ILLINOIS INSTITUTE
OF TECHNOLOGY

BULLETIN • UNDERGRADUATE PROGRAMS • 2014–2016

Undergraduate Degree Programs

Illinois Institute of Technology offers degree programs in the following areas of study.

Armour College of Engineering

- Aerospace Engineering
- Architectural Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Engineering Management
- Materials Science and Engineering
- Mechanical Engineering

College of Architecture

- Architecture

College of Science

- Applied Mathematics
- Applied Physics
- Biochemistry
- Biology
- Chemistry
- Computer Information Systems
- Computer Science
- Molecular Biochemistry and Biophysics
- Physics
- Physics Education

Lewis College of Human Sciences

- Applied Analytics
- Behavioral Health and Wellness
- Communication
- Consumer Research, Analytics, and Communication
- Digital Humanities
- Humanities
- Political Science
- Psychology
- Sociology
- Social and Economic Development Policy

School of Applied Technology

- Industrial Technology and Management
- Information Technology and Management

Stuart School of Business

- Business Administration

Foreword for the IIT Undergraduate 2014-2016 Bulletin

Purpose of the IIT Undergraduate Bulletin

This bulletin describes the academic programs and resources, policies, procedures, and student services in effect at the time of publication. It is a primary source of information for undergraduate students, faculty, and the administration.

General information regarding the history of the university, the setting of the campus, and campus life is also included. These sections can be used by prospective students and others to gain an understanding of the university as a whole.

The programs described in this bulletin are applicable to those students who enter IIT in the academic years 2014–2016. Students follow the programs described in the bulletin in effect at the time of their first registration.

Changes in programs and policies often occur before a new bulletin is published. A faculty advisor from the student's major department is the best source for current curriculum information. The Office of Undergraduate Academic Affairs can refer students to the appropriate administrative office for current policies and procedures. Many policies in this bulletin are also found at **www.iit.edu/registrar**.

Illinois Institute of Technology is a multicultural community that values and respects its members. We take pride in the fact that our faculty, staff, and students come from various backgrounds and all parts of the world, and we welcome their diverse perspectives and contributions. It is our policy to provide a working and learning environment in which faculty, staff, and students are able to realize their full potential as productive members of the IIT community.

To this end, IIT affirms its commitment to equal opportunity and nondiscrimination in employment and education for all qualified individuals regardless of race, religion, color, national origin, gender, age, sexual orientation, gender identity, disability, applicable veteran status, or any other characteristic protected by applicable federal, state, or local law. Further, IIT is committed to taking affirmative action to increase opportunities at all levels of employment and to increase opportunities for participation in programs and activities by all faculty, staff, and students.

Every member of the IIT community: faculty, staff, and student, is expected to cooperate fully in meeting these goals.

Any student, applicant, or employee of Illinois Institute of Technology who believes that he or she has received inequitable treatment because of discrimination violating IIT's stated policy of equal opportunity in employment and in education should communicate, either in writing or in person, with the Director, Equal Employment Opportunity and Affirmative Action, IIT Tower, Illinois Institute of Technology.

For descriptions of graduate programs and courses, see the ***IIT Bulletin: Graduate Programs*** or visit the website **www.iit.edu/graduate_college**. For descriptions of law programs and courses, see the ***Chicago-Kent College of Law*** website **www.kentlaw.iit.edu**.

The information in this bulletin is subject to change without notice. Changes will be duly published. See **www.iit.edu**.

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Carole Orze Associate Vice Provost of Undergraduate Academic Affairs, Undergraduate Bulletin editor and project manager.

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The Colleges of Illinois Institute of Technology

Armour College of Engineering

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Carol and Ed Kaplan Armour Dean of Engineering
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10 W. 33rd St.
Chicago, IL 60616
312.567.3009
engineering.iit.edu

IIT Armour College of Engineering traces its roots to Armour Institute, founded in 1892 to prepare students of all backgrounds for leadership roles - primarily as engineers - in a challenging industrial society. Armour College carries on that tradition of excellence in engineering education and research.

Today, Armour College is home to about 100 full-time faculty, more than 2,500 undergraduate and graduate students, and the graduate and undergraduate programs of five engineering departments.

Undergraduate degrees offered by Armour College are accredited by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology. All IIT graduate and undergraduate programs are also accredited by the North Central Association (NCA).

The mission of Armour College of Engineering is to: provide state-of-the-art education and research programs that enhance Armour's reputation as an internationally recognized engineering school; educate a new breed of engineers with a strong fundamental knowledge of engineering principles and an understanding and appreciation of the economic, environmental, and social forces that impact intellectual choices; and strengthen Armour's leadership role by focusing on the core research competencies and enhancing partnerships with industry, government laboratories, and academic and research institutions.

College of Architecture

Wiel Arets, Dean
S.R. Crown Hall
3360 S. State St.
Chicago, IL 60616
312.567.3230
arch.iit.edu

The program in architecture was established at Armour Institute of Technology, one of IIT's predecessors, in 1895. In 1938, the program came under the directorship of the world-renowned architect and educator Ludwig Mies van der Rohe. The College is housed in S.R. Crown Hall, a National Historic Landmark, one of Mies' most significant buildings, and a major contribution to Chicago's rich architectural heritage. The College emphasizes applied studio work under the instruction of practicing architects; the study of architectural theory; interdisciplinary learning; digital technologies; sustainability; design/build; and international study.

College of Science

R. Russell Betts, Dean
220 Engineering 1 Building
10 W. 32nd St.
Chicago, IL 60616
312.567.3800
science.iit.edu

IIT College of Science traces its roots to the Lewis Institute, founded in 1895, and to Armour Institute of Technology, founded in 1892. The college offers more than 90 rigorous and relevant programs in mathematics and the sciences at the undergraduate and graduate level (including master's, professional master's, and Ph.D.) through five departments: Applied Mathematics; Biological and Chemical Sciences; Computer Science; Mathematics and Science Education; and Physics.

Lewis College of Human Sciences

Christine Himes, Dean
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10 W. 35th St.
Chicago, IL 60616
312.567.3580
humansciences.iit.edu

Lewis Institute was founded in 1895; in 1940 it was brought together with Armour Institute to create IIT. We proudly bear the Lewis name and house the departments of Humanities, Psychology and Social Sciences. IITs Lewis College of Human Sciences rests at the nexus of knowledge, methods for discovery, human thought, and action. Human sciences enable us to explore and explain the world at a time when technological innovation frames the world in which we live. Our programs emphasize the free spirit and broad perspectives of a traditional liberal arts program with the quantitative and technical rigor of science and methods. In addition to traditional undergraduate programs, we offer six unique interdisciplinary undergraduate programs with partners such as the business school. We also offer professional graduate training in psychology and technical communication.

School of Applied Technology

C. Robert Carlson, Dean
10 W. 33rd St.
Perlstein Hall 223
Chicago, IL 60616
312.567.5290

Daniel F. and Ada L. Rice Campus
201 East Loop Road
Wheaton, IL 60187
630.682.6000
appliedtech.iit.edu

The School of Applied Technology (SAT), established in 2010; was formed to prepare students to become innovators, entrepreneurs, and leaders of the future. Programs and courses at the School of Applied Technology provide a blend of theoretical content and practical application that utilize a hands-on, reality-based approach to education. The degree and certificate programs provide an innovative experience where students work on cutting-edge, industry-sponsored projects, allowing students to apply what they learn in class to solve real-life problems.

IIT SAT offers Bachelor's and Master's degrees from the Department of Information Technology & Management in Information Technology & Management and in Cyber Forensics and Security; Master's degrees from the Department of Food Science & Nutrition in Food Process Engineering and Food Safety & Technology; and Bachelor's and Master's degrees from the Industrial Technology & Management program in Industrial Technology & Management.

IIT SAT is affiliated with the renowned Institute for Food Safety & Health and hosts the Center for Cyber Security and Forensics Education (C2SAFE) and the Center for Innovation Science and Applications.

In addition to degree-seeking programs, the School of Applied Technology, through its Office of Professional Development and IIT Online, combines university-wide resources to establish a common administration and support structure for online and non-degree programs. Programs include: University-wide ESL assessment and instruction, technology-oriented training and certificates, employee and professional development, and short courses and seminars.

Stuart School of Business

Harvey Kahalas, Dean
IIT Tower 18th Floor
10 W 35th Street
Chicago, IL 60616
312.906.6500
stuart.iit.edu

IIT Stuart School of Business provides intellectually rigorous business and management education at all levels, from baccalaureate to doctoral. All IIT Stuart programs are designed to educate tomorrow's global innovators through the unique concept of strategic competitiveness. Constructs including creativity, innovation, entrepreneurship, incisiveness, leadership, and sustainability are interwoven throughout coursework and professional development opportunities, offering students thorough preparation for the challenges of the next economy.

IIT Stuart was established in 1969 with a gift from IIT alumnus and noted financier Harold Leonard Stuart. The school houses the IIT Entrepreneurship Academy, the Center for Financial Innovation, and the Center for Strategic Competitiveness.

IIT Stuart offers the following degrees: B.S. in Business Administration, Co-Terminal B.S.B.A and M.P.A, Master of Business Administration (M.B.A), Masters of Mathematical Finance (M.M.F.) offered in partnership with IIT College of Science Applied Mathematics Department, M.S. in Environmental Management and Sustainability, M.S. in Finance, M.S. in Marketing Analytics and Communication, Master of Public Administration (M.P.A), and Ph.D. in Management Science. A series of dual degrees with IIT's Chicago-Kent College of Law and IIT's Institute of Design are also offered, as well as numerous Graduate Certificate Programs.

Graduate Education at IIT

The objective of IIT's graduate education is to provide programs that enhance students' fundamental knowledge in their chosen field. IIT seeks to educate and mentor graduate students to function in a global community with an appreciation of the economic, environmental, and social forces that impact professional choices.

To strengthen IIT's leadership role in higher education, emphasis is placed on the core research competencies and enhancing partnerships with industry, government laboratories, and academic and research institutions.

Chicago-Kent College of Law

Harold J. Krent, Dean
Downtown Campus
565 West Adams Street
Chicago, IL 60661
312.906.5000
www.kentlaw.iit.edu

Chicago-Kent College of Law is the second-oldest law school in Illinois. When it joined the University in 1969, IIT became the first major institute of technology to include law among its disciplines.

Chicago-Kent offers programs leading to the degrees of Juris Doctor, Master of Laws, and Doctor of the Science of Law, and participates in joint-degree programs with IIT Stuart School of Business and the University of Illinois-Chicago.

Institute of Design

Patrick F. Whitney, Dean
350 N. LaSalle St., Fourth Floor
Chicago, IL 60610
312.595.4900
www.id.iit.edu

Since its founding as the New Bauhaus in 1937, the Institute of Design has grown into the largest full-time graduate-only design program in the U.S. with students from around the world. The school offers a professional Master of Design degree program with areas of study in communication design, interaction design, product design, strategic design, systems thinking, and user research; a dual Master of Design/M.B.A. degree program in partnership with the IIT Stuart School of Business; the Master of Design Methods, a nine-month program for mid-career professionals; and a Ph.D. in Design. The Institute of Design created the country's first Ph.D. design program in 1991.

IIT History and Campuses

In 1890, when advanced education was often reserved for society's elite, Chicago minister Frank Wakely Gunsaulus delivered what came to be known as the "Million Dollar Sermon." From the pulpit of his South Side church, near the site Illinois Institute of Technology now occupies, Gunsaulus said that with a million dollars he could build a school where students of all backgrounds could prepare for meaningful roles in a changing industrial society.

Inspired by Gunsaulus' vision, Philip Danforth Armour Sr. (1832-1901) gave $1 million to found the Armour Institute. Armour, his wife, Malvina Belle Ogden Armour (1842-1927) and their son J. (Jonathan) Ogden Armour (1863-1927) continued to support the university in its early years. When Armour Institute opened in 1893, it offered professional courses in engineering, chemistry, architecture, and library science.

Illinois Tech was created in 1940 by the merger of Armour Institute and Lewis Institute. Located on the west side of Chicago, Lewis Institute, established in 1895 by the estate of hardware merchant and investor Allen C. Lewis, offered liberal arts as well as science and engineering courses for both men and women. At separate meetings held by their respective boards on October 26, 1939, the trustees of Armour and Lewis voted to merge the two colleges. A Cook County circuit court decision on April 23, 1940 solidified the merger.

The Institute of Design (ID), founded in Chicago by Làszlò Moholy-Nagy in 1937, merged with Illinois Tech in 1949.

Chicago-Kent College of Law, founded in 1887, became part of the university in 1969, making Illinois Institute of Technology one of the few technology-based universities with a law school.

Also in 1969, the Stuart School of Management and Finance - now known as the Stuart School of Business - was established thanks to a gift from the estate of Lewis Institute alumnus and Chicago financier, Harold Leonard Stuart. The program became the Stuart School of Business in 1999.

The Midwest College of Engineering, founded in 1967, joined the university in 1986, giving Illinois Tech a presence in west suburban Wheaton with what is today known as the Rice Campus-home to Illinois Tech's School of Applied Technology.

In December 2006, the University Technology Park at Illinois Institute of Technology, an incubator and life sciences/tech start-up facility, was started in existing research buildings located on the south end of Main Campus. As of April 2014, the University Tech Park at Illinois Institute of Technology is home to many companies.

Today, IIT is a private, Ph.D.-granting university with programs in engineering, science, human sciences, applied technology, architecture, business, design, and law. One of the 22 institutions that comprise the Association of Independent Technological Universities (AITU), IIT offers exceptional preparation for professions that require technological sophistication. Through a committed faculty and close personal attention, IIT provides a challenging academic program focused by the rigor of the real world.

The university has five campuses in the Chicago area. The 120-acre Main Campus, centered at 33rd and State Streets in Chicago, as well as many of its buildings, was designed by Ludwig Mies van der Rohe, who directed the architecture program at IIT from 1938 to 1958 and was one of the 20th century's most influential architects. S. R. Crown Hall, home of IIT College of Architecture, was named a National Historic Landmark in 2001, and part of the IIT Main Campus was entered into the National Register of Historic Places in 2005.

Accreditation

IIT is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools.

Commission URL:
www.ncahlc.org
Commission Telephone: 312.263.0456

Specific professional curricula are accredited by the Engineering Accreditation Commission and the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology, American Psychological Association, Council on Rehabilitation Education, American Bar Association, Association of American Law Schools, The Association to Advance Collegiate Schools of Business, and National Architectural Accrediting Board.

Undergraduate Admission

Classification of Students

The Office of Undergraduate Admission is responsible for admission decisions for all undergraduate students: full-time and part-time, non-degree and degree-seeking, post baccalaureate, Joint Program, dual admission, Shimer College, and summer transfer students.

Students should contact:

Office of Undergraduate Admission
10 W. 33rd St.
Perlstein Hall 101
Chicago, IL 60616
Telephone: 312.567.3025
Outside Chicago: 800.448.2329
Fax: 312.567.6939
E-mail: **admission@iit.edu**
Online application: **apply.iit.edu**
Web: **admission.iit.edu**

Classification

A student registered for 12 semester hours or more is classified as a full-time student. A student registered for less than 12 semester hours is classified as a part-time student.

Acceptance of Admission/Enrollment Deposit

To accept IIT's offer of admission, all students must return the Enrollment Form which is sent to every admitted student. Full-time students must submit a non-refundable $300 matriculation deposit. This deposit is credited to the student's account and will go toward the cost of attendance. The enrollment form may be found at **admissions.iit.edu/undergraduate/admitted/step-1-confirm-your-enrollment**.

New Student Fee

First time undergraduate students are charged a one-time fee to cover the costs of orientation activities for their first term of enrollment.

Campus Locations

Students can take courses at either the Main Campus or the Daniel F. and Ada L. Rice Campus in Wheaton, a Chicago suburb. The Main Campus has the most extensive offering of day and evening classes. The Rice Campus offers evening classes, most of which start at 6:25 p.m. The majority of undergraduate courses taught at the Rice Campus are 300- and 400-level courses both in information technology and management and in industrial technology and management.

IIT Online produces, delivers, and supports university courses, lectures and programs using educational technology. Through IIT Online, academic departments offer 28 distance education degree and certificate programs to the IIT community around the world. Please note that undergraduate students must have departmental approval to register in online course sections.

Application as a First-Year Student

Special programs and scholarships have specific deadlines and supplemental applications. See **admission.iit.edu** for details. Students have until May 1 (National Candidates' Reply Date) to accept IIT's offer of admission. To accept IIT's offer of admission, a student must return the Enrollment Form, which is sent to every admitted student, and a non-refundable matriculation deposit by the above dates.

Applicants must submit a completed application, transcripts from all high schools attended, transcripts of all colleges (where applicable), standardized test scores (ACT or SAT I), and a letter of recommendation. International students should see additional requirements in the International Student section. The application is available online at **apply.iit.edu.**

Standardized Test Scores for First-Year Students

All students are required to submit scores from either the College Entrance Examination Board's Scholastic Aptitude Test (SAT I Reasoning) or the American College Test (ACT). The tests may be taken at any time, but preferably early in the high school senior year. Applicants for the spring semester (all majors except architecture) must have taken the SAT I or ACT by the preceding November. IIT will consider SAT II tests in math and science but does not require them for admission or scholarship applications.

High School Requirements for First-Year Students

Graduates from an accredited high school applying for admission must present evidence that they have completed a minimum of 16 units of high school work. Most admitted students exceed this minimum. A unit may be defined broadly as the study of a major subject for one academic year in high school.

High school studies should provide a sound background for college study. Preparation in mathematics, for example, must have sufficient depth in geometry, trigonometry, and especially in algebra, to permit applicants for science and engineering programs to immediately begin the study of college-level calculus and analytical geometry.

A background in English must prepare a student to write well and to read intelligently and analytically, with depth and sensitivity of comprehension.

Required:

- Four years of English
- Four years of mathematics
- Two years of science, including lab*

* Material should include two of the following areas: Biology, Chemistry, or Physics.

College Coursework Taken While Still in High School

IIT will accept college coursework taken while still in high school from other accredited universities and colleges, provided that the courses are comparable in nature, content, and level to those offered at IIT. Grades must be equivalent to a C or higher. Grades of C- are not acceptable for transfer credit. A maximum of 36 applicable semester hours will be accepted. Official transcripts of all college work are required to be submitted as part of the application for admission to the Office of Undergraduate Admission, regardless of the transferability of credits.

Application as an International Student

International students are those who are neither citizens nor permanent residents of the United States. Though the required admission documents can vary depending upon individual circumstances, all international applicants must submit a completed application for admission, official transcripts in the native language, certified English translation of all transcripts, TOEFL or IELTS scores, and an affidavit of financial support. Please read appropriate application requirements for first-year or transfer students.

Prospective applicants should carefully read the description of requirements on the IIT website: **apply.iit.edu.**

Application as a Transfer, Visiting, or Exchange Student

The Office of Undergraduate Admission is responsible for admission decisions for transfer, visiting, and exchange students. Transfer, visiting, and exchange students may apply for the fall or spring term in all majors. See **admission.iit.edu** for deadlines.

The transfer application may be obtained by visiting **apply.iit.edu**. Students must submit the IIT Transfer Application, transcripts for all colleges and universities attended, a personal statement, and a letter of recommendation to the Office of Undergraduate Admission.

International students should see additional requirements in the International Student Section.

Requirements for Transfer Students

Transfer applicants must be in good academic standing at their previous college(s) to be considered for admission to IIT. Admission is based upon a cumulative grade point average (GPA) and individual grades in all classes that apply to the major selected. A minimum cumulative GPA of 3.00 is recommended for transfer consideration. Students on academic probation, or who have been dismissed for academic or other reasons, will not be considered for transfer. Students must also be in good financial standing at all previous colleges attended.

Transfer applicants with fewer than 30 hours of transferable graded college coursework must submit high school transcripts and SAT I or ACT scores as part of their application.

Application as a Non-Degree-Seeking Student

Applicants who are taking courses for the following reasons will be limited to part-time enrollment:

- Taking courses for professional development.
- Taking courses prior to being admitted to a graduate program.
- Taking courses to transfer to another institution.

A non-degree-seeking student must be admitted to IIT. Admission is based on prerequisite coursework or other preparation necessary for the intended course. Non-degree-seeking students can read the description of admission requirements on the IIT website: **apply.iit.edu**

Application for Summer School Admission

Students who attend another college or university and wish to enroll for summer courses at IIT with the intention of transferring the credits to their home institution must submit the following to the IIT One Stop:

- Online Summer School Application. (summer.iit.edu)
- A transcript and/or a letter of good standing that indicates completion of the prerequisites for the requested course(s) at IIT.

Additionally, students should check with their home institutions to determine the equivalencies for specific courses and the policies and procedures required to transfer IIT courses.

Transfer of College-Level Credit

Transfer Credit

Official transfer credit evaluations are completed only after a student is admitted to IIT and only from official college transcripts. Courses may be acceptable for transfer from accredited colleges and universities, provided they are comparable in nature, content, and level to those offered at IIT. Credit may also be accepted, based on appropriate documentation, for DANTES, military experience, and CLEP (see page 276). IIT does not grant credit for vocational courses or life/work experience. In addition, technology courses will not be accepted in any engineering program. IIT will accept up to 36 hours of college coursework taken while still in high school from other accredited universities and colleges.

A maximum of 68 applicable semester hours of transfer credit is permitted from a two-year college. There is no maximum number of hours of transfer credit from a four-year college; however, the final 45 semester hours of any degree program must be completed at IIT. Transfer credit will be accepted for courses completed with the equivalent of a grade C or better. A grade of C- is not acceptable for transfer credit. Grades from transfer courses are not included in the IIT cumulative or major grade point average. In certain instances, the academic department must approve transfer credit if a long period of time has elapsed since the course was completed.

Contact Undergraduate Academic Affairs (**ugaa@iit.edu**) regarding the transfer of courses from any college or university.

Advanced Placement Examinations

IIT will award credit for CEEB Advanced Placement (AP) examinations. Credit will vary by test score. A complete list of acceptable AP scores and IIT course equivalents may be found at **www.iit.edu/ugaa**.

International Baccalaureate Program

Students holding an International Baccalaureate (I.B.) diploma or who have successfully completed I.B. examinations may be awarded credit according to the following policies: college credit will be awarded for higher-level (HL) exams with a score of 4 or better; a maximum of 10 semester hours of credit for each HL exam can be awarded; no credit is granted for work completed at the subsidiary level (SL). Scores should be sent to Undergraduate Academic Affairs (ugaa@iit.edu).

General Certificate of Education Examination - Advanced Level and Advanced Subsidiary Level

College credit will be awarded for General Certification of Education (GCE) examinations with a grade of A, B, C, D, and E. A maximum of 10 semester hours of credit can be awarded for each advanced level (A-level) examination. A maximum of five semester hours of credit can be awarded for each advanced subsidiary level (AS-level) examination.

Placement Testing

Placement testing is done prior to first enrollment. For students entering in the fall semester, placement tests are scheduled in the summer preceding matriculation. For students entering in the spring semester, placement tests are scheduled immediately preceding matriculation. Placement tests are only used for placing students into the appropriate courses. Test results do not appear on the student's official academic record and no academic credit is awarded.

Students are required to take up to three placement exams.

- All new first-year and transfer students are required to take the mathematics placement test. Advanced Placement credit and transfer credit for MATH 151 – Calculus I will still be awarded.
- All new first-year and transfer students who have neither Advanced Placement credit nor transfer credit for COM 101 – University Writing, or Com 111 – Writing in the University for Non-Native Students are required to demonstrate writing proficiency in one of two ways. They may either pass the writing placement exam prior to enrollment or receive a C or better in COM 101 or COM 111 during their first year of attendance.
- Students in chemical engineering who have neither Advanced Placement credit nor transfer credit for CHEM 124 - General Chemistry are required to take the chemistry placement test.

Immunization and Proof of Immunity

Illinois Institute of Technology is required to collect student immunization records and provide this information to the Illinois Department of Public Health, or its designated representative, in the event of a health emergency or compliance audit. All immunization documents submitted to IIT become the property of the University. Unless required to do so by law, IIT will not release student immunization records to any third party. Limited exemptions from showing proof of immunity can be accepted with official supporting documentation. In accordance with public health law, anyone with an exemption may be excluded from campus in the event of a health emergency. Additional proof of immunity for specific health conditions is required of international students who are not otherwise exempt. Students who do not comply with these requirements prior to, or during their first term of study, will be prevented from registering for subsequent terms. Questions regarding the immunization policy should be directed to the Student Health and Wellness Center at 312.567.7550 or **www.iit.edu/shwc**.

Financial Aid

Website: www.iit.edu/financial_aid

Comprehensive Aid Program

IIT administers a comprehensive financial aid program, which includes federal, state, and institutional funds for full- and part-time undergraduate students. Federal programs include grants, loans, and work-study employment. State programs include grant funds. Most federal and state funds are based on demonstrated financial need. Institutional funds include need-based grants and loans, as well as merit scholarships based on academic and service achievements.

Student Eligibility Requirements to Receive Federal and State Financial Assistance

Students must be U.S. citizens or eligible non-citizens and be enrolled in a degree-seeking program at least half-time (six credit hours or more per semester) and demonstrate academic progress towards graduation to receive federal and state aid. Satisfactory academic progress (SAP) includes a minimum grade point average and sufficient credit hours earned each semester towards the completion of a degree program. IIT has an established SAP policy in compliance with federal and state regulations. Failure to comply with IIT's SAP policy will lead to a student losing their eligibility for financial assistance. *International students are not eligible for federal financial aid.*

Federal Financial Aid Application Process

All students applying for financial assistance must complete the Free Application for Federal Student Aid (FAFSA). This application is available at **www.fafsa.ed.gov** beginning January 1 of the academic year in which the student plans to attend. The IIT Title IV School code is **001691**. The priority date for financial aid consideration at IIT is February 15. All students who file the FAFSA receive a Student Aid Report (SAR) when the FAFSA is complete. All federal financial assistance is awarded on an annual basis; a FAFSA must be filed each academic year. The amount of financial aid a student receives each year depends on demonstrated financial need and the availability of funds. Students applying for federal financial aid will be required to submit tax information upon request.

New first-year students should not wait for a final admission decision before filing the FAFSA due to the February 15 deadline for complete financial consideration. For the same reason, new transfer students should not wait for a final admission decision before filing an original or renewal FAFSA.

Determining Financial Need For Assistance

Financial need is the difference between a student's total annual cost of attendance at IIT and the amount the student and the student's family are expected to contribute toward the cost of education. The total cost of attendance at IIT includes tuition, mandatory fees, room and board, books and supplies, transportation, and personal expenses. The amount the student and family are expected to contribute is called the expected family contribution (EFC). The U.S. Department of Education has established the formula used to calculate the EFC, based on the FAFSA information provided by a student and family. The EFC is subtracted from the cost of attendance and what is left over is considered to be the demonstrated need for financial assistance. One of the principles of need-based assistance is that students and their families are expected to help pay some of the cost of education.

Federal Financial Aid Programs

To be considered for all federal financial aid programs, students must submit a FAFSA.

Federal Pell Grant

The federal Pell Grant is a federal grant that does not have to be repaid. Pell Grants are awarded only to undergraduate students who have not earned a Bachelor's or professional degree. Pell Grants are awarded based on demonstrated financial need. Students apply for a Pell Grant by filing the FAFSA.

Federal Supplemental Educational Opportunity Grant (FSEOG)

The FSEOG is a federal grant that does not have to be repaid. This grant is for undergraduate students who demonstrate exceptional financial need. FSEOG funds are limited and awarded on a first-come, first-serve basis. The final need criteria for this award are determined each year by the Office of Financial Aid.

Federal Perkins Loan

The federal Perkins Loan is a low-interest federal loan for undergraduate students with exceptional financial need. This loan is made with governmental funds and serviced by IIT. No interest is charged while the student is enrolled in school. When a student leaves school or drops below half-time, the loan enters a nine-month interest-free grace period before the student begins repayment. Once repayment begins, the loan accrues 5% of the principal each year. Perkins Loan funds are limited and awarded on a first-come, first-serve basis. The final need criteria for this award are determined each year by the Office of Financial Aid.

Federal Work Study

Federal Work Study (FWS) provides funding for jobs for undergraduate students with demonstrated financial need. Students awarded FWS can earn money to help pay educational expenses and are responsible for finding employment. Students can work either on or off campus. Off-campus jobs will be with private, non-profit organizations or public agencies that provide community service work. Students awarded FWS are paid at least the current federal minimum wage or higher, depending on the type of work performed. Students are paid by the hour and receive a paycheck. FWS students cannot work more than 20 hours per week during the academic year and may not work during their scheduled class times. FWS positions are advertised through the Office of Financial Aid on the website **www.iit.edu/financial_aid/student_employment/**.

Direct Loan Programs

IIT participates in the Direct Loan program with the Department of Education. Interest rates for the loans in this program are determined each year on July 1. Loan rates are fixed once a student receives the funds in a given academic year. Direct Loans must be repaid over a scheduled period of time after the student leaves school or drops below half-time. The funds for these loans come from the federal government. Below are the types of Direct Loan programs offered at IIT.

Federal Direct Stafford Loans (Subsidized and Unsubsidized)

The subsidized Stafford Loan is awarded based on demonstrated financial need and students do not accrue interests on the principal while in school. The unsubsidized Stafford Loan is a non-need based loan. Interest accrues from the time the student receives the loan funds. Students have the option of paying the interest during school or having the interest added to the principal after graduation or if dropping to less than half-time enrollment. Both Stafford Loans are charged an origination fee (up to 3%) each year before the loan disburses to the student.

Federal Direct Parent Loans

PLUS loans enable parents with good standing credit to borrow money to help pay educational expenses for their dependent undergraduate student. PLUS loans cannot be taken in a student's name. If a parent is denied for this loan, they may reapply with an endorser. If a parent is not approved for the loan, the Office of Financial Aid may offer additional unsubsidized Stafford Loan funds to a student.

State Financial Aid Programs

Illinois Student Assistance Commission (ISAC) Financial Aid Programs

Monetary Award Program (MAP)

This program is for undergraduate Illinois residents and provides grant assistance that does not have to be repaid. To receive a MAP Grant, a student must demonstrate financial need, be a resident of Illinois, and be enrolled at an Illinois institution. The MAP Grant can only be applied to mandatory tuition and fees and is awarded on a per-credit-hour basis. A student can receive the MAP Grant for up to a maximum of 135 credit hours. All students awarded the MAP Grant must provide proof of Illinois residency.

Institutional Financial Aid Programs

Most undergraduate students at IIT receive some sort of institutional support, based on merit or need. The Office of Undergraduate Admission awards IIT funds up front to new admits and the Office of Financial Aid administers the renewal of scholarships each year. Generally, scholarships are awarded for up to four years of study. Students must be full time (at least 12 hours each term) to receive IIT scholarship funds and must maintain satisfactory academic progress as defined in the IIT Undergraduate Bulletin. Some IIT scholarships have additional requirements and will be specified to the student at the time of awarding.

Veterans' Educational Benefits

The Illinois Institute of Technology proudly participates in Montgomery GI Bill and Yellow Ribbon Program. Veterans who wish to process VA benefits at IIT can find all relevant information at **http://www.iit.edu/financial_aid/policies/veteran_benefits**. Veterans enrolling for the first time should contact the veteran representative in the Office of the One Stop, by emailing **onestop@iit.edu** or calling 312.567.3810. The veteran must also inform the university Veterans Affairs representative of any change in credit hours within a term or of future enrollment plans. If a veteran drops a course or withdraws from school completely, his or her allotment may be reduced or withdrawn. The veteran must report immediately the exact termination date to the Veterans Affairs representative. Veterans must maintain reasonable academic progress according to university standards. Failure to meet minimum-progress criteria can result in a cessation of educational benefits.

Taxation of Scholarships, Fellowships, and Stipends

U.S. Citizen or Resident Alien

A scholarship/fellowship payment received by a candidate for degree is generally not taxable income to the student if it is used for qualified expenses. Qualified expenses are defined by the Internal Revenue Service (IRS) and include tuition and required fees, and/or for books, supplies, and equipment required of all students in the course. These payments do not need to be reported to the IRS by the student or Illinois Institute of Technology (the University).

A scholarship/fellowship used for expenses other than qualified expenses is taxable income and includes payments that are used for living and incidental expenses such as room and board (housing), travel, research, clerical assistance, or equipment and other expenses that are not required for enrollment or attendance.

Although these payments are taxable income to the U.S. citizen or resident alien student, the IRS does not require the University to withhold tax on the payment. In addition, the University is not required to report these payments to the IRS. However, students are responsible for reporting these payments and remitting any tax due with their personal income tax returns. Since the University cannot advise students regarding their personal tax matters, the student should consult with their personal tax advisor regarding the reporting of their scholarship/fellowship or stipend on their tax return.

International Student

The Internal Revenue Service (IRS) is the U.S. government agency that administers U.S. tax laws and collects taxes from individuals receiving payments in the United States. The U.S. tax system is based on a calendar year, January 1 through December 31.

The IRS requires that the University apply specific federal tax withholding and reporting rules to payments made to international students.

A scholarship/fellowship payment received by an international student who is a candidate for a degree is generally not taxable income to the student if it is used for qualified expenses. Qualified expenses are defined by the IRS and include tuition and required fees, and/or for books, supplies, and equipment required of all students in the course. These payments do not need to be reported to the IRS by the student or the University.

A scholarship/fellowship used for expenses other than qualified expenses is taxable income and includes payments that are used for living and incidental expenses such as room and board (housing), travel, research, clerical assistance, or equipment and other expenses that are not required for enrollment or attendance. For these types of scholarships, international students with an F, J, M, or Q visa are subject to 14% federal tax withholding unless their country of residency has a tax treaty with the United States that excludes scholarships/fellowships from taxation. Payments made to international students in any other immigration status are subject to 30% withholding.

Since the University cannot advise students regarding their personal tax matters, the student should consult with their personal tax advisor regarding the reporting of their scholarship/fellowship on their tax return.

Student Accounting

Financial Responsibility

Students take financial responsibility for the payment of all education related charges and fees that become a part of their student account, when those charges are due regardless of their expected reliance on third-party resources such as financial aid, family gifts, employer reimbursement, private loans, outside scholarship or sponsorships. Any balance due to IIT as the result of adjustments made to estimated or confirmed financial aid or the refusal to apply for any or all of your financial aid or the inability to complete the financial aid verification become the student's responsibility for payment. Students agree to supply the Financial Aid Office with any reasonable information or documents that they may request to complete the verification process in a timely manner. Students acknowledge that any outstanding balance due on their student account that is not timely paid when due is subject to service charges in the amounts or at the rates established and published by IIT from time to time and that they will be prevented from registering for additional courses at IIT or obtaining official documents such as diplomas or transcripts until that outstanding balance has been paid in full. Failure to pay a past due debt may result in the debt being listed with the State Comptroller's Offset Program, referred to a collection agency and/or other authorized legal debt collection procedures. Under such circumstances, the student is responsible for all fees and costs incurred by the university in the collection of the past due debt, including collection fees and/or attorney's fees.

Charges

All university mandatory and non-mandatory charges are published regularly. The official university publication of current tuition, fees, and other charges for all students can be found at **www.iit.edu/bursar** on the Tuition and Fees page. All other published tuition and fee information should be considered an estimate and not the official published rates. Continually rising costs do no permit the University to gaurantee that published charges will not change. Students and parents should anticipate periodic increases in the future.

Tuition-Undergraduate

Undergraduates registered for 12-24 credit hours are considered full-time and will be charged at the full-time tuition rate. Undergraduates registered for fewer than 12 credit hours are considered part-time and will be charged at a per-credit-hour, part-time tuition rate.

Other Fees and Charges

A student may incur other fees and charges that are both mandatory and non-mandatory. Please refer to the Undergraduate Admission section of the bulletin for information related to enrollment deposits and new student fees. For a complete current listing of all charges and fees, go to **www.iit.edu/bursar** and select Tuition and Fees.

Parking Fee

All students parking in campus parking lots must register their cars with Access Card and Parking Services and pay a parking fee at the beginning of the semester. For current fees, students should contact Access Card and Parking Services at **www.iit.edu/acaps** or 312.567.8968. Students authorized to park in IIT lots will receive a parking permit.

Student Health Insurance

All students who are either registered for 9 or more credit hours or occupants of IIT residence halls are required to purchase the student health insurance policy or to submit proof of equivalent insurance before the end of the first week of classes. All students who are here on an F1 or J1 visa and are registered for at least 1 class, participants in the co-op program, research or teaching assistants, or occupants of IIT residence halls are required to purchase the student health insurance. The premium for the insurance will be added to student tuition and fees as a charge. To avoid this charge, submit proof of comparable coverage online at **www.iit.edu/shwc**. F1 and J1 students may only waive IIT's coverage with proof of U.S. employer provided insurance. Students must submit their waiver each Fall. Other students, spouses, and dependents of students may participate in the student health program, if desired. Students should consult the Student Health Service in IIT Tower, Suite 3D9-1, at 312.567.7550, for further details.

E-bills

Each semester, a billing statement will be made available to you through the myIIT portal and such other responsible party or parties that you designate (e.g., parent or guardian) and for whom you have provided IIT with an e-mail address. This statement will detail the then-current charges, payments and other credits to your account, including the amount you must pay and the date such payment is due. Notifications of new billing statements will be sent via email to your IIT email address as well as the e-mail for any other responsible party that you had designated. You agree to monitor your IIT email account regularly.

Payment of Tuition, Room and Board, and Other Fees and Charges

Tuition and fees, less any authorized financial aid awards, are considered a student's out-of-pocket responsibility. The due date for all out-of-pocket payments will be posted each semester at **www.iit.edu/bursar**. All out-of-pocket payments must be paid by the due date. Payment plan information can be found at **www.iit.edu/bursar**. The deadline to enroll in a plan will be posted each semester at **www.iit.edu/bursar**.

*Please see **www.iit.edu/bursar/payments** for options and instructions related to making payment.*

Rejected Payments

If IIT receives notification that a payment has been rejected for any reason, the returned amount will be charged to the student account along with a $50.00 fee. Payments rejected due to insufficient funds must be replaced with a cashier's check, money order, or credit card. Payments rejected due to invalid routing and/or account information or a closed account may be replaced with another electronic check from a different account. Following a second rejected payment, the University will no longer accept personal or electronic checks or electronic checks from the payee. All subsequent payments must be made by cashier's check, money order, or credit card.

Outstanding Debts/Late Fees/Financial Holds

Any outstanding balance due on your student account that is not timely paid when due is subject to service charges in the amounts or at the rates established and published by IIT from time to time. A restrictive hold is placed on a student's record when that student is delinquent in fulfilling his or her financial obligation to the university. A student will be considered delinquent when his or her account is not paid in full according to established University policies and by posted payment due dates. Students with outstanding university debt may be suspended from current term classes. Students will be prevented from registering for additional courses at IIT or obtaining official documents such as diplomas or transcripts until that outstanding balance has been paid in full. Students also acknowledge that failure to pay any amount due by the due date may result in an unfavorable report with credit bureaus and collection activities against you, including litigation.

Tuition Waiver Policy

Under exceptional circumstances such as withdrawal for involuntary military service, serious illness or injury, or action by the university, consideration may be given by the university for the issuing of a credit or refund for unused tuition upon written request to the One Stop (**onestop@iit.edu**). Payments for other charges than tuition will remain the responsibility of the student. Students should consult **www.iit.edu/registrar** for the last day to add or drop without a penalty.

University Refund Policy

If a student's financial aid, including any disbursements of Title IV funds such as Pell grants or Federal loans, creates a credit balance on their student account, they will be refunded any such overage. If any non-financial aid payments that are made results in an overpayment of the charges on a student's account, IIT will hold these credits on the student account to be applied towards future charges, unless the student contacts the students contacts the Student Accounting Office to request a refund of the overpayment, or ceases to be enrolled.

Students must be enrolled in direct deposit to receive your student refund. Refunds from financial aid credits are processed throughout the semester. We will send an email whenever we process a refund, provided the student is enrolled in direct deposit. There is no fee for receiving a refund via direct deposit. For a full explanation of the University's policies and procedures related to refunding student account credit balances, refer to **www.iit.edu/bursar/credits_and_refunds**.

Title IV Federal Loan Authorizations

Health insurance fees, parking charges, and other items on a student bill <u>cannot</u> be automatically paid with Title IV Federal Loan funds. Students may authorize the University to pay these fees with Title IV Federal Loan funds by completing a Title IV Authorization form on the myIIT portal and checking the "Pay Non-Institutional Charges" box. **Students who do not complete this Title IV Authorization may receive a refund and still owe IIT money**.

Employer Tuition Deferment Plan

The Employer Tuition Reimbursement Plan allows students that are employed by a company that offers tuition reimbursement an opportunity to defer the reimbursable portion of their tuition until 45 days after grades are posted. By applying for IIT's Tuition Employer Tuition Deferment Plan students recognize that their employer's tuition reimbursement plan has qualifying conditions which they must meet in order to be reimbursed. Should your company refuse to pay this bill within the usual time frame for tuition deferment, you the student will be personally responsible for this tuition and will be required to pay the bill in full. Students should also understand that a deferred payment fee of $55.00 will be due at the time of application, and it is non-refundable. If the tuition due under this agreement is not paid within 45 days following grades being posted, the student authorizes their employer to withhold the amount due from their pay and to pay that amount to Illinois Institute of Technology.

Students must understand that any amount not covered by the terms of their company's tuition reimbursement policy is due in full by the end of the add/drop period and is subject to fees and a hold preventing registration for the next term. If a student fails to meet the requirements to be eligible for IIT's Employer Tuition Deferment Plan by the deadline, their tuition will not be deferred and will be due.

Sponsor Billing (Third Party Invoicing)

Sponsor billing is the generation of an Illinois Institute of Technology (IIT) invoice to request payment of tuition/fees/housing for a student billed by the University to an external party or for the recovery of expenses incurred by the university on behalf of a student. Sponsors include outside parties, such as embassies, companies, and community agencies, who pay Illinois Institute of Technology directly for a student's educational expenses with funds that did not originate with the student.

Proof of Sponsorship Required

Students whose tuition and fees are paid by a sponsor need to submit proof of sponsorship from their sponsoring agency. Adequate documentation must:

- Be written in English on the sponsor's official stationery;
- Request the University to bill the sponsor for the student's charges;
- Identify the student by full name (given name first followed by family name) and CWID if available;
- Clearly state the type and percentage of charges the sponsor will pay;
- Include a billing address;
- Stipulate the exact begin and end dates of the period during which the sponsor will pay the student's charges (if the sponsor wishes to continue payment after the end date it must submit a new authorized letter);
- Contain no restrictions or contingencies (if, for example, the sponsor requires grades or transcripts prior to payment, the student must pay the original bill then seek reimbursement from the sponsoring organization);
- Be signed by an authorized official of the sponsoring organization.

Processing/Altering Sponsorship Agreement

Invoices will be processed after the add/drop date of each semester. Any changes in eligibility for a sponsored student should be communicated to the Student Accounting Office immediately.

Students that become ineligible or have a reduction in their sponsored amount will owe this amount immediately. A restrictive hold will be placed on the account to prevent registration for subsequent terms, as well as prevent students from obtaining any official paperwork from the university.

Late Sponsorship Payment

In the event a sponsor fails to remit payment for a student, the sponsorship coverage is removed. The student is responsible for all outstanding balances on the account after the sponsorship is removed. If the student believes payment was inadvertently delinquent, it is the responsibility of the student to communicate with the sponsor to rectify this situation.

Students that fail to submit required sponsorship documentation to the Student Accounting Office in a timely manner will be held responsible for any outstanding balance on the student account, as well penalty fees assessed to their accounts due to lack of payment.

Living Expenses

Unmarried Students

The University's residence halls provide facilities for room and board for undergraduate and graduate men and women. First-year students not living with their parents or guardians within a 50 mile radius of campus must live in the residence halls. Housing for first-year students is guaranteed through July 1. Residence hall contracts are made for the full academic year, from the first week of classes in August until commencement in May. Charges for room and board for 2014 range from $9,233 to $22,042 for the academic year. When a student submits a contract for campus housing, an itemized list of available campus accommodations and rates will be provided. For more information, see the Residence and Greek Life website: **www.iit.edu/housing**.

Meals

Students living in residence halls contract for a variety of meal plans. All undergraduate students are required to have a meal plan. Meal plans and meals on a cash basis are available to non-residents. For more information, see the Residence and Greek Life website: **www.iit.edu/housing**.

Housing Prepayment Fee

Returning students must pay a $600 non-refundable payment before signing up for their room and board contract. This will be applied in full to their room and board charges. Students can pay the deposit through thier myIIT portal finances tab or can fill out an application via the myIIT portal finances tab for a payment plan or payment waiver on the RGL website: **www.iit.edu/housing.**

Commuting Students

A student living at home and commuting will spend an estimated annual average of $2,000 on living costs at home and for meals on campus, and approximately $1,800 for travel.

Miscellaneous Expenses

Miscellaneous personal and recreational expenses are estimated at $2,100 for the academic year. These figures are used in computing the official financial aid budget.

Married Students

There is availability in Carman Hall apartments for undergraduate and graduate students who are married, living with a domestic partner, or have legal guardianship of a dependent. Married or family housing is in a studio unit that is fully furnished. Contracts for family housing is 1.5 times the normal studio rate ($4699.50 per semester for the 2014-2015 Academic Year). All utilities are included, as well as internet, cable, and 5-digit dialing. The room reservation process of Carman Hall is available online at **www.iit.edu/housing**. Apartments are limited and offered in the order that online applications are received. Once your on-line reservation form is submitted, please contact **housing@iit.edu** for the verification forms.

Academic Programs

Undergraduate Curricula at IIT

IIT combines excellence in academic preparation for professional careers with opportunities for practical experience in the major branches of engineering, the sciences, mathematics, architecture, computer science, business, and liberal arts. IIT Core Curriculum requirements are described on page 25. Specific degree requirements are described in the departmental listings beginning on page 26. For minors, see pages 172–175.

Undeclared Majors

Students who are unsure of their career choices may enter IIT as undeclared or open majors. During the first year of study, undeclared majors take required IIT Core Curriculum courses in science, mathematics, computer science, humanities, and social science. These courses provide the foundation for nearly all of IIT's major programs. Because core curriculum courses apply to all majors, most students may wait as late as the sophomore year to declare their major and still graduate on time.

Department, Degrees, and Certificates

Applied Mathematics Department

- Bachelor of Science in Applied Mathematics

College of Architecture

- Bachelor of Architecture

Biological and Chemical Sciences Department

- Bachelor of Science in Biochemistry
- Bachelor of Science in Biology
- Bachelor of Science in Chemistry
- Bachelor of Science in Molecular Biochemistry and Biophysics
- Certificate in Premedical Sciences

Biomedical Engineering Department

- Bachelor of Science in Biomedical Engineering

Stuart School of Business

- Bachelor of Science in Business Administration

Chemical and Biological Engineering Department

- Bachelor of Science in Chemical Engineering

Civil, Architectural, and Environmental Engineering Department

- Bachelor of Science in Civil Engineering
- Bachelor of Science in Architectural Engineering
- Bachelor of Science in Engineering Management
- Certificate in Engineering Graphics and CAD

Computer Science Department

- Bachelor of Science in Computer Science
- Bachelor of Science in Computer Information Systems

Electrical and Computer Engineering Department

- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Computer Engineering

Humanities Department

- Bachelor of Science in Communication
- Bachelor of Science in Digital Humanities
- Bachelor of Science in Humanities

Industrial Technology and Management Department – School of Applied Technology

- Bachelor of Industrial Technology and Management
- Certificate in Industrial Technology and Management

Information Technology and Management Department – School of Applied Technology

- Bachelor of Information Technology and Management

Mathematics and Science Education Department

- Mathematics and Science Education Secondary Science or Mathematics Teaching Licensure

Mechanical, Materials, and Aerospace Engineering Department

- Bachelor of Science in Mechanical Engineering
- Bachelor of Science in Materials Science and Engineering
- Bachelor of Science in Aerospace Engineering

Physics Department

- Bachelor of Science in Applied Physics
- Bachelor of Science in Physics
- Bachelor of Science in Physics Education

Psychology Department

- Bachelor of Science in Applied Analytics
- Bachelor of Science in Behavioral Health and Wellness
- Bachelor of Science in Consumer Research, Analytics, and Communication
- Bachelor of Science in Psychology
- Certificate in Industrial Training

Social Sciences Department

- Bachelor of Science in Political Science
- Bachelor of Science in Social and Economic Development Policy
- Bachelor of Science in Sociology

Co-Terminal Degrees

Co-terminal degrees allow outstanding IIT undergraduate students to simultaneously complete both an undergraduate and graduate degree (Bachelor's degree and Master's degree).

Co-terminal degrees provide an opportunity for students to gain greater knowledge in specialized areas while completing a smaller number of credit hours. Because most co-terminal degrees allow students to share course credit (a maximum of 9 credit hours), students may complete both a Bachelor's and Master's degree in as few as five years. All degree requirements must be completed within six years of undergraduate matriculation, or the student will be dismissed from the co-terminal degree program.

Co-terminal students maintain their undergraduate student status while completing graduate coursework, and can maintain financial aid eligibility when applicable.

The following are co-terminal degrees approved as of July 2014. Please consult the Graduate Admission website for an updated degree list: **admissions.iit.edu/graduate**

Applied Mathematics
Bachelor of Science in Applied Mathematics/Master of Science in Applied Mathematics
Bachelor of Science in Applied Mathematics/Master of Computer Science
Bachelor of Science in Applied Mathematics/Master of Science in Computer Science

Architecture
Bachelor of Architecture/Master of Construction Engineering and Management

Biological and Chemical Sciences
Bachelor of Science in Biochemistry/Master of Biology with Biochemistry specialization
Bachelor of Science in Biochemistry/Master of Science in Biology with Biochemistry specialization
Bachelor of Science in Biochemistry/Master of Food Safety and Technology
Bachelor of Science in Biology/Master of Biology
Bachelor of Science in Biology/Master of Science in Biology
Bachelor of Science in Biology/Master of Computer Science
Bachelor of Science in Biology/Master of Science in Computer Science
Bachelor of Science in Biology/Master of Food Safety and Technology
Bachelor of Science in Chemistry/Master of Food Safety and Technology

Biomedical Engineering
Bachelor of Science in Biomedical Engineering/Master of Biomedical Imaging and Signals
Bachelor of Science in Biomedical Engineering/Master of Chemical Engineering

Business Administration
Bachelor of Science in Business Administration/Master of Public Administration

Chemical, Biological, and Food Process Engineering
Bachelor of Science in Chemical Engineering/Master of Biological Engineering
Bachelor of Science in Chemical Engineering/Master of Chemical Engineering
Bachelor of Science in Chemical Engineering/Master of Environmental Engineering
Bachelor of Science in Chemical Engineering/Master of Food Process Engineering

Civil and Architectural Engineering
Bachelor of Science in Architectural Engineering/Master of Architectural Engineering
Bachelor of Science in Architectural Engineering/Master of Construction Engineering and Management
Bachelor Science in Architectural Engineering/Master of Structural Engineering
Bachelor of Science in Civil Engineering/Master of Construction Engineering and Management
Bachelor of Science in Civil Engineering/Master of Environmental Engineering
Bachelor of Science in Civil Engineering/Master of Geotechnical Engineering
Bachelor of Science in Civil Engineering/Master of Structural Engineering
Bachelor of Science in Civil Engineering/Master of Transportation Engineering

Computer Science
Bachelor of Science in Computer Science/Master of Science in Applied Mathematics
Bachelor of Science in Computer Science/Master of Computer Science
Bachelor of Science in Computer Science/Master of Science in Computer Science
Bachelor of Science in Computer Science/Master of Intellectual Property Management and Markets

Electrical and Computer Engineering
Bachelor of Science in Computer Engineering/Master of Electrical and Computer Engineering
Bachelor of Science in Computer Engineering/Master of Science in Computer Engineering
Bachelor of Science in Computer Engineering/Master of Science in Electrical Engineering
Bachelor of Science in Computer Engineering/Master of Computer Science
Bachelor of Science in Computer Engineering/Master of Science in Computer Science
Bachelor of Science in Electrical Engineering/Master of Electrical and Computer Engineering
Bachelor of Science in Electrical Engineering/Master of Science in Computer Engineering
Bachelor of Science in Electrical Engineering/Master of Science in Electrical Engineering

Industrial Technology and Management
Bachelor of Industrial Technology and Management/ Master of Industrial Technology and Operations

Information Technology and Management
Bachelor of Information Technology and Management/ Master of Cyber Forensics and Security
Bachelor of Information Technology and Management/ Master of Information Technology and Management

Mechanical, Materials, and Aerospace Engineering
Bachelor of Aerospace Engineering/Master of Materials Science Engineering
Bachelor of Aerospace Engineering/Master of Mechanical and Aerospace Engineering
Bachelor of Mechanical Engineering/Master of Materials Science Engineering
Bachelor of Mechanical Engineering/Master of Mechanical and Aerospace Engineering

Physics
Bachelor of Science in Physics/Master of Health Physics
Bachelor of Science in Physics/Master of Science in Physics
Bachelor of Science in Physics/Master of Computer Science
Bachelor of Science in Physics/Master of Science in Computer Science

IIT Core Curriculum

The core curriculum is designed to ensure that all IIT graduates have a basic understanding of certain essential areas of knowledge. The core curriculum sets minimal requirements. Most degree programs require additional courses in these areas. These additional course requirements are found in the departmental listings. Core curriculum requirements will not be waived. Substitutions may be considered upon written request to the Office of Undergraduate Academic Affairs. Approval will be granted on an individualized basis and then, only under extraordinary circumstances.

A. Writing and Communications

IIT recognizes the importance of critical thinking, writing, and oral communication in all academic pursuits and in professional practice. IIT is committed to a campus-wide program that engages students in the practice of written and oral communication in all disciplines. This program includes the following components:

1. Students who have not received transfer or AP credit for COM 101 at IIT must take the IIT English Proficiency Examination before starting classes at IIT. Within their first year at IIT, students who do not pass the IIT English Proficiency Examination must demonstrate basic writing proficiency by passing a composition course at IIT. This requirement applies to all students enrolling for an undergraduate degree.
2. Students must complete a minimum of 36 credit hours of courses with a significant written and oral communication component, identified with a **(C)** in this bulletin, with a minimum distribution as follows:
   (a) 12 hours in major courses.
   (b) 12 hours in non-major courses.
   (c) Full-time students should enroll in two **(C)**-designated courses, and part-time students should enroll in one **(C)**-designated course each academic year.
3. Students must contact the IIT Writing Center (see page 299) when referred by course instructors or academic advisors.

B. Humanities 200-level Course

All students must complete HUM 200, 202, 204, 206, 208, or any other HUM 200-level elective.

C. Human Sciences Module

All students must complete 18 credit hours subject to the following distribution requirements:

1. At least two Humanities courses (**(H)** designation) at the 300-level or above. Students may use foreign language courses at the intermediate and advanced level to fulfill 300-level requirements.
2. At least three Social or Behavioral Sciences courses. These courses are marked with an **(S)** in this bulletin. The courses must be distributed as follows:
   (a) At least one course at the 300-level or above.
   (b) Courses from at least two different fields.
   (c) At least six credits in a single field.

D. STEM Module

A minimum 16 credit hours is required between Mathematics and Natural Science or Engineering.

1. Mathematics: 5-6 credit hours
   The courses must be at the level of MATH 119 or above. BUS 221 and PSYC 203 also satisfy this requirement.
2. Natural Science or Engineering: 10-11 credit hours
   This component may be satisfied by courses in engineering, biology, chemistry, physics, or courses in architecture, food safety and technology, and psychology marked with an **(N)**. These courses must be distributed as follows:
   (a) Two sequential natural science or engineering courses in a single field. (CHEM 124 with MS 201 satisfies this requirement.)
   (b) At least one natural science or engineering course in a second field.
3. Computer Science: 2 credit hours
   All students must take CS 104, 105, 110, 115, 116, 201, ARCH 107, ITM 311, or a computer science course at the 300-level or above.

E. Collaborative Interdisciplinary and/or Professional Experience

All students must take 8 credit hours as follows:

1. Introduction to the Profession: 2 credit hours
   Students must complete this requirement in their first year. Students entering with 30 hours or more of transfer credit may have this requirement waived with department approval. If waived, the total credit hours required for the degree still must be satisfied.
2. Interprofessional Projects (IPRO): 6 credit hours
   Students will participate in at least two Interprofessional Project experiences. These projects develop commnunication, teamwork, and leadership skills, as well as an awareness of economic, marketing, ethical, and social issues within the framework of a multidisciplinary team project. The project teams will be integrated across academic programs and at different levels within programs. Students who complete an ROTC minor are exempt from one of the two IPRO requirements.

Applied Mathematics

Website: science.iit.edu/applied-mathematics

Engineering 1 Building
10 W. 32nd St.
Chicago, IL 60616
312.567.8980

Chair
Fred J. Hickernell

Associate Chair and
Director of Undergraduate Studies
Gregory Fasshauer

Applied mathematics is mathematics created in response to problems in science, engineering, and society. Applied mathematicians work on a wide variety of topics, such as the methods for multi-criteria decision making (requiring probability/statistics, analysis, optimization) and the analysis of liquid flow around solids (including computational methods and analysis). Undergraduate study in applied mathematics at IIT incorporates foci in four areas of modern applied mathematics: applied analysis, computational mathematics, discrete applied mathematics, and stochastic analysis. These areas of study both support IIT's broad range of professional degree programs and comprise a specialized Bachelor of Science (B.S.) degree in Modern Applied Mathematics.

The objectives of the Applied Mathematics program are to prepare students for careers that utilize mathematics to address problems in science, engineering, and society and to prepare students for graduate study in mathematics.

A faster and, if preferred, more research-oriented program leading to a dual Bachelor of Science/Master of Science in Applied Mathematics is also an option, especially for incoming students who have taken advanced courses in high school, or students who are keen on doing research and continuing for graduate studies.

The Applied Mathematics Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Applied Mathematics/Master of Science in Applied Mathematics
- Bachelor of Science in Applied Mathematics/Master of Computer Science
- Bachelor of Science in Applied Mathematics/Master of Science in Computer Science

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Applied Mathematics departmental website: **science.iit.edu/applied-mathematics**

Students with an applied mathematics background are prepared for jobs in the insurance industry, electronics and computer manufacturing businesses, logistic companies, pharmaceutical firms, etc. The program's flexibility allows students to assemble a portfolio of courses that will satisfy both intellectual needs and career preparation.

The degree program includes a required minor consisting of five related courses (at least 15 semester hours) in an area outside of applied mathematics. A minor in business, computer science, or one of the engineering disciplines prepares the student to enter the job market in business or government.

For information regarding faculty visit the Applied Mathematics departmental website at **science.iit.edu/applied-mathematics/people/faculty**.

Bachelor of Science in Applied Mathematics

Required Courses	Credit Hours
Applied Mathematics Requirements MATH 100, 151, 152, 230, 251, 252, 332, 350, 400, 402, (430 or 454), 475	42
Applied Mathematics Electives*	18
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Minor Requirement Five related courses from an area outside of applied mathematics.	15
Interprofessional Projects	6
Computer Science Requirements (CS 115 and CS 104) or (CS 115 and CS 116) or (CS 105 and CS 201)	4
Science Requirement PHYS 123	4
Science Electives	9
Free Electives	9
Total Hours	**128**

* Applied mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on pages 29–31 may also serve as a guide to applied mathematics elective selection.

Applied Mathematics Curriculum

Semester 1		Credits
MATH 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CS 104	Introduction to Computer Programming for Engineers	2
Science Elective		3
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
MATH 152	Calculus II	5
MATH 230	Introduction to Discrete Mathematics	3
CS 115	Object-Oriented Programming I	2
PHYS 123	General Physics I	4
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MATH 251	Multivariate and Vector Calculus	4
MATH 332	Elementary Linear Algebra	3
Minor Elective		3
Science Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
MATH 252	Introduction to Differential Equations	4
MATH 350	Intro to Computational Mathematics	3
Minor Elective		3
Science Elective		3
Social Sciences Elective		3
Total Hours		**16**

Semester 5		Credits
MATH 430	Applied Algebra	
OR		3
MATH 454	Graph Theory	
MATH 475	Probability	3
Applied Mathematics Elective*		3
Minor Elective		3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**18**

Semester 6		Credits
MATH 402	Complex Analysis	3
Applied Mathematics Elective*		3
Applied Mathematics Elective*		3
IPRO Elective I		3
Minor Elective		3
Total Hours		**15**

Semester 7		Credits
MATH 400	Real Analysis	3
Minor Elective		3
Applied Mathematics Elective*		3
Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**15**

Semester 8	Credits
IPRO Elective II	3
Applied Mathematics Elective*	3
Applied Mathematics Elective*	3
Humanities Elective (300+)	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **128**

* Applied mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on pages 29–31 may also serve as a guide to applied mathematics elective selection.

Applied Mathematics Specializations

In addition to the general B.S. degree in Applied Mathematics, the department offers six special five-course sequences that may be used as a guide for the selection of mathematics electives and will prepare the student for a career in:

- business/finance,
- education,
- industrial research, or
- graduate school.

Choosing any of the following specializations is optional.

Specialization in Mathematical Finance
Program advisor: T. Bielecki

Students who choose this specialization may qualify for admission to the Master of Mathematical Finance program – a collaborative program between the Stuart School of Business and the Applied Mathematics department. The objective of the MMF program is to provide individuals interested in pursuing careers in the finance industry with advanced education in theoretical, computation, and business aspects of relevant quantitative methodologies.

A **Business** or **Entrepreneurship minor** is required (see pages 172–175).

Required Courses

MATH 475	Probability
MATH 476	Statistics
MATH 478	Numerical Methods for Differential Equations
MATH 481	Introduction to Stochastic Processes
MATH 485	Introduction to Mathematical Finance

MATH 475 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 461	Fourier Series and Boundary Value Problems
MATH 477	Numerical Linear Algebra
MATH 483	Design and Analysis of Experiments
MATH 484	Regression and Forecasting
MATH 486	Mathematical Modeling
MATH 489	Partial Differential Equations

Specialization in Math Education
Program Advisor: G. Fasshauer

Completion of the following 27-credit-hour **Mathematics and Science Education Specialization** will prepare students for the Illinois State Certification in Secondary Mathematics (grades 6-12) and Secondary Science: Biology, Chemistry, Physics (grades 6-12).

MSED 200	Analysis of Classrooms
MSED 250	Middle and Secondary Curriculum/Foundations
MSED 300	Instructional Methods/Strategies I
MSED 320	Inquiry and Problem Solving in Mathematics and Science
MSED 350	Informal Education Practicum and Seminar
MSED 400	Instructional Methods/Strategies II
MSED 450	Professional Internship
MSED 497	Special Project

Required Courses
Choose five of the following:

MATH 300	Perspectives in Analysis
MATH 410	Number Theory
MATH 420	Geometry
MATH 430	Applied Algebra
MATH 453	Combinatorics
MATH 454	Graph Theory
MATH 475	Probability
MATH 476	Statistics
MATH 486	Mathematical Modeling

MATH 430 or 454, and 475 are required for all applied mathematics majors. The other courses count toward MATH electives.

Specialization in Applied Analysis
Program advisor: J. Duan

Applied analysis is one of the foundations for interdisciplinary applied mathematics. The principles of analysis are applied to such areas as partial differential equations, dynamical systems, and numerical analysis. The basic framework, concepts, and techniques of modern mathematical analysis are essential for modeling, analysis, and simulation of complicated phenomena in engineering and science.

Required Courses

MATH 400	Real Analysis
MATH 402	Complex Analysis
MATH 461	Fourier Series and Boundary Value Problems
MATH 488	Ordinary Differential Equations and Dynamical Systems
MATH 489	Partial Differential Equations

MATH 400 and 402 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 405	Iteration and Chaos
MATH 478	Numerical Methods for Differential Equations
MATH 486	Mathematical Modeling

Recommended minors include: Physics or an engineering minor.

Specialization in Computational Mathematics
Program Advisor: X. Li

The use of computation/simulation as a third alternative to theory and experimentation is now common practice in many branches of science and engineering. Many scientific problems that were previously inaccessible have seen tremendous progress from the use of computation (e.g., many-body simulations in physics and chemistry, simulation of semi-conductors, etc.). Researchers and scientists in these areas must have a sound training in the fundamentals of computational mathematics and become proficient in the use and development of new algorithms and analytical techniques as they apply to modern computational environments.

Required Courses

MATH 350	Introduction to Computational Mathematics
MATH 435	Linear Optimization
OR	
MATH 461	Fourier Series and Boundary Value Problems
MATH 476	Statistics
MATH 477	Numerical Linear Algebra
MATH 478	Numerical Methods for Differential Equations

MATH 350 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 405	Iteration and Chaos
MATH 435	Linear Optimization*
MATH 461	Fourier Series and Boundary Value Problems*
MATH 484	Regression and Forecasting
MATH 486	Mathematical Modeling
MATH 488	Ordinary Differential Equations and Dynamical Systems
MATH 489	Partial Differential Equations

*Only if not already counted as a required course.

Recommended minors include: Artificial Intelligence, Computational Structures, or Software Engineering.

Specialization in Discrete Applied Mathematics

Program Advisor: M. Pelsmajer

Discrete applied mathematics is a fairly young branch of mathematics and is concerned with using combinatorics, graph theory, optimization, and portions of theoretical computer science to attack problems in engineering as well as the hard and soft sciences.

Required Courses

MATH 332	Elementary Linear Algebra
MATH 430	Applied Algebra
MATH 435	Linear Optimization
MATH 453	Combinatorics
MATH 454	Graph Theory

MATH 332 and MATH 430 or 454 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 405	Iteration and Chaos
MATH 410	Number Theory
MATH 431	Applied Algebra II

Recommended minors include: Artificial Intelligence, Computational Structures, or Computer Networking.

Specialization in Stochastics

Program Advisor: I. Cialenco

Stochastics at IIT includes traditional statistics (the methods of data analysis and inference) and probability (the modeling of uncertainty and randomness). However, also included are other areas where stochastic methods have been becoming more important in recent years such as stochastic processes, stochastic integration, stochastic dynamics, stochastic partial differential equations, probabilistic methods for analysis, mathematical finance, discrete mathematics, and computational methods for stochastic systems.

Required Courses

MATH 475	Probability
MATH 476	Statistics
MATH 481	Introduction to Stochastic Process
MATH 485	Introduction to Mathematical Finance
MATH 488	Ordinary Differential Equations and Dynamical Systems

MATH 475 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 453	Combinatorics
MATH 483	Design and Analysis of Experiments
MATH 484	Regression and Forecasting
MATH 486	Mathematical Modeling

College of Architecture

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Eva Kultermann

Through its deep commitment to a rigorous architectural education and its historic contributions to the legacy of modernism, the IIT College of Architecture enjoys an unparalleled international reputation. The College is one of the largest and most international architecture schools in the United States, with over 700 students from fifty countries and more than 100 faculty members. With a pedagogy based in the synthesis of practice and research, IIT offers the professional, five-year Bachelor of Architecture (B.Arch.). Accredited by the National Architectural Accrediting Board (NAAB), this well-established degree program prepares architects to apply visual communication, design, analytical, and professional skills to provide inventive solutions to a broad range of design problems.

Drawing strength from a lineage that reaches back to the Bauhaus, the faculty and curriculum of the College are committed by way of vigorous research to the material culture of the built environment, to a sophisticated integration of technology and design, and to a deep engagement with professional practice. The College presses students to engage with a full range of contemporary issues, including sustainability, global urbanization, material and structural advances, design-build integration, digital modeling and fabrication, and design theory and criticism. The students, faculty, and alumni foster an academic environment that is intellectually stimulating, professionally challenging, committed to innovation, and international in scope.

Urbanization of the planet is the dominant theme facing architects in the coming decades. Half of the world's population is now urban, and the proportion of people living in cities is increasing every day. How will architects respond to the needs of a mobile and changing society? What physical changes to the city do these new patterns of urbanization imply? The B.Arch. degree prepares students to confront the challenges and explore the opportunities presented to the discipline by growing urbanization.

At the same time, the profession of architecture is changing, due to forces both internal and external. Developments in technology offer architects new representational tools that change how projects are conceived. Digital fabrication tools provide architects new means of realizing their projects and suggest a future in which architects move between the studio and the shop, working side-by-side with fabricators to make their visions a reality. The College prepares students to take command of these new technologies and forge a future that embraces new modes of thinking and making.

While technology is reshaping architecture within, the profession is also being affected by external forces. Economic factors and changes in project delivery are upsetting traditional power structures within the industry, while the increasing complexity of building projects is leading toward specialization within the field and the creation of new alliances. Within this rapidly-changing environment, architects of tomorrow will have to be agile, carving their own paths through the profession and authoring of their own careers. The B.Arch. degree program at IIT stresses research, analysis, and synthesis as the means to prepare students for an expanding field in which resourcefulness, critical thinking, and the ability to seize opportunity and new territories of intervention will be rewarded.

As IIT focuses on a future of global urbanism and instills in its students a profound awareness of the changing world around them, it also acknowledges what does not change, remaining true to its legacy as a place of rigorous thinking and making. Amidst new patterns of urbanization and technological advance, and against the backdrop of a changing profession, IIT is still a place where how a thing is made matters-whether it be a door, a building, or a city.

Curriculum Overview

The curriculum for the B.Arch. is organized thematically into "strands" corresponding to different areas of the curriculum-design, technology, history/theory, design communication and professional practice. The Design strand includes design studio courses as well as elective courses in design and independent studies. The Technology strand covers courses in structural engineering, environmental systems, and elective courses in advanced building technology. The History/Theory strand includes required and elective courses in architectural history, theory, and cultural studies. The Design Communication strand includes courses to develop the student's design thinking, computation skills, drawing, writing and verbal abilities. Professional Practice courses educate students in contemporary practice and prepare them for future trends. General Education courses in the humanities, social sciences, mathematics and other disciplines define the sixth strand for the undergraduates.

In the first years, students are introduced to the fundamental elements of architecture and aspects of the profession. Students are given an introduction to the history and theory of architecture and develop their skills of communication (verbal, graphic, and written). Intermediate years of the program continue to develop the students' skills while engaging them with issues of contemporary architecture and urbanism in design studios and related coursework that focus on the architectural and infrastructural elements that comprise the city. The final year of the architecture programs introduces students to urban design in research-based, forward-looking studios that speculate on the city of the future and related coursework on the city and global urbanism.

Design Studios

Design Studios for the Bachelor of Architecture program follow a similar trajectory, starting with an understanding of architectural elements, proceeding to buildings, and culminating in studies on the contemporary city. Studios are urban-themed in their focus and research-based in their methodology, with each studio section of each year serving as a laboratory generating a unique body of knowledge that contributes to the studio whole.

The course of study begins with the elements of architecture in which students study the history of architecture through precedent and case studies, and are introduced to the elements that comprise a building. Studio coursework in this introductory period focuses on developing students' drawing and model-making skills by introducing them to the elements which comprise architecture–wall, opening, door, stair, room, etc.–and culminates in the design of a small structure.

The second period of the curriculum consists of studios exploring issues of contemporary architecture in the city. Students are introduced to the elements that comprise the city–buildings, neighborhoods, institutions, among others. Studio projects build in scale and complexity from a house, to multiples and hybrids, to neighborhoods. This sequence culminates in a comprehensive building design studio, in which students are introduced to contemporary building practices in a more in-depth manner which stresses the integration of structure, envelope and building systems in the design of a large institutional building in the city.

The design strand culminates in design-based research studios which engage issues of global urbanism and are more speculative in nature. These "Cloud" studios combine advanced students from the Bachelor and Master's programs, who can choose from a variety of studio "options" which serve as laboratories for speculating on the future of the urban condition, and together address the theme of the "rethinking metropolis."

History/Theory

The History and Theory Strand of our curriculum presents the intellectual contexts within which architecture, urbanism, and landscape architecture are practiced and interpreted. These courses introduce the buildings, cities, sites, projects, texts, images, people, movements, schools, and concepts that have shaped architecture in the past and that shape architecture today. In addition to this content, the History and Theory Strand also teaches methods of visual analysis, close reading, critical thinking, and effective writing.

Our goal is to provide an understanding of the complex intellectual, aesthetic, technical, and political contexts within which architecture arises. Primary source readings by architects, critics, novelists, and theorists are essential to this approach. An overriding aim of these courses is to articulate the irreducibly rich relationships between buildings, cities, and landscapes as material artifacts and the ideas that surround them.

The History and Theory sequence begins with a set of core classes that provide a broad introduction to architecture and urbanism, covering examples from around the world and throughout history. These courses are built upon a core set of projects, texts, and concepts that provide our students with a foundation for their studies and careers. This core sequence is followed by advanced classes–mostly electives selected from a changing menu of seminars–that expand into more sophisticated and specialized topics in smaller class settings.

Technology

The Technology Strand of our curriculum provides students an understanding of the building systems and technologies impacting the design of the built environment. The sequence starts with an introduction to structural concepts and structural proportioning, followed by courses in structural systems and the elements of structure. Advanced level courses on the development of structural form and structural analysis introduce students to more advanced techniques.

Running parallel with this coursework is an integrated sequence of materials courses–concrete and masonry, metals, woods and plastics, and glass–intended to provide an in–depth knowledge of building materials. Building systems are taught in a two-semester course sequence and integrated into studio work in a comprehensive building design project.

Design Communication

The field of communication entangled in the processes of design, including all modalities of media, data and computational processes, and the entire spectrum of sensory input and output. The design communication curriculum heralds a deeply entangled hybridity of physical and digital. It circumvents the term "virtual," to disallow the way in which it undermines the true physical and cognitive realities of the digital. We are in the beginning of an age where the built environment is constituted through an "Internet of Things." We will increase the fluency of our students across a spectrum of languages: spoken, written, composed, constructed, coded.

Professional Practice

The primary objective of the Professional Practice Strand is to instill awareness and understanding of the conceptual framework and knowledge base necessary to facilitate the transition from the university to the rapidly-evolving world of professional practice. As a result of completing the Professional Practice Strand, students will be able to evaluate career options and establish a focused career path, command the knowledge required to begin their careers responsibly and effectively, and understand the processes whereby continuing learning can take place. Students will develop a sense of themselves as members of a profession, an understanding of the legal, social and cultural responsibilities of the architect, and the potential roles of the architect in society.

The Architecture department also offers the following co-terminal degree, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Architecture/Master of Construction Engineering and Management

Co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Architecture departmental website: **arch.iit.edu**.

For information regarding faculty visit the College of Architecture website at **arch.iit.edu/people/faculty**.

Professional Degrees

The undergraduate professional degree program at IIT has always been a comprehensive five-year accredited Bachelor of Architecture (B.Arch) degree. The curriculum provides the fundamental body of knowledge required by the profession. Each Design Studio is team taught to horizontally integrate all courses within each year and vertically sequence learning experiences. This professional background prepares students for the last two years of advanced design studios focused on spatial awareness, comprehensive building design, and the design of large building complexes.

IIT has also taken a leadership role in addressing the responsibilities of professional education for the 21st century's global workplace. While technical proficiency will always be necessary, IIT recognizes that colleges must also educate students to work as part of teams, to communicate well, and to understand the economic, social, ethical, environmental, and international context of their profession. Faculty broaden the upper-level studios to resemble real-world interdisciplinary projects. This emphasis on holistic learning, when combined with a new global vision and advanced computer and communication technology, positions IIT and the College of Architecture on the leading edge of architectural education.

Accreditation

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

The College of Architecture has two NAAB accredited degrees: the Bachelor of Architecture and the Master of Architecture professional degree programs. Both hold six-year terms of accreditation with the NAAB.

The four-year pre-professional degree, where offered, is not accredited by NAAB. The pre-professional degree is useful to those wishing a foundation in the field of architecture as preparation for either continued education in a professional degree program or for employment options in fields related to architecture. (The College does not offer this four-year pre-professional degree.)

Bachelor of Architecture

Required Courses	Credit Hours
Architecture Requirements ARCH 100, 107, 108, 113, 114, 201, 202, 207, 208, 305, 306, 403, 404, 413, 417, 418, 419, 420	84
Building Science and Structural Requirements ARCH 230, 334, 335, 482, 483	15
Art and Architectural History Requirements AAH 119, 120, ARCH 321	9
Architectural History Elective	3
Architecture and Urbanism Requirements AURB 201, 465	6
Mathematics Requirements MATH 119, 122	6
Physics Requirement PHYS 200	4
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Interprofessional Projects (2)	6
Architecture Electives (5)	15
Total Hours	**169**

Architecture Curriculum

Semester 1		Credits
ARCH 113	Architecture Studio I: Elements	6
ARCH 100	Introduction to Architecture	3
ARCH 107	Design Communications I: Units & Order	3
MATH 119	Geometry for Architects	3
Humanities 200-level Course		3
Total Hours		**18**

Semester 2		Credits
ARCH 114	Architecture Studio II: Unit	6
ARCH 108	Design Communications II: Systems & Assemblages	3
MATH 122	Introduction to Calculus	3
AURB 201	The Elements of Urbanism	3
Total Hours		**15**

Semester 3		Credits
ARCH 201	Architecture Studio III: House	6
ARCH 207	Design Communications III: Analysis and Exposure	3
AAH 119	History of World Architecture I	3
PHYS 200	Energy, Waves, Materials & Forces	4
Total Hours		**16**

Semester 4		Credits
ARCH 202	Architecture Studio IV: Multiple	6
ARCH 208	Design Communications IV: Interaction and Immersion	3
ARCH 230	Systems: Structural Analysis	3
AAH 120	History of World Architecture II	3
Humanities or Social Sciences Elective		3
Total Hours		**18**

Semester 5		Credits
ARCH 305	Architecture Studio V: Hybrid	6
ARCH 321	Contemporary Architecture	3
ARCH 334	Material: Metal	3
ARCH 403	Mechanical and Electrical Building Systems for Architects I	3
Social Sciences Elective		3
Total Hours		**18**

Semester 6		Credits
ARCH 306	Architecture Studio VI: Neighborhood	6
ARCH 335	Material: Cementitious	3
ARCH 404	Mechanical and Electrical Building Systems for Architects II	3
AURB 465	Principles of Urbanism	3
Humanities Elective (300+)		3
Total Hours		**18**

Semester 7		Credits
ARCH 417	Architecture Studio VII: Institution	6
ARCH 482	Material: Fibrous	3
Architecture Elective		3
History of Architecture Elective		3
Social Sciences Elective		3
Total Hours		**18**

Semester 8		Credits
ARCH 418	Architecture Studio VIII: Institution	6
ARCH 413	Architectural Practice	3
IPRO Elective I		3
ARCH 483	Material: Transparent	3
Architecture Elective		3
Total Hours		**18**

Semester 9		Credits
ARCH 419	Architecture Studio IX: Metropolis	6
IPRO Elective II		3
Architecture Elective		3
Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 10		Credits
ARCH 420	Architecture Studio X: Metropolis	6
Architecture Elective		3
Architecture Elective		3
Humanities Elective (300+)		3
Total Hours		**15**

Total Credit Hours **169**

Academic Standards

The Bachelor of Architecture is a professional degree, accredited by NAAB. The IIT curriculum must comply with the NAAB's Conditions for Accreditation, which define minimum standards of knowledge in professional education. The College alone is responsible for maintaining professional standards, high academic quality, and the purposeful integration and sequencing of general education and prerequisite courses to meet the NAAB's criteria for student performance. These criteria encompass two levels of accomplishment: understanding and ability. In meeting these criteria, the College prepares students for the profession and its practice. Students are expected to monitor their degree progress and work closely with their academic advisor to insure they are complying with academic requirements while meeting College and university standards.

With the Office of Undergraduate Academic Affairs, the College routinely evaluates degree progress and academic standards for all architecture students. When student performance repeatedly falls below College and university academic standards, students may be placed on academic probation or dismissed. The studio sequence is the core of the curriculum. Students may continue their studio enrollment only when all prerequisite courses are satisfactorily completed.

To maintain academic and professional standards, the College may restrict or postpone a student's studio enrollment under any of the following conditions: failure of any prerequisite studio, unmet prerequisite courses (general education or support courses), university academic probation, or if a student's studio GPA falls below 2.25. Students and their advisors are notified each semester if these conditions arise.

Transfer Students

Transfer students admitted to the College of Architecture are expected to complete the equivalent of at least two years of IIT's five-year B.Arch. degree. Depending on their previous studio and architecture courses, they will begin their studio sequence at IIT in one of the foundation studios–years one, two, or three. Transfer credit is awarded based upon an evaluation of general education and architecture courses by the Office of Undergraduate Academic Affairs. Transfer credit for architecture courses is determined by an individual portfolio review conducted by College faculty. Portfolios must include examples of student work, official course descriptions, a course syllabus, and supporting documents. Studio placement will depend not only on previous studio work, but also upon the completion of all prerequisite courses in related subjects such as math, physics, structures, and design communications. The last six studios must be taken at IIT. Students attending a four-year university who have completed three years of coursework are discouraged from applying to IIT as a B.Arch. transfer student.

Visiting Students

Non-degree visiting students who wish to transfer to IIT and complete a B.Arch. degree must re-apply for admission as a transfer student. Upon admission, they will follow the same requirements for studio placement and transfer credit as all transfer students. Visiting students seeking one semester of study are encouraged to apply for the fall semester only.

Specializations in Architecture

The global practice of architecture invites students to develop an extensive background in related areas of expertise. Within the required curriculum, students may select from studios and architecture electives to satisfy an area of specialization. Working with their academic advisors, students are encouraged to identify a specialization in their second or third year of study in order to plan the appropriate sequence of courses. Credit requirements (15 credit hours) for each specialization are met by a combination of required core courses, advanced studios, and architecture electives. Prior approval for electives is required. In addition to the established specializations, a student may also propose a self-directed specialization in a relevant architectural subject. With the equivalent of 15 credits, a self-directed specialization must be approved by the student's advisor and the College.

Architectural History and Theory

In addition to the required elective in the history of architecture, students must take:
AAH 119 History of World Architecture I
AAH 120 History of World Architecture II
ARCH 321 Contemporary Architecture

Students must also select three elective history of architecture courses (AAH, ARCH, or LA) approved by the advisor.

Architecture and Urbanism

See your academic advisor or the Associate Dean of the College for appropriate courses.

Design Build

See your academic advisor or the Associate Dean of the College for appropriate courses.

Digital Design

See your academic advisor or the Associate Dean of the College for appropriate courses.

Landscape Architecture

This specialization requires 15 credit hours. Students must take one landscape architecture studio (ARCH 417, ARCH 418, ARCH 419, or ARCH 420).

Students must also take nine credit hours from the following: LA 501, LA 502, LA 565, LA 566, ARCH 443, ARCH 445, or an approved ARCH 497 course which must have a landscape architecture focus.

Minors and Architecture Electives

College of Architecture students may pursue a minor in another department; however, the requirements for a minor must be met in addition to the curricular requirements for the Bachelor of Architecture degree. Requirements for architecture electives are most often met by courses offered in the College of Architecture. When deemed appropriate by an advisor or a dean, and in consultation with the Office of Undergraduate Academic Affairs, a select number of courses from other departments may serve as an architecture elective. These have included ID courses in architectural photography or selected CAE courses related to construction management or civil and architectural engineering. Students should consult with their academic advisor early in their program of study.

Change of Major to Architecture (B.Arch.)

Students admitted to IIT in another major are asked to petition the College of Architecture for admission to the professional degree program. In addition to the Change of Major Form, students are required to submit a personal statement and meet with designated College of Architecture staff to initiate their application and discuss the requirements of the five-year degree. Students must have a minimum cumulative GPA of 3.00 at IIT for consideration. Admission is for the fall semester only due to the studio sequence.

Optional Programs

Bachelor of Architecture (B.Arch.)/Master of Business Administration (M.B.A.)

Architects recognize the importance of business skills in their profession. Recognizing the 21^{st} century's concerns with environmental management and sustainable design issues, IIT offers young architects a unique opportunity for advanced graduate study in the Stuart School of Business.

IIT students completing the requirements for the B.Arch. degree may also earn the M.B.A. degree by completing an approved set of courses established by their academic advisors and appropriate deans in the College of Architecture and the Stuart School of Business. Thus, qualified architecture students may earn their B.Arch. and the M.B.A. in approximately six-and-a-half years, rather than the usual seven years. When including a summer term, the M.B.A. will typically require one-and-a-half more years of study.

Students considering the B.Arch./M.B.A. dual-degree program should consult with undergraduate advisors in both programs early in their academic career.

Students will be required to apply for admission to the graduate M.B.A. program, providing Graduate Management Admission Test (GMAT) scores and all other necessary application materials. Professional experience in the business world is not required for consideration, allowing B.Arch. students to pursue their M.B.A. degree without interruption. Formal application should be completed prior to the end of the seventh semester of the B.Arch. program. Upon admission, B.Arch. students could successfully complete up to four M.B.A. courses, or 12 credits, before joining the program on a full-time basis. These courses are typically basic core courses for which there are no prerequisites. The Stuart School M.B.A. advisors would be able to identify these courses and offer appropriate advice to the B.Arch students upon their admission to the program.

Bachelor of Architecture/Master of Civil Engineering Double-Degree Option

Qualified students enrolled at IIT may earn both the Bachelor of Architecture and the Master of Civil Engineering (M.C.E.) degrees. They must complete preparatory courses for the M.C.E. prior to entry into the combined program. Students who anticipate entry into the combined program and who intend to specialize in structural engineering must successfully complete the following courses as part of their undergraduate program in architecture:

MATH 151, MATH 152, MATH 251, PHYS 123,
CAE 286 or MMAE 200, CAE 287 or MMAE 202,
CAE 303, CAE 304, CAE 307, CAE 310, CAE 431,
and CAE 432.

Students who anticipate entering into the program should seek advising in the Department of Civil and Architectural Engineering and the College of Architecture early in their studies at IIT.

Study Abroad

The reality of architectural practice today is that it is global. Study Abroad has a long and important history in the training of architects and the College's desire is to make this essential experience central to each of our student's education. The College provides multiple possibilities allowing for students to participate in both short-term and long-term international off-campus programs. Undergraduate students may participate in CoA-led semester-long programs as part of the fifth year Cloud Studios or in advanced studios field work programs for durations of several weeks. Summer traveling programs include international seminars with partner institutions or project-based workshops. Spring break and inter-session travel programs are generally open to students at all levels. And the College maintains partner and exchange agreements with numerous foreign institutions allowing students in the fourth year to study abroad and transfer credits back into their program at IIT.

Biological and Chemical Sciences

Websites: science.iit.edu/biology
science.iit.edu/chemistry

Life Sciences Building
3101 S. Dearborn St.
Chicago, IL 60616
312.567.3480

Acting Chair
Ben Stark

Executive Associate Chair – Biology
Thomas Irving

Executive Associate Chair – Chemistry
Ishaque Khan

Associate Chair – Biology
Tanya Bekyarova

In an ever more technological world, a substantive understanding of the sciences is a requirement for many professions, including careers in science, education, the health professions and, increasingly, areas such as law and business. In the latter cases, a technical background can serve as a unique and sought-after qualification.

The Department of Biological and Chemical Sciences offers traditional Bachelor of Science (B.S.) degrees in each area of Biology and Chemistry as well as interdisciplinary B.S. degrees in Biochemistry, and Molecular Biochemistry and Biophysics (M.B.B.). All programs serve as a solid foundation for entry into graduate and medical schools and for jobs in both the government and the private sector. They are also designed to fulfill the requirements for our special medical and optometry degree programs.

The department also provides specialized B.S. degree programs that integrate the sciences with law, business, and secondary education. These include programs which offer joint admission to IIT Chicago-Kent College of Law, the Stuart School of Business Financial Markets Program, and the Department of Mathematics and Science Education.

The Biological and Chemical Sciences Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Biochemistry/Master of Biology with Biochemistry specializaion
- Bachelor of Science in Biochemistry/Master of Science in Biology with Biochemistry specializaion
- Bachelor of Science in Biochemistry/Master of Food Safety and Technology
- Bachelor of Science in Biology/Master of Biology
- Bachelor of Science in Biology/Master of Science in Biology
- Bachelor of Science in Biology/Master of Food Safety and Technology
- Bachelor of Science in Biology/Master of Computer Science
- Bachelor of Science in Biology/Master of Science in Computer Science
- Bachelor of Science in Chemistry/Master of Food Safety and Technology

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Biological and Chemical Sciences departmental websites: **science.iit.edu/biology** and **science.iit.edu/chemistry**

Details of the traditional programs, as well as the specialized degree programs, can be found on the following pages, the Department of Mathematics and Science Education section (pages 123–124), and in the Special Programs section (pages 176–185).

For information regarding faculty visit the Biological and Chemical Sciences websites at **science.iit.edu/biology/people/faculty** and **science.iit.edu/chemistry/people/faculty**.

Biochemistry

The degree program in Biochemistry is intended to prepare students for entrance into post-baccalaureate programs in the health professions or the basic sciences. Biochemistry is becoming an increasingly popular career path for many scientists as the basic scientific fields of chemistry and biology intertwine. The program in Biochemistry will offer students a strong foundation in both the biological and chemical sciences with opportunities to construct their degree program to best suit their interests.

Bachelor of Science in Biochemistry

Required Courses	Credit Hours
Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 445, 446, (451 or CHEM 451), 495	23/25
Chemistry Requirements CHEM 124, 125, 237, 239, 240, 247, 343, 344, (451 or BIOL 451), 485	28/31
Biochemistry Requirements BIOL 401, 402, 404	9
Technical Electives	11/12
Physics Requirements PHYS 123, 221	8
Mathematics Requirements MATH 151, 152, 251, 425	17
Interprofessional Projects	6
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Total Hours	**127/129**

Biochemistry Curriculum

Semester 1		Credits
BIOL 100	Introduction to the Profession	2
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	1
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
Humanities 200-level Course		3
Total Hours		**16**

Semester 3		Credits
BIOL 214	Genetics	3
CHEM 237	Organic Chemistry I	4
PHYS 123	General Physics I	4
MATH 251	Multivariate & Vector Calculus	4
CS 105	Intro to Computer Programming I	2
Total Hours		**17**

Semester 4		Credits
BIOL 210	Microbiology	3
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Laboratory	2
PHYS 221	General Physics II	4
Social Sciences Elective		3
Total Hours		**15**

Semester 5		Credits
CHEM 343	Physical Chemistry I	3
BIOL 445	Cell Biology	3
CHEM 247	Analytical Chemistry	3
Technical Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 6		Credits
CHEM 344	Physical Chemistry II	4
CHEM 485	Chemistry Colloquium	1
MATH 425	Statistical Methods	3
IPRO Elective I		3
Technical Elective		3
Social Sciences Elective		3
Total Hours		**17**

Semester 7		Credits
BIOL 401	Introductory Biochemistry	3
BIOL 446	Cell Biology Lab	3
BIOL 495	Biology Colloquium	1
Technical Elective		3
BIOL 451	Literature in Biology	
OR		2/3
CHEM 451	Modern Techniques in Chem Lit	
Humanities Elective (300+)		3
Total Hours		**15/16**

Semester 8		Credits
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
IPRO Elective II		3
Technical Elective		2/3
Humanities Elective (300+)		3
Social Sciences Elective (300+)		3
Total Hours		**17/18**

Total Credit Hours **127/129**

Biology

The undergraduate Biology degree at IIT provides excellent preparation for the health professions, including medicine, osteopathic medicine, and dentistry. In addition, the rigorous program prepares graduates for careers in biotechnology, biochemistry, patent law, and environmental science.

Graduates are also prepared for immediate entry into positions in industrial, medical, and other research laboratories and for graduate programs in biotechnology, cell biology, biochemistry, genetics, and molecular biology.

The objectives of IIT's biology major are to give students strong training in the areas of modern cell biology, genetics, biochemistry, microbiology, and physiology, supported by a solid foundation in mathematics and the physical sciences. In addition, the biology major is designed to give students broad opportunities to study advanced topics in biology, both in the classroom and by participating in undergraduate research projects.

Bachelor of Science in Biology

Required Courses	Credit Hours
Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 225, 401, 402, 404, 430, 445, 446, 451, 495 (2)	40
Biology Electives	12
Interprofessional Projects	6
Mathematics Requirements MATH 151, 152, 425	13
Chemistry Requirements CHEM 124, 125, 237, 239, 247	18
Physics Requirements PHYS 123, 221, 224	11
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Free Elective	3
Total Hours	**126**

Bachelor of Science in Biology with Secondary Education Teaching Certification

Many students will be interested in education with a strong math- and science-based curriculum, especially with a growing need for science educators nationwide. Students will earn a Bachelor of Science degree in Biology and a teaching certification through the Math and Science Education department.

Students may substitute 12 credits of biology electives, one credit of biology colloquium, and three credits of free electives with MSED courses. Also, students may substitute Biology 403 for Biology 401 and 402.

MSED 450 is an internship and must be taken full time with no other contemporaneous courses, resulting in tight course scheduling. Students are advised to indicate their interest as soon as possible and seek advising specific to this program from both the Biological and Chemical Sciences and the Math and Science Education departments.

Students must take the following to qualify for teaching certification:

MSED 200	Analysis of Classrooms (Practicum and Seminar)
MSED 250	Middle and Secondary School Curriculum/Foundations
MSED 300	Instructional Methods/Strategies I
MSED 320	Inquiry and Problem Solving in Mathematics and Science
MSED 350	Informal Education Practicum and Seminar
MSED 400	Instructional Methods/Strategies II
MSED 450	Professional Internship

Biology Curriculum

Semester 1		Credits
BIOL 100	Introduction to the Profession	2
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	1
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
Humanities 200-level Course		3
Total Hours		**16**

Semester 3		Credits
BIOL 214	Genetics	3
CHEM 237	Organic Chemistry I	4
PHYS 123	General Physics I	4
Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
BIOL 210	Microbiology	3
BIOL 225	Microbiology Laboratory	2
CHEM 239	Organic Chemistry II	3
PHYS 221	General Physics II	4
Humanities Elective (300+)		3
Total Hours		**15**

Semester 5		Credits
BIOL 401	Introductory Biochemistry	3
BIOL 430	Animal Physiology	3
CHEM 247	Analytical Chemistry	3
PHYS 224	General Physics III	3
Social Sciences Elective		3
Total Hours		**15**

Semester 6		Credits
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
IPRO Elective I		3
CS 105	Intro to Computer Programming I	2
MATH 425	Statistical Methods	3
Humanities Elective (300+)		3
Total Hours		**17**

Semester 7		Credits
BIOL 451	Literature in Biology	2
BIOL 445	Cell Biology	3
BIOL 446	Cell Biology Laboratory	3
BIOL 495	Biology Colloquium	1
Biology Elective		3
Biology Elective		3
Total Hours		**15**

Semester 8		Credits
BIOL 495	Biology Colloquium	1
IPRO Elective II		3
Biology Elective		3
Biology Elective		3
Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**16**

Total Credit Hours **126**

Chemistry

Chemistry is the study of the miniaturized world of atoms and molecules. Chemists analyze the structure of this world of chemicals, discover the forces that govern chemical changes, and invent chemical reactions which create new molecules and materials for the benefit of mankind. For example, most of the clothes we wear and the containers that hold our food are made of synthetic fibers and polymers that were conceived and developed by chemists. Life-saving pharmaceuticals are designed and synthesized by chemists. The development of insecticides, cosmetics, fragrances, fertilizers, and high-tech materials are other examples of the impact of chemistry on society. The objective of the IIT undergraduate program in Chemistry is to provide rigorous education in the fundamental areas of chemical theory and chemical experimentation. Students become well trained for industrial careers in research and development, chemical analysis, or chemical manufacturing and marketing. The opportunity for participation in an original research project also provides the necessary experiences for entrance into graduate school in one of the chemical sciences. In addition, the IIT program in Chemistry provides excellent pre-professional training for careers in medicine (see page 53 and **www.iit.edu/∼premed**), law, business, and other areas of science and healthcare. IIT has developed a very flexible curriculum which, in addition to our standard Bachelor of Science degree in Chemistry, gives students the option of selecting an area of chemical emphasis such as biological, pharmaceutical, polymer, materials, chemical physics, or chemical education. Students learn not only the basic science of chemistry but also the practical aspects of the discipline and its numerous applications. The IIT Bachelor of Science degree in Chemistry is approved by the American Chemical Society Committee on Professional Training.

Coursework

The first stage of undergraduate training provides a solid foundation in all of the five basic areas of chemistry (analytical, inorganic, organic, physical and biochemistry). Most of these courses include required laboratory work. These laboratories provide extensive practical exposure to each of these areas and experience with modern chemical instrumentation such as nuclear magnetic resonance spectroscopy, infrared spectroscopy, and gas and high-pressure liquid chromatography. Concurrently, students take courses to strengthen their understanding of mathematics and physics. Students are invited and encouraged to attend weekly chemistry colloquia where lectures are given by prominent chemists from industrial, governmental, and academic laboratories. In the second stage, students take advanced and specialized courses which focus on career interests. Students are encouraged to participate in a research project under the supervision of a member of the chemistry faculty. This research may lead to a senior thesis. Students may receive certification of their Bachelor of Science degree in Chemistry through the American Chemical Society (**www.acs.org**) by selection of appropriate chemistry electives.

Optional Degree Programs in Chemistry

Because of the diversity of interests of students in chemistry and the increasing interdisciplinary impact of chemistry in other areas, IIT offers optional degree programs in Chemistry. Each degree program maintains the five basic core areas of chemistry while at the same time providing options to prepare students to enter an operationally well-recognized career path. Students can elect the traditional Bachelor of Science degree in Chemistry where they choose their own technical electives or focus on one of the following six options:

- Bachelor of Science in Chemistry with emphasis in Biological Chemistry
- Bachelor of Science in Chemistry with emphasis in Pharmaceutical Chemistry
- Bachelor of Science in Chemistry with emphasis in Polymer Chemistry
- Bachelor of Science in Chemistry with emphasis in Materials Chemistry
- Bachelor of Science in Chemistry with emphasis in Chemical Physics
- Bachelor of Science in Chemistry with emphasis in Chemical Education

Bachelor of Science in Chemistry

Required Courses	Credit Hours
Chemistry Requirements CHEM 100, 124, 125, 237, 239, 240, 247, 321, 343, 344, 415, 416*, 434, 451, 485(2)*, two CHEM electives** (six credit hours)	54
Technical Electives	12
Biology Requirement BIOL 107 or BIOL 115, BIOL 401 or BIOL 403	6/7
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Interprofessional Projects	6
Total Hours	**127/128**

* MATH 251, CHEM 416, and CHEM 485 are not required for students pursuing the Bachelor of Science in Chemistry degree with emphasis in Chemical Education.

** Students may choose from CHEM 410, CHEM 450, CHEM 454, CHEM 455, CHEM 470, CHEM 487, and CHEM 500+ level courses. Students planning on taking CHEM 487 must complete CHEM 450 in a previous semester and are only required to take one semester of CHEM 485.

Chemistry Curriculum

Semester 1		Credits
CHEM 100	Introduction to the Profession	2
CHEM 124	Principles of Chemistry I	4
CS 105	Intro to Computer Programming I	2
MATH 151	Calculus I	5
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Social Sciences Elective		3
Total Hours		**16**

Semester 3		Credits
CHEM 237	Organic Chemistry I	4
BIOL 107	General Biology Lecture	
OR		3
BIOL 115	Human Biology	
MATH 251	Multivariate and Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**18**

Semester 4		Credits
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Lab	2
CHEM 247	Analytical Chemistry	3
MATH 252	Introduction to Differential Equations	4
Humanities Elective (300+)		3
Total Hours		**15**

Semester 5		Credits
CHEM 343	Physical Chemistry I	3
CHEM 321	Instrumental Analysis	4
IPRO Elective I		3
Technical Elective*		3
Social Sciences Elective		3
Total Hours		**16**

Semester 6		Credits
CHEM 344	Physical Chemistry II	4
CHEM 434	Spectroscopic Methods	4
Technical Elective*		3
CHEM 485	Chemistry Colloquium	1
Humanities Elective (300+)		3
Total Hours		**15**

Semester 7		Credits
CHEM 415	Inorganic Chemistry	3
BIOL 401	Introductory Biochemistry	
OR		3/4
BIOL 403	Biochemistry Lecture	
IPRO Elective II		3
Chemistry Elective**		3
Technical Elective*		3
Total Hours		**15/16**

Semester 8		Credits
CHEM 416	Inorganic Chemistry Laboratory	3
CHEM 451	Modern Techniques in Chem Literature	3
CHEM 485	Chemistry Colloquium	1
Chemistry Elective**		3
Technical Elective*		3
Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **127/128**

* Requires approval of the advisor.

** Students may choose from CHEM 410, CHEM 450, CHEM 454, CHEM 455, CHEM 470, CHEM 487, and CHEM 500+ courses. Students planning on taking CHEM 487 must take CHEM 450 in a previous semester and are only required to take one semester of CHEM 485.

Note: CHEM 321, 434, 415 and 451 are not offered every semester. The curriculum may differ in semesters 5 thru 8 depending on course offerings.

BS in Chemistry with Secondary Science Teaching Certification - Sample Curriculum

Semester 1		Credits
CHEM 100	Introduction to the Profession	2
CHEM 124	Principles of Chemistry I	4
CS 105	Intro to Computer Programming I	2
MATH 151	Calculus I	5
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Humanities or Social Sciences Elective		3
Total Hours		**16**

Semester 3		Credits
CHEM 237	Organic Chemistry I	4
BIOL 107	Introduction to Biology	
OR		3
BIOL 115	Human Biology	
PHYS 221	General Physics II	4
MSED 200	Analysis of Classrooms	3
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Lab	2
CHEM 247	Analytical Chemistry	3
MATH 252	Introduction to Differential Equations	4
MSED 250	Middle & Secondary Curriculum/Foundations	3
Humanities or Social Sciences Elective		3
Total Hours		**18**

Semester Summer	Credits
Humanities or Social Sciences Elective (300+)	3
Total Hours	**3**

Semester 5		Credits
CHEM 343	Physical Chemistry I	3
CHEM 321	Instrumental Analysis	4
IPRO 497		3
MSED 300	Instructional Methods/Strategies I	3
MSED 320	Inquiry & Problem Solving in Math & Science	3
Total Hours		**16**

Semester 6		Credits
CHEM 344	Physical Chemistry II	4
CHEM 434	Spectroscopic Methods	4
MSED 400	Instructional Methods/Strategies II	3
Humanities or Social Science Elective (300+)		3
Total Hours		**14**

Semester Summer	Credits
Humanities or Social Sciences Elective (300+)	3
Total Hours	**3**

Semester 7		Credits
CHEM 415	Inorganic Chemistry	3
BIOL 401	Introductory Biochemistry	3
CHEM 451	Modern Techniques in Chem Literature	3
MSED 350	Informal Education Practicum & Seminar	3
IPRO 497		3
Humanities or Social Science Elective		3
Total Hours		**18**

Semester 8		Credits
MSED 450	Professional Internship	6
MSED 497	Special Projects	6
Total Hours		**12**

Total Credit Hours **133**

Note: Chem 321, 434, 415 and 451 are not offered every semester. The curriculum may differ in semesters 5 thru 7 depending on course offerings. All four courses will be offered, and must be taken, during the 3-semesters preceding student teaching (MSED 450).

Optional Chemistry Degree Program Course Requirements

Students choosing to pursue one of the optional degree programs below must take the following prescribed courses as technical electives. Detailed sample curricula are available for each of the degree programs, see: **www.iit.edu/csl/che/programs/undergrad**.

Bachelor of Science in Chemistry with Emphasis in Biological Chemistry

Program Advisor: N. Menhart

Biological chemistry is the study of the structure, composition, and chemical reactions of substances found in living systems. This option provides the necessary link between chemistry and biology which allows students to learn both the theory and technical skills required to initiate and successfully complete scientific problems at the interface of these two disciplines. The biological chemistry option is particularly well suited for students interested in the molecular basis of medicine. The option provides all the necessary background material required for admission to any medical, osteopathic, or veterinary school in the country.

Students must take:

BIOL 210	Microbiology Lectures
BIOL 225	Microbiology Laboratory
BIOL 214	Genetics
BIOL 402	Metabolic Biochemistry
BIOL 445	Cell Biology
BIOL 446	Cell Biology Laboratory

Bachelor of Science in Chemistry with Emphasis in Pharmaceutical Chemistry*

Program Advisor: H. S. Chong

Pharmaceutical chemistry is an area of chemistry focused on the development of new drugs used to prevent, cure, or relieve symptoms of disease. Modern medical practice relies on an enormous armamentarium of drugs that block, counteract, or lessen the debilitating effects of disease. The pharmaceutical chemistry option emphasizes the synthesis and characterization of pharmaceuticals as well as the relationship between the structure of the drug to its biological activity.

Students must take:

CHEM 455	Advanced Organic Chemistry
CHEM 531	Tactics of Organic Synthesis
CHEM 539	Introduction to Pharmaceutical Chemistry
BIOL 402	Metabolic Biochemistry
CHEM 497	Special Problems

Bachelor of Science in Chemistry with Emphasis in Polymer Chemistry*

Program Advisor: B. Mandal

A polymer is a chain of small molecules linked together to form a larger single molecule. Chemists make polymers because of their unique properties which they impart to products such as paints and adhesives, drug delivery systems, and artificial skin. The polymer chemistry option emphasizes the techniques involved in the synthesis and characterization of polymeric materials.

Students must take:

CHEM 455	Advanced Organic Chemistry
CHEM 470	Introduction to Polymer Chemistry
CHEM 535	Advanced Polymer Chemistry
CHEM 537	Polymer Chemistry Laboratory
CHEM 542	Polymer Characterization and Analysis

* Students interested in pursuing the Pharmaceutical Chemistry or Polymer Chemistry degree option must submit a formal letter of intent to a program advisor by the end of their second year. To insure adequate performance in CHEM 455 and graduate-level organic chemistry courses, students should have completed CHEM 237 and CHEM 239 with grades of B or better. Students must also take the American Chemical Society placement examination in organic chemistry after they complete CHEM 239. The results will be used for advising and tracking purposes.

Bachelor of Science in Chemistry with Emphasis in Materials Chemistry

Program Advisor: M.I. Khan

Materials chemistry is focused on the preparation and characterization of pure chemicals or chemical systems that have some unique function. This function can be dependent on the material's optical, electronic, magnetic, or catalytic properties. The materials chemistry option draws from all five of the basic areas of chemistry to lay the foundation for understanding the synthesis, structure, characterization, and applications of materials. A particularly strong emphasis at IIT is programmatic access to advanced X-crystallographic instrumentation to study the structure of inorganic-based materials in the solid state.

Students must take:

MS 201	Materials Sciences
MMAE 486	Principles of Ceramics
PHYS 437	Solid State Physics
CHEM 470	Introduction to Polymer Chemistry

Also choose one of the following:

MMAE 465	Electrical, Magnetic and Optical Properties of Materials
PHYS 415	Solid State Electronics

Bachelor of Science in Chemistry with Emphasis in Chemical Physics

Program Advisors: R. Wang

Chemical physics is focused on the development of theoretical constructs and experimental methodologies to infer the properties of bulk matter from a molecular prospective. Chemical physicists seek to unravel varied mysteries such as how proteins fold, how nanostructures form and behave, and how small molecules interact with cell membranes. The chemical physics option provides a solid foundation in chemistry with extensive coursework in physics and mathematics allowing students to make connections using the language of mathematics and the laws of physics to solve chemical problems.

Students must take:

PHYS 308	Classical Mechanics I
PHYS 401	Statistical Physics
PHYS 405	Fundamentals of Quantum Theory I
PHYS 410	Molecular Biophysics
PHYS 440	Computational Physics

Also choose one of the following:

PHYS 412	Modern Optics and Lasers
PHYS 413	Electromagnetism I
PHYS 437	Solid State Physics

Bachelor of Science in Chemistry with Secondary Science Teaching Certification

Program Advisors: N. Lederman

There is a national need for teachers with a rigorous training in chemistry. The chemical education option not only leads to the Bachelor of Science degree in Chemistry but also enables a student to obtain a science teaching certificate through our Department of Mathematics and Science Education (see pages 123–124 and **www.iit.edu/csl/msed**).

Students must take:

MSED 200	Analysis of Classrooms (Practicum and Seminar)
MSED 250	Middle and Secondary School Curriculum/Foundations
MSED 300	Instructional Methods/Strategies I
MSED 320	Inquiry and Problem Solving in Mathematics and Science
MSED 350	Informal Education Practicum and Seminar
MSED 400	Instructional Methods/Strategies II
MSED 450	Professional Internship
MSED 497	Special Projects

Molecular Biochemistry and Biophysics

Why should a biologist know about physics and chemistry? Why should physicists and chemists know about biology? Just ask some of IIT's faculty who are using x-ray synchrotron radiation science to study proteins and their molecular structures. This research may lead to the important advances in understanding the causes of a number of diseases.

Molecular Biochemistry and Biophysics (MBB) is an interdisciplinary major, combining studies in biology, chemistry, and physics. Its objectives are to give students solid training in the areas of modern cell biology, genetics, and biochemistry while also providing a strong background in mathematics and the physical sciences. In this way the MBB degree will provide each student with the skills needed to succeed as a professional in biology as the field becomes increasingly dependent on new technologies.

Through this curriculum, students will discover the essential building blocks of life, how they fit together, how they work, and the physical methods for exploring them. With its quantitative emphasis encompassing all the sciences, this program is a great way to prepare for careers in medicine or medical research. It is also one of the majors that is part of the honors medical programs with Rush University.

Bachelor of Science in Molecular Biochemistry and Biophysics

Required Courses	Credit Hours
Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 225, 401, 402, 404, 430, 445, 446, 451, 495 (2)	40
Chemistry Requirements CHEM 124, 125, 237, 239, (247 or PHYS 300), 343, (344 or PHYS 348)	24/26
Physics Requirements PHYS 123, 221, 223, 410	15
Interprofessional Projects	6
Mathematics Requirements MATH 151, 152, 251, (252 or PHYS 240), 425	20/21
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Total Hours	**128/131**

Molecular Biochemistry and Biophysics Curriculum

Semester 1		Credits
BIOL 100	Introduction to the Profession	2
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	1
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
Humanities 200-level Course		3
Total Hours		**16**

Semester 3		Credits
PHYS 123	General Physics I	4
CHEM 237	Organic Chemistry I	4
BIOL 214	Genetics	3
MATH 251	Multivariate and Vector Calculus	4
CS 105	Intro to Computer Programming I	2
Total Hours		**17**

Semester 4		Credits
PHYS 221	General Physics II	4
CHEM 239	Organic Chemistry II	3
BIOL 210	Microbiology	3
BIOL 225	Microbiology Laboratory	2
IPRO Elective I		3
Social Sciences Elective		3
Total Hours		**18**

Semester 5		Credits
BIOL 445	Cell Biology	3
PHYS 223	General Physics III	4
CHEM 247	Analytical Chemistry	
OR		3/4
PHYS 300	Instrumentation Lab	
CHEM 343	Physical Chemistry I	3
Humanities or Social Sciences Elective		3
Total Hours		**16/17**

Semester 6		Credits
BIOL 430	Animal Physiology	3
PHYS 240	Computational Science	
OR		3/4
MATH 252	Introduction to Differential Equations	
PHYS 348	Modern Physics	
OR		3/4
CHEM 344	Physical Chemistry II	
Social Sciences Elective		3
Humanities Elective (300+)		3
Total Hours		**15/17**

Semester 7		Credits
BIOL 451	Literature in Biology	2
BIOL 401	Introductory Biochemistry	3
PHYS 410	Molecular Biophysics	3
BIOL 446	Cell Biology Laboratory	3
BIOL 495	Biology Colloquium	1
Humanities Elective (300+)		3
Total Hours		**15**

Semester 8		Credits
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
BIOL 495	Biology Colloquium	1
MATH 425	Statistical Methods	3
IPRO Elective II		3
Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **128/131**

Post-Baccalaureate Premedical Program

The purpose of the Post-baccalaureate Premedical Program is to meet the needs of college graduates who have decided to pursue a medical education but who have taken none or only some of the basic science courses required for admission to medical school. The objective of the program is to provide rigorous education in all areas of the premedical sciences which are required for admission to any medical, osteopathic, or veterinary school in the country. Students who satisfactorily complete the program will be awarded a Certificate in Premedical Sciences. This program does not qualify for financial aid.

Coursework

Students sufficiently prepared in mathematics and English who enter the program in the fall semester can expect to complete the program in two years. The third year is known as the "glide year." This is the year between completing the program and entering medical school. For most students, the glide year provides the opportunity to take additional courses or to deepen their exposure to medicine through full-time employment in a clinical setting or in the arts and sciences:

- One year of college English, including a significant amount of expository writing .
- One year of college mathematics, beyond precalculus, including at least one term of calculus. Statistics is recommended as the second mathematics course.
- One year of general physics, including laboratory.
- One year of general chemistry, including laboratory.
- One year of organic chemistry, including laboratory.
- One year of biology, including laboratory, with significant emphasis in molecular and cellular biology.

Advising and Support

On the main campus of Illinois Institute of Technology there are a number of advisors who constitute the Premedical Advisory Committee, see: **www.iit.edu/premed**. Post-baccalaureate Premedical students will be assigned an advisor who will be available to counsel them as they plan their program of study and as they prepare their applications to medical school. A number of academic support services will be made available to students in the Post-baccalaureate Premedical Program. In the University's Academic Resource Center, students can meet with tutors at no expense for additional help in their premedical courses. In the Premedical Office, support staff will collect and send letters of recommendation to medical schools. Each year the Premedical Office and the IIT Honors Medical Society host a number of events specifically for premedical students including special seminars of medical interest and forums in which current students can learn from experiences of those who have already taken the MCAT or been admitted to medical school. The Princeton Review offers MCAT preparatory courses at reduced cost to IIT students in the spring semester each year. Post-baccalaureate Premedical students are invited and encouraged to attend weekly colloquia in the biological, chemical, and physical sciences and in other departments offering seminars of medical interest. Finally, IIT's location in the city of Chicago is a special advantage to students in the Post-baccalaureate Premedical Program. The city is home to six medical schools and numerous hospitals and medical research centers. It is also home to the American Medical Association. This concentration of medical practice will provide IIT Post-baccalaureate Premedical students with a wide variety of opportunities to gain experience in both clinical settings and in medical research through volunteer service and paid employment.

Academic Standards

Medical schools expect successful applicants to possess excellent grounding in the premedical sciences. The quality of a student's preparation is measured by the grades earned in premedical courses. For this reason, IIT Post-baccalaureate Premedical students will be held to high academic standards. At a minimum, students must maintain a cumulative GPA of 3.00 to remain in the program. Likewise, medical schools have high expectations about an applicant's character. Students in the IIT Post-baccalaureate Premedical Program are expected to conduct themselves with honesty and integrity inspiring confidence in their abilities to assume the responsibilities of medical practice.

Admissions Eligibility

The student must hold the degree of Bachelor of Arts or Science from an accredited college or university in the United States or an equivalent degree from an institution outside the United States. At a minimum, successful applicants must possess a cumulative undergraduate GPA of 3.00. In most cases, students will not be eligible for admission if they have applied to medical school previously or have completed their premedical preparation elsewhere within the last five years. This is not a remedial program. Students must submit a complete application package to the Office of Undergraduate Admission for full consideration.

Certificate in Premedical Sciences*

Required Courses	Credit Hours
Chemistry Requirements CHEM 124, 125, 237, 239, 240	17
Biology Requirements BIOL 107, 109, 115, 117	8
Mathematics Requirements MATH 151, PSYC 203 or MATH 425	8
Physics Requirements PHYS 123, 221	8
Total Hours	**41**

* Students who complete all of these courses (or their equivalents) with a GPA of 3.00 will be awarded a Certificate in Premedical Sciences. A minimum of 15 credit hours must be completed at IIT to be awarded the Certificate in Premedical Sciences.

Premedical Sciences Curriculum

Semester 1		Credits
CHEM 124	Principles of Chemistry I	4
PHYS 123	General Physics I	4
MATH 151	Calculus I	5
Clinical Volunteer Service		0
Total Hours		**13**

Semester 2		Credits
CHEM 125	Principles of Chemistry II	4
PHYS 221	General Physics II	4
PSYC 203	Undergrad Stats for Behavioral Sciences	3
OR		3
MATH 425	Statistical Methods	3
Clinical Volunteer Service		0
Total Hours		**11**

Semester 3		Credits
CHEM 237	Organic Chemistry I	4
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	1
Research Volunteer Service		0
Total Hours		**8**

Semester 4		Credits
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Laboratory	2
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
Research Volunteer Service		0
Total Hours		**9**

Total Credit Hours **41**

Prepare and take MCAT in April.

Summer Session: Submit Medical School Applications

Semesters 5 & 6 – The Glide Year –
The following courses are recommended but not required:
BIOL 214 Genetics
BIOL 401 Introductory Biochemistry
BIOL 402 Metabolic Biochemistry
BIOL 430 Animal Physiology
BIOL 445 Cell Biology
BIOL 451 Biological Literature

Full-time employment in health care or in medical research is strongly encouraged during this year.

Other Degree Programs in Biological and Chemical Sciences

Beyond the traditional degree programs, the department offers several specialized programs designed for students who are interested in studying science and who wish to pursue a postgraduate education. Detailed programs of study for each of the programs listed below are available from the department.

Research Honors Program

This program is specifically designed for students who plan to pursue an advanced research degree. The program of study is based on the traditional degrees but is accelerated to include a full year of research experience in a faculty research lab, culminating in a senior thesis. In addition, students selected for this program may have guaranteed stipends for the summers after their sophomore and junior years in addition to any other scholarships that have been awarded.

Combined B.S./M.D. Program

For detailed information, see page 179.

Honors Law Program

Students in any of the Biological and Chemical Sciences programs are eligible for this program (see page 178). For students in biology or chemistry, this is a seven-year program which can be accelerated under special conditions approved by the student's advisor.

Five-Year Financial Markets Program

This program combines an undergraduate science degree with the Master of Science in Financial Markets. The five-year combined B.S./M.S. program guarantees admission to the Master's program, provided the student maintains an undergraduate GPA of 3.00 and obtains a satisfactory score on the GMAT. Students enrolled in any of the Biological and Chemical Sciences programs are eligible for this program.

Biomedical Engineering

Website: engineering.iit.edu/bme

Wishnick Hall Suite 314
3255 S. Dearborn St.
Chicago, IL 60616
312.567.5324

Chair
David Mogul

Mission
The mission of the Biomedical Engineering undergraduate program at IIT is to educate students in the fundamentals of biomedical engineering. This foundation consists of a broad exposure to the chemical, mathematical, physical, and biological sciences, coupled with the appropriate technical and engineering skills to be able to fill diverse professional roles in industry, graduate school, and the medical professions.

Biomedical Engineering at IIT
Biomedical engineering is an interdisciplinary major in which the principles and tools of traditional engineering fields, such as mechanical, materials, electrical, and chemical engineering, are integrated with the chemical, physical, and biological sciences. Together, they are applied towards a better understanding of physiological processes in humans or towards the solution of medical problems. Engineering will continue to play an increasingly important role in advancing medical treatment, developing biotechnology, and improving health-care delivery. By its very nature, biomedical engineering is expansive and requires a broad and integrated foundation in the physical, chemical, mathematical, and biological sciences.

Program Outcomes and Objectives
At the undergraduate level, the department offers a four-year engineering curriculum leading to a Bachelor of Science (B.S.) in Biomedical Engineering.

Our students will attain the following outcomes by the time of their graduation:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multi-disciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for and an ability to engage in life-long learning.
- A knowledge of contemporary issues.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The program educational objectives for the BME program are:

- Graduates will meet the expectations of employers of biomedical engineers.
- Qualified graduates will pursue advanced study if they so desire.
- Graduates will assume/undertake leadership roles in their professions.

The Biomedical Engineering Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Biomedical Engineering/Master of Chemical Engineering
- Bachelor of Science in Biomedical Engineering/Master of Biomedical Imaging and Signals

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Biomedical departmental website:
engineering.iit.edu/bme.

For information regarding faculty visit the Biomedical Engineering website at
engineering.iit.edu/bme/people/faculty.

Areas of Specialization (Tracks)

The Biomedical Engineering program has three areas of specialization (or tracks): cell and tissue engineering, medical imaging, and neural engineering. While distinct in their concept, these areas share core exposure to the physical, chemical, biological, and engineering sciences. Thus, there is potential for considerable crossover among the areas at the upper-division level. This is indicated by the track course options.

Medical School Admission

For information regarding admission to medical schools, see page 180 or go to **www.iit.edu/premed**.

Cell and Tissue Engineering

This area involves the more recent attempts to understand and attack biomedical problems at the microscopic level and to use such knowledge to begin to "engineer" replacement tissues and organs from individual cells. Knowledge of anatomy, biochemistry, and the mechanics of cellular and sub-cellular structures is necessary in order to understand disease processes and to be able to intervene at very specific sites. With such knowledge a number of approaches have been or are being developed. These range from the development of miniature devices to deliver compounds that can stimulate or inhibit cellular processes at precise target locations in order to promote healing or inhibit disease formation and progression to the newer techniques that have produced replacement skin and one day will produce heart valves, coronary vessels, and even whole hearts. This area also includes the development of artificial materials used for implantation. Understanding the properties and behavior of living material is vital in the design of implant materials. The use of placing materials in the human body for healing or repair has been practiced for over 100 years, but it remains one of the most difficult tasks faced by the biomedical engineer. Certain metal alloys, ceramics, polymers, and composites have been used as implantable materials. Biomaterials must not only function normally over the lifespan of the recipient but also be nontoxic, non-carcinogenic, chemically inert, stable, and sufficiently strong to withstand the repeated forces of a lifetime. Few materials meet all such specifications. Newer biomaterials are being developed which incorporate proteins or living cells in order to provide a truer biological and mechanical match for the living tissue.

Bachelor of Science in Biomedical Engineering: Cell and Tissue Engineering Track

Required Courses	Credit Hours
Biomedical Engineering Core Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 453, 490	24
Cell and Tissue Engineering Requirements CS 115, MMAE 200, ECE 215, CHEM 237, 239, CHE 202, BME 301, 335, 418, 424, 433, 482, two BME electives (six credit hours)	42
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 124, 125	8
Biology Requirements BIOL 115, 117	4
Interprofessional Projects	6
Humanities and Social Science Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Total Hours	**131**

Biomedical Engineering Curriculum: Cell and Tissue Track

Semester 1		Credits
BME 100	Introduction to the Profession	2
CS 115	Object-Oriented Programming I	2
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Experimental Biology	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Total Hours		**17**

Semester 3		Credits
ECE 215	Circuit Analysis I	3
MATH 252	Introduction to Differential Equations	4
MMAE 200	Introduction to Mechanics	3
Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
BME 200	Biomedical Engineering Application of MATLAB	2
CHE 202	Material Energy Balances	3
MATH 251	Multivariate and Vector Calculus	4
PHYS 221	General Physics II	4
Social Sciences Elective		3
Total Hours		**16**

Semester 5		Credits
BME 315	Instrumentation Laboratory	2
BME 330	Analysis of Biosignals and Systems	3
CHEM 237	Organic Chemistry I	4
BME 433	Biomedical Engineering Applications of Statistics	3
IPRO Elective I		3
Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 6		Credits
BME 301	Biofluid Mechanics	3
BME 310	Biomaterials	3
BME 320	Biofluids Laboratory	1
BME 335	Thermodynamics of Living Systems	3
CHEM 239	Organic Chemistry II	3
BME Elective*		3
Total Hours		**16**

Semester 7		Credits
BME 405	Physiology Laboratory	2
BME 408	Reaction Kinetics	3
BME 419	Introduction to Design	2
BME 453	Quantitative Physiology	3
BME 482	Mass Transport for BME	3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 8		Credits
BME 420	Design Concepts in BME	3
BME 424	Quantitative Aspects of Cell and Tissue Engineering	3
BME 490	Senior Seminar	1
IPRO Elective II		3
BME Elective*		3
Humanities Elective (300+)		3
Total Hours		**16**

Total Credit Hours **131**

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Medical Imaging

This area combines knowledge of unique physical properties of electromagnetic and acoustic energy with high-speed electronic data processing, signal analysis, and rapid display to generate an image of a body part or, more recently, of a bodily function. Often, these images can be obtained with minimal or completely noninvasive procedures, making them less painful and more readily repeatable than invasive techniques. Moreover, many of the devices require no ionizing radiation doses, thereby lessening the danger of secondary radiation effects on the patient. The students learn the theoretical bases underlying the common forms of medical imaging, such as magnetic resonance imaging (MRI), computerized axial tomography scanning (CAT-scan), positron emission tomography (PET), and the limitations and the applicability of such techniques.

Bachelor of Science in Biomedical Engineering: Medical Imaging Track

Required Courses	Credit Hours
Biomedical Engineering Core Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 453, 490	24
Medical Imaging Requirements CS 115, 116, ECE 215, 216, 437, 481, BME 309, 433, 438, 443, 445, PHYS 224 or CHEM 237, MATH 333 or CHEM 239, two BME electives (6 credit hours)	43/44
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 124, 125	8
Biology Requirements BIOL 115, 117	4
Interprofessional Projects	6
Humanities and Social Science Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Total Hours	**132/133**

Biomedical Engineering Curriculum: Medical Imaging Track

Semester 1		Credits
BME 100	Introduction to the Profession	2
CS 115	Object-Oriented Programming I	2
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Experimental Biology	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Total Hours		**17**

Semester 3		Credits
CS 116	Object-Oriented Programming II	2
ECE 215	Circuit Analysis I	3
MATH 252	Introduction to Differential Equations	4
PHYS 221	General Physics II	4
Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
BME 200	Biomedical Engineering Application of MATLAB	2
ECE 216	Circuit Analysis II	3
MATH 251	Multivariate and Vector Calculus	4
PHYS 224	Thermal and Modern Physics	
OR		3/4
CHEM 237	Organic Chemistry I	
Humanities or Social Sciences Elective		3
Humanities Elective (300+)		3
Total Hours		**18/19**

Semester 5		Credits
BME 309	Biomedical Imaging and Sensing	3
BME 315	Instrumentation Laboratory	2
BME 330	Analysis of Biosignals and Systems	3
BME 433	Biomedical Engineering Applications of Statistics	3
MATH 333	Matrix Algebra and Complex Variables	
OR		3
CHEM 239	Organic Chemistry II	
IPRO Elective I		3
Total Hours		**17**

Semester 6		Credits
BME 310	Biomaterials	3
BME 320	Fluids Laboratory	1
BME 443	Biomedical Instrumentation/Electronics	3
BME 445	Quantitative Neural Function	3
BME Elective*		3
Social Sciences Elective		3
Total Hours		**16**

Semester 7		Credits
BME 405	Physiology Laboratory	2
BME 419	Introduction to Design	2
BME 453	Quantitative Physiology	3
ECE 437	Digital Signal Processing	3
IPRO Elective II		3
BME Elective*		3
Total Hours		**16**

Semester 8		Credits
BME 438	NeuroImaging	3
BME 420	Design Concepts in BME	3
BME 490	Senior Seminar	1
ECE 481	Image Processing	3
Humanities Elective (300+)		3
Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **132/133**

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Neural Engineering

This area uses fundamental and applied engineering techniques to help solve basic and clinical problems in the neurosciences. At the fundamental level it attempts to understand the behavior of individual neurons, their growth, signaling mechanisms between neurons, and how populations of neurons produce complex behavior. Such information has broad application to a better understanding of the communication that occurs between the various parts of the nervous system and the brain. For example, such an understanding can be applied to the development of replacement parts for impaired neural systems, such as the auditory, visual, and motor systems as well as achieving a better understanding of how normal and diseased systems work.

Bachelor of Science in Biomedical Engineering: Neural Engineering Track

Required Courses	Credit Hours
Biomedical Engineering Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 453, 490	24
Neural Engineering Requirements CS 115, ECE 211, 213, 218, BME 309, 433, 443, 445, 438, MATH 333 or CHEM 237, technical elective or CHEM 239, three BME electives (nine credit hours)	43/44
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 124, 125	8
Biology Requirements BIOL 115, 117	4
Interprofessional Projects	6
Humanities and Social Science Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Total Hours	**132/133**

Biomedical Engineering Curriculum: Neural Engineering Track

Semester 1		Credits
BME 100	Introduction to the Profession	2
CS 115	Object-Oriented Programming I	2
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Experimental Biology	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Total Hours		**17**

Semester 3		Credits
ECE 211	Circuit Analysis I	4
ECE 218	Digital Systems	3
MATH 252	Introduction to Differential Equations	4
Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
BME 200	Biomedical Engineering Application of MATLAB	2
ECE 213	Circuit Analysis II	4
MATH 251	Multivariate and Vector Calculus	4
PHYS 221	General Physics II	4
Social Sciences Elective		3
Total Hours		**17**

Semester 5		Credits
BME 309	Imaging and Sensing	3
BME 315	Instrumentation Laboratory	2
BME 330	Analysis of Biosignals and Systems	3
MATH 333	Matrix Algebra and Complex Variables	
OR		3/4
CHEM 237	Organic Chemistry I	
IPRO Elective I		3
BME 433	Biomedical Engineering Applications of Statistics	3
Total Hours		**17/18**

Semester 6		Credits
BME 310	Biomaterials	3
BME 320	BioFluids Laboratory	1
BME 443	Biomedical Instrumentation/Electronics	3
BME 445	Quantitative Neural Function	3
BME Elective*		3
CHEM 239	Organic Chemistry II	
OR		3
Technical Elective		
Total Hours		**16**

Semester 7		Credits
BME 405	Physiology Laboratory	2
BME 419	Introduction to Design	2
BME 453	Quantitative Physiology	3
IPRO Elective II		3
BME Elective*		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 8		Credits
BME 420	Design Concepts in BME	3
BME 438	NeuroImaging	3
BME 490	Senior Seminar	1
BME Elective*		3
Social Sciences Elective (300+)		3
Humanities Elective (300+)		3
Total Hours		**16**

Total Credit Hours **132/133**

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Stuart School of Business

Website: stuart.iit.edu

IIT Tower, 18th Floor
10 W. 35th Street
Chicago, IL 60616
312.906.6500

Dean
Harvey Kahalas

Associate Deans
Siva K. Balasubramanian
John Bilson

At IIT Stuart School of Business, students learn business in a hands-on, innovative way that prepares them for careers in finance, management, marketing, or to launch their own entrepreneurial ventures. Earning a business degree at a tech school often leads to working and studying side by side with engineers, scientists, programmers, and architects. Students also learn how to collaborate with, and to lead interdisciplinary teams by working on highly innovative, technology-driven, real-world projects.

The Bachelor of Science in Business Administration (B.S.B.A.) not only offers specializations in marketing and finance, but also allows students to go beyond these traditional fields to select a specialization in many departments or schools within IIT that approve the specialization. Such specializations could include, but are not limited to, applied mathematics, chemistry, construction management, information technology, life sciences, logistics, material sciences, etc.

This distinctive program is designed to educate students to deal with the problems of an increasingly complex business environment. In conjunction with the IIT Core Curriculum requirement, with its focus on mathematics, computer science, and natural sciences, the business curriculum helps students gain practice of business administration and preparation for the Next Economy.

The objectives of this program are to provide future business owners, managers, and leaders with:

- A solid technological foundation for the new and emerging business environment.
- A fundamental grounding in the core competencies of business including accounting, economics, finance, marketing, management, and social skills.
- An understanding of the interdisciplinary nature of management in today's complex businesses, which compete in the global economy.

The Stuart School of Business also offers the following co-terminal degree, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Business Administration/Master of Public Administration

Co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Stuart School of Business departmental website:
stuart.iit.edu

For information regarding faculty visit the Stuart School of Business website at **stuart.iit.edu/faculty**

Bachelor of Science in Business Administration

The Bachelor of Science in Business Administration provides a solid foundation in business fundamentals along with a basic grounding in science. Core business competencies include accounting, economics, statistics, finance, business law, marketing, management, entrepreneurship, and leadership. Students also take a specialization that allows them to develop a depth of knowledge in a business field or another field of their choosing. Currently available business specializations are in finance and marketing, while specializations outside of business can be developed to meet the special needs of a student.

Bachelor of Science in Business Administration

Required Courses	Credit Hours
Business Requirements BUS 100, 211, 212, 221, 301, 305, 311, 321, 341, 351, 361, 371, 467, 480, ECON 151, 152	48
Project Courses BUS 102, 103, 104, 203, 204, 303, 403, 404	8
Specialization Courses	15
Mathematics Requirements MATH 151 or (MATH 148 and MATH 149)	5
Science Requirements See IIT Core Curriculum, section D, page 25.	12
Humanities and Social Science Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Computer Science Requirement CS 105 or CS 110	2
Interprofessional Projects Strongly recommended one IPRO elective to be IPRO 397 or an entrepreneurial IPRO.	6
Free Electives	9
Total Hours	**126**

Business Administration Curriculum

Semester 1		Credits
BUS 100	Introduction to Business	3
BUS 102	Computing Tools for Business Analysis	1
ECON 151	Making Strategic Decisions in the Marketplace	3
MATH 151	Calculus I	5
CS 105	Intro to Computer Programming I	2
Humanities 200-level Course		3
Total Hours		**17**

Semester 2		Credits
BUS 103	Ideation: What Are My Interests	1
BUS 221	Analytics for Informed Decision-Making	3
ECON 152	Understanding and Competing in the Global Marketplace	3
Science Elective		3
Humanities or Social Sciences Elective		3
Social Sciences Elective		3
Total Hours		**16**

Semester 3		Credits
BUS 104	Needs Analysis and Opportunity Analysis Aligned with My Interests	1
BUS 211	Measuring and Assessing Entity Financial Performance	3
BUS 301	Designing and Structuring the Organization for Strategic Decision-Making	3
Science Elective		3
Science Elective		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 4		Credits
BUS 203	Indentification and Evaluation of Prospective Consumers	1
BUS 212	Managerial Decision-Making and Control	3
BUS 341	Business Law for Entrepreneurs in the Modern Global Economy	3
BUS 351	Effective Financial Decision-Making	3
BUS 371	Strategies for Reaching New Markets	3
Science Elective		3
Total Hours		**16**

Semester 5		Credits
BUS 204	Indentification and Evaluation of Competitive Advantage	1
BUS 311	Strategic Cost Management	3
BUS 321	Quantitative Models for Effective Decision-Making	3
BUS 361	Entrepreneurial Thinking and Practice in a Complex Organization	3
Specialization Elective*		3
Social Sciences Elective		3
Total Hours		**16**

Semester 6		Credits
BUS 303	Financial Analysis: Pro-Forma Financial Statements	1
BUS 305	Contemporary Design of Business Processes and Business Models	3
Specialization Elective*		3
Specialization Elective*		3
IPRO Elective I**		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 7		Credits
BUS 403	Developing a Strategically Competitive Business Plan	1
BUS 467	Managing Entrepreneurial Enterprise and the Global Marketplace	3
IPRO Elective II**		3
Specialization Elective*		3
Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**16**

Semester 8		Credits
BUS 404	Selling Your Business Plan	1
BUS 480	Strategic Management and Design Thinking for the Next Economy	3
Specialization Elective*		3
Free Elective		3
Free Elective		3
Total Hours		**13**

Total Credit Hours **126**

* At least 15 semester hours in a designated specialization.

** Strongly recommend one IPRO elective be IPRO 397 or an entrepreneurial IPRO.

Chemical and Biological Engineering

Website: engineering.iit.edu/chbe

Perlstein Hall Suite 127
10 W. 33rd St.
Chicago, IL 60616
312.567.30230

Chair
Sohail Murad

The department offers leading edge research and education programs in Chemical Engineering and Biological Engineering. These programs are aimed to prepare engineers for the technological challenges of the 21st century by providing students with:

- Fundamental knowledge and design capability in chemical, biological, and environmental engineering, food process engineering, and pharmaceutical engineering.
- Advanced research programs in core competency areas.
- Understanding of ethical, economic, and social issues that influence technology choices.
- Leadership and communication skills.
- Life-long learning capabilities.

The objective of the undergraduate program is to educate chemical engineering students and prepare them for career in professional practice and/or for advanced studies at the graduate level. The program specifically aims to develop a new breed of engineers who are not only well schooled in the basics and fundamentals of chemical and biological engineering, but who also possess the skills necessary for success in today's workplace. In recognition of the recent shift of the chemical engineering profession into a more prominent involvement in biotechnology and biological engineering, the department has redesigned the undergraduate curriculum in order to ensure that its graduates will possess additional knowledge and skills in biology and biological engineering as predicated by the changing needs of industry.

B.S., M.S., Professional Master's, and Ph.D. degree programs are offered in Chemical Engineering. A Professional Master's degree is offered in Biological Engineering. M.S. and Professional Master's degree programs are also offered in Chemical Engineering/Computer Science. The department also offers a B.S./M.D. program in Engineering and Medicine (see page 179) and a combined undergraduate/graduate law program (see page 178).

The Chemical and Biological Engineering Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Biomedical Engineering/Master of Chemical Engineering
- Bachelor of Science in Chemical Engineering/Master of Biological Engineering
- Bachelor of Science in Chemical Engineering/Master of Chemical Engineering
- Bachelor of Science in Chemical Engineering/Master of Environmental Engineering
- Bachelor of Science in Chemical Engineering/Master of Food Process Engineering

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Chemical and Biological Engineering departmental website: **engineering.iit.edu/chbe**.

For information regarding faculty visit the Chemical and Biological Engineering website at
engineering.iit.edu/chbe/people/faculty.

Chemical Engineering

Chemical engineering is concerned with the design, development, and management of facilities that convert raw materials into useful products. The engineer must assume responsibility for the economical use of the raw materials, preservation of the environment, and profitability of the operation. The Chemical Engineering program has been designed to provide both the engineering competence and the professional skills necessary to succeed in this endeavor. In order to achieve this objective, the curriculum incorporates coursework in both of these areas throughout the four-year duration of the program.

Coursework

The Chemical Engineering curriculum emphasizes basic knowledge and applications of transport processes, thermodynamics and kinetics of processes, automatic control, and design, as well as fundamental sciences, mathematics, and engineering sciences. Design experience is spread across the curriculum, beginning with the Introduction to the Profession courses. Equipment design is emphasized in courses such as Fluid Mechanics, Heat and Mass-Transfer Operations, Thermodynamics, and Chemical Reaction Engineering. Control-system design is practiced in the Process Control course. Process modeling, simulations and optimization are discussed and practiced in Transport Phenomena, Process Modeling and System Theory, Numerical and Data Analysis, Statistical Tools for Engineering, and Process Control courses. The capstone design courses (Chemical Process Design I & II) integrate these design concepts and practice process design and optimization. In addition to engineering competence, the program also examines the economic, environmental, and societal implications of chemical engineering.

Professional Training

Professional training is stressed in the design of the Chemical Engineering curriculum. Because engineering is largely a team effort, the department develops the individual's ability to work effectively as a team member. Group projects are assigned starting with the Introduction to the Profession course. Laboratory course and capstone design course projects are conducted by teams of students. The laboratory work is designed to reinforce the concepts developed in the lectures and to show the application of chemical engineering principles to the solution of real-world problems. Because individual attention is so important to the student's growth, laboratory sections are small and a high-level of personal contact between student and instructor is maintained. Students are encouraged to become involved with state-of-the-art research projects at the undergraduate level. The industry/university co-op program is available to students who would like to use one or more extra semesters any time after their sophomore year to work on an internship in industry.

Specialized Programs

In addition to the core curriculum, special programs exist to accommodate students who want to develop more extensive background in related areas. With their exposure to a wide range of industrial applications and problems, students are better equipped to make a decision to explore an area of interest in depth. Professional specializations are available in:

- Energy/Environment/Economics (E^3)
- Environmental Engineering
- Polymer Science and Engineering
- Bioengineering
- Process Design and Operation

Students may also choose a minor program (see pages 172–175). All students must include in their minor program, or as a technical elective, CHE 426 (Statistical Tools for Engineers) or at least one three-credit-hour engineering science course. Students who plan to go to graduate school are advised to take CHE 535 (Applications of Mathematics to Chemical Engineering) as a technical elective.

Bachelor of Science in Chemical Engineering

Required Courses	Credit Hours
Chemical Engineering Requirements CHE 100, 101, 202, 301, 302, 311, 317, 351, 406, 418, 423, 433, 435, 439, 451, 494, 496	47
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 125, 237, 239, 343, CHEM 344 or BIOL 403	18
Computer Science Requirement CS 104 or CS 105	2
Electrical and Computer Engineering Requirement ECE 215 or 218	3
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Technical Electives	9
Interprofessional Projects	6
Total Hours	**132**

Chemical Engineering Curriculum

Semester 1		Credits
CHE 100	Introduction to the Profession I	2
MATH 151	Calculus I	5
CHEM 125	Principles of Chemistry II*	4
CS 104	Introduction to Computer Programming for Engineers	
OR		2
CS 105	Intro to Computer Programming I	
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
CHE 101	Introduction to the Profession II	2
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
CHE 202	Material and Energy Balances	3
MATH 252	Introduction to Differential Equations	4
CHEM 237	Organic Chemistry I	4
PHYS 221	General Physics II	4
Humanities Elective (300+)		3
Total Hours		**18**

Semester 4		Credits
CHE 301	Fluid Mechanics	3
MATH 251	Multivariate and Vector Calculus	4
CHEM 239	Organic Chemistry II	3
CHEM 343	Physical Chemistry II	3
Social Sciences Elective		3
Total Hours		**16**

Semester 5		Credits
CHE 302	Heat and Mass Transfer Operations	3
CHE 311	Foundations of Bio Science for Engineers	3
CHE 351	Thermodynamics I	3
ECE 215	Circuit Analysis I	
OR		3
ECE 218	Digital Systems	
Humanities Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
CHE 317	Chemical/Biological Engineering Lab I	2
CHE 451	Thermodynamics II	3
CHE 433	Process Modeling and System Theory	3
CHEM 344	Physical Chemistry II**	4
IPRO Elective I		3
Technical Elective		3
Total Hours		**18**

Semester 7		Credits
CHE 418	Chemical/Biological Engineering Lab II	2
CHE 423	Chemical Reaction Engineering	3
CHE 435	Process Control	3
CHE 494	Process Design I	3
Technical Elective		3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 8		Credits
CHE 406	Transport Phenomena	3
CHE 439	Numerical and Data Analysis	3
CHE 496	Process Design II	3
IPRO Elective II		3
Technical Elective		3
Total Hours		**15**

Total Credit Hours **132**

* Initial placement in CHEM 125 requires consent of the Biological and Chemical Sciences (BCS) department.

** BIOL 403 may substitute for CHEM 344.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Professional Specializations

Students choosing one of the professional specializations should take a total of three courses in the specialization area.

Appropriate substitution may be made with the approval of the program advisor.

Energy/Environment/Economics (E^3)
Program advisor: J. Abbasian

Students must take the following course:

CHE 543 Energy, Environment, Economics

In addition, they should choose at least one course from each of these two areas:

Energy Sources, Conversion, Utilization, and Distribution

CHE 465 Electrochemical Energy Conversion
CHE 467 Fuel Cell System Design
CHE 489 Fluidization
CHE 491 Undergraduate Research
CHE 541 Renewable Energy Technologies
CHE 542 Fluidization and Gas-Solids Flow Systems
CHE 565 Electrochemical Engineering
CHE 567 Fuel Cell Fundamentals
CHE 582 Interfacial and Colloidal Phenomena
ECE 319 Fundamentals of Power Engineering
ECE 411 Power Electronics
ECE 419 Power System Analysis
ECE 420 Analysis Methods in Power Systems
ECE 438 Control Systems
MMAE 423 Air Conditioning and Refrigeration
MMAE 424 Internal Combustion Engines
MMAE 425 Direct Energy Conversion
MMAE 426 Nuclear, Fossil-Fuel, & Sustainable Energy Systems
MMAE 524 Fundamentals of Combustion
MMAE 525 Fundamentals of Heat Transfer

Energy and Environment, System Analysis, and Special Problems

CHE 426 Statistical Tools for Engineers
ENVE 404 Water and Wastewater Engineering
ENVE 463 Introduction to Air Pollution Control
ENVE 485 Pollution Prevention
ECE 491 Undergraduate Research
MMAE 491 Undergraduate Research
MMAE 494 Undergraduate Design Project
MMAE 497 Undergraduate Special Topic
ECON 423 Economic Analysis of Capital Investments
PS 338 Energy and Environmental Policy
IPRO 497 In Energy/Environment Areas

Environmental Engineering
Program advisor: P. Anderson

Students must take at least one course from each of the following two areas:

Environmental Engineering

CHE 426 Statistical Tools for Engineers
ENVE 404 Water and Wastewater Engineering
ENVE 463 Introduction to Air Pollution Control
ENVE 485 Pollution Prevention
ENVE 491 Undergraduate Research

Civil Engineering

CAE 421 Risk Assessment Engineering
CAE 482 Hydraulic Design of Open Channel Systems
CAE 483 Environmental Systems for Building I
CAE 484 Environmental Systems for Building II
IPRO 497 In Energy/Environment Areas

Process Design and Operation
Program advisor: D. Chmielewski

For students interested in design, operation, monitoring, optimization, and control of chemical processes.

At least one course must be taken from the following:

CHE 426 Statistical Tools for Engineers
CHE 508 Process-Design Optimization
CHE 530 Advanced Process Control
CHE 560 Statistical Quality and Process Control

A least one must be selected from the following (only one may be an ENVE course):

CHE 430 Petrochemical Process Operations and Design
CHE 465 Electrochemical Energy Conversion
CHE 489 Fluidization
CHE 491 Undergraduate Research
ENVE 463 Introduction to Air Pollution Control
ENVE 476 Engineering Control of Industrial Hazards
ENVE 485 Pollution Prevention
ENVE 578 Industrial Gas Cleaning
ENVE 580 Hazardous Waste Engineering
FPE 521 Food Process Engineering
FPE 522 Advanced Food Process Engineering

Polymer Science and Engineering
Program advisors: J. Schieber, D. Venerus

The program embraces polymer chemistry, characterization, structure and properties, as well as the manufacture of polymeric raw materials and their processing into finished products.

Students must take one of the following courses:
CHE 470 Introduction to Polymer Science
CHEM 470 Introduction to Polymer Science
MMAE 470 Introduction to Polymer Science

In addition, they should choose at least one course from the following:
CHE 538 Polymerization Reaction Engineering
CHE 555 Polymer Processing
CHE 575 Polymer Rheology
CHEM 535 Advanced Polymer Chemistry
CHEM 537 Polymer Chemistry Laboratory
CHEM 542 Interfacial Characterization of Polymers
MMAE 483 Structure/Property Relation in Polymers
MMAE 487 Fiber Reinforced Polymer Composite Materials
MMAE 579 Characterization of Polymers
MMAE 580 Structure and Property of Polymers
MMAE 581 Theory of Mechanical Behavior of Polymers

Students may take up to one course from the following:
CHE 426 Statistical Tools for Engineers
CHE 489 Fluidization
CHE 491 Undergraduate Research
CHE 582 Interfacial and Colloidal Phenomena
FPE 541 Principles of Food Packaging
MMAE 451 Finite Element Methods in Engineering
MMAE 485 Manufacturing Processing

Bioengineering
Program advisors: S. Parulekar and V. Pérez-Luna

Bioengineering has two career specializations:

Biomedical Engineering
Students must take the following courses:
BIOL 107 General Biology
BIOL 115 Human Biology

One elective is chosen from the following:
BIOL 214 Genetics
OR
BIOL 414 Genetics for Engineering Scientists
BIOL 401 Introductory Biochemistry
BIOL 430 Animal Physiology
BIOL 445 Cell Biology
CHE 491 Undergraduate Research
CHE 577 Bioprocess Engineering

Biotechnology
Three electives are chosen from the following:
BIOL 107 General Biology
BIOL 214 Genetics
OR
BIOL 414 Genetics for Engineering Scientists
BIOL 401 Introductory Biochemistry
BIOL 423 Microbial Genetics Laboratory
BIOL 445 Cell Biology
CHE 577 Bioprocess Engineering
FPE 505 Food Microbiology

Civil, Architectural, and Environmental Engineering

Website: engineering.iit.edu/caee

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3201 S. Dearborn St.
Suite 228
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312.567.3540

Chair
Gongkang Fu

The Department of Civil, Architectural, and Environmental Engineering offers three degree programs that prepare the IIT graduate to face a changing world and create solutions that benefit all of humanity.

Civil engineering is the oldest of all engineering professions. Its roots can be traced back to ancient history and followed through to modern times by its ubiquitous presence in the lives of every modern and emerging society across the globe. Civil engineers are needed to answer the basic challenges rooted in all of engineering.

Civil engineers work on large infrastructure projects; everything from highways, railroads, pipelines, water treatment systems, dams, reservoirs, seaports, airports, waterways, tunnels, cities, and even skyscrapers. Civil engineers do more than build; they are responsible for ensuring the safety of infrastructure.

Architectural engineers work on buildings. They design and integrate the structure, systems, enclosure, and environment to create a single design that answers and exceeds the needs of the client. Architectural engineering is multidisciplinary by its nature. Studies include thermodynamics of building components, the science of air and water flow, the management of electrical energy, the design of light steel space frames, how to provide the proper illumination in an auditorium, how to manage the humidity in the air, and how to make a theater's acoustics enhance any performance. Architectural engineers are trained to work with architects to incorporate engineering directly into design and ensure that a building performs as expected and actually protects its occupants from the threat of fire and smoke.

Environmental engineering is a specialization within civil engineering. The department offers a Bachelor's degree with specialization in environmental engineering and a Master's program in environmental engineering. Environment engineers are the designers of sustainable solutions to protect as well as use air, water, and earth across the globe. They fulfill a crucial aspect in the design of our infrastructure to ensure that resources are conserved and used for the benefit of humanity now and well into the future.
Engineering management is a degree that focuses on the development of professional skills and catapulting new ideas into new products and services in any field of engineering. The degree allows students to concentrate in any engineering area and augments engineering skills with improved knowledge of creativity, innovation, communication, intellectual property, and entrepreneurship. The degree is designed to give maximum freedom in course selection and can be tailored to provide the building blocks leading to start a Master's program in any engineering field.

The Civil, Architectural, and Environmental Engineering Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Architecture/Master of Construction Engineering and Management
- Bachelor of Science in Architectural Engineering/Master of Architectural Engineering
- Bachelor of Science in Architectural Engineering/Master of Construction Enginering and Management
- Bachelor of Science in Architectural Engineering/Master of Structural Engineering
- Bachelor of Science in Chemical Engineering/Master of Environmental Engineering
- Bachelor of Science in Civil Engineering/Master of Construction Engineering and Management
- Bachelor of Science in Civil Engineering/Master of Enviornmental Engineering
- Bachelor of Science in Civil Engineering/Master of Geotechnical Engineering
- Bachelor of Science in Civil Engineering/Master of Structural Engineering
- Bachelor of Science in Civil Engineering/Master of Transportation Engineering

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Civil, Architectural, and Environmental Engineering departmental website: **engineering.iit.edu/caee**.

The programs in Civil, Architectural, and Environmental Engineering lay a broad basis to begin the journey to professional licensure and assume the responsibility to "...hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties." – American Society of Civil Engineers Code of Ethics.

For information regarding faculty visit the Civil, Architectural, and Environmental Engineering website at **engineering.iit.edu/caee/people/faculty**.

Civil Engineering

The objective of the Civil Engineering program is to prepare graduates to enter and be successful in the civil engineering profession. Graduates are expected to become licensed professional engineers, and to reach responsible positions in a wide range of professional settings, including consulting firms, industry, or government. As well, this program will prepare students to begin and successfully complete graduate studies in engineering and/or post-baccalaureate education in a professional degree program. The Civil Engineering program provides breadth in core sub-disciplines and depth in at least one area of specialization. This degree program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Civil engineering is the original of the engineering disciplines. With the increase in population, the growing complexity of industries, and changing urban centers, the civil engineer's task - applying science to the control and utilization of the environment for the total benefit of mankind - represents a challenge unsurpassed in all of engineering.

The civil engineer often is confronted with conditions so variable and complex that they cannot be precisely defined by science and mathematics. Therefore, a knowledge of the arts and social sciences, as well as the physical sciences, is essential. In addition, because civil engineering requires overall planning of very large projects whose components involve many other disciplines, it is also necessary to have knowledge of management techniques. The goal of the Civil Engineering program is to provide an education that enables graduates to make far-reaching decisions that draw not only from technical knowledge but also from integrity and judgment.

In the professional courses, classroom lectures are supplemented by laboratory practice, including the study of materials, structural engineering, hydraulics, environmental engineering, geotechnical engineering, and surveying. The principal functional areas that are considered subdivisions of civil engineering are structural engineering, transportation engineering, geotechnical engineering, environmental engineering, water resources engineering, and construction management.

Students may choose a professional specialization as described on the following pages, or one of the following minors: Air Force Aerospace Studies, Military Science, Naval Science, and other approved minors (see pages 172–175).

Architecture students who plan to pursue a Master's degree in Structural Engineering should take the following courses:

CAE 303 Structural Design I
CAE 304 Structural Analysis I
CAE 307 Structural Design II
CAE 431 Steel Design
CAE 432 Concrete and Foundation Design

Students should consult the ***IIT Bulletin: Graduate Programs*** for additional details.

All civil engineering students are required to take the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the State of Illinois in October and April. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Bachelor of Science in Civil Engineering

Required Courses	Credit Hours
Civil Engineering Requirements CAE 100, 101, 105, 110, 111, 221, 302, 303, 304, 307, 312, 315, 323, 419, 431, 432, 457, 470	48
CAE Technical Electives*	12
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Capstone Design Requirement CAE 495	3
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 104 or CS 105	2
Engineering Course Requirements CAE 286, 287, and MMAE 305	9
Interprofessional Projects	6
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Total Hours	**131**

* All the technical electives must be CAE or EG courses at 400 level or above.

Civil Engineering Curriculum

Semester 1		Credits
CAE 100	Intro to Engineering Drawing and Design	2
CAE 110	Professional Practice I	1
CAE 105	Geodetic Science	3
MATH 151	Calculus I	5
CHEM 124	Principles of Chemistry I	4
Humanities 200-level Course		3
Total Hours		**18**

Semester 2		Credits
CAE 101	Intro to AutoCAD Drawing and Design	2
CAE 111	Professional Practice II	1
MATH 152	Calculus II	5
CS 104	Intro Computer Programming for Engineers	
OR		2
CS 105	Intro to Computer Programming I	
PHYS 123	General Physics I	4
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MATH 251	Multivariate and Vector Calculus	4
CAE 286	Theory & Concept of Structural Mechanics	3
CAE 221	Engineering Geology	3
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
MATH 252	Introduction to Differential Equations	4
MMAE 305	Dynamics	3
CAE 287	Mechanics of Structural Materials	3
CAE 312	Engineering Systems Analysis	3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 5		Credits
CAE 302	Fluid Mechanics & Hydraulics	3
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 315	Materials of Construction	3
IPRO Elective I		3
Total Hours		**15**

Semester 6		Credits
CAE 307	Structural Design II	3
CAE 323	Introduction to Geotechnical Engineering	3
CAE Technical Elective*		3
IPRO Elective II		3
Social Sciences Elective		3
Total Hours		**15**

Semester 7		Credits
CAE 419	Transport Engineering and Design	3
CAE 431	Steel Design	3
CAE 457	Geotechnical Foundation Design	3
CAE 470	Construction Methods/Cost Estimating	3
CAE Technical Elective*		3
Humanities Elective (300+)		3
Total Hours		**18**

Semester 8		Credits
CAE 432	Concrete and Foundation Design	3
CAE Technical Elective*		3
CAE Technical Elective*		3
Capstone Design Course		3
Social Sciences Elective (300+)		3
Total Hours		**15**

Total Credit Hours **131**

* All technical electives must be CAE or EG courses at the 400 level or above.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Professional Specializations in Civil Engineering

Students who select an area of specialization must take a minimum of nine credit hours from the following technical electives listed under the respective area of specialization. Three additional credit hours may be any 400-level CAE course taken with prior approval of the student's advisor and chair.

Structural Engineering

CAE 408 Bridge and Structural Design
CAE 411 Structural Analysis II*
CAE 420 Dynamics of Structures
CAE 430 Probability Concepts in Civil Engineering
CAE 435 Experimental Analysis of Structures

Construction Engineering and Management

CAE 471 Construction Planning and Scheduling
CAE 472 Construction Site Operation
CAE 473 Construction Project Administration

Geotechnical Engineering

CAE 401 Hydraulics, Hydrology & their Applications
CAE 415 Pavement Design, Construction, and Maintenance
CAE 486 Soil and Site Improvement

Transportation Engineering

CAE 412 Traffic Engineering Studies and Design
CAE 415 Pavement Design, Construction, and Maintenance
CAE 416 Facility Design of Transportation Systems
CAE 417 Railroad Engineering Studies and Design
CAE 430 Probability Concepts in Civil Engineering

Civil-Environmental Engineering

ENVE 310 Introduction to Environmental Engineering
ENVE 404 Water & Waste Engineering
ENVE 426 Statistical Tools for Engineers
ENVE 463 Introduction to Air Pollution Control

* Required for Structural Engineering Specialization.

Architectural Engineering

The objective of the Architectural Engineering program is to prepare graduates to enter and be successful in the architectural engineering profession. Graduates are expected to become licensed professional engineers, and to reach responsible positions in a wide range of professional settings, including consulting firms, industry, or government. As well, this program will prepare students to begin and successfully complete graduate studies in engineering and/or post-baccalaureate education in a professional degree program. The Architectural Engineering program provides breadth in core sub-disciplines and depth in at least one area of specialization. This degree program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Architectural engineering is a building-oriented discipline which offers students an opportunity to obtain an engineering education specializing in building architecture, building-system integration, and structural and computer-aided design.

Professional architectural engineers are concerned with the structural integrity of buildings; the design and analysis of HVAC (Heating, Ventilating and Air Conditioning); plumbing, fire protection and electrical systems; acoustics; lighting; energy conservation; building science and the study of building performance; and the management of construction resources and schedules. Graduates of the Architectural Engineering program will be well prepared for careers as consulting engineers, building contractors, construction managers, structural engineers, and knowledgeable specialists in related areas of building design and analysis.

Architectural engineering shares much in common with civil and mechanical engineering but is distinct in its exclusive concentration on building projects. Architectural engineering students should have an aptitude in and an appreciation of the following areas of knowledge: basic principles of mathematics; physics and chemistry; manual and computer-aided drafting and design; surveying; construction materials; engineering mechanics; structural analysis and design; building-system integration; and professional practice and ethics.

Architecture students who plan to pursue a Master's degree in Architectural Engineering should take the following courses:

CAE 208 Thermal-Fluids Engineering I
CAE 209 Thermal-Fluids Engineering II
CAE 383 Electrical nd Electronic Circuits

Students should consult the ***IIT Bulletin: Graduate Programs*** for additional details.

All architectural engineering students are required to take the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the State of Illinois in October and April. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Bachelor of Science in Architectural Engineering

Required Courses	Credit Hours
Architectural Engineering Requirements CAE 100, 101, 105, 110, 111, 208, 209, 303, 304, 307, 312, 315, 323, 331, 383, 461, 464, 468, 470, 471	54
Capstone Design Requirement CAE 495	3
CAE Technical Electives*	9
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 104 or CS 105	2
Engineering Course Requirements CAE 286, 287	6
Humanities Requirement AAH 119 or 120	3
Interprofessional Projects	6
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	18
Total Hours	**131**

* All technical electives must be CAE or EG courses at the 400 level or above.

Architectural Engineering Curriculum

Semester 1		Credits
CAE 100	Intro to Engineering Drawing and Design	2
CAE 110	Professional Practice I	1
CAE 105	Geodetic Science	3
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Humanities 200-level Course		3
Total Hours		**18**

Semester 2		Credits
CAE 101	Intro to AutoCAD Drawing and Design	2
CAE 111	Professional Practice II	1
CS 104	Intro Computer Programming for Engineers	
OR		2
CS 105	Intro to Computer Programming I	
PHYS 123	General Physics I	4
MATH 152	Calculus II	5
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
CAE 286	Theory & Concept of Structural Mechanics	3
PHYS 221	General Physics II	4
MATH 251	Multivariate and Vector Calculus	4
CAE 208	Thermo-Fluids Engineering I	3
AAH 119	History of World Architecture I	3
Total Hours		**17**

Semester 4		Credits
CAE 287	Mechanics of Structural Materials	3
CAE 312	Engineering Systems Analysis	3
MATH 252	Introduction to Differential Equations	4
CAE 209	Thermo-Fluids Engineering II	3
Social Sciences Elective		3
Total Hours		**16**

Semester 5		Credits
CAE 315	Materials of Construction	3
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 331	Building Science	3
CAE 383	Electrical and Electronic Circuits	3
IPRO Elective I		3
Total Hours		**18**

Semester 6		Credits
CAE 307	Structural Design II	3
CAE 323	Introduction to Geotechnical Engineering	3
CAE 464	HVAC Systems Design	3
IPRO Elective II		3
Humanities Elective (300+)		3
Total Hours		**15**

Semester 7		Credits
CAE 461	Plumbing and Fire Protection Design	3
CAE 470	Construction Methods/Cost Estimating	3
CAE 468	Architectural Design	3
CAE Technical Elective*		3
Humanities Elective (300+)		3
Total Hours		**15**

Semester 8		Credits
CAE 471	Construction Planning and Scheduling	3
CAE Technical Elective*		3
Capstone Design Course		3
CAE Technical Elective		3
Social Sciences Elective (300+)		3
Total Hours		**15**

Total Credit Hours **131**

* All technical electives courses must be CAE or EG courses at the 400 level or above.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Professional Specializations in Architectural Engineering

Students who select an area of specialization must take a minimum of nine credit hours from the following technical electives listed under the respective area of specialization.

Building Mechanical and Energy

CAE 403 Sound and Vibration Control in Buildings
CAE 463 Building Enclosure Design
CAE 465 Building Energy Conservation Technologies

Acoustics and Illumination

CAE 403 Sound and Vibration Control in Building
CAE 409 Acoustic Performance Spaces
CAE 467 Lighting Systems Design

Structural Engineering

CAE 411 Structural Analysis II*
CAE 431 Steel Design
CAE 432 Concrete and Foundation Design

Construction and Engineering Management

CAE 472 Construction Site Operation
CAE 473 Construction Project Administration
EG 430 Introduction to Building Information Modeling

Electrical and Illumination

CAE 465 Building Energy Conservation Technologies
CAE 466 Building Electrical Systems Design
CAE 467 Lighting Systems Design

Fire Protection and Life Safety

CAE 422 Sprinklers, Standpipes, and Fire Pumps
CAE 424 Introduction to Fire Dynamics
CAE 425 Fire Protection and Life Safety

* Required for Structural Engineering specialization.

Engineering Graphics-Optional Programs

Engineering graphics is an indispensable communication and design tool which is concerned with the graphical representation of designs and specifications for physical objects and data relationships used in engineering, science, business, and technical work. The graphic language, along with the symbolic and verbal languages, enables those engaged in technology to communicate effectively, making it possible for new ideas, designs, and developments to be transformed into useful consumer products. The well-trained engineer, scientist, or technician must be able to make correct graphical representations of engineering structures, designs, and data relationships, as well as possess an ability to express ideas quickly and accurately through the use of the graphic language.

For further information call 312.567.3365.

Certificate in Engineering Graphics and CAD

Recognizing the need for drafters and designers with a strong background in special areas of graphics, the Department of Civil, Architectural, and Environmental Engineering offers a certificate program in Engineering Graphics. This certificate is only available to students enrolled in a degree program at IIT and does not qualify for federal financial aid. It is designed to prepare specialists in graphics for positions in business and industry. Students completing the specified courses with satisfactory grades will be awarded a certificate of completion.

Students must take:

An Introductory Engineering Graphics & Design course*
EG 305 Advanced Engineering Graphics and Design
EG 306 Engineering Descriptive Geometry
EG 405 Mechanical Design Graphics
EG 406 Technical and Pictorial Illustration
EG 419 Computer Graphics in Engineering
EG 430 Introduction to Building Information Modeling

* CAE 100 and CAE 101, MMAE 232, or an equivalent introductory course.

Professional Specialization in Engineering Graphics

The department offers a comprehensive series of special courses in engineering graphics that a student may take as electives in areas related to individual professional goals. Consult the department's engineering graphics coordinator for advice on appropriate courses.

Engineering Management

The Engineering Management program at IIT is founded on the tradition of discipline and innovation established by the Armour College of Engineering.

The program offers an opportunity for students to obtain skills and competencies that are highly relevant and driven by the accelerating development of new technologies in the emerging global economy at the intersection of engineering invention and business administration.

The program's objective is to prepare students to become leaders in the corporate world shaped by innovations in engineering. Students learn fundamentals of science, engineering management, and business administration by concentrating on the development of critical thinking skills directed toward practical problem solving and informed decision making.

Students completing this program are uniquely positioned to make decisions concerning product process development in ways that combine technical, financial, marketing, human resources, and strategic considerations. Students are prepared to perform economic analyses for new products, evaluate technologies, and assess business processes. Students completing this program will be able to prepare business plans that include financial details, marketing strategies, and design decisions based on target costs and forecasted rate of return on investment capital.

Students have several possibilities to specialize in engineering disciplines. Specializations include: civil engineering, architectural engineering, materials science and engineering, and mechanical engineering.

The program also includes a business curriculum that focuses on developing organization and management, critical thinking, and entrepreneurship skills.

Bachelor of Science in Engineering Management

Required Courses	Credit Hours
Mathematics/Computer Science Requirements MATH 151, 152, 251, 252, CS 104/105	20
Physics Requirements PHYS 123, 221	8
Chemistry Requirement	3/4
Introduction to the Profession	2
Core Engineering Specialization (Individual department requirements may vary)	28/30
Core Entrepreneurship Requirements BUS 211, 212, 301, and 371 and four courses selected from the following: EMGT 363, 406, 470, INTM 477, MMAE 232, BUS 361, COM 428 or ECON 423 or CAE 312 (for non-CAE majors).	24
Interprofessional Projects	6
Humanities and Social Sciences Requirements ECON 211 is recommended. See IIT Core Curriculum, sections B and C, page 25.	21
Core Engineering or Entrepreneurship Technical Electives	9
Free Electives	6
Total Hours	**127/130**

Engineering Management Specializations

Specializations include those listed blow. See **www.iit.edu/engineering/cae** for additional engineering specializations.

Civil Engineering (28 Credit Hours)

CAE 100 Introduction to Engineering Drawing and Design
CAE 101 Introduction to AutoCAD Drawing and Design
CAE 286 Theory & Concept of Structural Mechanics
CAE 287 Mechanics of Structural Materials
CAE 302 Fluid Mechanics, and Hydraulics
CAE 312 Engineering Systems Analysis
CAE 315 Materials of Construction
CAE 323 Introduction to Geotechnical Engineering
MMAE 305 Dynamics

And one of the following

CAE 303 Structural Design
CAE 304 Structural Analysis I

Architectural Engineering (28 Credit Hours)

CAE 100 Introduction to Engineering Drawing and Design
CAE 101 Introduction to AutoCAD Drawing and Design
CAE 286 Theory & Concept of Structural Mechanics
CAE 287 Mechanics of Structural Materials
CAE 208 Thermal-Fluids Engineering I
CAE 209 Thermal-Fluids Engineering II
CAE 312 Engineering Systems Analysis
CAE 331 Building Science
CAE 461 Plumbing & Fire Protection Design

And one of the following courses:

CAE 383 Electrical and Electronic Circuits
CAE 464 HVAC Systems Design

Materials Science and Engineering (28 Credit Hours)

MMAE 100 Introduction to the Profession*
MMAE 200 Introduction to Mechanics
MMAE 202 Mechanics of Solids II
MMAE 232 Design for Innovation
MMAE 365 Structure & Properties of Materials I
MMAE 370 Materials Laboratory I
MMAE 463 Structure & Properties of Materials II
MS 201 Materials Science

And two of the following

MMAE 371 Engineering Materials
OR
MMAE 372 Design of Aerospace Materials Laboratory
MMAE 470 Introduction to Polymer Science
MMAE 468 Introduction to Ceramic Materials
OR
MMAE 472 Advanced Aerospace Materials
OR
MMAE 482 Composites
MMAE 476 Materials Laboratory II
MMAE 485 Manufacturing Processes

Mechanical Engineering (29/30 Credit Hours)

MMAE 100 Introduction to the Profession*
MMAE 200 Introduction to Mechanics
MMAE 202 Mechanics of Solids II
MMAE 232 Design for Innovation
MMAE 313 Fluid Mechanics
MMAE 315 Aerospace Laboratory I
OR
MMAE 319 Mechanical Laboratory II
MMAE 320 Thermodynamics
MS 201 Materials Science

And one of the following

MMAE 302 Mechanics of Solids III
MMAE 321 Applied Thermodynamics
MMAE 322 Heat & Mass Transfer with Laboratory
MMAE 323 Heat & Mass Transfer
MMAE 332 Design of Machine Elements
MMAE 547 Computer-Integrated Manufacturing Technologies
MMAE 557 Computer-Integrated Manufacturing Systems
MMAE 589 Applications in Reliability Engineering I
MMAE 590 Applications in Reliability Engineering II

Aerospace Engineering(28 Credit Hours)

MMAE 100 Introduction to the Profession*
MMAE 200 Introduction to Mechanics
MMAE 202 Mechanics of Solids II
MMAE 304 Mechanics of Aero-structures
MMAE 311 Compressible Flow
MMAE 312 Aerodynamics of Aerospace Vehicles
MMAE 313 Fluid Mechanics
MMAE 315 Aerospace Laboratory I
MMAE 320 Thermodynamics
MS 201 Materials Science

Electrical Engineering (28 Credit Hours)

ECE 100 Introduction to the Profession*
CS 115 Object Oriented Programming I**
CS 116 Object Oriented Programming II
ECE 211 Circuit Analysis I
ECE 213 Circuit Analysis II
ECE 218 Digital Systems
MATH 333 Matrix Algebra and Complex Variables
ECE 307 Electrodynamics
ECE 308 Signals and Systems
ECE 311 Engineering Electronics

Chemical Engineering (30 Credit Hours)

CHE 100 Introduction to the Profession I
CHE 101 Introduction to the Profession II
CHEM 125 Principles of Chemistry II
CHEM 237 Organic Chemistry I
CHEM 239 Organic Chemistry II
CHEM 343 Physical Chemistry I
CHE 202 Material and Energy Balances
CHE 302 Heat and Mass Transfer Operations
CHE 301 Fluid Mechanics
CHE 351 Thermodynamics I
CHE 451 Thermodyanmics II

Biomedical Engineering: Cell and Tissue Track (30 Credit Hours)

BME 100 Introduction to the Profession***
CHEM 125 Principles of Chemistry II
BIOL 115 Human Biology
BIOL 117 Human Biology Laboratory
ECE 215 Circuit Analysis I
OR
CAE 383 Electrical & Electronic Circuits
MMAE 200 Introduction to the Mechanics
MS 201 Materials Science
BME 200 BME Application of MATLAB
BME 315 Instrumentation Laboratory
BME 330 Analysis of Biosignals & Systems
CHE 202 Material and Energy Balances
BME 301 Biofluid Mechanics

Biomedical Engineering: Medical Imaging Track (29-30 Credit Hours)

BME 100 Introduction to the Profession*
CHEM 125 Principles of Chemistry II
BIOL 115 Human Biology
BIOL 117 Human Biology Laboratory
ECE 215 Circuit Analysis I
CS 201 Accelerated Introduction to Computer Science ***
PHYS 224 Physics 3
OR
CHEM 237 Organic Chemistry I
BME 200 BME Application of MATLAB
BME 315 Instrumentation Laboratory
BME 330 Analysis of Biosignals & Systems
BME 309 Biomedical Imaging and Sensing
BME 310 Biomaterials

Biomedical Engineering: Neural Engineering Track (30 Credit Hours)

BME 100 Introduction to the Profession*
CHEM 125 Principles of Chemistry II
BIOL 115 Human Biology
BIOL 117 Human Biology Laboratory
ECE 215 Circuit Analysis I
ECE 216 Circuit Analysis II
ECE 218 Digital Systems
ECE 212 Analog & Digital Labs I
ECE 214 Analog & Digital Labs II
CS 115 Object Oriented Programming **
CHEM 237 Organic Chemistry
BME 200 BME Application of MATLAB
BME 315 Instrumentation Laboratory
BME 330 Analysis of Biosignals & Systems

Computer Science (29 Credit Hours)

CS 100 Introduction to the Profession
CS 115 Object Oriented Programming I **
CS 116 Object Oriented Programming II
CS 331 Data Structures and Algorithms
CS 330 Discrete Structures
OR
MATH 230 Introduction to Discrete Math
CS 350 Computer Organization/Assembly Language
MATH 332 Elementary Linear Algebra
OR
MATH 333 Matrix Algebra & Complex Variables
CS 430 Introduction to Algorithms
CS 351 Systems Programming
MATH 474 Probability & Statistics
MATH 475 Probability
CS 440 Programming Languages/Translators
CS 425 Database Organization

* Two hours of BME 100, MMAE 100 or ECE 100 apply to the Introduction to the Profession requirement and one hour applies to the specialization.

** CS 115 fulfills Computer Science General Education requirements.

*** Two hours of CS 201 applies to the CS requirement and two hours apply to the core credit hours.

Computer Science

Website: science.iit.edu/computer-science

Stuart Building 235
10 W. 31st St.
Chicago, IL 60616
312.567.5150

Chair
Xian-He Sun

Associate Chair
Bogdan Korel

Computers have changed what we do and how we do it in our homes, in our offices, and throughout our world. The discipline of computer science focuses upon the many challenging problems encountered in the development and use of computers and computer software. Areas of study in computer science range from theoretical analyses into the nature of computing and computing algorithms, through the development of advanced computing devices and computer networks, to the design and implementation of sophisticated software systems.

The department offers two undergraduate programs in computer science: a Bachelor of Science (B.S.) in Computer Science and Bachelor of Science (B.S.) in Computer Information Systems. Both programs provide an excellent background in computer science and allow for ample study in other areas. Where these programs differ is in the approach they take to computer science. The B.S. in Computer Science provides an in-depth experience focusing on the theory and practice of computer science while the B.S. in Computer Information Systems provides a more interdisciplinary experience, balancing study in computer science with study in another field.

Each graduate of the B.S. in Computer Science program should be able to:

- Apply knowledge of computing and mathematics appropriate to the discipline.
- Analyze a problem, and identify and define the computing requirements appropriate to its solution.
- Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- Function effectively on teams to accomplish a common goal.
- Have an understanding of professional, ethical, legal, security, and social issues and responsibilities.
- Communicate effectively with a range of audiences.
- Analyze the local and global impact of computing on individuals, organizations, and society.
- Recognize the need for, and an ability to engage in, continuing professional development.
- Use current techniques, skills, and tools necessary for computing practices.
- Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- Apply design and development principles in the construction of software systems of varying complexity.
- Be prepared to enter a top-ranked graduate program in computer science.

Both programs begin with a set of introductory courses that work together to provide students with a firm foundation in computer science. These introductory courses include weekly labs in which students use state-of-the-art software development techniques (object-oriented programming in C++ or Java, for instance) to create solutions to interesting problems. The department's unique four-phase laboratory model encourages student creativity by providing ample opportunity for constructive feedback on each student's efforts. Having completed the introductory core, a student is prepared to work independently within a well-structured design framework – in the classroom or on the job.

The last two years of study build upon this foundation. The B.S. in Computer Science focuses on the concepts and techniques used in the design and development of advanced software systems. Students in this program explore the conceptual underpinnings of computer science–its fundamental algorithms, programming languages, database systems, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives including computer graphics, artificial intelligence, computer networks, and cloud and mobile computing, among others. As with the introductory sequence, these advanced courses stress "hands-on" learning by doing. A generous allotment of free electives allows students to combine study in computer science with study in another field – either by taking a well-defined specialized minor in another discipline or by working with an advisor to formulate a program that combines experiences across disciplines.

The B.S. in Computer Information Systems program emphasizes the use of computers as sophisticated problem-solving tools. Students in this program pursue an interdisciplinary course of study that combines a solid foundation in computer science with a focus in another discipline. This program is designed for students who seek to blend their computer science abilities with skills specific to another domain to solve problems in that domain. Examples include computing with a business focus (e.g., management information systems) or computing with a natural science focus (e.g., computational physics).

The Computer Science Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Applied Mathematics/Master of Computer Science
- Bachelor of Science in Applied Mathematics/Master of Science in Computer Science
- Bachelor of Science in Biology/Master of Computer Science
- Bachelor of Science in Biology/Master of Science in Computer Science
- Bachelor of Science in Computer Engineering/Master of Computer Science
- Bachelor of Science in Computer Engineering/Master of Science in Computer Science
- Bachelor of Science in Computer Science/Master of Computer Science
- Bachelor of Science in Computer Science/Master of Science in Computer Science
- Bachelor of Science in Physics/Master of Computer Science
- Bachelor of Science in Physics/Master of Science in Computer Science

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Computer Science departmental website: **science.iit.edu/computer-science**.

Brief History and Mission of the Department

The Computer Science (CS) department grew out of Illinois Institute of Technology's Information Science Center which first offered CS courses in 1959. When the Information Science Center became the Department of Computer Science in 1971, IIT was already offering undergraduate and graduate courses leading to a Master of Science in Information Science, a Master of Science for Teachers in Information Science, and non-credit courses for high school students and teachers. Since 1971, Computer Science has become the largest department in the College of Science and Letters and has granted more than five thousand degrees. On Main Campus, degrees are offered at all levels, and through IIT Online Master's degrees are offered both nationally and internationally.

The mission of the CS department is to prepare graduates for a broad range of professional careers and provide a foundation for advanced studies at the graduate or professional level. The mission of the department as part of the college of Science and Letters (CSL) is to:

- Deliver superior educational and research opportunities through B.S., M.S., and Ph.D. degree programs as well as certificate, professional masters, and short-course programs.
- Provide responsive, appropriate core curriculum courses for students from all academic units at IIT.
- Engage in nationally and internationally recognized research and scholarship.
- Promote interdisciplinary and collaborative research among faculty and students within and outside of IIT and the college.
- Prepare our graduates for leadership in the profession and in higher education.

The CS mission statement is posted on our website: **science.iit.edu/computer-science/about/mission-statement**.

For information regarding faculty visit the Computer Science website at **science.iit.edu/computer-science/people/faculty**.

Bachelor of Science in Computer Science

Required Courses	Credit Hours
Computer Science Requirements CS 100, 115, 116*, 330**, 331, 350, 351, 425, 430, 440, 450, 485, 487	36
Computer Science Electives* **	12
Mathematics Requirements MATH 151, 152, 251, (332 or 333), (474 or 475)	20
Mathematics Elective Chosen from MATH 252, 350, 410, 435, 453, 454, 476, 481	3
Science Requirements PHYS 123, 221	8
Science Electives****	6
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Writing and Speaking Elective COM 421 or COM 428	3
Interprofessional Projects	6
Free Electives	12
Total Hours	**127**

* CS 201 is a one-semester, accelerated course equivalent to the two-semester CS 115/CS 116 sequence.

** MATH 230 is allowed as a substitute for CS 330.

*** Computer science electives: Any computer science course at the 300-level or higher (including graduate CS courses) may be used as a computer science elective, except CS 401, CS 402, CS 403 and CS 406. ECE 218 - Digital Systems and ECE 441 - Microcomputers may also be used as computer science electives. Higher mathematics or computational science courses at the 300-level or above can also be used as computer science electives, with CS department approval.

**** Science electives (no lab required): Chosen from the natural sciences (biology, chemistry, and physics), or MS 201 - Materials Science, or psychology (limited to courses marked with an N in the IIT Bulletin). At least one course must be in a field other than physics.

The Bachelor of Science in Computer Science degree is accredited by the Computing Accreditation Commission of ABET, 415 N. Charles Street, Baltimore, MD 21201, telephone: 410.347.7700.

Computer Science Curriculum

Semester 1		Credits
CS 100	Introduction to the Profession	2
CS 115	Object-Oriented Programming I	2
MATH 151	Calculus I	5
Humanities 200-level Course		3
Social Sciences Elective		3
Total Hours		**15**

Semester 2		Credits
CS 116	Object-Oriented Programming II	2
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Humanities Elective (300+)		3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 3		Credits
CS 331	Data Structures and Algorithms	3
CS 330	Discrete Structures	3
MATH 251	Multivariate and Vector Calculus	4
PHYS 221	General Physics II	4
Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
CS 350	Computer Org/Assembly Language Prog	3
CS 430	Introduction to Algorithms	3
MATH 332	Matrices	
OR		3
MATH 333	Matrix Algebra and Complex Variables	
Humanities Elective (300+)		3
Science Elective		3
Total Hours		**15**

Semester 5		Credits
CS 351	System Programming	3
CS 440	Programming Languages/Translators	3
MATH 474	Probability and Statistics	
OR		3
MATH 475	Probability	
COM 421	Technical Communication	
OR		3
COM 428	Verbal and Visual Communication	
Computer Science Elective		3
Total Hours		**15**

Semester 6		Credits
CS 425	Database Organization	3
CS 450	Operating Systems	3
IPRO Elective I		3
Mathematics Elective		3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
CS 487	Software Engineering	3
IPRO Elective II		3
Computer Science Elective		3
Science Elective		3
Humanities or Social Sciences Elective		3
Free Elective		3
Total Hours		**18**

Semester 8		Credits
CS 485	Computers in Society	3
Computer Science Elective		3
Computer Science Elective		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours **127**

Bachelor of Science in Computer Information Systems

Required Courses	Credit Hours
Computer Science Requirements CS 100, 115, 116, 330 (or MATH 230), 331, 350, 351	18
Computer Science Technical Electives*	15
Computer Science Electives	6
Mathematics Requirement MATH 151	5
Mathematics Elective	3
Science Requirements BIOL 107 or 115, CHEM 124, PHYS 123	11
Science Elective	3
Humanities Requirement Humanities 100-level course	3
Humanities Electives	9
Psychology Requirements PSYC 221, 301	6
Social Sciences Requirement PS 2XX (Any 200-level Political Science course)	3
Social Sciences Electives	6
Interprofessional Projects	6
Minor Electives	15
Free Electives	18
Total Hours	**127**

* Computer science technical electives are designated with a **(T)** in the course descriptions.

Computer Information Systems Curriculum

Semester 1		Credits
CS 100	Introduction to the Profession	2
CS 115	Object-Oriented Programming I	2
MATH 151	Calculus I	5
PSYC 221	Human Behavior Growth and Learning	3
Humanities 200-level Course		3
Total Hours		**15**

Semester 2		Credits
CS 116	Object-Oriented Programming II	2
BIOL 115	Human Biology	
OR		3
BIOL 107	General Biology	
Mathematics Elective		3
Humanities Elective		3
Social Sciences Elective		3
Total Hours		**14**

Semester 3		Credits
CS 330	Discrete Structures	3
CS 331	Data Structures and Algorithms	3
CHEM 124	Principles of Chemistry I	4
PS 2XX	Political Science Course	3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 4		Credits
CS 350	Computer Org/Assembly Language Prog	3
PHYS 123	General Physics I	4
Minor Elective		3
Computer Science Elective		3
Computer Science Technical Elective*		3
Total Hours		**16**

Semester 5		Credits
CS 351	Systems Programming	3
Minor Elective		3
Science Elective		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 6		Credits
PSYC 301	Industrial Psychology	3
IPRO Elective I		3
Minor Elective		3
Computer Science Technical Elective*		3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**18**

Semester 7	Credits
Minor Elective	3
Computer Science Elective	3
Computer Science Technical Elective*	3
Computer Science Technical Elective*	3
Social Sciences Elective (300+)	3
Free Elective	3
Total Hours	**18**

Semester 8	Credits
IPRO Elective II	3
Minor Elective	3
Computer Science Technical Elective*	3
Free Elective	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **127**

* Computer science technical electives are designated with a **(T)** in the course descriptions.

Specializations in Computer Science

Students in either the CS or CIS program may elect to complete one of these specializations by choosing their computer science electives and free electives appropriately, or by taking extra classes. The student must receive department approval and notify the Office of Undergraduate Academic Affairs. A minimum of four courses are required for a specialization.

Data Science

BUS 371 Strategies for Reaching New Markets
CS 451 Introduction to Parallel and Distributed Computing
CS 442 Data Mining
OR
CS 584 Machine Learning
MATH 481 Introduction to Stochastic Processes
OR
MATH 483 Design and Analysis of Experiments

Note: MATH 481 has prerequisites of MATH 332 or MATH 333 and MATH 475; MATH 483 has a prerequisite of MATH 476.

Distributed and Cloud Computing

CS 451 Introduction to Parallel and Distributed Computing
CS 455 Data Communication
CS 442 Mobile Applications Development
OR
CS 447 Distributed Objects
CS 553 Cloud Computing

Information and Knowledge Management Systems

Students must take the following courses:

CS 425 Database Organization
CS 482 Information & Knowledge Management Systems

In addition, also choose at least two courses from the following:

CS 422 Introduction to Data Mining
CS 429 Introduction to Information Retrieval Systems
CS 481 Artificial Intelligence: Language Understanding

Information Security

CS 425 Database Organization
CS 458 Information Security
CS 455 Data Communications
CS 549 Cryptography and Network Security

Electrical and Computer Engineering

Website: engineering.iit.edu/ece

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312.567.3400

Chair
Ashfaq Khokhar

Associate Chair
Jafar Saniie

The Department of Electrical and Computer Engineering offers the Bachelor of Science in Electrical Engineering (B.S.E.E.). The department also offers a Bachelor of Science in Computer Engineering (B.S.CP.E.). Both degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Minors in areas not listed below require approval from an academic advisor and department chair (for more details, see pages 172–175).

- Air Force Aerospace Studies
- Applied Mathematics
- Applied Solid State Physics
- Business
- Energy/Environment/Economics (E^3)
- Military Science
- Naval Science
- Premedical Studies for Electrical Engineering
- Telecommunications

The B.S.E.E. curriculum provides a strong foundation in mathematics, physics, chemistry, and computer science during the first two years of study. The fundamentals of circuits, electronics, digital and computer systems, electrodynamics, linear systems, and energy conversion are introduced in the second and third years. In the senior year, students further explore their specific areas of interest and gain in-depth exposure to engineering design through the choice of elective courses.

The B.S.CP.E. curriculum concentrates on the design and application of computer hardware and software systems. During the first three years, the curriculum provides students with a strong foundation in mathematics, physics, chemistry, and computer science, followed by the fundamentals of electrical engineering and computer science that form the basis of computer engineering. During the senior year, advanced courses provide students with depth in selected areas and exposure to the practice of engineering design. Elective courses provide the flexibility to take specialized courses in a number of different areas.

Students with strong interests in both electrical engineering and computer engineering can elect to earn a dual degree, B.S.E.E./B.S.CP.E.

The Electrical and Computer Engineering Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Biomedical Engineering/Master of Biomedical Imaging and Signals
- Bachelor of Science in Computer Engineering/Master of Computer Science
- Bachelor of Science in Computer Engineering/Master of Science in Computer Science
- Bachelor of Science in Computer Engineering/Master of Science in Computer Engineering
- Bachelor of Science in Computer Engineering/Master of Electrical and Computer Engineering
- Bachelor of Science in Computer Engineering/Master of Science in Electrical Engineering
- Bachelor of Science in Electrical Engineering/Master of Science in Computer Engineering
- Bachelor of Science in Electrical Engineering/Master of Electrical and Computer Engineering
- Bachelor of Science in Electrical Engineering/Master of Science in Electrical and Computer Engineering

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Electrical and Computer Engineering departmental website: **engineering.iit.edu/ece**.

For information regarding faculty visit the Electrical and Computer Engineering website at
engineering.iit.edu/ece/people/faculty.

Electrical Engineering

Electrical engineering is concerned with the generation, transmission, and utilization of electrical energy and with the transmitting and processing of information. Electrical engineers are involved in the analysis, design, and production of electric power, radio, radar, television, computing, telecommunication, control, and information systems. These engineers find solutions to the challenging technical problems that arise in our rapidly changing society. They impact virtually every aspect of daily life, as evidenced by examples such as wireless communications, audio and video equipment, power distribution, computerized traffic control, noise pollution monitoring and abatement, and medical instrumentation.

The Electrical Engineering curriculum puts emphasis on both theory and practical applications by providing a solid background in engineering science and mathematics, followed by a sequence of core courses in electrical engineering. Design skills are fostered in the professional elective courses in the senior year, along with the project experience instilled by Interprofessional Projects (IPROs).

The objectives of the ECE undergraduate Electrical Engineering program are to produce electrical engineering graduates who are prepared to:

- Enter their profession and make intellectual contributions to it.
- Embark on a lifelong career of personal and professional growth.
- Take advanced courses at the graduate level.

Bachelor of Science in Electrical Engineering

Required Courses	Credit Hours
Electrical Engineering Requirements ECE 100, 211, 213, 218, 242, 307, 308, 311, 312, 319	36
Professional ECE Electives	17/20
Mathematics Requirements MATH 151, 152, 251, 252, 333, 374	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 122	3
Engineering Science Course Requirement MMAE 200 or MMAE 320	3
Computer Science Requirements CS 115, 116	4
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Science Elective BIOL 105, BIOL 114, MS 201, or CHEM 126	3
Technical Elective	3
Interprofessional Projects	6
Total Hours	**131/134**

Electrical Engineering Curriculum

Semester 1		Credits
ECE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 122	Principles of Chemistry I	3
CS 115	Object-Oriented Programming I	2
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 116	Object-Oriented Programming II	2
Science Elective*		3
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MATH 252	Introduction to Differential Equations	4
PHYS 221	General Physics II	4
ECE 211	Circuit Analysis I	4
ECE 218	Digital Systems	3
Total Hours		**15**

Semester 4		Credits
MATH 251	Multivariate & Vector Calculus	4
PHYS 224	General Physics III	3
ECE 213	Circuit Analysis II	4
ECE 242	Digital Computers and Computing	3
Social Sciences Elective		3
Total Hours		**17**

Semester 5		Credits
MATH 333	Matrix Algebra and Complex Variables	3
ECE 307	Electrodynamics	4
ECE 311	Engineering Electronics	4
IPRO Elective I**		3
Humanities Elective (300+)		3
Total Hours		**17**

Semester 6		Credits
ECE 308	Signals and Systems	3
ECE 312	Electronic Circuits	4
ECE 319	Fundamentals of Power Engineering	4
MATH 374	Probability and Statistics for ECE	3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 7	Credits
IPRO Elective II**	3
Professional ECE Elective†	4
Professional ECE Elective†	3/4
Technical Elective††	3
Humanities Elective (300+)	3
Total Hours	**16/17**

Semester 8	Credits
Professional ECE Elective†	4
Professional ECE Elective†	3/4
Professional ECE Elective†	3/4
Engineering Science Elective***	3
Humanities or Social Sciences Elective	3
Total Hours	**16/18**

Total Credit Hours **131/134**

* Science elective must be BIOL 105, BIOL 114, CHEM 126, or MS 201.

** Interprofessional Projects may be taken at any time during the sophomore, junior or senior years. (Course scheduling must be adjusted accordingly with advisor approval.)

*** Engineering science elective: Choose either MMAE 200 or MMAE 320.

† Professional ECE electives may be chosen from any of the 400-level ECE courses identified with (P) in the course descriptions. Courses at the 500-level may be taken with the written consent of the instructor, faculty advisor and the ECE department chair. At least two of the electives must contain laboratories. A maximum of three credits of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as professional ECE electives with advisor approval.

†† Advisor-approved course from engineering, science, mathematics, or computer science that is more advanced than the academic level of the student.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Computer Engineering

Computer engineering involves the design and application of computer hardware and computer software. Computer hardware consists of the physical components that implement a computer system: processor and memory chips, circuit boards, and peripheral devices. Computer software consists of computer programs that accomplish a specific task using sequences of simple, programmable steps. Computers have become an integral part of many large systems that require sophisticated control, including automobiles, medical instrumentation, telecommunication systems, and factory automation. Computers are a driving force behind many of today's exciting new technologies, including wireless communications, interactive multimedia, and high-speed computer networks. Computer engineers must have detailed knowledge of both hardware and software to design, build, and use complex information processing systems for a wide range of applications.

The objectives of the ECE undergraduate Computer Engineering program are to produce electrical engineering graduates who are prepared to:

- Enter their profession and make intellectual contributions to it.
- Embark on a lifelong career of personal and professional growth.
- Take advanced courses at the graduate level.

Bachelor of Science in Computer Engineering

Required Courses	Credit Hours
ECE Major Requirements ECE 100, 211, 213, 218, 242, 311, 441, 485	28
Computer Science Major Requirements CS 115, 116, 330, 331, 351, 450	16
Junior Computer Engineering Elective ECE 307, 308, 312, or 319	3/4
Professional ECE Electives	6/8
Computer Systems/Software Elective ECE 407, 408, 443, 449, CS 425, or CS 487	3/4
Hardware-Design Elective ECE 429 or 446	4
Mathematics Requirements MATH 151, 152, 251, 252, 374, junior mathematics elective (MATH 333 or 350)	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 122	3
Engineering Course Requirement MMAE 200 or MMAE 320	3
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Science Elective BIOL 105, BIOL 114, MS 201, or CHEM 126	3
Interprofessional Projects	6
Total Hours	**131/135**

Computer Engineering Curriculum

Semester 1		Credits
ECE 100	Interprofessional Project	3
MATH 151	Calculus I	5
CHEM 122	Principles of Chemistry I	3
CS 115	Object-Oriented Programming I	2
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 116	Object-Oriented Programming II	2
Social Sciences Elective		3
Science Elective*		3
Total Hours		**17**

Semester 3		Credits
MATH 252	Introduction to Differential Equations	4
PHYS 221	General Physics II	4
ECE 211	Circuit Analysis I	4
ECE 218	Digital Systems	3
CS 331	Data Structures and Algorithms	3
Total Hours		**18**

Semester 4		Credits
MATH 251	Multivariate and Vector Calculus	4
PHYS 224	General Physics III	3
ECE 213	Circuit Analysis II	4
ECE 242	Digital Computers and Computing	3
CS 330	Discrete Structures	3
Total Hours		**17**

Semester 5		Credits
ECE 311	Engineering Electronics	4
CS 351	Systems Programming	3
Engineering Science Elective**		3
Junior Mathematics Elective***		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 6		Credits
CS 450	Operating Systems I	3
MATH 374	Probability and Statistics for ECE	3
IPRO Elective I†		3
Junior CPE Elective****		3/4
Social Sciences Elective		3
Total Hours		**15/16**

Semester 7		Credits
ECE 441	Microcomputers	4
ECE 485	Computer Organization and Design*****	3
Computer Systems/Software Elective††††		3/4
Professional ECE Elective††		3/4
Humanities or Social Sciences Elective		3
Total Hours		**16/18**

Semester 8	Credits
IPRO Elective II†	3
Professional ECE Elective††	3/4
Hardware-Design Elective†††	4
Humanities Elective (300+)	3
Social Sciences Elective (300+)	3
Total Hours	**16/17**

Total Credit Hours **131/135**

* Science elective must be BIOL 105, BIOL 114, CHEM 126, or MS 201.

** Engineering science elective: Choose either MMAE 200 or MMAE 320.

*** Junior mathematics elective: Choose either MATH 333 or MATH 350.

**** Junior CPE elective: Choose one of ECE 307, 308, 312, or 319.

***** CS 470 may be substituted with advisor approval.

† Interprofessional Projects may be taken at any time during the sophomore, junior, or senior years. (Course scheduling must be adjusted accordingly with advisor approval.)

†† Professional electives may be chosen from the 400-level ECE courses identified with a (P) in the course descriptions, and any 400-level computer science courses except CS 485. A maximum of three credits of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as a professional elective with advisor approval.

††† Hardware-design elective must be ECE 429 or ECE 446.

†††† Computer systems/software elective: Choose one of ECE 407, 408, 443, 449, CS 425, or CS 487.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Electrical Engineering/ Bachelor of Science in Computer Engineering

The dual degree, B.S.E.E./B.S.CP.E., combines all the essential elements of a broad-based, traditional B.S.E.E. degree with the modern and progressive aspects of a B.S.CP.E. degree. This program contributes to the foundation of the new millennium, where computer hardware and software are used in areas such as telecommunications, power electronics, digital signal processing, computer networks, and control systems. Freshmen entering IIT with a significant number of Advanced Placement credits may be able to complete both degrees in four years.

Bachelor of Science in Electrical Engineering/ Bachelor of Science in Computer Engineering

Required Courses	Credit Hours
Electrical Engineering Requirements ECE 100, 211, 212, 213, 214, 218, 242, 307, 308, 311, 312, 319, 441, 485	43
Computer Engineering Requirements CS 115, 116, 330, 331, 351, 450	16
Professional ECE Electives	9/12
Computer Systems/Software Elective ECE 407, 408, 443, 449, CS 425, or CS 487	3/4
Hardware-Design Elective ECE 429 or ECE 446	4
Mathematics Requirements MATH 151, 152, 251, 252, 333, 374	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 122	3
Engineering Science Course Requirement MMAE 200 or MMAE 320	3
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Science Elective BIOL 105, BIOL 114, MS 201, or CHEM 126	3
Interprofessional Projects	6
Total Hours	**146/150**

Bachelor of Science in Electrical Engineering/ Bachelor of Science in Computer Engineering

Semester 1		Credits
ECE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 122	Principles of Chemistry I	3
CS 115	Object-Oriented Programming I	2
Humanities 200-level Course		3
Total Hours		**16**

Semester 2		Credits
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 116	Object-Oriented Programming II	2
Science Elective*		3
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MATH 252	Introduction to Differential Equations	4
PHYS 221	General Physics II	4
ECE 211	Circuit Analysis I	4
ECE 218	Digital Systems	3
CS 331	Data Structures and Algorithms	3
Total Hours		**18**

Semester 4		Credits
MATH 251	Multivariate and Vector Calculus	4
PHYS 224	General Physics III	3
ECE 213	Circuit Analysis II	4
ECE 242	Digital Computers and Computing	3
CS 330	Discrete Structures	3
Total Hours		**17**

Semester 5		Credits
MATH 333	Matrix Algebra and Complex Variables	3
ECE 307	Electrodynamics	4
ECE 311	Engineering Electronics	4
IPRO Elective I		3
CS 351	Systems Programming	3
Total Hours		**17**

Semester 6		Credits
ECE 308	Signals and Systems	3
ECE 312	Electronic Circuits	4
ECE 319	Fundamentals of Power Engineering	4
Engineering Science Elective**		3
Social Sciences Elective		3
Total Hours		**17**

Semester 7		Credits
ECE 441	Microcomputers	4
CS 450	Operating Systems	3
MATH 374	Probability and Statistics for ECE	3
IPRO Elective II		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 8		Credits
ECE 485	Computer Organization and Design***	3
Computer Systems/Software Elective****		3/4
Hardware-Design Elective†		4
Professional ECE Elective††		3/4
Social Sciences Elective (300+)		3
Total Hours		**16/18**

Semester 9	Credits
Professional ECE Elective††	3/4
Professional ECE Elective††	3/4
Humanities Elective (300+)	3
Humanities or Social Sciences Elective	3
Total Hours	**12/14**

Total Credit Hours **146/149**

* Science elective must be BIOL 105, BIOL 114, CHEM 126, or MS 201.

** Engineering science elective: Choose either MMAE 200 or MMAE 320.

*** CS 470 may be substituted with advisor approval.

**** Computer systems/software elective: Choose one of ECE 407, 408, 443, 449, CS 425, or CS 487.

† Hardware-design elective must be ECE 429 or 446.

†† ECE 400-level course with (P) designation. A maximum of three credits of either ECE 491 or ECE 497.

Humanities

Website: humansciences.iit.edu/humanities

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Chair
Maureen A. Flanagan

Associate Chair and Undergraduate Advisor
Greg Pulliam

The Department of Humanities offers Bachelor of Science (B.S.) degrees in Humanities (HUM), Digital Humanities (DHUM), and Communication (COM). The HUM degree is a flexible liberal arts degree, and students may specialize in history, literature, philosophy, communication, or art and architectural history. Students taking the DHUM degree have two specializations: a three-course set in a traditional area of the humanities such history, philosophy, etc; and a five-course digital specialization in Information Architecture, Policy and Ethics, or Science and Technology Studies. Students pursuing the COM degree specialize in Professional and Technical Commnunication, Journalism of Science, or Journalism of Technology and Business. The department offers courses in art and architectural history, communication, literature, and philosophy.

The Humanities department also offers academic minors in communication, English language and literature, history, linguistics, literature, philosophy, professional and technical communication, and Web communication. A minor in urban studies is also offered in conjunction with the Department of Social Sciences.

The department has these five undergraduate educational objectives:

- To offer and support the B.S. degree programs and the academic minors.
- To provide students the opportunity to pursue personal interests in the humanities. This objective is achieved through offering a wide range of advanced courses in the many disciplines that comprise the humanities. The department also encourages students to take minors in literature, history, and philosophy.
- To strengthen the ability of all IIT students to formulate and to express ideas. In addition to composition courses for both native and non-native English speakers, the department supports the Writing Center, where students receive one-on-one tutoring at their convenience. Undergraduates who qualify may also take advanced courses in writing. Advanced courses provide further exposure to critical thinking and to the communication of ideas.
- To support the requirements of all of IIT's professional degree programs. Courses marked with (H) satisfy degree requirements in general education. The department also offers specialized courses (such as architectural history) that meet the educational needs of specific degree programs. The department offers many courses of special relevance to students preparing for careers in the law in IIT's pre-professional degree programs.
- To enable all IIT students to enrich their professional and personal lives. This goal is achieved through advanced elective courses in the humanities, which provide an appreciation and understanding of human development and the moral foundations of human experience, particularly as reflected in history, literature, and philosophy.

IIT students are encouraged to broaden their educational backgrounds and to discover new interests through the study of humanities.

The Humanities department considers the advising of students an important obligation. Each semester, all students majoring in HUM, DHUM, or COM must meet with their faculty advisors during the advising period. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements of the degree programs.

For information regarding faculty visit the Humanities website at **humansciences.iit.edu/humanities/faculty**

Bachelor of Science in Communication (COM)

Students earning the Communication degree specialize in one of three areas: Professional and Technical Communication (PTC), Journalism of Science (JS), or Journalism of Technology and Business (JTB). All COM majors take coursework in editing, persuasion, communication law and ethics, and science and technology in society. PTC specialists add courses in document design, graphic and/or web design, linguistics, art and architectural history, and more. Journalism specialists add courses in journalism, mass media, and intercultural communication; JS specialists add courses in math and science, science writing, and philosophy of science, while JTB specialists take courses in economics, business, information technology, writing about technology, and history of technology.

Bachelor of Science in Communication: Journalism of Science Specialization

Required Courses	Credit Hours
Communication Requirements COM 371, 377, 425 and Portfolio	9
Journalism Requirements COM 323, 372, 435, 440	12
Mathematics Requirement MATH 151	5
Science Requirements BIOL 107, CHEM 124, PHYS 123	11
Science Elective BIOL 114 or 115, CHEM 125 or 126, PHYS 212 or 221	3/4
Mathematics and Science Electives	21
Computer Science Requirement See IIT Core Curriculum, section D, page 25.	2
Science and Technology in Society (STS) Electives Choose from: PHIL 341, PHIL 350, PHIL 351	6
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Introduction to the Profession	3
Interprofessional Projects	6
Minor Electives Recommended Minors inlcude: Biology, Chemistry or Physics	15
Free Electives	12
Total Hours	**126/127**

Communication Curriculum

Sample Program for Journalism of Science Specialization

Semester 1		Credits
Introduction to the Profession		3
MATH 151	Calculus I	5
BIOL 107	General Biology Lectures	3
Humanities 200-level Course		3
Social Sciences Elective		3
Total Hours		**17**

Semester 2		Credits
CS 105	Introduction to Computer Programming	
OR		2
CS 110	Computing Principles	
CHEM 124	Principles of Chemistry I	4
COM 372	Mass Media	3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**15**

Semester 3		Credits
COM 323	Communicating Science	3
PHYS 123	General Physics I	4
Mathematics/Science Elective		3
COM 377	Communication Law and Ethics	3
Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
Minor Elective		3
COM 371	Persuasion	3
STS Elective*		3
Humanities Elective (300+)		3
Required Science Elective**		3
Total Hours		**15**

Semester 5		Credits
Mathematics/Science Elective		3
IPRO Elective I		3
Social Sciences Elective (300+)		3
Minor Elective		3
Free Elective		3
COM 435	Intercultural Communication	3
Total Hours		**18**

Semester 6		Credits
COM 440	Introduction to Journalism	3
Mathematics/Science Elective		3
Free Elective		3
Humanities or Social Sciences Elective		3
Minor Elective		3
Total Hours		**15**

Semester 7		Credits
Mathematics/Science Elective		3
Mathematics/Science Elective		3
IPRO Elective II		3
Minor Elective		3
STS Elective *		3
Total Hours		**15**

Semester 8		Credits
COM 425	Editing	3
Minor Elective		3
Mathematics/Science Elective		3
Mathematics/Science Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours **126**

* Choose from: PHIL 341, PHIL 350, PHIL 351

** Choose from: BIOL 114 or 115, CHEM 125 or 126, PHYS 212 or 221

Bachelor of Science in Communication: Journalism of Technology and Business Specialization

Required Courses	Credit Hours
Communication Requirements COM 371, 377, 425 and Portfolio	9
Journalism Requirements COM 372, 421, 435, 440	12
Technology and Business Requirement BUS 210, BUS 301 OR 371, ECON 211, ITM 301, 311, ITMD 421, 461, ITMO 440	24
Mathematics and Computer Science Requirement See IIT Core Curriculum, section D, page 25.	7
Natural Science and Engineering Requirements See IIT Core Curriculum, section D, page 25.	11
Science and Technology in Society (STS) Elective Choose from: HIST 375, HIST 382, OR HIST 383	6
Humanities and Social Science Electives See IIT Core Curriculum, sections B and C, page 25.	21
Introduction to the Profession	3
Interprofessional Projects	6
Minor Electives Recommended Minors inlcude: Business, Entrepreneurship, Computer Structures, Computer Architecture, Computer Networking, Internet Application Development, Information Technology and Management, or Technology and Human Affairs	15
Free Electives	12
Total Hours	**126**

Communication Curriculum

Sample Program for Journalism of Technology and Business Specialization

Semester 1		Credits
Introduction to the Profession		3
MATH 130	Thinking Mathematically	3
BIOL 105/109	Introduction to Biology and Lab	4
Humanities 200-level Course		3
Social Sciences Elective		3
Total Hours		**16**

Semester 2		Credits
CS 105	Introduction to Computer Programming	
OR		2
CS 110	Computing Principles	
BIOL 114/117	Introduction to Human Biology and Lab	4
COM 372	Mass Media	3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**15**

Semester 3		Credits
COM 421	Technical Communication	3
ITM 301	Introduction to Contemporary Operating Systems and Hardware I	3
PHYS 211	Basic Physics I	
OR		3
CHEM 122	Principles of Chemistry I	
COM 377	Communication Law and Ethics	3
COM 435	Intercultural Communication	3
Social Sciences Elective		3
Total Hours		**18**

Semester 4		Credits
Minor Elective		3
COM 371	Persuasion	3
STS Elective*		3
Humanities Elective (300+)		3
ECON 211	Principles of Economics	3
Total Hours		**15**

Semester 5		Credits
Humanities or Social Sciences Elective		3
IPRO Elective I		3
Social Sciences Elective (300+)		3
Minor Elective		3
Free Elective		3
BUS 210	Financial and Managerial Accounting	3
Total Hours		**18**

Semester 6		Credits
COM 440	Introduction to Journalism	3
MATH 425	Statistical Methods	3
ITM 311	Software Development	3
Free Elective		3
Minor Elective		3
Total Hours		**15**

Semester 7		Credits
ITMD 421	Data Modeling & Applications	3
BUS 301	Designing and Structuring the Organization for Strategic Decision-Making	
OR		3
BUS 371	Strategies for Reaching New Markets	
IPRO Elective II		3
Minor Elective		3
STS Elective		3
Total Hours		**15**

Semester 8		Credits
COM 425	Editing	3
Minor Elective		3
Free Elective		3
ITMO 440	Introduction to Data Networks and the Internet	3
ITMD 461	Internet Technologies and Web Design	3
Total Hours		**15**

Total Credit Hours **127**

* Choose from: HIST 375, HIST 382, HIST 383

Bachelor of Science in Communication: Professional and Technical Communication (PTC) Specialization

Required Courses	Credit Hours
Communication Requirements COM 371, 377, 425 and Portfolio	9
Professional and Techincal Communication Requirements COM 421, 424, 428	9
One of the following Three Nine Credit Sequences **WebCom** ITMD 461, ITMD 462, ITMD 460 or 465 **Engineering Graphics** EG 225, 325, 425 **Architechtural CAD** ARCH 125 and two CAD Electives*	9
Science and Technology in Society (STS) Electives	6
Professional and Technical Communication (PTC) Electives	9
PTC/STS Elective	3
Art and Architectural History (AAH) Elective	3
Linguistics Elective	3
Mathematics Requirements See IIT Core Curriculum, section D, page 25.	5
Natural Science and Engineering Requirements See IIT Core Curriculum, section D, page 25.	11
Computer Science Requirements See IIT Core Curriculum, section D, page 25.	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Introduction to the Profession	3
Interprofessional Projects	6
Minor Electives Recommended Minors inlcude: Business, Entrepreneurship, Psychology, Sociology	15
Free Electives	12
Total Hours	**126**

Communication Curriculum

Sample Program for Professional and Technical Communication Specialization

Semester 1	Credits
Introduction to the Profession	3
MATH 130 Thinking Mathematically	3
BIOL 105/109 Introduction to Biology and Lab	4
Humanities 200-level Course	3
Social Sciences Elective	3
Total Hours	**16**

Semester 2	Credits
CS 105 Introduction to Computer Programming	
OR	2
CS 110 Computing Principles	
BIOL 114/117 Intro Human Biology/Lab	4
Linguistics Elective	3
Humanities Elective (300+)	3
Free Elective	3
Total Hours	**15**

Semester 3	Credits
COM 421 Technical Communication	3
PHYS 211 Basic Physics I	
OR	3
CHEM 122 Principle of Chemistry I	
AAH Elective	3
COM 377 Communication Law & Ethics	3
Social Sciences Elective	3
COM 424 Document Design	3
Total Hours	**18**

Semester 4	Credits
Minor Elective	3
COM 371 Persuasion	3
STS Elective	3
Humanities Elective (300+)	3
Free Elective	3
Total Hours	**15**

Semester 5	Credits
WebCom Course I	3
IPRO Elective I	3
Humanites or Social Sciences Elective	3
Minor Elective	3
Free Elective	3
Social Sciences Elective (300+)	3
Total Hours	**18**

Semester 6	Credits
COM 425 Editing	3
MATH 425 Statistical Methods	3
WebCom Course II	3
PTC Elective	3
Minor Elective	3
Total Hours	**15**

Semester 7	Credits
WebCom Course III	3
STS Elective	3
IPRO Elective II	3
Minor Elective	3
PTC Elective	3
Total Hours	**15**

Semester 8	Credits
COM 428 Verbal and Visual Communication	3
Minor Elective	3
PTC Elective	3
STS/PTC Elective	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **127**

Bachelor of Science in Digital Humanities (DHUM)

Digital Humanities is the interdisciplinary study of traditional humanities subjects and concerns using digital technologies. The Bachelor of Science in Digital Humanities (DHUM) at IIT offers students a unique opportunity to combine humanistic inquiry in areas such as communication, history, language and linguistics, literature, and philosophy with a sophisticated skill set that is readily applicable to professional fields. Students majoring in Digital Humanities complete required courses that include training in research and writing skills as well as web and interactive design. Additionally, all students choose a traditional humanities specialization in history, literature, or philosophy; an interdisciplinary specialization; and a minor concentration. This enables them to develop deeper topical knowledge while pursuing the subjects they find most interesting. The Digital Humanities curriculum at IIT cultivates critical thinking and communication skills along with a host of technical proficiencies.

Bachelor of Science in Digital Humanities (DHUM)

Required Courses	Credit Hours
Digital Humanities Requirement HUM 2XX (Interest in Digital Humanities) COM/HUM 2XX (Digital Writing) COM 3XX Standards-Based Web Design COM 3XX Web Application Development HIST 3XX Digital Labor: History and Practice HIST 3XX Digital Humanites Research Methods CS Elective (2 hours)	20
Digital Humanities Specialization Choose from the following: Data and Analytics, Information Architecture, Policy and Ethics, Science and Technology Studies. See page 108 for complete description.	15
Traditional Humanities Specialization Choose from the following: History, Literature, Philosophy. Students may complete topically appropriate independent study courses to fulfill this requirement.	9
Minor Requirement Recommended Minors include: Business, Communication, Computer Networking, Database Management, Graphics and CAD (for non-Engineers), Entrepreneurship, History, Internet Application Development, Literature, Linguistics, Military Science, Music, Naval Science, Organizational Psychology, Philosophy, Political Science, Professional and Technical Communication, Psychology, Public Administration, Sociology, Urban Studies.	15
Capstone Electives (2)	6
Mathematics Requirements See IIT Core Curriculum, section D, page 25.	5
Computer Science Requirement See IIT Core Curriculum, section D, page 25.	2
Natural Science and Engineering Requirement See IIT Core Curriculum, section D, page 25.	11
Humanities and Social Sciences Electives See IIT Core Curriculum, sections B and C, page 25.	21
Introduction to the Profession	3
Interprofessional Projects	6
Free Electives	13
Total Hours	**126**

Sample Program for Digital Humanities (DHUM) Curriculum

Semester 1	Credits
Introduction to the Profession	3
MATH 130 Thinking Mathematically	3
CS 115 Object-Oriented Programming I	2
Free Elective	3
Humanities 200-level Course	3
Total Hours	**14**

Semester 2	Credits
Interest in Digital Humanities (200-level)	3
Digital Writing (200-level)	3
Social Sciences Elective	3
Humanities or Social Sciences Elective	3
Free Elective	3
CS 116 Object-Oriented Programming II	2
Total Hours	**17**

Semester 3	Credits
BIOL 105/109 Introduction to Biology and Lab	4
Standards-Based Web Design (300-level)	3
DHUM Research Methods (300-level)	3
Traditional Humanities Specialization	3
Minor Elective	3
Total Hours	**16**

Semester 4	Credits
Web Application Development (300-level)	3
Digital Labor: History & Practice (300-level)	3
DHUM Specialization Course	3
Minor Elective	3
BIOL 114/117 Introduction to Human Biology and Lab	4
Total Hours	**16**

Semester 5	Credits
Science/Engineering Elective (not BIOL)	3
Social Sciences Elective	3
Minor Elective	3
DHUM Specialization Course	3
Traditional Humanities Specialization	3
Humanities Elective (300+)	3
Total Hours	**18**

Semester 6	Credits
IPRO Elective I	3
Minor Elective	3
MATH 425 Statistical Methods	3
DHUM Specialization Course	3
Traditional Humanities Specialization	3
Total Hours	**15**

Semester 7	Credits
DHUM Specialization Course	3
Capstone Elective I	3
Minor Elective	3
Social Sciences Elective (300+)	3
Free Elective	3
Total Hours	**15**

Semester 8	Credits
DHUM Specialization Course	3
Capstone Elective II	3
IPRO Elective II	3
Humanities Elective (300+)	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **126**

Digital Humanities Specializations and Minors

The Digital Humanities program incorporates specializations in interdisciplinary subject areas including Information Architecture, Policy and Ethics, and Science and Technology Studies. Digital Humanities majors complete five courses in one of these areas as part of their degree requirements. These specializations are also available as minors to students in other programs. These specializations provide opportunities for in-depth interdisciplinary study of topical areas. A detailed description for each specialization with a listing of course requirements is included below.

Information Architecture

The Information Architecture specialization prepares students with a rich historical, theoretical, and practical foundation in technology and humanities for careers in web design/development, user experience and interface design, and other digital communications careers. This specialization is particularly appropriate for students interested in pursuing our five-year co-terminal MS in Information Architecture, which is part of the graduate program in Technology and Humanities. Students enrolled in the co-terminal BS/DH/MS/IARC degree should take 500-level courses whenever possible.

Choose one of the following:

COM 421 Technical Communication
COM 428 Verbal and Visual Communication
HUM 200-level Elective

Choose two of the following (only one can be a COM 380):

COM 525 User Experience Research and Evaluation
COM 528 Document Design
COM 529 Technical Editing
COM 380/580 Topics in Communication

Choose two of the following (only one can be a COM 380):

COM 541 Information Structure and Retrieval
COM 542 Knowledge Management
COM 543 Publication Management
COM 380/580 Topics in Communication

Policy and Ethics

Students in the Policy and Ethics specialization study and analyze ethical and policy concerns in a variety of areas such as technology, urban and global development, and media. Policy and Ethics is particularly relevant for students with an interest in public policy, nonprofit management, philosophy, law and related fields. Note: Additional COM 380, HUM 380, and HIST 380 courses may also be approved depending on course content.

Prerequisites (must be taken before entering specialization; these courses may fulfill other degree requirements):

HUM 200-level Elective

Philosophy
Choose one of the following:

PHIL 301 Ancient Philosophy
PHIL 302 Origin of Mordern Philosophy
PHIL 305 20th Century Philosophy
PHIL 311 Great Philosophers
PHIL 332 Political Philosophy
PHIL 333 Social Philosophy

Applied Ethics
Choose two of the following:

PHIL 351 Science and Values
PHIL 365 Philosophy of Free Speech
PHIL 370 Engineering Ethics
PHIL 371 Ethics in Architecture
PHIL 373 Business Ethics
PHIL 374 Ethics in Computer Science
PHIL 377/COM 377 Communication Law and Ethics

Topics in Policy and Ethics
Choose two of the following:

COM 372 Mass Media and Society
ECON 152 Understanding and Competing in the Global Marketplace
HIST 380 Topics: Disasters!
HUM 380 Topics: Science and Technology Studies
PS 332 Politics of Science and Technology
SOC 362 Technology and Social Change

Science and Technology Studies

Science and Technology Studies teaches students theories of techno-social growth and development through case studies of large technological systems. It trains students to analyze the ways in which technological growth re-engineers social relationships and how social relationships are in turn written into technological systems. Students with an interest in STS will find themselves well placed to thoughtfully and productively engage in a variety of areas that require a deep understanding of the interaction of large-scale technical and social systems. The knowledge and critical thinking skills learned in the STS subdiscipline can be deployed in public policy, journalism, academic or health administration, technical writing, and more. Note: Additional COM 380, HUM 380, and HIST 380 courses may also be approved depending on course content.

Requirement

Choose five of the following:

COM 334 Literature of Mordern Science
COM 372 Mass Media and Society
COM/PHIL 377 Communication Law and Ethics
COM 380/532 Rhetoric of Technology
COM 380 Topics: Humanizing Technology
COM 380 Topics: Social Networks
COM 580 Topics: Science and Technology Studies
ECON 152 Understanding and Competing in the Global Marketplace
HIST 372 History of Engineering
HIST 375 History of Computing
HIST 380 Topics: Gender and Technological Change
HIST 380 Topics: Disasters!
HIST 380 Topics: Science Fiction in History
HIST 383 Technology in History: 1850 to Present
HUM 380 Topics: Digital Media Studies
HUM 380 Topics: Digital Game Theory
HUM 380 Topics: Science and Technology Studies
LIT 306 Science Fiction
LIT 380 Topics: Literature of Technology
PHIL 341 Philosophy of Science
PHIL 350 Science and Method
PHIL 351 Science and Values
PHIL 374 Ethics in Computer Science
PS 332 Politics of Science and Technology
SOC 301 The Social Dimension of Science
SOC 302 Science and Belief
SOC 303 Science in Society
SOC 362 Technology and Social Change

Bachelor of Science in Humanities (HUM)

IIT's B.S. in Humanities is a flexible degree program aimed at students who are interested in the study of history, philosophy, and communication from a technological point of view, and in the study of science and technology from a humanistic point of view. This degree prepares students for graduate studies in the humanities and social sciences and for professional programs in law and medicine.

Within this major, students can choose concentrations in digital humanities, literature, linguistics, philosophy, history, and communication. Students who choose philosophy, for example, would take all major electives and independent study courses in philosophy and add these to the two required philosophy courses, for a total of 30 hours in philosophy.

This degree has three components:
- IIT Core Curriculum (47 hours)
- Major Coursework (33 hours)
- Minor*/Second Major/Free Electives (46 hours)

Bachelor of Science in Humanities

1. **IIT Core Curriculum**
   (47 hours)
   Where unspecified, follow the bulletin guidelines, see page 25

   Basic Writing Proficiency
   Mathematics (5-6 hours)
   Computer Science (2 hours)
   Humanities and Social Sciences (21 hours)
   Natural Science or Engineering (10-11 hours)
   Interprofessional Projects (6 hours)
   ITP: Introduction to the Profession (2 hours)

   Note: A minimum 16 credit hours is required between Mathematics and Natural Science or Engineering.

2. **The Major**
   (33 hours)
   Eleven (11) courses in art and architectural history, communication, history, literature, philosophy, or courses offered by other departments that are approved by the student's HUM major advisor. At least eight (8) of these courses should be at or above the 300 level.

   Students wishing to specialize should take at least eight (8) courses (24 hours) in a particular discipline.

   Students planning to go on to graduate study in the humanities are encouraged to take at least one independent study course.

   For single majors, all major coursework is over and above the IIT Core Curriculum humanities requirements, and must be chosen in consultation with the student's academic advisor.

   For multiple majors, up to two courses may in some cases be double-counted as applying to both the IIT humanities Core Curriculum and the humanities major.

3. **Minor*/2nd Major/Free Electives**
   (46 hours)

Total Hours: 126

* Students accepted into the Honors Pre-law Program forego the minor and most free electives and take all other coursework in the first three years.

Humanities Curriculum
Sample Program for Honors Law Program Students

Semester 1		Credits
MATH 151	Calculus I	5
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	2
PS 101	Introduction to the Profession	2
Humanities 200-level Course		3
Total Hours		**15**

Semester 2		Credits
BIOL 115	Human Biology	3
CS 105	Intro to Computer Programming I	2
Major Elective		3
Major Elective		3
Humanities Elective (300+)		3
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
PHYS 211	Basic Physics I	3
Major Elective		3
Major Elective		3
Humanities Elective (300+)		3
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 4	Credits
IPRO Elective I	3
Major Elective	3
Major Elective	3
Free Elective	3
Free Elective	3
Social Sciences Elective	3
Total Hours	**18**

Semester 5	Credits
IPRO Elective II	3
Major Elective	3
Major Elective	3
Major Elective	3
Social Sciences Elective (300+)	3
Total Hours	**15**

Semester 6	Credits
Major Elective	3
Major Elective	3
Major Elective	3
Free Elective	3
Free Elective	3
Free Elective	3
Total Hours	**18**

Semester 7	Credits
Courses at Chicago-Kent College of Law	
Total Hours	**14**

Semester 8	Credits
Courses at Chicago-Kent College of Law	
Total Hours	**14**

Total Credit Hours **126**

Industrial Technology and Management
School of Applied Technology

Website: appliedtech.iit.edu/intm

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Director
Mazin Safar

Program Manager
Pamela Houser

The Bachelor of Industrial Technology and Management (BINTM) program is designed to prepare skilled adults for managerial positions in industry. This is a completion program for working individuals who have technical training in manufacturing or industrial specialties. The program enables students to build upon existing skills, improve their managerial capabilities, and thereby expand their career opportunities.

Educational outcomes of the BINTM program include:

- Understand best practices in industry and methods of implementation.
- Identify and evaluate significant factors and issues affecting managerial decision-making.
- Ability to assume a leadership role and a higher level of professional responsibility.
- Understand how to address a wide range of operational and situational challenges.
- Understand the importance of ethical and sustainable industrial operations.
- Understand the dynamics of the global industrial landscape.
- Communicate effectively at all levels, in an objective and professional manner.
- Ability to function on multidisciplinary teams.

The program offers five professional specializations: Industrial Facilities (IF), Industrial Sustainability (ST), Manufacturing Technology (MT), Supply Chain Management (SCM), and Telecommunication Technology (TT). Students have the option to complete a specialization or take courses from more than one specialization area as electives. The core curriculum covers material applicable to all industrial sectors. This approach allows students to optimize course selection to suit individual career objectives.

The ideal candidate for this program is a person who is already working within, or has strong interest in, these industries or related fields. This curriculum provides a broad knowledge base which gives students the flexibility to advance within a chosen technical specialty or to move into a related career at a professional or management level.

Admission to the program is based on a review of college transcripts plus consideration of work experience and career goals. In general, 63 semester hours from an accredited college are needed for admission (only courses graded C or better are accepted for transfer). Those who have accrued at least 45 hours towards admission requirements may be admitted with the condition that all outstanding requirements be completed within two years of starting the program. Candidates with more than 63 hours of transferable credit may qualify to have excess credit applied towards INTM coursework.

To accommodate full-time work schedules, courses are offered evenings and Saturdays at IIT's Main Campus in Chicago, IIT's Rice Campus in Wheaton, IL, and via the Internet for students who are unable to attend live classes.

A three-course INTM certificate program is available for individuals interested in improving managerial and decision-making skills. The courses are part of the regular curriculum and can be applied toward the BINTM degree.

Industrial Technology and Management also offers a co-terminal degree, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Industrial Technology and Management/ Master of Industrial Technology and Operations

The co-terminal degree allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Industrial Technology and Management departmental website: **appliedtech.iit.edu/intm**.

For information regarding faculty visit the Industrial Technology and Management website at **appliedtech.iit.edu/industrial-technology-and-management/about/people/faculty**.

Admission Requirements

Candidates must complete an application for undergraduate admission and submit official transcripts from all colleges attended, one letter of recommendation, and a personal statement. The BINTM program nominally requires the transfer of 63 semester hours as outlined in the following admission requirements:

Mathematics*
Five (5) to six (6) credit hours at the level of trigonometry or above. Technical Mathematics is also accepted. See IIT Core Curriculum, section D, page 25.

Natural Science*
Ten (10) to eleven (11) credit hours of science or engineering courses. Relevant courses include physics, chemistry, or biology (physics highly recommended). Up to six credit hours may be in engineering graphics/drafting. Two sequential courses must be completed in a single field and the third course must be in a different field. In certain cases, technology courses may satisfy requirement. See IIT Core Curriculum, section D, page 25.

Computer Science
Three (3) credit hours of computer literacy/programming.

Humanities and Social Sciences
Twelve (12) credit hours. Humanities courses include literature, philosophy (except logic), and history. Social sciences typically include anthropology, geography, political science, psychology, sociology, and economics. A minimum of three (3) credit hours in humanities and six (6) credit hours in social sciences is required.

Technical coursework
Thirty-one (31) credit hours. (Candidates with adequate college credit but lacking the technical coursework may qualify for admission based on a strong interest and/or relevant industrial experience.)

* A minimum 16 credit hours is required between Mathematics and Natural Science or Engineering.

Industrial Technology and Management Curriculum

A total of 126 semester hours are required for the Bachelor's degree, consisting of 63 credit hours (21 courses) of junior- and senior-level courses completed at IIT and the 63 transfer credit hours required for admission. Students may attend on a part-time or full-time basis, understanding that INTM courses are generally offered evenings to accomodate full-time work schedules of students.

The core curriculum (14 courses) emphasizes proficiency in the essential functions of industrial enterprises with a focus on management-related topics. This coursework includes upper-level humanities and social sciences electives and two (2) Interprofessional Projects (IPRO). In addition, students complete seven (7) electives, generally consisting of three (3) technical electives, and four (4) specialization electives. Electives provide in-depth coverage of specific aspects of industrial organizations and their related sectors. Students choose elective courses based on career goals and personal interests, and have the option to complete a formal specialization by taking four courses within one specialty area.

The Core Curriculum (14 courses)

INTM 301 Communications for the Workplace
INTM 315 Industrial Enterprises
INTM 322 Industrial Project Management
INTM 404 Sales, Marketing and Product Introduction
INTM 408 Cost Management
INTM 409 Inventory Control
INTM 410 Operations Management
INTM 425 Human Resource Management
INTM 432 Sales and Operations Planning
Two(2) Interprofessional Project(IPRO)Courses
Two(2) 300/400 level Humanities Electives
One(1) 300/400 level Social Science Electives

INTM Electives (7 courses) are chosen from both Technical and Specialization elective options

Technical Electives:

INTM 314 Maintenance Technology and Management
INTM 319 Electronics in Industry
INTM 414 Topics in Industry
INTM 418 Industrial Risk Management
INTM 420 Applied Strategies for the Competitive Enterprise
INTM 427 E-Commerce
INTM 441 Supply Chain Management
INTM 477 Entrepreneurship in Industry

Specializations

Five industrial specializations are available. To earn a specialization, the student must complete four (4) courses within an identified focus area.

Industrial Facilities (IF)
Covers construction, project management, and renovation and maintenance of buildings, facilities, and equipment.

INTM 407 Construction Technology
INTM 413 Facilities and Construction Adminstration
INTM 415 Advanced Project Management
INTM 417 Construction Estimating

Industrial Sustainability (ST)
Covers a range of issues in industrial sustainability, critical material resources, and alternative energies.

INTM 459 Issues in Industrial Sustainability
INTM 460 Sustainability of Critical Materials
INTM 461 Energy Options in Industry
INTM 462 Special Topics in Sustainability

Manufacturing Technology (MT)
Covers manufacturing processes for metals, chemical, and electronic industries, information systems, and quality control.

INTM 406 Quality Control
INTM 412 Manufacturing Processes for Metals/Mechanical Systems
INTM 431 Manufacturing Processes: Electronics/Electrical Systems
INTM 433 Manufacturing Processes in Chemical Industries
INTM 446 Manufacturing and Logistics Information Systems

Supply Chain Management (SCM)
Covers strategic supply chain management, warehousing and distribution, purchasing, transportation, and export/import.

INTM 430 Transportation
INTM 441 Supply Chain Management
INTM 442 Warehousing and Distribution
INTM 443 Purchasing
INTM 444 Export/Import
INTM 446 Manufacturing and Logistics Information Systems

Telecommunication Technology (TT)
Covers management and maintenance of data networks, network configurations, network security, and evolving technologies, including voice over IP.

ITMO 440 Introduction to Data Networks and the Internet
ITMO 441 Network Administration and Operations
ITMS 448 Cyber Security Technologies
INTM 449 Telecommunications Over Data Networks

Bachelor of Industrial Technology and Management

Required Courses	Credit Hours
Admission Requirements	63
Industrial Technology Requirements INTM 301, 315, 322, 404, 408, 409, 410, 425, 432	27
INTM Electives (Technical and/or Specialization)	21
Humanities Electives 300/400-level courses	6
Social Sciences Elective 300/400-level course	3
Interprofessional Projects (IPRO)	6
Total Hours	**126**

Industrial Technology and Management

A suggested program based on half-time attendance. Students may complete coursework at their own pace.

Semester 1		Credits
INTM 301	Communications for the Workplace	3
INTM 315	Industrial Enterprises	3
INTM 410	Operations Management	3
Total Hours		**9**

Semester 2		Credits
INTM 322	Industrial Project Management	3
INTM Elective		3
INTM Elective		3
Total Hours		**9**

Semester 3		Credits
INTM 404	Sales, Marketing and Product Intro	3
INTM Elective		3
Humanities Elective (300+)		3
Total Hours		**9**

Semester 4		Credits
INTM 409	Inventory Control	3
INTM Elective		3
Social Science Elective (300+)		3
Total Hours		**9**

Semester 5		Credits
INTM 432	Sales and Operations Planning	3
INTM Elective		3
IPRO Elective I		3
Total Hours		**9**

Semester 6		Credits
INTM 425	Human Resource Management	3
INTM Elective		3
Total Hours		**6**

Semester 7		Credits
INTM 408	Cost Management	3
Humanities Elective (300+)		3
Total Hours		**6**

Semester 8		Credits
IPRO Elective II		3
INTM Elective		3
Total Hours		**6**

Total Credit Hours **63**

Certificate in Industrial Technology and Management

The three-course INTM certificate provides an introduction to industrial organizations and how they operate.

Certificate students should have at least two years of work experience and some college credit in industrial subjects. The INTM certificate does not qualify for federal financial aid.

Students must complete the following courses:

INTM 315 Industrial Enterprises
INTM 322 Industrial Project Management
INTM 410 Operations Management

Information Technology and Management–School of Applied Technology

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Dean and Chair
C. Robert Carlson

Associate Chair and
Director of Undergraduate Advising
Ray Trygstad

The objective of the Bachelor of Information Technology and Management degree is to produce graduates prepared for a career in the information technology field, while equipping them with the critical thinking skills necessary to cope with the emergence of new technologies and with management principles needed to advance in their careers. While the program was originally designed for students who have achieved an Associate's degree and would like to complete a Bachelor's degree, students may also enter the program as first-year students.

Government studies such as Free and Aspray: *The Supply of Information Technology Workers in the United States*, show that technology positions will be the fastest growing segment in the United States for the next 30 years. Organizations of all kinds have become dependent on networked computing infrastructure as the key element to enabling modern business processes, and our graduates are prepared to select, manage, and maintain that infrastructure, ensuring that it meets organizational needs. Information technology professionals assume responsibility for selecting hardware and software products appropriate for an organization, integrating those products with organizational needs and infrastructure, and installing, customizing, and maintaining those applications for the organization's computer users. Planning and managing an organization's technology infrastructure is a difficult and complex job that requires a solid foundation in applied computing as well as management and people skills. Professionals in this discipline require special skills, such as understanding how networked systems are composed and structured and what their strengths and weaknesses are, and being prepared to deal with important software systems concerns such as reliability, security, usability, and effectiveness and efficiency for their intended purpose. These topics are difficult and intellectually demanding.

The Bachelor of Information Technology and Management degree produces graduates who are able to:

- Problem solve and create innovative answers to provide technology solutions for the problems of business, industry, government, non-profit organizations, and individuals.
- Identify and analyze user needs, identify and define computing requirements appropriate to the problem solution, and take them into account in the selection, creation, evaluation, and administration of computer and network-based systems.
- Apply current technical and mathematical concepts and practices in the core information technologies and recognize the need to engage in continuing professional development.

To meet these goals, graduates must demonstrate knowledge and proficiency in these areas:

- Information technology basics including hardware and operating systems
- Application developement and programming
- Human-computer interaction
- Databases and data management
- Networking and communications
- Websystems
- Cybersecurity
- Professionalism

Bachelor of Information Technology and Management students are required to complete a minor. The minor may be in a field which will complement information technology such as business or professional and technical communication, or may be chosen from a field very different such as history or sociology to provide a more widely rounded educational experience.

Admission for transfer students is based on a review of college transcripts and documentation of work experience. Applicants must submit an application for admission as a degree-seeking student. Transfer applicants must hold an Associate's degree (A.A.) from an accredited college or the equivalent (completion of atleast 58 credit hours). Only courses in which the student has earned a grade of C or better may be accepted for transfer. Supporting documentation to be included with the application includes official transcripts of all college-level work.

The Information Technology and Management Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Information Technology and Management/Master of Cyber Forensics and Security
- Bachelor of Information Technology and Management/Master of Information Technology and Management

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Information Technology and Management departmental website: **appliedtech.iit.edu/itm**.

For information regarding faculty visit the Information Technology and Management website at **appliedtech.iit.edu/ information-technology-and-management/about/ people/faculty**.

Transfer Admission Requirements

Admitted transfer students are expected to have satisfied the following IIT Core Curriculum requirements prior to admission. If not, the student must complete them while working on the ITM degree. The degree requires a minimum of 127 semester hours including transfer and coursework completed at IIT. A maximum of 68 applicable semester hours of transfer credit is permitted from a two-year college.

Basic Writing Proficiency Requirement

Students must take the IIT English Proficiency Examination before beginning classes at IIT. Within their first year at IIT, students who do not pass the IIT English Proficiency Examination must demonstrate basic writing proficiency by passing a composition course at IIT.

Computer Science

Two credit hours of computer programming; may be satisfied by taking ITM 311.

Humanities and Social Sciences

Twelve semester hours. Humanities include literature, philosophy (except logic), and history. Social or behavioral sciences typically include anthropology, geography, political science, psychology, sociology, and economics. Studies must include a minimum of three semester hours in humanities and six semester hours in the social sciences.

Free or Technical Electives

Twenty-eight semester hours of approved courses. Students should contact the Office of Undergraduate Academic Affairs for additional information.

Mathematics*

Five to six semester hours of mathematics at the level of MATH 119 or above; Discrete Math and Probability and Statistics are highly recommended. Students who enter the program with less than fifty-eight hours of total transfer credit or less than five hours of mathematics credit will be required to take a mathematics elective; BUS 221 Analytics for Informed Decision-Making is preferred. See IIT Core Curriculum, section D, page 25.

Natural Science or Engineering*

Ten to eleven semester hours of natural science or engineering courses. Relevant science courses include physics, chemistry, astronomy, biology or engineering graphics. Two sequential courses must be from the same field and one must be from another field. In some cases, certain technology courses might be applied to this requirement. See IIT Core Curriculum, section D, page 25.

* A minimum 16 credit hours is required between Mathematics and Natural Science or Engineering.

Bachelor of Information Technology and Management

Transfer students are required to take 69 semester hours at IIT and transfer 58 semester hours to complete the Bachelor's degree for a total of 127 semester hours. This includes 18 information technology courses for a total of 54 semester hours in the major. An additional 18 semester hours outside the major must be taken at IIT in order to satisfy the remaining IIT Core Curriculum Requirements. These include three 300/400-level humanities and social or behavioral science electives and two IPRO courses. Two social or behavioral science electives must be from the same field and one must be from a different field; lower level social or behavioral science electives count towards this requirement. The computer science general education requirement may be satisfied by completion of ITM 311.

All students must complete a minimum of 36 semester hours of courses with a significant written and oral communication component, identified with a (**C**) in the bulletin; 12 hours of (**C**)-coded courses must be taken in the major.

ITM students are required to complete a minor and are strongly encouraged to consider minors which complement their primary program of study; these include (but are not limited to) Business, Industrial Technology, Professional and Technical Communications; Circuits and Systems; Computer Architecture; and ROTC. Courses taken to fulfill a minor requirement may not also be used as electives in the major. The minor requirement may be waived for students entering as transfer students or who change their major to Information Technology and Management after completion of 30 hours of studies at IIT.

A maximum of nine hours of ITM graduate courses taken as an undergraduate may be applied to the Master of Information Technology and Management degree, and any graduate courses taken to fulfill undergraduate degree requirements may not also be applied to a graduate degree unless the student is enrolled in a co-terminal Master's degree program.

Bachelor of Information Technology and Management (Program for First-Year Students)

Required Courses	Credit Hours
ITM Requirements ITM 100, 301, 311, 312, ITMD 411, 421, 434, 461, ITMM 471, ITMO 440, 456, ITMS 448, ITMT 430	38
ITM Electives Select from ITM, ITMD, ITMM, ITMO, ITMS, ITMT, and TECH	18
Mathematics Requirements A mathematics elective at the level of MATH 119 or above (MATH 230 is strongly recommended), and a Statistics Elective (BUS 221, PSYC 203 or MATH 425)	6
Natural Science and Engineering Requirements EG 225 is recommended. See IIT Core Curriculum, section D, page 25.	11
Humanities and Social Sciences Requirements PSYC 301 is recommended. See IIT Core Curriculum, sections B and C, page 25.	21
Interprofessional Projects	6
Minor Electives	15
Free Electives	12
Total Hours	**127**

Information Technology and Management Curriculum

(Program for First-Year Students)

Semester 1		Credits
ITM 301	Introduction to Contemporary Operating Systems & Hardware I	3
ITMD 421	Data Modeling & Applications	3
Natural Science or Engineering Elective		4
Humanities 200-level Elective		3
Total Hours		**13***

Semester 2		Credits
ITM 100	Introduction to Information Technology as a Profession	2
ITM 311	Introduction to Software Development	3
Social Sciences Elective		3
Mathematics Elective (MATH 230 is recommended)		3
Natural Science or Engineering Elective		4
Total Hours		**15**

Semester 3		Credits
ITM 312	Introduction to Systems Software Programming	3
ITMM 471	Project Management for Information Technology & Management	3
ITMO 440	Introduction to Data Networks & the Internet	3
Natural Science or Engineering Elective		3
Social Sciences Elective		3
Total Hours		**15**

Semester 4		Credits
ITMD 411	Intermediate Software Development	3
ITMD 434	Human/Computer Interaction	3
ITMD 461	Internet Technologies & Web Design	3
ITM Elective		3
Statistics Elective (MATH 425, BUS 221, PSYC 203)		3
Minor Elective		3
Total Hours		**18**

Semester 5		Credits
ITMO 456	Introduction to Open Source Operating Systems	3
ITM Elective		3
Minor Elective		3
Humanities Elective (300+)		3
Free Elective		3
Free Elective		3
Total Hours		**18**

Semester 6	Credits
ITM Elective	3
ITM Elective	3
IPRO Elective I	3
Social Sciences Elective (300+)	3
Minor Elective	3
Free Elective	3
Total Hours	**18**

Semester 7		Credits
ITMS 448	Cyber Security Technologies	3
ITM Elective		3
Minor Elective		3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**15**

Semester 8		Credits
ITMT 430	System Integration	3
ITM Elective		3
IPRO Elective II		3
Minor Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**15**

Total Credit Hours **127**

* Students should be aware that students not completing 30 hours of study in their first year will still be classified as a first year student in the first semester of their second year of study, which may adversely impact some financial aid. Students with issues or questions about this should discuss it with a Financial Aid Counselor.

Bachelor of Information Technology and Management (Transfer, Part-Time Program)

Required Courses	Credit Hours
Courses Transferred (or taken at IIT)	58
Humanities Electives 300/400-level courses	6
Social Sciences Elective 300/400 level course PSYC 301 is recommended	3
Interprofessional Projects	6
ITM Requirements ITM 301, 311, 312, ITMD 411, 421, 434, 461 ITMM 471, ITMO 440, 456, ITMS 448, ITMT 430	36
ITM Electives Select from ITM, ITMD, ITMM, ITMO, ITMS, ITMT, and TECH	18
Total Hours	**127**

Information Technology and Management Curriculum

(Students Entering as Transfer, Part-Time)

Semester 1		Credits
ITM 301	Introduction to Contemporary Operating Systems & Hardware I	3
ITM 311	Introduction to Software Development	3
ITMD 421	Data Modeling & Applications	3
Total Hours		**9**

Semester 2		Credits
ITM 312	Introduction to Systems Software Programming	3
ITMO 440	Introduction to Data Networks & the Internet	3
Humanities Elective (300+)		3
Total Hours		**9**

Semester 3		Credits
ITMD 461	Internet Technologies & Web Design	3
ITMD 411	Intermediate Software Development	3
ITMM 471	Project Management for Information Technology & Management	3
Total Hours		**9**

Semester 4		Credits
ITMO 456	Introduction to Open Source Operating Systems	3
ITMD 434	Human/Computer Interaction	3
Humanities Elective (300+)		3
Total Hours		**9**

Semester 5		Credits
ITMS 448	Cyber Security Technologies	3
ITM Elective		3
Social Sciences Elective (300+)		3
Total Hours		**9**

Semester 6		Credits
ITMT 430	System Integration	3
IPRO Elective I		3
ITM Elective		3
Total Hours		**9**

Semester 7	Credits
IPRO Elective II	3
ITM Elective	3
ITM Elective	3
Total Hours	**9**

Semester 8	Credits
ITM Elective	3
ITM Elective	3
Total Hours	**6**

Total Credit Hours **69**

Information Technology Curriculum Specializations

The ITM electives may be chosen from one or more of the following course specializations. ITM required courses may not be counted toward completion of elective requirements for specializations. With the permission of the advisor, other undergraduate or graduate courses in the same area may be substituted for courses in a specialization.

Systems Security

Focuses on application, data, and network security and the management of information technology security.

ITMS 478 Cyber Security Management

AND any one of the following

ITMO 433 Enterprise Server Administration
ITMO 441 Network Administration and Operations
ITMO 450 Enterprise End-User System Administration
ITMO 453 Open Source Server Administration

AND any two ITMS electives.

Data Management

Focuses on the design, development, and administration of traditional and Internet-based data management.

ITMD 422 Advanced Database Management
ITMS 428 Database Security

AND any two of the following:

ITMO 444 Cloud Computing Technologies

OR any ITMD elective(s)

Web Design and Application Development

Focuses on the design and development of fully-interactive websites and applications for Internet deployment.

ITMO 441 Network Administration and Operations
ITMD 462 Web Site Application Development

AND any two of the following:

ITMO 444 Cloud Computing Technologies
ITMD 455 Intelligent Device Applications
ITMD 463 Intermediate Web Application Development
ITMD 464 Advanced Web Application Development
ITMD 465 Rich Internet Applications
ITMD 466 Service Oriented Architecture
ITMD 467 Web Systems Integration
ITMD 469 Topics in Application Development

IT Entrepreneurship and Management

Focuses on the managerial and entrepreneurial skills needed to launch a new enterprise.

ITMM 470 Fundamentals of Management for Technical Professionals
ITMM 481 Information Technology Entrepreneurship

AND any two from ITMM or the following:

BUS 100 Introduction to Business
ECON 151 Making Strategic Decisions in the Marketplace

OR any BUS electives at the 200-level or above.

OR any INTM electives selected with adviser's approval.

Software Development

Focuses on programming and the development of sophisticated applications.

ITMD 415 Advanced Software Development
ITMD 462 Web Site Application Development

AND any one of the following:

ITMD 412 Advanced Structured & Systems Programming
ITMD 413 Open Source Programming
ITMD 419 Topics in Software Development
ITMD 455 Intelligent Device Applications

OR any ITMD elective.

System Administration

Focuses on the administration and the management of servers.

ITMO 441 Network Administration and Operations

AND any two of the following:

ITMO 433 Enterprise Server Administration
ITMO 450 Enterprise End-User System Administration
ITMO 453 Open Source Server Administration

AND any two of the following:

IMTO 417 Shell Scripting for System Administrators
ITMO 444 Cloud Computing Technologies
ITMO 454 Operating System Virtualization
ITMS 458 Operating System Security

Networking and Communications

Focuses on network applications and management.

ITMO 441 Network Administration and Operations

AND any one of the following:

ITMO 433 Enterprise Server Administration
ITMO 453 Open Source Server Administration

AND any two from ITMO, ITMT, or the following:

ITMD 465 Rich Internet Applications
ITMS 443 Vulnerability Analysis and Control
ITMS 478 Cyber Security Management

IIT/College of DuPage and IIT/Joliet Junior College Dual Admissions Programs

Students who meet the requirements of the Dual Admissions Program (DAP) may enroll simultaneously at the College of DuPage (COD) or Joliet Junior College (JJC) and IIT. Students accepted into the DAP will have access to advising and other services from both institutions. Students who successfully complete the institutional course requirements of both institutions under the DAP will be awarded an Associate's degree from COD or JJC and a Bachelor of Information Technology and Management from IIT.

Eligibility for the Program

Students applying to the DAP must be enrolled in one of the following programs:

At COD: Associate of Applied Science degree in Computer Information Systems or Associate of Applied Science degree in Computer Internetworking Technologies

At JJC: Associate of Applied Science degree in Computer Information Systems; Network Specialist, Programming or Web Design and Administration Options

Students must have and maintain a cumulative GPA of at least 3.00 at COD or JJC to be eligible for admission to IIT. Students must make satisfactory academic progress at COD, as defined by COD, or at JJC, as defined by JJC.

Application Process

Applicants must complete a Statement of Intent Form, which permits the exchange of academic admission and advising information between IIT and COD or JJC. Applicants must also complete the application process at both COD or JJC and IIT in order to be admitted to both institutions. The IIT application may be submitted only for a Bachelor's program in Information Technology and Management. Admission to other IIT programs may have additional requirements that are outside the scope of the program.

Academic Program Requirements

Students must follow each institution's policies regarding admission, course enrollment, transfer hours, probation, dismissal and re-instatement. Transcripts must be sent to the IIT Office of Undergraduate Academic Affairs each semester for each student attending COD or JJC and enrolled in the DAP. IIT will provide COD and JJC with major and course updates, course prerequisites, and program requirements for the Information Technology and Management Bachelor's degree completion program.

Graduation Requirements

Students enrolled in the DAP must follow the COD or JJC catalog to satisfy requirements for the Associate's degree and the requirements set out in the IIT Undergraduate Bulletin in effect at the time of admission into the DAP for the Bacehlor's degree.

Mathematics and Science Education

Website: science.iit.edu/mathematics-science-education

South Tower 4007
3424 S. State St.
Chicago, IL 60616
312.567.3661

The Department of Mathematics and Science Education has an education program that prepares students for teaching licensure at the secondary level (grades 6-12) while they receive a Bachelor of Science degree in Biology, Chemistry, Physics, Applied Mathematics, Computer Sciences, an engineering discipline, or a related field.

A math or science teacher must know the subject matter as well as how to teach it. The Department of Mathematics and Science Education is a discipline-based teaching program. Students will learn how to effectively teach their chosen disciplines because the curriculum focuses on each student's chosen discipline as opposed to general education.

The program draws primarily from constructivist epistemology as a means by which knowledge is developed and fully recognizes the individual perspectives from which learners approach school and life situations. Additionally, the knowledge base utilizes contemporary research on teaching and learning and is philosophically and substantively aligned with Illinois Content Standards and the professional subject-matter organizations. Graduates of the program will be leaders in instructional innovation in mathematics and science.

The overall organizational framework for the program borrows heavily from Shulman's (1986) *Knowledge Growth in Teaching* with the ultimate focus on the Teacher as Transformer of Subject Matter. At an operational level, the program focuses on the development, revision, and elaboration of six primary domains of knowledge that both theory and research have indicated are essential for effective instruction. It is this combination of domains of knowledge that distinguishes the expert teacher from others possessing one or more of the following domains of knowledge: subject matter knowledge, pedagogical knowledge, knowledge of schools, knowledge of learners, curricular knowledge, and pedagogical content knowledge.

Within the Knowledge Growth in Teaching model, the IIT program is committed to providing students with experiences that help them develop a full range of knowledge and skills in the areas of subject matter, pedagogy, pedagogical content knowledge, schools, learners, and curriculum within a framework of moral and ethical societal norms, including a commitment to equity and diversity. From a constructivist perspective, individuals are continually structuring knowledge and revising their knowledge in response to differing contexts and new knowledge/perceptions. Consequently, it is important to note that the program does not view any of the domains of knowledge as completed outcomes upon graduation. Rather, the domains provide a basis for continued life-long professional development.

For information regarding faculty visit the Mathematics and Science Education website at **science.iit.edu/mathematics-science-education /people/faculty**

Specific Program Outcomes

Program graduates will demonstrate their knowledge of the stated domains of knowledge by:

- The development of integrated and in-depth subject matter knowledge in topical areas directly relevant to teaching content specialty (Subject Matter Knowledge).
- The successful development of instructional materials/plans consistent with research on teaching/learning and supports emotional development (Pedagogical Knowledge).
- Successfully working within the school and community in a manner that fosters community and state instructional goals (Knowledge of Schools).
- The development and implementation of instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for all students regardless of their race, ethnicity, gender, sexual orientation, language, religion, socioeconomic status, and regional/geographic origins (Knowledge of Learners).
- Appropriate selection of instructional/curriculum materials relative to local, state, and national curriculum goals and reforms, and exhibited ability to analyze and revise materials so that they are consistent with appropriate curriculum goals (Curricular Knowledge).
- Successful development and implementation of instruction that represents current subject matter to students in a form that promotes in-depth understanding and ability to apply knowledge to new and unique situations (Pedagogical Content Knowledge).

Mathematics and Science Education Secondary Science or Mathematics Teaching Licensure*

Required Courses	Credit Hours
MSED 200 Analysis of Classrooms (Practicum and Seminar)	3
MSED 250 Middle and Secondary School Curriculum/Foundations	3
MSED 300 Instructional Methods/Strategies I	3
MSED 320 Inquiry and Problem Solving in Mathematics and Science	3
MSED 350 Advanced Methods for Inclusive Instruction and Practicum	3
MSED 400 Instructional Methods/Strategies II	3
MSED 450 Professional Internship	6
Total Hours	**24/30****

* This program has been approved by Illinois State Board of Education.

** Students may be required to take MSED 497, Special Projects (Student Teaching Seminar). Consult the MSED departmental advisor.

Mechanical, Materials, and Aerospace Engineering

Website: engineering.iit.edu/mmae

10 W. 32nd St.
Engineering 1 Building Suite 243
Chicago, IL 60616
312.567.3175

Chair
Keith Bowman

The Department of Mechanical, Materials, and Aerospace Engineering offers the Bachelor of Science degree in Mechanical Engineering (ME), Materials Science and Engineering (MSE), and Aerospace Engineering (AE). These degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The educational objectives of the (AE/ME/MSE) undergraduate program are the following:

- Graduates will meet the expecations of employers of AE/ME/MSE engineers.
- Qualified graduates will pursue advanced study if they so desire.
- Graduates will assume/undertake leadership roles in their community and/or profession.

The educational outcomes of the (AE/ME/MSE) program are to develop in graduates:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in, life-long learning.
- A knowledge of contemporary issues.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The Mechanical, Materials, and Aerospace Engineering Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Aerospace Engineering/Master of Materials Science Engineering
- Bachelor of Aerospace Engineering/Master of Mechanical and Aerospace Engineering
- Bachelor of Mechanical Engineering/Master of Materials Science Engineering
- Bachelor of Mechanical Engineering/Master of Mechanical and Aerospace Engineering

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Mechanical, Materials, and Aerospace Engineering departmental website: **engineering.iit.edu/mmae**.

For information regarding faculty visit the Mechanical, Materials, and Aerospace Engineering website at **engineering.iit.edu/mmae/people/faculty**.

Mechanical, Materials, and Aerospace Engineering

Students are introduced to the scope of the engineering profession in the first-semester course "Introduction to the Profession", and to the ethical, economical, safety, environmental, and other responsibilities of being a professional engineer. Strong emphasis is placed on development of oral and written communication skills. Accompanying courses in mathematics and the basic sciences provide the foundation for later studies of engineering sciences relevant to the students' major fields of study. These areas include: energy, structures, and motion for the ME major; materials, structure-property relations, materials processing, service behavior, and design for the MSE major; and structures and materials, propulsion, and aerodynamics for the AE major. Regardless of the students' intended major, all MMAE students have a common curriculum for the first two semesters.

The second year emphasizes building a foundation for the eventual study of engineering design. The engineering sciences offer a rational approach to solving detailed problems encountered in major-specific courses, including the IPROs and capstone design courses of the third and fourth years.

In the third year, students begin the transition to professional practice and learn to develop sound engineering judgment by studying open-ended problems and realistic constraints. Students build further on the engineering sciences, and approximately one-third of major-specific coursework is devoted to the introduction of tangible engineering design. The student's professional experience is developed by participation in a minimum of two Interprofessional Projects in the third and fourth years.

The process continues into the fourth year where the three programs culminate in senior-year projects. Mechanical engineering projects involve design of thermal and mechanical systems; materials science and engineering students develop new or optimized materials, processing routes, or selection schemes; and aerospace engineering students produce conceptual designs of aircraft and spacecraft missions.

Advising

The MMAE department considers the advising of students an important obligation. Each student must meet with a faculty advisor during the advising period each semester. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements for ABET accreditation. Students' academic advisors can be found on their myIIT account.

Program requirements may not be waived, nor will substitutions be permitted, without the approval of the departmental Undergraduate Studies Committee.

Minors

Minors available to students who wish to broaden their knowledge can be found on pages 172–175. In all programs, two of the required minor courses substitute for two free or technical electives. Minors other than those listed below may be undertaken with the approval of the student's faculty advisor and the MMAE Undergraduate Studies Committee. In the event that a required course for a minor is also required for the major, an approved substitution must be made. Application to take a minor is typically made in the student's third or fourth semester. Minors require completion of additional courses.

Among the minors that are available to ME, MSE, and AE students are:

- Aerospace Engineering (for ME students only)
- Air Force Aerospace Studies
- Artificial Intelligence
- Business
- Construction Management
- Electromechanical Design and Manufacturing (for ME and AE students only)
- Energy/Environment/Economics (E3)
- Environmental Engineering
- Materials Engineering (for ME or AE students only)
- Mechanical Engineering (for AE students only)
- Military Science
- Naval Science
- Polymer Science and Engineering
- Premedical Studies
- Software Engineering

Mechanical Engineering

Mechanical engineering is an essential part of most industries and modern technologies, and includes the analysis, design, and development of machines and structures that involve motion. Mechanical engineers are employed in areas such as the design and control of machinery; the development of means of transportation including automobiles, aircraft, space and marine vehicles, and railroads; computer-aided design and manufacture of products, consumer goods, devices, and industrial equipment; medical technology utilizing mechanical and electromechanical devices; the generation of energy from fossil and nuclear fuels; and the utilization, storage, and distribution of alternative energy sources.

Bachelor of Science in Mechanical Engineering

Required Courses	Credit Hours
Mechanical Engineering Requirements MMAE 100, 200, 202, 232, 302, 305, 313, 319, 320, 321, 323, 332, 350, 419, 432, 433, 443, 445, 485	59
Material Science Requirement MS 201	3
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 104	2
Humanities and Social Sciences Electives See IIT Core Curriculum, sections B and C, page 25.	21
Interprofessional Projects	6
Free Electives	6
Total Hours	**127**

Mechanical Engineering Curriculum

Semester 1		Credits
MMAE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 124	Principles of Chemistry I	4
Humanities 200-level Course		3
Total Hours		**15**

Semester 2		Credits
MS 201	Materials Science	3
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 104	Intro to Computer Programming for Engineers	2
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MMAE 200	Introduction to Mechanics	3
MMAE 232	Design for Innovation	3
MATH 251	Multivariate and Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
MMAE 202	Mechanics of Solids	3
MMAE 350	Computational Mechanics	3
MATH 252	Introduction to Differential Equations	4
Humanities Elective (300+)		3
Social Sciences Elective		3
Total Hours		**16**

Semester 5		Credits
MMAE 302	Advanced Mechanics of Solids	3
MMAE 305	Dynamics	3
MMAE 313	Fluid Mechanics	3
MMAE 320	Thermodynamics	3
Humanities Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
MMAE 319	Mechanical Laboratory I	4
MMAE 321	Applied Thermodynamics	3
MMAE 323	Heat & Mass Transfer	3
MMAE 332	Design of Machine Elements	3
Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 7		Credits
MMAE 419	Mechanical Laboratory II	4
MMAE 443	Systems Analysis & Control	3
MMAE 445	Computer Aided Design	3
MMAE 485	Manufacturing Processes	3
IPRO Elective I		3
Total Hours		**16**

Semester 8		Credits
MMAE 432	Design of Mechanical Systems	3
MMAE 433	Design of Thermal Systems	3
IPRO Elective II		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours 127

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Materials Science and Engineering

The Materials Science and Engineering program aims to develop an understanding of the structure, properties, processing, and service behavior of engineering materials, including metallic, ceramic, polymeric, and composite materials. This understanding fosters both development of new materials and improvement of existing materials in order to optimize manufactured products. Laboratory experience is an important part of the program and emphasizes microstructural characterization using modern analytical techniques, such as optical and electron microscopy and x-ray diffraction, materials processing, determination of the physical and mechanical behavior of materials, and materials and process selection. Graduating students find employment opportunities in a wide range of industries requiring knowledge of materials development and/or optimization, processing, and selection.

Bachelor of Science in Materials Science and Engineering

Required Courses	Credit Hours
Materials Engineering Requirements MMAE 100, 200, 202, 232, 320, 365, 370, 372, 373, 463, 465, 470, 472, 476, 485	46
Material Science Requirement MS 201	3
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 104	2
Technical Electives	9
Engineering Elective	3
Humanities and Social Sciences Electives See IIT Core Curriculum, sections B and C, page 25.	21
Interprofessional Projects	6
Free Elective	3
Total Hours	**126**

Materials Science and Engineering Curriculum

Semester 1		Credits
MMAE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 124	Principles of Chemistry I	4
Humanities 200-level Course		3
Total Hours		**15**

Semester 2		Credits
MS 201	Materials Science	3
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 104	Intro to Computer Programming for Engineers	2
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MMAE 200	Introduction to Mechanics	3
MMAE 232	Design for Innovation	3
MATH 251	Multivariate and Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
MMAE 202	Mechanics of Solids	3
MATH 252	Introduction to Differential Equations	4
PHYS 224	General Physics III for Engineers	3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**16**

Semester 5		Credits
MMAE 320	Thermodynamics	3
MMAE 365	Structure & Properties of Materials I	3
MMAE 370	Materials Laboratory I	3
MMAE 373	Instrumentation & Measurements Lab	4
Social Sciences Elective		3
Total Hours		**16**

Semester 6		Credits
MMAE 372	Aerospace Materials Laboratory	3
MMAE 463	Structure and Properties of Materials II	3
MMAE 465	E&M/Optical Properties of Materials	3
Technical Elective*		3
Humanities Elective (300+)		3
Total Hours		**15**

Semester 7		Credits
MMAE 470	Introduction to Polymer Science	3
MMAE 476	Materials Laboratory II	3
MMAE 485	Manufacturing Processes	3
IPRO Elective I		3
Technical Elective*		3
Total Hours		**15**

Semester 8		Credits
MMAE 472	Advanced Aerospace Materials	3
IPRO Elective II		3
Technical Elective*		3
Engineering Elective**		3
Social Sciences Elective (300+)		3
Total Hours		**15**

Total Credit Hours **126**

* A technical elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalent) or in mathematics, chemistry, physics, or computer science. However, not all such courses are acceptable as technical electives. See your faculty advisor for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any substitutions require written approval by the department.

** An engineering elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalents).

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Aerospace Engineering

Aerospace engineering explores both the design and manufacture of aircraft, as well as the design and flight of vehicles beyond the earth's atmosphere. Knowledge of aerodynamics, structures and materials, propulsion systems, and flight mechanics and controls are important to this field. Aerospace engineers are primarily employed in civil aeronautics, the defense industry, and the space program. However, applications of aerospace technology are also found in related areas such as ground and undersea transportation systems, pollution control, wind power and the effects of wind on structures, and the development and use of advanced materials.

Bachelor of Science in Aerospace Engineering

Required Courses	Credit Hours
Aerospace Engineering Requirements MMAE 100, 200, 202, 304, 305, 311, 312, 313, 315, 320, 350, 372, 410, 411, (412 or 414), 415, (413 or 416), 443, 452	59
Material Science Requirement MS 201	3
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 104	2
Humanities and Social Sciences Electives See IIT Core Curriculum, sections B and C, page 25.	21
Interprofessional Project	6
Technical Elective	3
Free Elective	3
Total Hours	**127**

Aerospace Engineering Curriculum

Semester 1		Credits
MMAE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 124	Principles of Chemistry I	4
Humanities 200-level Course		3
Total Hours		**15**

Semester 2		Credits
MS 201	Materials Science	3
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 104	Intro to Computer Programming for Engineers	2
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MMAE 200	Introduction to Mechanics	3
MATH 251	Multivariate and Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Humanities Elective (300+)		3
Total Hours		**17**

Semester 4		Credits
MMAE 202	Mechanics of Solids	3
MMAE 313	Fluid Mechanics	3
MMAE 320	Thermodynamics	3
MATH 252	Introduction to Differential Equations	4
MMAE 305	Dynamics	3
Total Hours		**16**

Semester 5		Credits
MMAE 311	Compressible Flow	3
MMAE 312	Aerodynamics of Aerospace Vehicles	3
MMAE 315	Aerospace Laboratory I	4
MMAE 350	Computational Mechanics	3
Social Sciences Elective		3
Total Hours		**16**

Semester 6		Credits
MMAE 304	Mechanics of Aerostructures	3
MMAE 372	Aerospace Materials	3
MMAE 443	Systems Analysis & Control	3
MMAE 452	Aerospace Propulsion	3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
MMAE 410	Aircraft Flight Mechanics	3
MMAE 411	Spacecraft Dynamics	3
MMAE 412	Spacecraft Design I*	
OR		3
MMAE 414	Aircraft Design I*	
IPRO Elective I		3
Humanities Elective (300+)		3
Total Hours		**15**

Semester 8		Credits
MMAE 413	Spacecraft Design II*	
OR		3
MMAE 416	Aircraft Design II*	
MMAE 415	Aerospace Laboratory II	4
IPRO Elective I		3
Technical Elective**		3
Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **127**

* Students must choose either the MMAE 412 and MMAE 413 sequence or the MMAE 414 and MMAE 416 sequence.

** A technical elective is a 300 or higher level course in any engineering discipline (other than MMAE courses or their equivalent) or in mathematics, chemistry, physics, or computer science. However, not all such courses are acceptable as technical electives. See your faculty advisor for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any substitutions require written department approval.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Physics

Website: science.iit.edu/physics

182 Life Sciences
3101 S. Dearborn St.
Chicago, IL 60616
312.567.3579

Chair
Grant Bunker

Associate Chair
Alan Glodowski

The undergraduate Physics programs at IIT provide an excellent preparation for a number of professions including law (patent and intellectual property), health physics, business, and research. Graduates are prepared for immediate entry into positions in industrial and government research laboratories, and for graduate study in areas such as biophysics, solid-state physics, or high energy physics. Many undergraduates go on to obtain graduate degrees not only in physics, but in engineering disciplines, the health sciences, or computer science.

A student completing a Bachelor of Science (B.S.) degree in one of the Physics programs at IIT will:

- Develop exceptional problem-solving ability.
- Gain experience with instrumentation and measurement processes.
- Develop mathematics and computational skills.
- Gain a wide knowledge of physics as it applies both to the everyday world and to understanding nature's secrets.

The Physics Department also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Physics/Master of Science in Physics
- Bachelor of Science in Physics/Master of Health Physics
- Bachelor of Science in Physics/Master of Computer Science
- Bachelor of Science in Physics/Master of Science in Computer Science

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Physics departmental website: **science.iit.edu/physics**.

For information regarding faculty visit the Physics Department website at
science.iit.edu/physics/people/faculty.

Physics

The undergraduate Physics program at IIT provides an excellent preparation for a number of professions including law (patent and intellectual property), health physics, business, medicine, or research. The rigorous interdisciplinary nature of the program prepares graduates with a greater understanding of how physics is interrelated with biology and chemistry. Graduates are also prepared for immediate entry into positions in industrial, medical, and other research laboratories and for graduate study in areas such as biophysics, solid state physics, or high energy physics.

Bachelor of Science in Physics

Required Courses	Credit Hours
Physics Requirements PHYS 100, 123, 221, 223, 240, 300, 304, 308, 309, 348, 405, 406, 413, 414, 427, 440, 485 (2)	53
Interprofessional Projects	6
Mathematics Requirements MATH 151, 152, 251, 252	18
Mathematics Electives	6
Chemistry Requirements CHEM 124, 125	8
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Free Electives	12
Total Hours	**126**

Physics Curriculum

Semester 1		Credits
PHYS 100	Introduction to the Profession	2
PHYS 123	General Physics I	4
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
PHYS 221	General Physics II	4
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
CS 105	Introduction to Computer Programming	2
Total Hours		**15**

Semester 3		Credits
PHYS 223	General Physics III	4
MATH 251	Multivariate and Vector Calculus	4
Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Humanities 200-level Course		3
Total Hours		**17**

Semester 4		Credits
PHYS 240	Computational Science	3
PHYS 348	Modern Physics	3
MATH 252	Introduction to Differential Equations	4
Social Sciences Elective		3
Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 5		Credits
PHYS 308	Classic Mechanics I	3
PHYS 300	Instrumentation Lab	4
PHYS 405	Quantum Theory I	3
IPRO Elective I		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 6		Credits
PHYS 309	Classic Mechanics II	3
PHYS 304	Statistical Physics and Thermodynamics	3
PHYS 406	Quantum Theory II	3
IPRO Elective II		3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
PHYS 413	Electricity and Magnetism I	3
PHYS 427	Advanced Physics Laboratory I	3
PHYS 485	Physics Colloquium	1
Math Elective, 400-level or above		3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**16**

Semester 8		Credits
PHYS 414	Electricity and Magnetism II	3
PHYS 440	Computational Physics	3
PHYS 485	Physics Colloquium	1
Math Elective, 400-level or above		3
Free Elective		3
Free Elective		3
Total Hours		**16**

Total Credit Hours **126**

Physics Education

According to the President's Council of Advisors on Science and Technology, "The most important factor in ensuring excellence is great STEM (science, technology, engineering, and math) teachers, with both deep content knowledge in STEM subjects and mastery of the pedagogical skills required to teach these subjects well." However, based on recent statistics from the National Taskforce on Teacher Education in Physics, two thirds of our nation's high school physics teachers do not have a degree in physics. IIT's Bachelor of Science in Physics Education answers these needs by providing deep grounding in both physics and in the pedagogical knowledge to teach physics, thus setting the IIT student apart from other prospective teachers.

Students in this program will have all the benefits of studying with IIT's Physics department including small class size, close relationships with faculty, and the opportunity to conduct research at nearby facitlities such as Argonne National Lab and Fermi National Accelerator Lab. In addition, students take classes, including a classroom internship, with IIT's Mathematics and Science Education department, a global leader in teaching and learning of the sciences. Upon completion of this degree program, students receive certification to teach high school science in Illinois and will have the necessary skills to fulfill certification requirements in other states.

Ideally students will choose the physics education track at the end of their second year and begin taking science education courses in their third year after having completed the general physics and modern physics sequence. An alternate route available to students is to first complete the requirements for the Bachelor of Science degree in Physics and then teaching certification requirements. This alternate path would take longer to complete than eight semesters.

Bachelor of Science in Physics Education

Required Courses	Credit Hours
Physics Requirements PHYS 100, 123, 221, 223, 240, 300, 304, 308, 309, 348, 405, 413, 427, 485	43
Mathematics and Science Education Requirements MSED 200, 250, 300, 320, 350, 400, 450	24
Mathematics Requirements MATH 151, 152, 251, 252, 425	21
Interprofessional Projects	6
Chemistry Requirements CHEM 124, 125	8
Biology Requirement BIOL 107 or 114 or 115	3
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Total Hours	**128**

Physics Education Curriculum

Semester 1		Credits
PHYS 100	Introduction to the Profession	2
PHYS 123	General Physics I	4
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
CS 105	Introduction to Computer Programming	2
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 221	Gereral Physics II	4
Humanities 200-level Course		3
Total Hours		**18**

Semester 3		Credits
BIOL 107*	General Biology	3
PHYS 223	General Physics III	4
MATH 251	Multivariate and Vector Calculus	4
Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
MATH 252	Introduction to Differential Equations	4
PHYS 240	Computational Science	3
PHYS 348	Modern Physics	3
Social Sciences Elective		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester Summer 1	Credits
Social Sciences Elective (300+)	3
Total Hours	**3**

Semester 5		Credits
PHYS 300	Instrumentation Lab	4
PHYS 308	Classic Mechanics I	3
MSED 200	Analysis of Classrooms	3
MSED 250	Middle, Secondary Curriculum	3
IPRO Elective I		3
Total Hours		**16**

Semester 6		Credits
PHYS 304	Kinetic Theory and Thermodynamics	3
PHYS 309	Classic Mechanics II	3
MATH 425	Statistical Methods	3
MSED 300	Instructional Methods/Strategies I	3
MSED 320	Inquiry & Problem Solving	3
IPRO Elective II		3
Total Hours		**18**

Semester Summer 2		Credits
MSED 400	Instructional Methods/Strategies II	3
Total Hours		**3**

Semester 7		Credits
PHYS 405	Quantum Theory I	3
PHYS 413	Electricity and Magnetism I	3
PHYS 427	Advanced Physics Laboratory I	3
PHYS 485	Physics Colloquium	1
MSED 350	Informal Ed., Practicum & Seminar	3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 8		Credits
MSED 450	Professional Internship	6
Total Hours		**6**

Total Credit Hours **128**

* BIOL 114 or BIOL 115 may be substituted for this course.

Applied Physics

According to the Princeton Review: "With technology's constantly expanding influence in our society, a major in applied physics could place you at the forefront of the next technology revolution." Applied physics combines fundamental research in physics with knowledge of how to solve real-world problems, thus putting graduates of this major in high demand by employers. Through research in applied physics, lasers in DVD players, flash memories in iPods, diagnostic tools for medicine, and many other cutting edge technologies have been developed. With this degree, graduates will be prepared to immediately begin a career in a multitude of different areas or to enter into a graduate program in physics, engineering, or a non-physics related field. College Board sums up this degree in one word: flexibility.

The Bachelor of Science in Applied Physics degree at IIT provides an option for students who have a strong affinity for physics but who wish to pursue a career in application of basic scientific principles to the design of equipment, which includes electronic and electro-mechanical systems for use in measurements, communications, and data acquisition. The program is recommended for students interested in newly developing areas of physics, high technology, instrumentation, and communications. It provides students with a solid physics background while allowing for a significant engineering or other technical concentration.

Bachelor of Science in Applied Physics

Required Courses	Credit Hours
Physics Requirements PHYS 100, 123, 221, 223, 240, 300, 304, 308, 309, 348, 405, 406, 413, 414, 427, 485	49
Engineering Requirements (Specialization) MS 201 plus 24 credit hours in a specific engineering discipline. See page 140 for recommended specializations.	27
Mathematics Requirements MATH 151, 152, 251, 252	18
Technical Electives To be selected from physics, mathematics, computer science, or engineering courses.	6
Interprofessional Projects	6
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Total Hours	**133**

Applied Physics Curriculum

Semester 1		Credits
PHYS 100	Introduction to the Profession	2
PHYS 123	General Physics I	4
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
CS 105	Introduction to Computer Programming	2
MS 201	Materials Science	3
PHYS 221	General Physics II	4
MATH 152	Calculus II	5
Humanities 200-level Course		3
Total Hours		**17**

Semester 3		Credits
PHYS 223	General Physics III	4
MATH 251	Multivariate and Vector Calculus	4
Engineering Course*		4
Humanities or Social Sciences Elective		3
Social Sciences Elective		3
Total Hours		**18**

Semester 4		Credits
PHYS 240	Computational Science	3
PHYS 348	Modern Physics	3
MATH 252	Introduction to Differential Equations	4
Engineering Course*		4
Humanities Elective (300+)		3
Total Hours		**17**

Semester 5		Credits
PHYS 300	Instrumentation Lab***	4
PHYS 308	Classic Mechanics I	3
IPRO Elective I		3
Engineering Course*		3
Social Science Elective		3
Total Hours		**16**

Semester 6		Credits
PHYS 304	Kinetic Theory and Thermodynamics	3
PHYS 309	Classic Mechanics II	3
IPRO Elective II		3
Engineering Course*		4
Humanities Elective (300+)		3
Total Hours		**16**

Semester 7		Credits
PHYS 405	Quantum Theory I	3
PHYS 413	Electricity and Magnetism I	3
PHYS 427	Advanced Physics Laboratory I	3
Technical Elective**		3
Engineering Course*		3
Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 8		Credits
PHYS 406	Quantum Theory II	3
PHYS 414	Electricity and Magnetism II	3
PHYS 485	Colloquium	1
Technical Elective**		3
Engineering Course*		3
Engineering Course*		3
Total Hours		**16**

Total Credit Hours **133**

* A minimum of 24 semester hours are required in a specific engineering discipline. See page 140 for recommended specializations. Courses should be chosen in consultation with an academic advisor.

** See page 140 for technical electives required in approved specialization.

*** For students who choose the electrical engineering specialization, PHYS 300 is satisfied by ECE 211, 213, and 218.

Engineering Specializations for Applied Physics

Courses should be chosen in consultation with an academic advisor. Approved specializations for the Bachelor of Science degree in Applied Physics include, but are not limited to, the following:

Aerospace Engineering

Students should take the following courses:

MMAE 232 Design for Innovation
MMAE 202 Mechanics of Solids II
MMAE 313 Fluid Mechanics
MMAE 304 Mechanics of Aerostructures
MMAE 311 Compressible Flow
MMAE 312 Aerodynamics of Aerospace Vehicles
MMAE 315 Aerospace Laboratory I
MMAE 372 Aerospace Materials Lab

In addition, the six semester hours of technical electives may be chosen from any 400-level physics course or the following:

MMAE 410 Aircraft Flight Mechanics
MMAE 411 Spacecraft Dynamics
MMAE 414 Aircraft Design I
MMAE 433 Design of Thermal Systems
MMAE 452 Aerospace Propulsion

Electrical Engineering

Students should take the following courses:

ECE 211 Circuit Analysis I
ECE 213 Circuit Analysis II
ECE 218 Digital Systems
ECE 308 Signals and Systems
ECE 311 Engineering Electronics

The remaining 6 semester hours may be chosen from the following:

ECE 401 Communication Electronics
ECE 421 & 423 Microwave Circuits & Systems & Laboratory
ECE 425 Analysis & Design of Integrated Circuits
ECE 429 Introduction to VLSI Design
ECE 436 & 437 Digital Signal Processing I & Laboratory
ECE 438 Control Sytems
ECE 441 Microcomputers
ECE 446 Advanced Logic Design

In addition, the six semester hours of technical electives must include MATH 333 and three semester hours chosen from the ECE courses listed above. The required course, PHYS 300 is satisfied by ECE 211, 213, and 218.

Mechanical Engineering

Students should take the following courses:

MMAE 232 Design for Innovation
MMAE 202 Mechanics of Solids II
MMAE 313 Fluid Mechanics
MMAE 302 Mechanics of Solids III
MMAE 323 Heat & Mass Transfer
MMAE 319 Mechanical Laboratory I
MMAE 321 Applied Thermodynamics
MMAE 332 Design of Machine Elements

In addition, the six semester hours of technical electives may be chosen from any 400-level physics course or the following:

MMAE 418 Fluid Power for Aerospace Applications
MMAE 443 Systems Analysis & Control
MMAE 485 Manufacturing Process

Co-terminal Bachelor of Science in Physics/Master of Health Physics Degree Program

IIT offers a five-year, co-terminal Bachelor of Science in Physics/Master of Health Physics degree program for students who wish to combine a Bachelor of Science degree in Physics with a professional-track Master of Health Physics degree leading to a career as a radiation health physicist. This program is designed for students seeking careers in government, industry, the military, and environmental and health-related fields where radiation protection and planning are critical.

The Nuclear Regulatory Commission, the Department of Energy, and the Health Physics Society (HPS) have all foreseen a significant need for new radiation health physicists. According to the HPS, "A projected shortfall in sufficiently educated radiation safety professionals has placed a burden on industries using radiation to support our nation's energy, security, and health needs." The current workforce in government and industry is aging and those positions need to be filled.

The unique opportunity to take classes online, as well as on campus, sets IIT apart from other health physics programs. According to a recent survey by the Oak Ridge Institute for Science and Education, IIT ranked third in the number of Master's degrees in Health Physics awarded in 2010. IIT is one of only a handful of universities that offer this five-year, co-terminal opportunity and at IIT, faculty help students find an appropriate health physics internship.

Department of Psychology

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Chair
Ronald S. Landis

Associate Chair
Scott B. Morris

The Department of Psychology offers a Bachelor of Science (B.S.) degree in Psychology, Applied Analytics, Behavioral Health and Wellness, and Consumer Research, Analytics, and Communications.

Designed for highly motivated, career-oriented students, the degree programs offered by the Department of Psychology emphasize the integration of applied research with faculty, practical experience in professional settings, and traditional classroom activities. The programs are characterized by faculty mentorship, individual advising, and group activities with faculty, graduate students, and other undergraduate students.

The B.S. in Psychology offers a distinctive research-based, human-behavior-oriented undergraduate education, with an emphasis on applications of psychology. Students benefit from the strengths of highly successful graduate programs in Clinical Psychology, Industrial/Organizational Psychology, and Rehabilitation and Mental Health Counseling.

Interdisciplinary degrees provide career-focused training that spans academic departments. These degrees combine coursework and hands-on experience in the multiple fields, including psychology, political science, sociology, communication, and business. Interdisciplinary training prepares students to succeed in the modern workplace, which increasingly relies on cross-functional teams with diverse expertise. Though housed in the Department of Psychology, faculty advisors for these degrees may also come from any of the affiliated departments.

The B.S. in Applied Analytics combines training in using quantitative research methods and communicating their results to various audiences. The degree prepares students for the workplace and/or advanced research in statistics or fields in which knowledge of statistics is required, particularly careers in data science, market analysis, business analysis, bioinformatics, psychometrics, and public relations.

The B.S. in Behavioral Health and Wellness provides students with a broad understanding of how lifestyle choices impact health, and how health professionals design programs to promote healthy lifestyle choices. The degree prepares graduates for a wide range of health/wellness professions in private business and industry, community organizations, and healthcare environments.

The B.S. in Consumer Research, Analytics, and Communication trains students as integrated social/behavioral scientists who can apply the theory, research, and tools of the social and behavioral sciences to practical problems of government policy and business strategy and can work with decision makers in both cultures.

The Department of Psychology also offers accelerated programs that combine undergraduate and graduate professional education. The degrees offered by the department may be used as the basis for the combined undergraduate-graduate professional degree programs in law (B.S./J.D.), business (B.S./M.B.A.), public administration (B.S./M.P.A.), rehabilitation and mental health counseling (B.S./M.S.) or personnel and human resources development (B.S./M.S.) offered by IIT.

For information regarding faculty visit the Psychology Departmental website at
humansciences.iit.edu/psychology/faculty.

Psychology

Psychology is the scientific study of behavior - how individuals think, feel, and behave. Graduates will have a strong background in scientific thinking and be able to apply psychological research and principles to the study of contemporary problems in a variety of fields.

Students in the psychology program will develop an understanding of:

- How people perceive and process information and how they use that information to make decisions.
- Psychological theories in a variety of fields including social, cognitive, clinical, industrial-organizational, development, and neuroscience.
- How to apply psychological theories to real-world problems.
- How to design research studies, analyze results, and communicate results to a variety of communities.

The psychology major has a large number of free electives which allows students to customize their education experience. Students will work with a faculty mentor to craft a program of study that supports their interests and career goals. Options for pre-medicine and honors law are available.

All students complete a capstone project designed to integrate and apply the concepts and skills learned throughout the curriculum. The capstone will be an individually tailored project defined in collaboration with a faculty advisor which will typically involve either a field placement or research component.

The Psychology degree will prepare graduates for a wide range of professions in business and industry, community organizations, and health services. The program will also prepare graduates to be competitive for a wide range of graduate training programs in psychology at the masters and doctoral levels. In addition, many students will find psychology highly beneficial as a pre-professional major for advanced studies in medicine, dentistry, law, business, or public administration.

Bachelor of Science in Psychology

Required Courses	Credit Hours
Psychology Requirements PSYC 100, 101, 204, 221, 222, 301, 303, 310, 406, 409, 423 or 426, 435 or 436	34
Mathematics Requirements PSYC 203, (any two of MATH 119, 122, 130) OR (MATH 148 and 149) OR MATH 151	8/12
Computer Science Requirement CS 105 or CS 110	2
Natural Sciences Requirements Recommend BIOL 105 and/or 114 and PHYS 120 and/or 200, take two in one discipline and one from a different discipline. Must take at least one lab (BIOL 109 and/or BIOL 117 recommended). See IIT Core Curriculum, section D, page 25.	11/13
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Interprofessional Projects	6
Psychology Capstone Project PSYC 485*	3
Free Electives	37/45
Total Hours	**126/130**

* Option is available to take a two-semester psychology capstone project (PSYC 485 and PSYC 486) for six credit hours.

Psychology Sample Curriculum

Semester 1		Credits
PSYC 100	Introduction to the Profession I	2
PSYC 221	Human Behavior, Growth and Learning	3
Humanities 200-level Course		3
Science Elective*		3
Science Lab Elective*		1
Mathematics Elective **		3
Total Hours		**15**

Semester 2		Credits
PSYC 101	Introduction to the Profession II	2
PSYC 222	Brain, Mind and Behavior	3
Social Sciences Elective		3
Science Elective *		3
Science Lab Elective *		1
Mathematics Elective **		3
Total Hours		**15**

Semester 3		Credits
PSYC 203	Undergraduate Statistics for the Behavioral Sciences ***	3
PSYC 310	Social Psychology	3
CS 110	Computing Principles	
OR		2
CS 105	Introduction to Computer Programming	
Humanities or Social Sciences Elective		3
Free Elective		3
Free Elective		3
Total Hours		**17**

Semester 4		Credits
PSYC 204	Research Methods in Behavioral Science	3
PSYC 301	Industrial Psychology	3
PSYC 303	Abnormal Psychology	3
Science Elective*		3
Free Elective		3
Free Elective		3
Total Hours		**18**

Semester 5		Credits
PSYC 409	Psychological Testing	3
PSYC 423	Learning Theory	
OR		3
PSYC 426	Cognition	
Humanities Elective (300+)		3
Social Sciences Elective		3
Free Elective		3
Free Elective		3
Total Hours		**18**

Semester 6		Credits
PSYC 435	Early Development	
OR		3
PSYC 436	Adult Development	
IPRO Elective I		3
Humanities Elective (300+)		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
PSYC 485	Senior Capstone Project ****	3
IPRO Elective II		3
Free Elective		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 8		Credits
PSYC 406	History & Systems	3
PSYC 486	Senior Capstone Project ****	3
Social Sciences Elective (300+)		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours **128**

* Recommend BIOL 105 and/or 114, and PHYS 120 and/or 200, take 2 in one discipline and 1 from a different discipline. Must take at least one lab (BIOL 109 and/or BIOL 117 recommended.) See IIT Core Curriculum, section D, page 25.

** Choose from any 2 of MATH 119, 122, or 130, or MATH 148 and 149, or MATH 151.

*** Must take psychology statistics, not business statistics or mathematics statistics.

**** Capstone project must be approved by advisor; second capstone is optional and may count as a free elective.

Applied Analytics

The Bachelor of Science in Applied Analytics combines training in using quantitative research methods and communicating their results.

Students pursuing a Bachelor of Science in Applied Analytics learn not only how to collect, curate, and analyze data but to communicate data and its associated implications to various audiences and applications. The Bachelor of Science in Applied Analytics prepares students for the workplace and/or advanced research in statistics or fields in which knowledge of statistics is required, particularly careers in data science, market analysis, business analysis, bioinformatics, psychometrics, and public relations. Students who successfully complete the Applied Analytics degree will be able to manage and analyze data using an array of statistical approaches. Our career advising is based on the close monitoring of the types of analytics needed today and in the future.

Proper advising is key, and advisors will be assigned to the student based on student interest. Students interested in psychology-related analytics will be assigned an advisor from Psychology, students interested in business/economics-related analytics will be assigned an advisor from the Stuart School of Business, and students interested in social sciences/humanities-related analytics will be assigned an advisor from Social Sciences or Humanities.

Bachelor of Science in Applied Analytics

Required Courses	Credit Hours
Introduction to Profession LCHS 100 or BUS 100 or SSCI 100 or PSYC 100 or PSYC 101	2
Theory and Data (TD) Requirements MATH 251, MATH 474, and four courses in a specialization track	19
Data Structures and Management (DSM) Requirements Choose three from the following: CS 331, CS 422, CS 435, ITMD 421, ITMD, 422, ITMS 428	9
Communicating About Data (CAD) Requirements Choose four from the following: COM 421, COM 424, COM 428, COM 430, EG 425, ITM 300, ITM 301, ITMD 415, PHIL 351, PHIL 374	12
Capstone Project	3
Mathematics Requirements MATH 151, MATH 152	10
Computer Science Requirements (CS 115 and CS 116) or (CS 105 and CS 201)	4
Natural Sciences Requirements See IIT Core Curriculum, section D, page 25.	11/12
Interprofessional Projects	6
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Free Electives	30
Total Hours	**127/128**

Applied Analytics Sample Curriculum

Semester 1	Credits
Introduction to the Profession*	2
Science Elective	3
Science Lab Elective	1
CS 115 Object-Oriented Programming I	2
MATH 151 Calculus I	5
Free Elective	3
Total Hours	**16**

Semester 2	Credits
MATH 152 Calculus II	5
CS 116 Object-Oriented Programming II	2
Science Elective	3
Social Sciences Elective	3
Humanities 200-level Course	3
Total Hours	**16**

Semester 3	Credits
MATH 251 Multivariate and Vector Calculus	4
Science Elective	4
TD Specialization Course I (see specialization tracks)	3
Social Sciences Elective	3
Free Elective	3
Total Hours	**17**

Semester 4	Credits
TD Specialization Course II (see specialization tracks)	3
DSM Elective I	3
Humanities or Social Sciences level Elective	3
CAD Elective I	3
Free Elective	3
Free Elective	3
Total Hours	**18**

Semester 5	Credits
MATH 474 Probability and Statistics	3
CAD Elective II	3
DSM Elective II	3
IPRO Elective I	3
Free Elective	3
Total Hours	**15**

Semester 6	Credits
TD Specialization Course III (see specialization tracks)	3
DSM Elective III	3
Humanities Elective (300+)	3
Free Elective	3
IPRO Elective II	3
Total Hours	**15**

Semester 7	Credits
CAD Elective III	3
TD Specialization Course IV (see specialization tracks)	3
Social Sciences Elective (300+)	3
Free Elective	3
Free Elective	3
Total Hours	**15**

Semester 8	Credits
CAD Elective IV	3
Humanities Elective (300+)	3
Free Elective	3
Capstone Course**	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **127**

* Choose from the following courses: LCHS 100, BUS 100, SSCI 100, PSYC 100, PSYC 101.

** Topic must be approved by the advisor.

Applied Analytics Specialization Tracks

As part of the Theory and Data (TD) requirement, each student must complete 12 credit hours in one of the following specialization tracks

Psychology

PSYC 203 Undergraduate Statistics for the Behavioral Sciences

PSYC 204 Research Methods in Behavioral Science

PSYC 221 Human Behavior, Growth and Learning

OR

PSYC 222 Brain, Mind, and Behavior

PSYC 320 Applied Correlation and Regression

Business/Economics

BUS 221 Statistics for Managerial Decision Making

ECON 151 The Economics of the Firm

ECON 152 Understanding and Competing in the Global Marketplace

ECON 423 Economic Analysis of Capital Investments

Social Sciences/Humanities

PSYC 203 Undergraduate Statistics for the Behavioral Sciences

OR

BUS 221 Statistics for Managerial Decision Making

SSCI 209 Research Methods for the Social Sciences

COM 381 Analyzing and Communicating Quantitative Data

OR

PS/SOC 385 Topics in Political Science/Sociology*

COM 383 Social Networks

* Topic must be approved by the advisor.

Behavioral Health and Wellness

The Behavioral Health and Wellness degree program will provide students with a broad understanding of how lifestyle choices impact health, and how health professionals design programs to promote healthy lifestyle choices. Students will develop an understanding of three core areas: (1) intervention development and implementation, (2) community care coordination, and (3) public health policy. Promoting skills in these interrelated areas will prepare graduates for a wide range of health/wellness professions in private business and industry, community organizations, and healthcare environments.

The Behavioral Health and Wellness degree is designed as an interdisciplinary program, combining coursework in psychology, sociology, political science, and nutritional science to address health promotion at the individual, institutional, and societal levels. The curriculum of the behavioral health and wellness major will provide students with a broad understanding of the psychological, social, and cultural context of health behavior, including related theories, skills, and emerging technology.

A flexible curriculum allows the degree to be customized around student interest and career goals. Students can choose to specialize in Health Psychology, Public Health, or Nutrition. The degree program will include a capstone project designed to integrate and apply the concepts and skills learned throughout the curriculum. The capstone will be an individually tailored project defined in collaboration with a faculty advisor which will typically involve a field placement and may include a research component.

Students completing the Behavioral Health and Wellness degree will be able to:

- Demonstrate knowledge of: a) principles of designing and implementing behavior change programs for a variety of health related behaviors; b) cultural and community-specific tailoring of behavioral health interventions; and c) fundamentals of public health policy analysis and advocacy.
- Effectively communicate health-promotion information to both professional and lay audiences.
- Gather and analyze information regarding individual and community health needs, and to use this information to guide program development.

Bachelor of Science in Behavioral Health and Wellness

Required Courses	Credit Hours
Behavioral Health and Wellness Requirements PSYC 100 or PSYC 101 or LCHS 100 or SSCI 100 PSYC 221, 222, SOC 200 PSYC 204 or SSCI 209 PSYC 310 or SOC 208 PSYC 409 or SOC 480 COM 421 or COM 423 or COM 428 or COM 435 PS 221 or SOC 221	26
Behavioral Health and Wellness Electives	30
Mathematics Requirements PSYC 203,(any two of MATH 119, 122, 130) OR (MATH 148 and 149) OR MATH 151	8/12
Capstone Project	3
Computer Science Requirement CS 105 OR CS 110	2
Natural Sciences Requirements At least one biology course is required. Suggested courses are BIOL 105, 114, 117, and (PHYS 200 or CHEM 124). See IIT Core Curriculum, section D, page 25.	11/14
Interprofessional Projects	6
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Free Electives	13/19
Total Hours	**126**

Behavioral Health and Wellness Electives

Students must complete 15 credit hours from one area of specialization (Health Psychology, Public Health, or Nutrition) and at least three credit hours from each of the other two specializations. The remaining nine credits may be taken from any of the three specializations or from the following list of other Behavioral Health and Wellness Electives.

Health Psychology Specialization

PSYC 303 Abnormal Psychology
PSYC 312 Human Motivation and Emotion
PSYC 330 Health Psychology
PSYC 380 Topics in Psychology*
PSYC 414 Neural and Biological Bases of Behavior
PSYC 435 Early Development
PSYC 436 Adult Development
PSYC 489 Undergraduate Psychology Seminar*

Public Health Specialization

PS 319 Comparative Health Systems
PS 385/ SOC 385 Topics in Political Science/Sociology*

Nutrition Specialization

FST 201 Nutrition and Wellness
FST 401 Nutrition, Metabolism, and Health
BIOL 430 Animal Physiology

Other Behavioral Health and Wellness Electives

BIOL 305 Human Anatomy
PSYC 301 Industrial Psychology
PSYC 320 Applied Correlation and Regression
PSYC 410 Introduction to Rehabilitation and Mental Health Counseling
PSYC 411 Medical Aspects of Disabling Conditions
PSYC 412 Multicultural and Psychosocial Issues in Rehabilitation and Mental Health Counseling
PSYC 455 Industrial Training
PSYC 481 Groups and Leadership at Work

* Seminar and Topics courses may be used as electives if the topic is relevant to behavioral health and wellness. These courses may be taken more than once if different topics are offered. Advisor approval required.

Behavioral Health and Wellness Sample Curriculum

Semester 1		Credits
Introduction to the Profession*		2
PSYC 221	Human Behavior, Growth and Learning	3
SOC 200	Introduction to Sociology	3
Science Elective**		3
Humanities 200-level Course		3
Mathematics Elective***		3
Total Hours		**17**

Semester 2		Credits
PSYC 222	Brain, Mind & Behavior	3
PS/SOC 221	Social Inequality	3
Science Elective**		3
Science Lab Elective**		1
Humanities Elective (300+)		3
Mathematics Elective***		3
Total Hours		**16**

Semester 3		Credits
PSYC 203	Undergraduate Statistics for the Behavioral Sciences	3
PSYC 310	Social Psychology	
OR		3
SOC 208	Social Psychology and Society	
Science Elective**		4
Social Sciences Elective		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 4		Credits
PS 319	Comparative Health Systems[b]	3
PSYC 303	Abnormal Psychology[a]	3
PSYC 204	Research Methods in Behavioral Science	
OR		3
SSCI 209	Social Science Research Methods	
Social Sciences Elective		3
Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 5		Credits
PSYC 312	Human Motivation and Emotion[a]	3
PSYC 409	Psychological Testing	
OR		3
PSYC 480	Introduction to Survey Methodology	
Free Elective		3
FST 210	Nutrition and Wellness[c]	3
CS 110	Computing Principles	
OR		2
CS 105	Introduction to Computer Programming	
Free Elective		3
Total Hours		**17**

Semester 6		Credits
PSYC 435	Early Development[a]	
OR		3
PSYC 436	Adult Development[a]	
PSYC 330	Health Psychology[a]	3
FST 401	Nutrition, Metabolism & Health[c]	3
Humanities or Social Sciences Elective		3
IPRO Elective I		3
Total Hours		**15**

Semester 7		Credits
IPRO Elective II		3
COM 421	Technical Communication****	3
PSYC 414	Biological Bases of Behavior[a]	3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 8	Credits
Capstone Project†	3
Public Health Elective[b]	3
Behavioral Health and Wellness Elective	3
Free Elective	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **126**

Note: [a]Health Psychology Elective; [b]Public Health Elective; [c]Nutritional Science Elective

* Choose from the following courses: PSYC 100, PSYC 101, LCHS 100, SSCI 100.

** At least one biology course is required. Recommended courses are BIOL 105, 114, 117, and (PHYS 200 or CHEM 124).

*** Choose (any two of MATH 119, 122, 130) or (MATH 148 and 149) or MATH 151.

**** Student may substitute COM 423, COM 428, or COM 435.

† Topic must be approved by the advisor.

Consumer Research, Analytics, and Communication

Students in the Consumer Research, Analytics, and Communication program are trained as integrated social/behavioral scientists who can apply the theory, research, and tools of the social and behavioral sciences to practical problems of government policy and business strategy and can work with decision makers in both cultures. The multidisciplinary nature of this program ensures that students will understand how people take in and make sense of information in the world around them, how to go about measuring people's attitudes, beliefs, and knowledge, and how to analyze and communicate the results of your research to individuals from a variety of backgrounds (industry, government, academic) in a variety of different forms (electronically, in writing, and orally).

The intent of this highly structured curriculum is to ensure that students have a firm grounding in the areas of psychology, social science, and communication. Students can choose the elective courses to tailor the degree based on specific career interests. For example, a student interested in obtaining a job in market research might choose to take additional business courses whereas a student interested in a graduate degree in psychology might opt to take additional psychology or data management classes. Similarly, students interested in working with big data may take additional courses in computer science or related areas.

Bachelor of Science in Consumer Research, Analytics, and Communication

Required Courses	Credit Hours
Consumer Research, Analytics, and Communication Courses	68
PSYC 100 or PSYC 101 or BUS 100 or LCHS 100	
PSYC 203, 204, 222, 310, 320, 409, 426	
COM 315, 372, 423, 428	
ITMD 421, 422, 461, 462	
PS 380, SOC 356 or 362, SOC 385	
BUS 371	
Any three of BUS 471, 473, 475, or 476	
Capstone Project	3
Mathematics Requirements	5/9
(MATH 119 and MATH 122) or (MATH 148 and MATH 149) or MATH 151	
Computer Science Requirement	2
CS 105 or CS 110	
Natural Sciences Requirements	11/13
See IIT Core Curriculum, section D, page 25.	
Interprofessional Projects	6
Humanities and Social Sciences Requirements	21
See IIT Core Curriculum, sections B and C, page 25.	
Free Electives	12
Total Hours	**128/134**

Consumer Research, Analytics, and Communication Sample Curriculum

Semester 1		Credits
Introduction to the Profession*		2
Science Elective		3
Science Lab Elective		1
Mathematics Elective**		3
COM 423	Communication in the Workplace	3
Humanties 200-level Course		3
Total Hours		**15**

Semester 2		Credits
PSYC 222	Brain, Mind & Behavior	3
Mathematics Elective**		3
Science Elective		3
Humanities Elective (300+)		3
Social Sciences Elective		3
Total Hours		**15**

Semester 3		Credits
PSYC 203	Undergraduate Statistics for the Behavioral Sciences	3
SOC 356	Transformative Technologies	
OR		3
SOC 362	Technology and Social Change	
Science Elective		4
Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
PSYC 204	Research Methods in Behavioral Science	3
PS 380	Technology for Development	3
COM 428	Verbal and Visual Communication	3
CS 105	Introduction to Programming	
OR		2
CS 110	Computing Principles	
BUS 371	Strategies for New Markets	3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 5		Credits
PSYC 409	Psychological Testing	3
BUS 471	Marketing Management****	3
SOC 385	Topics in Sociology ***	3
ITMD 461	Internet Technologies and Web Design	3
IPRO Elective I		3
Humanities Elective (300+)		3
Total Hours		**18**

Semester 6		Credits
BUS 476	Consumer Behavior****	3
ITMD 462	Web Site Application Development	3
PSYC 320	Applied Correlation and Regression	3
IPRO Elective II		3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
PSYC 426	Cognitive Processes	3
ITMD 421	Data Modeling and Applications	3
COM 372	Mass Media	3
BUS 473	Market Research****	3
Free Elective		3
Total Hours		**15**

Semester 8		Credits
ITMD 422	Advanced Database Management	3
PSYC 310	Social Psychology	3
COM 315	Disclosure Analysis	3
Capstone Project†		3
Free Elective		3
Free Elective		3
Total Hours		**18**

Total Credit Hours **129**

* Choose from the following courses: PSYC 100, PSYC 101, LCHS 100, BUS 100

** Choose from MATH 119 and 122, MATH 148 and 149, or MATH 151.

*** Topics must be approved by departmental advisor.

**** Choose from BUS 471, 473, 475, or 476

† Topic must be approved by the advisor.

Optional Programs

Accelerated Combined-Degree and Advanced Standing Programs

Today, an undergraduate degree doesn't necessarily guarantee a job in the workforce or provide long-term career security. However, the Department of Psychology offers combined, accelerated undergraduate and graduate programs and graduate advanced standing programs that help minimize both concerns. These flexible programs give students solid professional credentials in more than one field, improving their marketability and expanding their career options.

A specialization in psychology may be used as the basis for the combined undergraduate-graduate professional degree programs in law (B.S./J.D.), business (B.S./M.B.A.), public administration (B.S./M.P.A.), or personnel and human resources development (B.S./M.S.) offered by IIT. Students earning B.S. degree in Psychology can apply for advanced standing in IIT's MS in Rehabilitation and Mental Health Counseling program.

For undergraduate psychology majors, it is possible to earn a Master of Science in Rehabilitation and Mental Health Counseling with Advanced Standing or a Master of Science in Personnel and Human Resources Department (PHRD) in one-and a-half years instead of the normal two years. By taking psychology courses that apply to the Rehabilitation and Mental Health Counseling or PHRD program, graduate program coursework can be reduced by up to 15 credit hours, or one full-time semester.

Students wishing to participate in these options must indicate this as early as possible. With the consent of the Department of Psychology chair, undergraduate psychology students may enroll in some graduate-level psychology courses. Close communication with advisors is required for students to reach their target completion dates for accelerated programs. Students must also meet the minimum graduate program admission criteria, apply, and be accepted into the graduate program they wish to enter.

B.S./M.S. Rehabilitation and Mental Health Counseling with Advanced Standing

The mission of the Counseling and Rehabilitation Sciences Division at IIT is to prepare students to assume vital roles as counselors fully qualified to help in the clinical mental health, rehabilitation, vocational, educational, and personal adjustment of people with disabilities, chronic illnesses, and/or mental and emotional issues.

The Rehabilitation and Mental Health Counseling education program, fully accredited by the Council on Rehabilitation Education since 1975, is designed to prepare students to function as rehabilitation and/or clinical mental health counselors for persons with a variety of needs including mental health issues impacting the individual and/or family, and persons with physical or mental disabilities who need psychosocial and vocational readjustment. The program is grounded in a strengths-based philosophy of client empowerment where the counselor's role is to assist individuals to realize their optimum level of mental health and personal wellness, including vocational adjustment and independent living. This is done through the use of a variety of therapeutic interventions, including individual, group and/or family counseling, diagnosis, case management, the provision or coordination of evaluation, physical restoration, training, placement, and follow-up services. The demand for rehabilitation and clinical mental health counselors has exceeded the supply in recent years, in public, private, nonprofit, and for-profit sectors.

Rehabilitation and Mental Health Counseling Courses

Undergraduate students who complete the equivalent of the first semester's required courses may qualify admission with advanced standing in the Master of Science in Rehabilitation and Mental Health Counseling program. Admission with advanced standing may reduce the courses required for the M.S. degree by up to 15 credits, and allow the candidate to complete the Master of Rehabilitation and Mental Health Counseling degree in 1.5 years (three semesters). The regular Master's program in Rehabilitation and Mental Health Counseling requires 60 credit hours post Bachelor's degree usually completed over the course of two years. However, undergraduate students who meet the criteria for regular admission to the Master's program can consider completing their Master's degree more quickly by effective use of their electives. In the junior and senior years, qualified students can take graduate courses to meet their undergraduate elective requirements.

Students in the accelerated program may take the following courses as part of required or elective courses for the B.S. in Psychology. If taken as an undergraduate student, the courses listed below do not have to be repeated for the Master's in Rehabilitation and Mental Health Counseling. A grade of B or better is required for courses to be used toward a graduate degree.

PSYC 410	Introduction to Rehabilitation and Mental Health Counseling
PSYC 411	Medical Aspects of Disabling Conditions
PSYC 412	Multicultural and Psychosocial Issues in Rehabilitation and Mental Health Counseling
PSYC 513	Assessment in Rehabilitation and Mental Health Counseling
PSYC 523	Introduction to Theories of Psychotherapy
PSYC 562	Job Placement
PSYC 563	Human Growth and Career Development
PSYC 583	Rehabilitation Engineering Technology I
PSYC 590	Psychiatric Rehabilitation

B.S./M.S. Personnel and Human Resources Development

The Personnel and Human Resources Development Master's program is for individuals interested in careers in highly dynamic environments such as management consulting, human resources management, industrial relations, and consumer behavior.

Housed within the Industrial, Organizational, and Business Psychology Division, the Personnel and Human Resources Development program is based on a scientist/practitioner model and the guidelines of the Society for Industrial and Organizational Psychology, Division 14, of the American Psychology Association.

Current Research Projects

- Women in the Workplace
- Leadership
- Training
- Organizational Effectiveness
- Employee Selection
- Individual and Team Performance
- Organizational Justice

Personnel and Human Resources Development Courses

Students in the accelerated program may take the following courses as part of required or elective courses for the B.S. in Psychology. If taken as an undergraduate student, the courses listed below do not have to be repeated for the graduate Personnel and Human Resources Development program. A grade of B or better is required for courses to be used toward a graduate degree.

PSYC 556	Organizational Psychology
PSYC 502	Social Bases of Behavior
PSYC 545	Graduate Statistics I
PSYC 546	Graduate Statistics II
PSYC 503	Learning, Cognition, and Motivation

IIT/College of DuPage Dual Admission 2+2 Program

Students who meet the requirements of the Dual Admission Program (DAP) may enroll simultaneously at the College of DuPage (COD) and IIT. Students accepted into the DAP will have access to advising and other services from both institutions. Students who successfully complete the institutional course requirements of both institutions under the DAP will be awarded an Associate's degree from COD and a Bachelor of Science degree in Psychology from IIT.

Eligibility for the Program

Students applying to the program must have a cumulative GPA of at least 3.00 either in high school or at COD to be eligible for admission to the DAP. Students must make satisfactory academic progress at COD, as defined by COD and IIT, to remain in the program.

Application Process

Applicants must complete a Statement of Intent Form which permits the exchange of academic, admission, and advising information between IIT and COD. Applicants must also complete the application process at both COD and IIT in order to be admitted to both institutions. The IIT application may be submitted only for a Bachelor's program in Psychology. Admission to other IIT programs may have additional requirements that are outside the scope of this program.

Academic Program Requirements

Students must follow each institution's policies regarding admission, course enrollment, transfer hours, probation, dismissal, and reinstatement. Transcripts must be sent to the IIT Office of Undergraduate Academic Affairs each semester for each student attending COD and enrolled in the DAP. IIT will provide COD with major and course updates, course prerequisites, and program requirements for the Psychology program.

Graduation Requirements

Students enrolled in the DAP must follow the COD catalog to satisfy requirements for the Associate's degree and the requirements set out in the IIT Undergraduate Bulletin in effect at the time of admission into the DAP for the Bachelor's degree.

Scholarship Opportunities

Psychology students have access to a wide range of scholarships. One program – the David J. Vitale Scholarship – is earmarked only for undergraduate psychology students. Recipients typically receive $2,000-$5,000 per year. This award is only applicable to a student's first four years of study at IIT.

Certificate in Industrial Training

This certificate is designed to help either the experienced skilled worker or a technically educated person to learn methods of knowledge delivery in industrial training settings.

Admission Requirements
Qualified participants must be high school graduates and meet the minimum admission requirements for enrollment at IIT. Students should either have multiple years of work experience or have junior or higher status in a four-year program at IIT. Some basic psychology background would be helpful to the student, but this is not a requirement. This certificate is only available to students enrolled in a degree program at IIT and does not qualify for federal financial aid.

Program of Study
The American Society of Training and Development has a certificate with topics and courses similar to this certificate program. We ensure that our students will receive training on par with ASTD specifications. An introductory psychology course or basic knowledge of the field is recommended for this program.

PSYC 301 Industrial Psychology
PSYC 455 Development of Evaluation of Training in Organizations

And one of the following**

PSYC 312 Human Motivation and Emotion
PSYC 409 Psychological Testing
PSYC 423 Learning Theory
PSYC 481 Groups and Leadership at Work
PSYC 489 Undergraduate Psychology Seminar**

* These courses cannot be counted toward the certificate if they are a required course for a degree program.

** Topic must be approved by the advisor.

Minors

Minors consist of at least five courses (minimum 15 semester hours) and are optional and frequently cross-disciplinary. Since they provide a coherent set of ideas, concepts, and educational experiences in a variety of areas, students may find that they enhance potential for professional development. Students who wish to pursue a minor must consult with advisors in their respective major departments.

The Department of Psychology offers minors in Human Resources, Psychology, and Rehabilitation Services.

Human Resources
Required courses:

PSYC 221 Human Behavior, Growth, and Learning
PSYC 301 Industrial Psychology
PSYC 310 Social Psychology

And any two of the following:

PSYC 409 Psychological Testing
PSYC 455 Development and Evaluation of Training Organizations
PSYC 481 Groups and Leadership at Work

Psychology
At least 15 credit hours must be completed, including the following two required courses:

PSYC 203 Undergraduate Statistics for the Behavioral Sciences
PSYC 221 Human Behavior, Growth, and Learning
OR
PSYC 222 Brain, Mind, and Behavior

Rehabilitation Services

PSYC 410 Introduction to Rehabilitation and Mental Health Counseling
PSYC 411 Medical Aspects of Disabling Conditions
PSYC 412 Multicultural and Psychosocial Issues in Rehabilitation and Mental Health Counseling
PSYC 583 Rehabilitation Engineering Technology
PSYC 590 Psychiatric Rehabilitation

ROTC: Air Force Aerospace Studies

Website: afrotc.iit.edu

AFROTC Detachment 195
10 W. 31st St.
Chicago IL 60616
312.567.3525

Chair
Lt. Col. Steven Lindmark

The mission of Air Force Reserve Officer Training Corps (AFROTC) is to develop quality leaders for the Air Force. Students who become cadets have the opportunity to earn a commission in the United States Air Force while earning their baccalaureate degree. Most graduates who enter the Air Force through this program are assigned to positions consistent with their academic majors, but the needs of the Air Force do come first. Highly qualified, interested graduates may compete for selection as pilots, remotely piloted aircraft pilots, and navigators, usually in their AS 300 year.

Air Force ROTC students gain an understanding of air and space fundamental concepts and principles, and a basic understanding of associated professional knowledge. Students develop a strong sense of personal integrity, honor, and individual responsibility, and an appreciation of the requirements for national security.

Faculty

Professor
S. Lindmark

Assistant Professors
A. Temples, G. Tillman, C. Weber

Financial Aid

The Air Force ROTC High School Scholarship Program (HSSP) offers four-, three-, and two-year scholarships for highly qualified high school graduates interested in an Air Force career. Additionally, the In-College Scholarship Program (ICSP) offers a variety of scholarships to qualified students already enrolled in college. Interested students can learn more about scholarship opportunities at the Air Force ROTC website, **www.afrotc.com** or may contact Detachment 195 at 312.567.3525.

Courses

The General Military Course (AS 101, 102, 201, 202) examines the role of U.S. military forces in the contemporary world, with particular attention to the United States Air Force and its organization and mission.

The Professional Officer Course (AS 301, 302, 401, 402) provides an examination of the broad range of U.S. civil-military relations, the environmental context in which U.S. defense policy is formulated and implemented, and the principles and practices of leadership as they relate to the U.S. Air Force.

Leadership Laboratory is mandatory for each course and complements the program by providing fellowship and leadership experiences.

A student may take any course without entering the AFROTC program.

Minors

Students may select a minor in Air Force aerospace studies. For course requirements, see pages 172–175.

Four-Year Program

The four-year program consists of a two-year General Military Course (GMC) and a two-year Professional Officer Course (POC). Students normally start this program in their freshman year. Qualified students with previous service or at least three years Air Force JROTC may start as sophomores and enroll directly in the AS 200 course. Any student who is not on an AFROTC scholarship may withdraw from the GMC at any time. Students selected for POC must complete an AFROTC sponsored four-week field training encampment at an Air Force Base before being awarded POC status and stipends (pay). This requirement is normally fulfilled the summer after completing the sophomore year and before beginning the junior year. The major areas of study during field training include junior officer training, career orientation, base functions, and the Air Force environment.

ROTC Air Force Aerospace Studies Curriculum

Semester 1		Credits
AS 101	The Foundations of the USAF I	1
Total Hours		**1**

Semester 2		Credits
AS 102	The Foundations of the USAF II	1
Total Hours		**1**

Semester 3		Credits
AS 201	The Evolution of USAF Air and Space Power I	1
Total Hours		**1**

Semester 4		Credits
AS 202	The Evolution of USAF Air and Space Power II	1
Total Hours		**1**

Semester 5		Credits
AS 301	Air Force Leadership Studies I	3
Total Hours		**3**

Semester 6		Credits
AS 302	Air Force Leadership Studies II	3
Total Hours		**3**

Semester 7		Credits
AS 401	National Security Affairs	3
Total Hours		**3**

Semester 8		Credits
AS 402	Preparation for Active Duty	3
Total Hours		**3**

Total Credit Hours **16**

ROTC: Military Science

Website: www.iit.edu/departments/army

Department of Military Science
116 Farr Hall
Chicago, IL 60616
312.808.7140

Chair
LTC Peter Farrell

IIT Program Director
LTC Doug Barnett

Assistant Program Director
CSM Mark Bowman

The principal objective of the college-level Reserve Officer's Training Corps (ROTC) program is to develop commissioned officers for the Active Army, the Army National Guard, and U.S. Army Reserve. Each course is designed to develop essential qualities and traits of leadership required for success in either a civilian or a military career.

Instruction is offered through either a four-year or two-year program. The four-year program consists of the Basic Course (freshman and sophomore years) and the Advanced Course (junior and senior years). The two-year Advanced Course is open to students eligible for advanced placement through a variety of options. Both programs include attendance at Camp Adventure (a six-week advanced summer camp) just prior to commissioning.

Faculty

Professor
P. Farrel

Assistant Professor
D. Barnett

Basic Course

The Basic Course is an introduction to military science and carries no military obligation. Completion is a prerequisite to enrollment in the Advanced Course. Prior service, completion of basic combat training through the National Guard or Reserve, or completion of Camp Challenge may be substituted for the Basic Course.

Leadership Development Assessment Course (LDAC)

All cadets who successfully complete the Basic Course, meet the physical and academic requirements, and pass an officer-qualification test and a physical examination are eligible for selection by the professor of military science for the Leadership Development Assessment Course (LDAC). A tax-free subsistence allowance of $450-$500 per month is paid to each cadet in this advanced course except during attendance at summer camp, when pay is approximately $200 per week. Upon graduation and successful completion of the LDAC and the Professional Military Education Requirements (PMEs), cadets are commissioned as second lieutenants in the Active Army, the Army Reserve, or the National Guard.

Leadership Training Course (LTC)

Cadets are paid approximately $800 during this course. Travel to and from this course is at government expense. Meals, housing, medical care, uniforms, and equipment are furnished.

Professional Military Education Requirements (PMEs)

In order to receive a well-rounded education, cadets are required to complete courses in the following areas: advanced written communications, human behavior, military history, computer literacy, and math reasoning.

Simultaneous Membership Program (SMP)

Membership in the Army National Guard or United States Army Reserve offers cadets additional experience as officer trainees, and these individuals will receive both the ROTC stipend and drill pay as an E-5. They may also receive additional money while attending school through the Montgomery GI Bill and/or USAR Kickers.

Financial Assistance

In addition to a monthly stipend of $450-$500 as an advance-course cadet, the program offers two-, three-, and four-year federal Army ROTC scholarships for full tuition to qualified students. IIT offers an excellent incentive package to scholarship winners. For further information, students should call 312-808-7140 or visit the Department of Military Science in 116 Farr Hall.

ROTC: Military Science Curriculum

Semester 1		Credits
MILS 101	Foundations of Officership	1
MILS 147	Aerobic Conditioning*	2
Total Hours		**3**

Semester 2		Credits
MILS 102	Basic Leadership	1
MILS 148	Aerobic Conditioning*	2
Total Hours		**3**

Semester 3		Credits
MILS 201	Individual Leadership Studies	2
MILS 247	Aerobic Conditioning*	2
Total Hours		**4**

Semester 4		Credits
MILS 202	Leadership and Teamwork	2
MILS 248	Aerobic Conditioning*	2
Total Hours		**4**

Semester 5		Credits
MILS 301	Leadership and Problem Solving	3
MILS 347	Aerobic Conditioning**	2
Total Hours		**5**

Semester 6		Credits
MILS 302	Leadership and Ethics	3
MILS 348	Aerobic Conditioning**	2
Total Hours		**5**

Semester 7		Credits
MILS 401	Leadership and Management	3
MILS 447	Aerobic Conditioning**	2
Total Hours		**5**

Semester 8		Credits
MILS 402	Officership	3
MILS 448	Aerobic Conditioning**	2
Total Hours		**5**

Total Credit Hours **34**

* MILS 147, 148, 247, and 248 (Aerobic Conditioning) are required for all scholarship cadets in the Basic Program.

** MILS 347, 348, 447, and 448 (Aerobic Conditioning) are required for all Advanced Course cadets.

ROTC: Naval Science

Department Website: www.iit.edu/nrotc

NROTC IIT
10 W. 31st St.
Rm 215
Chicago, IL 60616
312.567.3527

Chair
CAPT Brian Koehr, USN

The Naval Reserve Officers Training Corps (NROTC) offers an opportunity for young men and women to qualify for a commission in the U.S. Navy or U.S. Marine Corps while attending college. While pursuing their academic studies, midshipmen of the NROTC receive a professional education and the necessary specialized training to qualify them to become commissioned Navy or Marine Corps officers.

As commissioned officers in the United States Navy, graduates may serve in one of the various components of the U.S. Fleet, such as surface ships, the aviation community, or nuclear-powered submarines. Of particular interest is the opportunity to serve as an operating engineer aboard a nuclear or conventionally powered ship. The theoretical knowledge obtained at IIT is combined with practical knowledge and early responsibility in the operation and management of the latest in missile, aircraft, and high-performance ship propulsion systems.

Students may request the option to become officers in the U.S. Marine Corps. A commission in the Marine Corps may lead to a specialization in aviation, infantry, engineering, armor, communications, or supply.

Faculty

Professor
B. Koehr

Associate Professor
J. Liberman

Assistant Professors
C. Boynton, J. Edminister, J. King, A. Kowalke

ROTC: Naval Science Undergraduate Study

The Illinois Institute of Technology Naval Reserve Officers Training Corps (NROTC) Unit was established in 1946 by congressional authorization to create a Naval Science department. The Professor of Naval Science (PNS) chairs Illinois Institute of Technology's Department of Naval Science. Department faculty members are commissioned officers serving on active duty in the United States Navy or Marine Corps. They are selected and nominated by their respective services and screened and approved by the University.

Naval ROTC Programs

The Naval Reserve Officers Training Corps offers young men and women the opportunity to obtain leadership and management experience as commissioned officers in the United States Navy (Navy option) or Marine Corps after graduation from Illinois Institute of Technology, through either the Scholarship Program or the non-scholarship College Program.

At Illinois Institute of Technology, NROTC midshipmen lead essentially the same campus life as other students. They participate in campus activities of their choice and can participate in work-study programs including University-sponsored overseas study.

There are no prescribed academic majors for NROTC students, although scientific and technical studies are encouraged. NROTC students are required to complete the Naval Science curriculum, attend a weekly two-hour laboratory, and participate in four to six weeks of active duty for summer training at sea or ashore. Additionally, NROTC students will participate in physical training at least once a week, and will have the opportunity to travel with the unit drill team to regional competitions. College Program students attend training during the summer preceding their last academic year. Between their third and fourth years, Marine Corps NROTC students will attend a summer training program at the Marine Corps development and Education Command in Quantico, VA.

Scholarship Program

NROTC scholarship students are selected by nationwide competition. The NROTC Scholarship pays for tuition, books, and fees, as well as providing a tax-free stipend each month for four years. Graduates are commissioned as naval or marine corps officers and incur a minimum obligation of four years of active duty service.

College Program

Admission to the College Program is controlled by the Professor of Naval Science. Students incur no obligation to the naval services for participation in this program until their junior year. Qualified students enrolled in this program may be recommended for scholarships by the Professor of Naval Science. In addition to uniforms and some naval science books issued to students enrolled in this program, the Navy provides a tax-free stipend each month during the junior and senior years. Graduates are commissioned as Reserve naval officers and incur a minimum obligation of three years of active duty.

Two-Year Programs

The Navy/Marine Corps offer two two-year programs; one of these is a Scholarship Program and the other is a two-year College Program. Students are selected before April 1 of their sophomore year and attend a six-week Naval Science Institute Course at Newport, RI, in the summer before entering their junior year. Scholarship benefits for the junior and senior year are identical to those received by students in the four-year scholarship program during their junior and senior years.

Academic Requirements

Scholarship Program students are encouraged to pursue majors in engineering and applied sciences to meet the technological demands of the modern Navy. Most other fields of study leading to a baccalaureate degree are permitted with the approval of the Professor of Naval Science. All Navy option scholarship program students are required to complete one year each of calculus and physics.

College Program students and students enrolled in the Marine Corps option are encouraged to take courses in calculus and physics or to pursue a science or engineering major. In addition to the prescribed naval professional academic courses, the naval faculty conducts laboratories all four academic years to give students experience in practical leadership.

All scholarship students are required to complete a course in American Military Affairs or National Security Policy and complete a cultural studies course. Naval science courses are not offered on a pass-fail basis.

Optional Program

Students may select a minor in naval science. Course requirements are shown on the next page.

ROTC: Naval Science Curriculum

Semester 1		Credits
NS 101	Introduction to Naval Science	2
Total Hours		**2**

Semester 2		Credits
NS 202	Seapower and Maritime Affairs	3
Total Hours		**3**

Semester 3		Credits
NS 401	Leadership and Management	3
Total Hours		**3**

Semester 4		Credits
NS 301	Navigation	3
Total Hours		**3**

Semester 5		Credits
NS 102	Naval Ship Systems	3
Total Hours		**3**

Semester 6		Credits
NS 201	Naval Weapons Systems	3
Total Hours		**3**

Semester 7		Credits
NS 302	Naval Operations and Seamanship	3
Total Hours		**3**

Semester 8		Credits
NS 402	Naval Leadership and Ethics	3
Total Hours		**3**

Total Credit Hours **23**

Marine Option

Semester 1		Credits
NS 101	Introduction to Naval Science	2
Total Hours		**2**

Semester 2		Credits
NS 202	Seapower and Maritime Affairs	3
Total Hours		**3**

Semester 3		Credits
NS 401	Leadership and Management	3
Total Hours		**3**

Semester 4		Credits
Total Hours		**0**

Semester 5		Credits
NS 310	Evolution of Warfare	3
Total Hours		**3**

Semester 6		Credits
NS 410	History of Amphibious Warfare	3
Total Hours		**3**

Semester 7		Credits
Total Hours		**0**

Semester 8		Credits
NS 402	Naval Leadership and Ethics	3
Total Hours		**3**

Total Credit Hours **17**

Social Sciences

Website: humansciences.iit.edu/social-sciences

Siegel Hall
3301 S. Dearborn St.
Chicago, IL 60616
312.567.3000

Chair
Jonathan Rosenberg

Associate Chair
Rebecca Steffenson

IIT's Department of Social Sciences offers four undergraduate degrees: 1) Bachelor of Science (B.S.) in Social and Economic Development Policy, 2) Bachelor of Science (B.S.) in Political Science, and 3) Bachelor of Science (B.S.) in Sociology. The department offers minors in policy, political science, and sociology, and collaborates with other IIT departments to offer an interdisciplinary minor in urban affairs.

Also offered are two accelerated degree programs: a B.S./J.D. program with IIT's Chicago-Kent College of Law that can be completed in six years, and a B.S./M.P.A. program with IIT Stuart School of Business that can be completed in five years.

The department offers a variety of courses to broaden the student's education and to fulfill the IIT Core Curriculum requirements. Courses from political science (PS), sociology (SOC), and interdisciplinary social science (SSCI) are administered through the Department of Social Sciences.

For information regarding faculty visit the Social Sciences departmental website at
humansciences.iit.edu/social-sciences/faculty.

Social and Economic Development Policy

The Bachelor of Science in Social and Economic Development Policy (SEDP) is an interdisciplinary social science degree grounded in the analysis of global and domestic economic and social development. Our students learn about the impact of globalization on local communities and regions, and on both markets and societies. They specifically focus on the role technology plays both in the alleviation of poverty and the overall economic competitiveness of places. Students will specialize in either emerging or advanced economies. The program is designed to foster the development of globally-engaged civic leaders. Students will acquire the knowledge needed to assess and analyze salient issues that are central to the work of local governments and international organizations. They will gain the expertise required to make policy recommendations that will effectively address these issues. The program prepares graduates for careers that demand an understanding of the social, economic, political, technological, environmental, and policy issues that are fundamental to development.

Students will be required to complete 30 credit hours of core courses and at least one 15-credit-hour specialization. Majors are also required to complete 15 minor credit hours in Economics. The senior capstone project requires students to complete a 30-hour internship.

The objective of the Social and Economic Development Policy program is to develop graduates who can demonstrate:

- Fundamental knowledge of the development field across the social sciences.
- Ability to analyze and critically evaluate development problems and solutions.
- Effective written and verbal communication skills.
- A commitment to positive change in their communities.

Bachelor of Science in Social and Economic Development Policy

Required Courses	Credit Hours
Social and Economic Development Policy Requirements SSCI 100, SSCI 209, SSCI 486, PS 306, PS 313, PS 332, PS 360, SSCI 493, two Research Methods electives* (6 credit hours)	30
Social and Economic Development Policy Specialization Choose Emerging Economics or Advanced Economics. See page 164 for requirements.	15
Mathematics Requirements Two courses at the level of MATH 119 or above including PSYC 203.	6
Natural Sciences Requirements See IIT Core Curriculum, section D, page 25.	11
Computer Science Requirement CS 105 or CS 110	2
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Economics Minor Requirements ECON 151, ECON 152, ECON 423, and two additional advisor-approved courses.	15
Free Electives	24
Interprofessional Projects	6
Total Hours	**130**

* Choose from COM 383, PS 408, PS 480, PSYC 204, PSYC 431, SOC 498, SSCI 387, or additional research methods courses with advisor approval.

Specialization Requirements

Specialization I: Emerging Economics*

Required courses:

PS 230 International Relations
PS 388 International Law and Organizations
SSCI 380 Technology for Development

Choose two of the following:

PS 323 Problems of Multi-Ethnic, Multi-Religious States
PS 372 Government and Politics in Africa
PS 375 Politics of Latin America
PS 376 Politics of Global Migration
PSYC 238 Professional Skills
PSYC 455 Development and Evaluation of Training in Organizations
PSYC 481 Groups and Leadership at Work
BUS 341 Business Law for Entrepreneurs in the Modern Global Economy
COM 435 Intercultural Communication

Specialization II: Advanced Economies*

Required courses:

PS 214 State and Local Government
SSCI 355 Regional Economic Development
SSCI 378 The Triple Helix

Choose two of the following:

SSCI 220 Global Chicago
SSCI 354 Urban Policy
HIST 350 US Urban History
HIST 352 History of Chicago
PSYC 238 Professional Skills
PSYC 455 Development and Evaluation of Training in Organizations
PSYC 481 Groups and Leadership at Work
PS 373 Politics of East Asia
PS 374 Politics of Europe
PS 376 Politics of Global Migration
COM 421 Technical Communication

* Additional courses may be approved by the program director.

Social and Economic Development Policy Sample Curriculum

Semester 1		Credits
SSCI 100	Introduction to the Profession	3
Humanities 200-level Course		3
ECON 151	Making Strategic Decisions in the Marketplace	3
Mathematics Elective*		3
Natural Science or Engineering Elective		3
Total Hours		**15**

Semester 2		Credits
Specialization Elective**		3
PS 313	Comparative Public Policy	3
PS 332	Politics of Science and Technology	3
ECON 152	Understanding and Competing in the Global Marketplace	3
PSYC 203	Undergraduate Statistics for the Behavioral Sciences*	3
Natural Science or Engineering Elective		3
Total Hours		**18**

Semester 3		Credits
SSCI 209	Social Science Research Methods	3
PS 306	Politics and Public Policy	3
PS 360	Global Political Economy	3
ECON 423	Economic Analysis of Capital Investments	3
Humanities Elective (300+)		3
Specialization Elective**		3
Total Hours		**18**

Semester 4		Credits
CS 105	Introduction to Computer Programming	
OR		2
CS 110	Computing Principles	
Research Methods Course***		3
Natural Science or Engineering Elective		3
Social Sciences Elective		3
Humanities Elective (300+)		3
Economics Minor Elective		3
Total Hours		**17**

Semester 5	Credits
Specialization Elective**	3
Economics Minor Elective	3
Natural Science or Engineering Elective	3
Free Elective	3
Free Elective	3
Specialization Elective**	3
Total Hours	**18**

Semester 6	Credits
Research Methods Course***	3
Social Sciences Elective	3
Free Elective	3
IPRO Elective I	3
Specialization Elective**	3
Total Hours	**15**

Semester 7		Credits
SSCI 486	Planning, Fundraising, and Program Evaluation	3
Free Elective		3
Free Elective		3
IPRO Elective II		3
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 8		Credits
SSCI 493	Public Service Internship	3
Social Sciences Elective (300+)		3
Free Elective		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours 131

* Two courses at the level of MATH 119 or above including PSYC 203 or BUS 221.

** Choose from Emerging Economics or Advanced Economics, see page 164 for requirements.

*** Choose from COM 383, PS 408, PS 480, PSYC 204, PSYC 431, SOC 498, SSCI 387, or additional research methods course with advisor approval.

Political Science

Political science at IIT is primarily an applied discipline. We seek to equip our students with the skills they will need to succeed in careers in government, the non-profit sector, and industry. Our program emphasizes critical thinking, analysis, communication, and research methods. Students learn to identify, analyze, and critically evaluate solutions to political problems.

Our students devote most of their attention to policy analysis in the context of urban affairs or international comparative studies. Several faculty conduct research in and teach the politics and policies of science and technology.

Political science majors are required to complete 36 credits in political science, including a senior seminar or capstone course, in which students produce a research paper or other project that demonstrates their interest and skills to potential employers and/or graduate schools. Majors are also required to complete an approved course in statistics and a course in research methods. Additional courses may be required to prepare students for professional training and for entrance to fields such as law and medicine.

The objectives of the Political Science program are to develop graduates who can demonstrate:

- A fundamental base of knowledge across fields within the discipline of political science.
- Abilities to analyze and critically evaluate political problems and policy solutions.
- Effective written and verbal communication skills.

Bachelor of Science in Political Science

Required Courses	Credit Hours
Political Science Requirements SSCI 100, PS 200, SSCI 209, SSCI 210, PS 230 or 232, PS 306, PS 315 or PS 317 or SSCI 354, PS 490 or PS 408 or SSCI 486	24
Political Science Electives Four additional PS or approved SSCI courses	12
Mathematics Requirements Two courses at the level of MATH 119 or above including PSYC 203 or BUS 221	6
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Natural Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	11
Computer Science Requirement CS 105 or CS 110	2
Free Electives	44
Interprofessional Projects	6
Total Hours	**126**

Political Science Curriculum

Semester 1		Credits
SSCI 100	Introduction to the Profession	3
PS 200	American Government	3
Humanities 200-level Course		3
Mathematics Elective*		3
Natural Science or Engineering Elective		4
Total Hours		**16**

Semester 2		Credits
CS 105	Introduction to Computer Programming	
OR		2
CS 110	Computing Principles	
PS 230	International Relations	3
OR		
PS 232	Introduction to Comparative Politics	
Natural Science or Engineering Elective		4
Humanities or Social Sciences Elective		3
Social Sciences Elective		3
Free Elective		3
Total Hours		**18**

Semester 3		Credits
PSYC 203	Undergraduate Statistics for the Behavioral Sciences*	3
PS 306	Politics and Public Policy	3
Political Science Elective		3
Humanities Elective (300+)		3
Social Sciences Elective		3
Total Hours		**15**

Semester 4		Credits
SSCI 209	Social Science Research Methods	3
PS 315	Urban Politics	
OR		
PS 317	Chicago Politics	3
OR		
SSCI 354	Urban Policy	
IPRO Elective I		3
Natural Science or Engineering Elective		3
Free Elective		3
Total Hours		**15**

Semester 5		Credits
SSCI 210	Social and Political Thought	3
Political Science Elective		3
Social Sciences Elective (300+)		3
Free Elective		2
Free Elective		3
Free Elective		3
Total Hours		**17**

Semester 6	Credits
Political Science Elective	3
Humanities Elective (300+)	3
Free Elective	3
Free Elective	3
Free Elective	3
Total Hours	**15**

Semester 7		Credits
PS 490	Senior Seminar	
OR		
PS 408	Methods of Policy Analysis	3
OR		
SSCI 486	Planning, Fundraising, and Program Evaluation	
IPRO Elective II		3
Free Elective		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 8	Credits
Political Science Elective	3
Free Elective	3
Free Elective	3
Free Elective	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **126**

* Two Mathematics courses at the level of MATH 119 or above, including PSYC 203 or BUS 221.

Sociology

The study of sociology seeks innovative ways to think about and analyze human systems and behaviors. At IIT, sociology students learn how contemporary sociology is incubating fresh approaches to problems that are local and global, theoretical and applied. Faculty research focuses on the sociology of technology, science, and the built environment.

Majors are required to complete 36 credit hours in sociology. This includes an 18-hour sociology core, including a senior seminar or "capstone course" in which students will produce a research paper or other project that demonstrates their interest and skills to potential employers and/or graduate schools. In addition, students take another 18 hours of SOC or SSCI electives.

The objectives of the Sociology program are to develop graduates who can demonstrate:

- An understanding of key sociological concepts and theories.
- Ability to investigate sociological questions with appropriate methods.
- Effective written and verbal communication skills.

Bachelor of Science in Sociology

Required Courses	Credit Hours
Sociology Requirements SSCI 100, SOC 200 or 203, SSCI 209, SSCI 210, SOC 221, SOC 490	18
Sociology Electives Six additional SOC or SSCI courses	18
Mathematics Requirements Two courses at the level of MATH 119 or above including PSYC 203 or BUS 221	6
Humanities and Social Sciences Requirements See IIT Core Curriculum, sections B and C, page 25.	21
Natural Sciences Requirements See IIT Core Curriculum, section D, page 25.	11
Computer Science Requirement CS 105 or CS 110	2
Free Electives	45
Interprofessional Projects	6
Total Hours	**127**

Sociology Curriculum

Semester 1		Credits
SSCI 100	Introduction to the Profession	3
SOC 200	Introduction to Sociology	
OR		3
SOC 203	Engaging Sociology	
Humanities 200-level Course		3
Mathematics Elective*		3
Natural Science or Engineering Elective		4
Total Hours		**16**

Semester 2		Credits
CS 105	Introduction to Computer Programming	
OR		2
CS 110	Computing Principles	
SOC 221	Social Inequality	3
Natural Sciences or Engineering Elective		4
Humanities Elective (300+)		3
Social Sciences Elective		3
Total Hours		**15**

Semester 3		Credits
SSCI 210	Social and Political Thought	3
PSYC 203	Undergraduate Statistics for the Behavioral Sciences*	3
Natural Science or Engineering Elective		3
Humanities Elective (300+)		3
Social Sciences Elective		3
Total Hours		**15**

Semester 4		Credits
SSCI 209	Social Science Research Methods	3
Sociology Elective		3
IPRO Elective I		3
Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**15**

Semester 5	Credits
IPRO Elective II	3
Sociology Elective	3
Sociology Elective	3
Humanities or Social Sciences Elective	3
Free Elective	3
Free Elective	3
Total Hours	**18**

Semester 6	Credits
Sociology Elective	3
Sociology Elective	3
Free Elective	3
Free Elective	3
Free Elective	3
Free Elective	3
Total Hours	**18**

Semester 7		Credits
SOC 490	Senior Seminar	3
Sociology Elective		3
Free Elective		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 8	Credits
Free Elective	3
Free Elective	3
Free Elective	3
Free Elective	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **127**

* Two Mathematics courses at the level of MATH 119 or above, including PSYC 203.

Minors and Special Programs

Minors

Minors consist of at least five courses (minimum 15 semester hours), are optional, and are frequently cross-disciplinary. Since they provide a coherent set of ideas, concepts, and educational experiences in a variety of areas, students may find that they enhance potential for professional development. Students who wish to pursue a minor must consult with advisors in their respective major departments. Courses used to satisfy general education or major requirements do not apply to a minor. Exceptions may be made in individual cases.

NOTE: Not all minors are applicable to all majors.

Following are approved minors:

Aerospace Science - Materials Science Engineering Majors only
MMAE 304, MMAE 311, MMAE 312, MMAE 313, and one (1) of the following courses: MMAE 350, MMAE 410 or MMAE 411, MMAE 443, or MMAE 452.

Aerospace Science - Mechanical Engineering Majors only
MMAE 311, MMAE 312, MMAE 452, and one (1) course from each of the following group of courses: (MMAE 410, MMAE 411, MMAE 441) and (MMAE 412, MMAE 414).

Air Force Aerospace Studies
AS 101, AS 102, AS 201, AS 202, AS 301, AS 302, AS 401, AS 402.

Applied Mathematics
MATH 230, MATH 252, MATH 332, and at least two (2) mathematics courses at the 400-level.

Applied Mechanics - Aerospace Engineering Majors only
MMAE 432 or MMAE 433, and four (4) of the following courses: MMAE 321, MMAE 323, MMAE 302 or MMAE 332, MMAE 445, or MMAE 485.

Applied Mechanics - Materials Science Engineering Majors only
MMAE 302 or MMAE 332, MMAE 313, MMAE 323, MMAE 350, MMAE 432 or MMAE 445.

Architecture - Non-Architecture Majors only
This minor consists of 15 semester hours. ARCH 100, ARCH 107, ARCH 113, AAH 119 or AAH 120, and one (1) of the following courses: ARCH 108, ARCH 114, ARCH 321, ARCH 403, or ARCH 413. Students preparing for competitive application to graduate programs in architecture are encouraged to select ARCH 114.

Artificial Intelligence
CS 201, CS 330, CS 331, CS 430, CS 480.

Biochemistry
BIOL 214, BIOL 401, BIOL 402, BIOL 404, BIOL 445.

Biology
BIOL 107, BIOL 115, BIOL 214, BIOL 445, and one (1) of the following: BIOL 210, BIOL 305, BIOL 327, BIOL 401, BIOL 402, BIOL 404, BIOL 410, BIOL 426, BIOL 430, BIOL 446, or an approved Biology elective at the 500-level.

Building Systems Engineering
CAE 331, CAE 461, CAE 464, and two (2) of the following courses: CAE 403, CAE 409, CAE 424, CAE 425, CAE 463, CAE 465, CAE 466, or CAE 467.

Business
BUS 210 or (BUS 211 and 212), ECON 211 or (ECON 151 and 152), BUS 301, and two (2) of the following courses: ECON 423, BUS 371, or BUS 305. Chemical engineering majors should also take CHE 426 or another engineering science course.

Chemistry
This minor consists of at least 15 semester hours. CHEM 247, (CHEM 237 and 239) or (CHEM 343 and 344), and electives chosen from 300-level and 400-level chemistry courses.

Circuits and Systems - Non-Electrical Engineering, Non-Computer Engineering Majors only
ECE 211, ECE 213, ECE 218, and one (1) of the following sequences: (ECE 308 and 403), (ECE 308 and 438), or (ECE 319 and 419).

Communication
This minor consists of 15 semester hours of communication coursework chosen in consultation with the minor advisor. At least nine (9) semester hours must be at or above the 300-level.

Computational Structures
CS 201, CS 330, CS 331, CS 430, MATH 350.

Computer Architecture
CS 201, ECE 218, CS 331, CS 350, CS 470.

Computer Networking
CS 201, CS 331, CS 350, CS 450, CS 455.

Construction Management
CAE 470, CAE 471, CAE 472, CAE 473, ECON 423.

Database Management
CS 201, CS 331, CS 422 or CS 429, CS 425, CS 445.

Digital Humanities
At least 15 semester hours in humanities department courses which deal with technology-related topics, chosen in consultation with the minor advisor.

Electromechanical Design and Manufacturing - Aerospace Engineering Majors only
MMAE 445, MMAE 485, BUS 305, ECE 218, ECE 242, ECE 441 (replaces MMAE 315).

Electromechanical Design and Manufacturing - Mechanical Engineering Majors only
MMAE 485, BUS 305, ECE 218, ECE 242, ECE 441 (replaces MMAE 319).

Energy/Environment/Economics (E3)
This minor consists of 15 semester hours. CHE 543 and six (6) semester hours from each of the following group of courses: (CHE 465, CHE 467, CHE 489, CHE 491, CHE 541, CHE 542, CHE 565, CHE 582, ECE 319, ECE 411, ECE 419, ECE 420, ECE 438, MMAE 424, MMAE 425, MMAE 426 or MMAE 522, MMAE 524, MMAE 525) and (ECE 491, ECE 497, ECON 423, ENVE 404,
ENVE 426, ENVE 463, ENVE 485, MMAE 491, MMAE 494, MMAE 497, PS 338). Appropriate substitutions may be made with the approval of the minor advisor.

Engineering Graphics and CAD
CAE 100, CAE 101, EG 305, EG 306, EG 405, EG 406, EG 419.

English Language/Literature
Six (6) semester hours of English linguistics courses, six (6) semester hours of literature courses, and a three (3) semester hour course in either English linguistics or literature. At least nine (9) semester hours must be at or above the 300-level.

Entrepreneurship
BUS 210, BUS 371, ECON 211, ECON 423, BUS 469

Environmental Engineering
This minor consists of 15 semester hours. At least six (6) semester hours from each of the following group of courses: (ENVE 404, ENVE 426, ENVE 463, ENVE 485) and (CAE 421, CAE 439, CAE 465, CAE 482). Appropriate substitutions may be made with the approval of the minor advisor.

Graphics and CAD for Non-Engineers
EG 225, EG 325, EG 329, EG 425, EG 429.

History
This minor consists of 15 semester hours of history coursework chosen in consultation with the minor advisor. Courses must be at or above the 300-level.

Human Resources
PSYC 221, PSYC 301, PSYC 310, and two (2) of the following courses: PSYC 409, PSYC 455, PSYC 481.

Industrial Technology and Management
Completion of 15 hours from the following INTM 315, INTM 322, INTM 410, INTM 418, INTM 420, INTM 441, INTM 477.

Information Architecture
See page 108 for requirements.

Information Security
ITMD 421, ITMS 428, ITMO 440, ITMS 448, ITMS 478.

Information System Administration
ITM 301, ITM 302, ITMO 440, and six (6) semester hours from the following courses: ITMO 451, ITMO 452, ITMO 454, or ITMO 456.

Information System Network Management
ITMO 440, ITMO 441, ITMS 448, ITMO 456 or ITMD 461, ITMM 471.

Information Technology and Management
ITM 301, ITM 302, ITMD 421, ITMO 440, ITMM 471.

Internet Application Development
ITM 311, ITMD 411, ITMD 461, ITMD 462, and one (1) of the following courses: ITMD 465, ITMD 466, ITMD 469, or an applicable communication (COM) course chosen in consultation with the minor advisor.

Linguistics
This minor consists of 15 semester hours of linguistics coursework chosen in consultation with the minor advisor. At least nine semester hours must be at or above the 300-level.

Literature
This minor consists of 15 semester hours of literature courses, at or above the 300-level.

Materials Science - Aerospace Engineering Majors only
MMAE 365, MMAE 370, MMAE 463, and two (2) of the following courses: MMAE 465, MMAE 468, MMAE 470, MMAE 472 or MMAE 482, MMAE 486, or MMAE 485.

Materials Science - Mechanical Engineering Majors only
MMAE 365, MMAE 370, MMAE 463, and two (2) of the following courses: MMAE 465, MMAE 468, MMAE 470, MMAE 472 or MMAE 482, or MMAE 476.

Materials Science - Non-MMAE Majors
MS 201, MMAE 365, MMAE 463, MMAE 465, and one (1) of the following courses: MMAE 370, MMAE 468, or MMAE 470.

Mathematics and Science Education
MSED 200, MSED 250, MSED 300, and two (2) additional MSED courses chosen in consultation with the minor advisor.

Military Science
MILS 101, MILS 102, MILS 201, MILS 202 or MILS 107, MILS 301, MILS 302, MILS 401, MILS 402. MILS 147, MILS 148, MILS 247, and MILS 248 (Aerobic Conditioning) are required for all cadets in the Basic Program. The proceeding four (4) courses and MILS 347, MILS 348, MILS 447, and MILS 448 (Aerobic Conditioning) are required for all Advanced Course cadets.

Music
This minor consists of 15 semester hours in music theory or practice taken at VanderCook College of Music. A maximum of three (3) semester hours of performance courses may be used toward a minor. Students should contact the Office of Undergraduate Academic Affairs regarding applicability of courses toward a degree program.

Naval Science
NS 101, NS 102 (Navy option), NS 201 (Navy option), NS 202, NS 301 (Navy option), NS 302 (Navy option), NS 310 (Marine option), NS 401, NS 402, NS 410 (Marine option). Attendance at the Naval Science Institute may be substituted for NS 101, NS 102, NS 201, and NS 202. NS 497 (0 credits) is required every semester.

Operating Systems
CS 201, CS 331, CS 350, CS 351, CS 450.

Philosophy
This minor consists of 15 semester hours of philosophy courses, at or above the 300-level.

Physics
PHYS 300 or PHYS 427, PHYS 308, PHYS 348, PHYS 405, PHYS 413.

Policy & Ethics
See page 108 for requirements.

Political Science
This minor consists of 15 semester hours. PS 100 or PS 202 and four (4) additional political science courses.

Polymer Science and Engineering
This minor consists of 15 semester hours. One (1) of the following courses: CHE 470, CHEM 470, or MMAE 470; three (3) of the following courses: CHE 538, CHE 555, CHE 575, CHEM 535, CHEM 537, CHEM 542, MMAE 483, MMAE 487, MMAE 579, MMAE 580 or MMAE 581; and ONLY one (1) of the following courses: CHE 426, CHE 489, CHE 491, CHE 582, FPE 541, MMAE 451, or MMAE 485. Appropriate substitutions may be made with the approval of the minor advisor.

Premedical Studies
This minor is intended for those students who plan to apply to medical school and has been approved by the Premedical Advisory Committee. Students who major in biology, biochemistry, or molecular biochemistry and biophysics satisfy the premedical studies course requirements.

Biomedical Engineering - Cell and Tissue Track CHEM 240 and at least 13 semester hours chosen from the following courses: BIOL 210, BIOL 214, BIOL 225, BIOL 401, BIOL 402, BIOL 403(equivalent of BIOL 401 and 402), BIOL 404, BIOL 445, BIOL 446, BIOL 491 (1-3 semester hours), or BME 495 (1-3 semester hours).

Premedical Studies - continued
Biomedical Engineering Majors - Neural Engineering or Medical Imaging Track CHEM 237, CHEM 239, CHEM 240 and at least six (6) semester hours chosen from the following courses: BIOL 210, BIOL 214, BIOL 225, BIOL 401, BIOL 402, BIOL 403(equivalent of BIOL 401 and 402), BIOL 404, BIOL 445, BIOL 446, or BME 491 (1-3 semester hours). If CHEM 237 or CHEM 239 is taken as an option in the Neural Engineering or Medical Imaging Track, then add the equivalent number of semester hours chosen from courses listed above.

Chemical Engineering BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 240, CHE 426 or a three (3) semester hour engineering science course.

Chemistry Students interested in pursuing chemistry as a premedical degree may elect the Bachelor of Science in Chemistry with emphasis in Biological Chemistry optional degree program. This program includes all the necessary courses required for entrance into medical school. Students may also pursue any of the other optional degree programs in chemistry but must additionally take BIOL 107, BIOL 109, BIOL 115, BIOL 117, BIOL 214, and one (1) of the following courses: BIOL 430 or BIOL 445.

Computer Science BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 124, CHEM 125, CHEM 237, CHEM 239, CHEM 240.

Electrical Engineering BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 125, CHEM 237, CHEM 239, CHEM 240.

Materials Science and Engineering BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 237, CHEM 239, CHEM 240.

Mechanical Engineering BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 125, CHEM 237, CHEM 239, CHEM 240.

Physics BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 237, CHEM 239, CHEM 240.

Professional and Technical Communication
COM 421 and 12 semester hours of communication coursework chosen in consultation with the minor advisor.

Programming Languages
CS 201, CS 331, CS 350, CS 351, CS 440.

Psychology
PSYC 203, PSYC 221 or PSYC 222, and at least nine (9) additional semester hours of psychology courses.

Public Administration
PS 200, PS 306, PS 314, PS 315, PS 351.

Public Policy
PS 306, PS 408, SSCI 209 and two (2) of the following courses: PS 312. PS 313, PS 319, PS 332, PS 338, SSCI 354.

Rehabilitation Services
PSYC 410, PSYC 411, PSYC 412, PSYC 583, PSYC 590.

Science and Technology Studies
See page 109 for requirements

Sociology
This minor consists of 15 semester hours. SOC 200 or SOC 203 and four (4) additional sociology courses.

Software Engineering
CS 201, CS 331, CS 441, CS 445, CS 487.

Structural Engineering - Architecture Majors only
CAE 303, CAE 304, CAE 307, CAE 431, CAE 432. This minor is usually taken in conjunction with the Bachelor of Architecture/Master of Civil Engineering Dual Degree Program (see page 177).

Structural Engineering - Non-CAEE, Non-ARCH Majors
CAE 303, CAE 304, CAE 307, CAE 315, CAE 431.

Telecommunications
CS 116 or CS 201, ECE 403 or ECE 405, ECE 406 or ECE 407, ECE 436, and two (2) of the following courses: CS 331, CS 450, or ECE 449.

Transportation Engineering
This minor consists of 5 required courses: CAE 412, CAE 415, CAE 416, CAE 417, and CAE 430. Appropriate substitutions may be made with the approval of the minor advisor.

Urban Studies
Choose five (5) courses from the following: HIST 350, HIST 351, HIST 352, PS 315 or PS 317 or SSCI 354, SOC 311, SSCI 220.

Special Programs

Dual Undergraduate Degree Options

Depending upon interest, capabilities, and goals, and with the permission of their advisors and department chairs, students may choose dual undergraduate degree programs or select one of the options listed below.

Bachelor of Science in Computer Engineering/Bachelor of Science in Computer Science

Students interested in this program should consult a Department of Computer Science advisor. Freshmen entering IIT with a significant number of Advanced Placement credits might be able to complete both degrees in four years.

Bachelor of Science in Computer Engineering/Bachelor of Science in Electrical Engineering

Students interested in this program should consult a Department of Electrical and Computer Engineering advisor. Freshman entering IIT with a significant number of Advanced Placement credits may be able to complete both degrees in four years.

Bachelor of Science in Mechanical Engineering (ME)/ Bachelor of Science in Aerospace Engineering (AE)/ Bachelor of Science in Materials Science and Engineering (MSE)

A dual major in ME and AE, ME and MSE, or AE and MSE may generally be completed in one additional year. Interested students should consult their advisor.

Co-Terminal Degrees (Bachelor's Degree and Master's Degree)

Co-terminal degrees allow outstanding IIT undergraduate students to simultaneously complete both an undergraduate and graduate degree (Bachelor's degree and Master's degree).

Co-terminal degrees provide an opportunity for students to gain greater knowledge in specialized areas while completing a smaller number of credit hours with increased scheduling flexibility than the completion of two degrees separately. Because most co-terminal degrees allow students to share course credit (a maximum of nine credit hours), students may complete both a Bachelor's and Master's degree in as few as five years. All degree requirements must be completed within six years of undergraduate matriculation, or the student will be dismissed from the co-terminal degree program.

Students applying to co-terminal studies must have completed at least 60 credit hours of undergraduate study and at least one full semester at IIT. Students must be at least one semester away from undergraduate graduation in order to apply. Applicants are encouraged to have a GPA of at least 3.0/4.0; however, please consult individual departments for their specific GPA requirements. Questions regarding co-terminal graduate admissions should be addressed to the Office of Graduate Admission: **inquiry.grad@iit.edu.**

Co-terminal students maintain their undergraduate student status while completing graduate coursework and can maintain financial aid eligibility when applicable.

Co-terminal degrees are awarded simultaneously, and students may not receive their first degree before the requirements of the second degree are satisfied. In such cases, the conferral of the first degree will be held until the completion of the second degree.

General questions regarding Co-terminal degrees may be addressed to **cotermdegrees@iit.edu**.

Bachelor's/Master's Degree Options

IIT's double-degree options allow students to earn two degrees in as few as five years. The University has created Bachelor's degree/Master's degree options in fields in demand in professions where graduate training is essential.

Students may enter some undergraduate/graduate double-degree programs either through the honors track or the standard track. Through the honors track, exceptional students may be admitted simultaneously into both the undergraduate and graduate schools when they apply to IIT. Admission will be based on their high school records, including grades, test scores, faculty/employer recommendation, and other documentation. Through the standard track, students are admitted into the undergraduate department offering the Bachelor's portion of the program.

Depending upon their interests, capabilities, and goals, and with the permission of their advisors and department chairs, students may choose combined degree programs or select one of the following options.

Bachelor of Architecture (B.Arch.)/Master of Business Administration (M.B.A.)

Architects recognize the importance of business skills in their profession. Recognizing the 21st century's concerns with environmental management and sustainable design issues, IIT offers young architects a unique opportunity for advanced graduate study in the Stuart School of Business.

IIT students completing the requirements for the B.Arch. degree may also earn the M.B.A. degree by completing an approved set of courses established by their academic advisors and appropriate deans in the College of Architecture and the Stuart School of Business. Thus, qualified architecture students may earn their B.Arch. and the M.B.A. in approximately six-and-a-half years, rather than the usual seven years. When including a summer term, the M.B.A. will typically require one-and-a-half more years of study.

Students considering the B.Arch./M.B.A. dual degree program should consult with undergraduate advisors in both programs early in their academic career.

Students will be required to apply for admission to the graduate M.B.A. program, providing Graduate Management Admission Test (GMAT) scores and all other necessary application materials. Application should be completed prior to the end of the seventh semester of the B.Arch. program. Upon admission, B.Arch. students could successfully complete up to four M.B.A. courses, or 12 credits, before joining the program on a full-time basis. These courses are typically basic core courses for which there are no prerequisites. The Stuart School M.B.A. advisors would be able to identify these courses and offer appropriate advice to the B.Arch students upon their admission to the program.

Bachelor of Architecture/Master of Civil Engineering

Qualified students enrolled at IIT may earn both the Bachelor of Architecture and one of two professional Master's degrees in Civil Engineering. Students who seek the Master of Structural Engineering degree (MAS STE) must successfully complete the following courses as part of their undergraduate program in architecture before starting a Master's program:

MATH 151 Calculus I
MATH 152 Calculus II
MATH 251 Multivariate and Vector Calculus
MATH 252 Differential Equations
PHYS 123 General Physics I: Mechanics
CAE 286 Theory & Concept of Structural Mechanics
CAE 287 Mechanics of Structural Materials
CAE 303 Structural Design I
CAE 304 Structural Analysis I
CAE 307 Structural Design II
CAE 431 Steel Design
CAE 432 Concrete and Foundation Design

Students who seek the Professional Master's degree in Architectural Engineering should take:

CAE 208 Thermal-Fluids Engineering I
CAE 209 Thermal-Fluids Engineering II
CAE 383 Electrical and Electronic Circuits

Students who seek the Master of Construction Engineering and Management (MAS CM) should consult the department.

Students who anticipate entering into the program should seek advising in the Department of Civil, Architectural, and Environmental Engineering and the College of Architecture early in their studies at IIT.

Bachelor of Science/Master of Public Administration

Qualified students who are interested in careers in the public sector may complete their Bachelor's degree and Master's degree in Public Administration (M.P.A.) in five or fewer years.

The requirements for the Bachelor of Science in Political Science and Master of Public Administration are often completed in four-and-a-half years. Requirements for a Bachelor's degree in engineering or science can be combined with an M.P.A. degree and usually take somewhat longer, depending on the student's load each semester and his or her total program. Students interested in this option should submit their request to the M.P.A. program after their fourth semester. Qualified students are granted provisional admission to the program and begin taking the graduate level M.P.A. courses, usually at the rate of one per semester. When the student has completed substantially all the requirements for the Bachelor's degree portion of the program, the student applies for regular admission to the graduate program. The decision about regular admission will be based on the work the student has completed at the time of his or her request for regular admission. By then, the student will have completed the M.P.A. foundation courses. Students in this program receive credit toward their Bachelor's degree electives for two M.P.A. courses and with the approval of the academic director, may receive credit toward their M.P.A. degree for up to six hours of relevant undergraduate coursework.

Combined Undergraduate/Graduate Law Programs (Leading to B.S./J.D. Degrees)

Students in these programs study their undergraduate program at the Main Campus of IIT and the law school portion of the program at IIT's Chicago-Kent College of Law. Two combined undergraduate and graduate law degree programs are available.

Prelaw undergraduate students also have access to seminars, prelaw advising, and assistance preparing for the LSAT.

Honors Law Program

The Honors Law Program allows students to pursue an accelerated sequence of coursework leading to the Bachelor of Science (B.S.) and Juris Doctor (J.D.) degrees. It is recommended that students apply to the Honors Law Program prior to beginning their freshman year. However, applications are also accepted from students in their freshman or sophomore year. Students who major in biology, chemistry, computer information systems, humanities, physics, political science, professional and technical communications, or psychology pursue an accelerated, focused course of study and normally complete both the B.S. degree and the J.D. degree in six years instead of the usual seven years. Students in other majors may also be able to accelerate completion of both degrees.

Acceptance by Chicago-Kent is automatic for those students who meet the minimum program requirements. Students are guaranteed a seat in the Chicago-Kent entering class provided that they meet the following criteria:

- Maintain a 3.25 cumulative undergraduate GPA.
- Take the Law School Admissions Test (LSAT) by February of their third undergraduate year at IIT if they are in the six-year program or by February of their forth year at IIT if they are not and achieve an LSAT score at or exceeding the median score for the Chicago-Kent entering class.
- Submit a completed application to Chicago-Kent by April 15 of the third undergraduate year if they are in the six-year program or in the fourth undergraduate year if they are not.
- Maintain a record consistent with the requirements of the bar examining program.

Students who participate in the program but who do not meet the criteria for guaranteed admission are invited to apply through the regular competitive application process for admission to Chicago-Kent after three or four years of undergraduate study. In reviewing such applications, consideration will be given to the student's participation in the Honors Law Program.

B.S./M.D./D.O./O.D. Programs

In addition to Premedical Studies, IIT offers three dual-degree programs. Students earn a Bachelor's degree from IIT and a medical degree from the medical or optometry school. These innovative programs are designed to meet the urgent and intensifying need for technologically proficient physicians and researchers. More information can be obtained from the Office of Undergraduate Admission at 312.567.3025 or **admission@iit.edu**.

IIT/Midwestern University Chicago College of Osteopathic Medicine Dual Admission Program (4+4)

The IIT/Midwestern B.S./D.O. Program is an eight-year program open to freshmen applicants in which students complete their Bachelor of Science degree at IIT in a major of their choosing. Students must complete a standard curriculum of Premedical Studies either as part of their major or as a Premedical Studies minor, maintain high academic standards, and obtain a satisfactory score on the MCAT. The final four years are spent at Midwestern University-Chicago College of Osteopathic Medicine, during which the student earns the Doctor of Osteopathic Medicine (D.O.) degree.

IIT/Rush Medical College B.S./M.D. Early Admission Program (4+4)

The IIT/Rush Medical College Program is an early admission program open to sophomores. Students must demonstrate high academic standards and research experience prior to admittance. This program is not open to international students. The MCAT is required. Students admitted to this program will complete their Bachelor of Science degree at IIT in a major of their choosing. As part of this experience, they will participate in a year-long research project that bridges engineering, science, and medicine. The final four years are spent at Rush Medical College, during which time the student earns the Doctor of Medicine (M.D.) degree. This program is designed for students who intend to become research-oriented physicians.

IIT/Illinois College of Optometry B.S./O.D. Early Admission Program (3+4)

The IIT/ICO Program is an early admission program open to sophomores. Students admitted to the program complete three years at IIT taking courses leading to a Bachelor of Science degree in Biology and four years at Illinois College of Optometry (ICO). IIT students are only guaranteed an interview with ICO after they have successfully completed the required biology curriculum outlined by ICO. Courses taken during the first year at ICO also count as senior-year-level biology courses. Students receive the Bachelor of Science degree in Biology from IIT after completing the first year at ICO and receive the Doctor of Optometry (O.D.) degree after completing all requirements at ICO. Students must maintain high academic standards and perform satisfactorily on the OPT (Optometry Admissions Test).

Premedical Programs

Department Website: www.iit.edu/premed

IIT provides excellent preparation for students planning to attend medical or other health-related professional schools. Students majoring in various fields, listed below, earn a Bachelor of Science degree and, at the same time, fulfill the prerequisites for medical school:

- Science (biology, chemistry, molecular biochemistry and biophysics, physics) with a minor in Premedical Studies (see pages 172–175). Many science majors will complete most of the courses required for the premedical curriculum as part of their major requirements. These students will not qualify for a Premedical Studies minor.
- Engineering (biomedical, chemical, electrical, materials science, mechanical) and computer science with a minor in Premedical Studies (see pages 172–175).

Rapidly advancing technology is changing the practice of medicine. Physicians who have a strong technical background will be among the best prepared to utilize the new technology. IIT's curricula emphasize technical proficiency as well as communication and teamwork, which help students develop the interpersonal skills that are critical in the health professions.

Students interested in pursuing careers in medicine, pharmacy, dentistry, osteopathy, optometry, and veterinary science should contact the Premedical Office for further information.

Each student works with a departmental premedical advisor to structure a course of study to meet medical school requirements and to prepare for the Medical College Admission Test (MCAT) in the junior year.

The following is a list of IIT science courses that fulfill the premedical requirements of most medical schools:

CHEM 124 Principles of Chemistry I with Laboratory
CHEM 125 Principles of Chemistry II
CHEM 237 Organic Chemistry I
CHEM 239 Organic Chemistry II
CHEM 240 Organic Chemistry Laboratory
PHYS 123 General Physics I: Mechanics
PHYS 221 General Physics II: Electricity & Magnetism
BIOL 107 General Biology Lectures
BIOL 109 General Biology Laboratory
BIOL 115 Human Biology Lectures
BIOL 117 Human Biology Laboratory

For a competitive application, and to improve performance during the first year in medical school, or to prepare for the MCAT, the following courses are recommended:

BIOL 214 Genetics
BIOL 403 Biochemistry Lectures
BIOL 430 Animal Physiology
BIOL 445 Cell Biology
PHYS 224 General Physics III for Engineers

The Premedical Advisory Committee members monitor academic progress, gather information about volunteer and research opportunities, guide the student through the medical school application process, advise in choosing a medical school and in preparation of the AMCAS application, collect and prepare recommendation letters, and assist in preparation for interviews with medical school admission committees.

Premedical Advisory Committee:
Kathryn Spink (Chair) (BCS)
Konstintinos Arfanakis (BME)
Nick Menhart (BCS)
Satish Parulekar (CHBE)
Molly Pachan (PSYC)

Coordinator
Cathie D'Amico
116 Engineering 1
312.567.8852

Coordinator
Todd Kersh
182 Life Sciences
312.567.7986

Post-Baccalaureate Premedical Program

The purpose of the Post-baccalaureate Premedical Program is to meet the needs of college graduates who have decided to pursue a medical education but who have taken none or only some of the basic science courses required for admission to medical school. The objective of the program is to provide rigorous education in all areas of the premedical sciences which are required for admission to any medical, osteopathic, or veterinary school in the country. Students who satisfactorily complete the program will be awarded a Certificate in Premedical Sciences. This program does not qualify for financial aid.

Coursework

Students sufficiently prepared in mathematics and English who enter the program in the fall semester can expect to complete the program in two years. The third year is known as the "glide year." This is the year between completing the program and entering medical school. For most students, the glide year provides the opportunity to take additional courses or to deepen their exposure to medicine through full-time employment in a clinical setting or in a medical research laboratory. In order to be eligible for admission to medical school and, subsequently, to be licensed to practice medicine, students must complete the following seven courses in the arts and sciences:

- One year of college English, including a significant amount of expository writing.
- One year of college mathematics, beyond precalculus, including at least one term of calculus. Statistics is recommended as the second mathematics course.
- One year of general physics, including laboratory.
- One year of general chemistry, including laboratory.
- One year of organic chemistry, including laboratory.
- One year of biology, including laboratory, with significant emphasis in molecular and cellular biology.

Advising and Support

On the main campus of Illinois Institute of Technology there are a number of advisors, who together constitute the Premedical Advisory Committee, see: **www.iit.edu/premed**. Post-baccalaureate Premedical students will be assigned an advisor who will be available to counsel them as they plan their program of study and as they prepare their applications to medical school. A number of academic support services will be made available to students in the Post-baccalaureate Premedical Program. In the University's Academic Resource Center, students can meet with tutors at no expense for additional help in their premedical courses. In the Premedical Office, support staff will collect and send letters of recommendation to medical schools. Each year the Premedical Office and the IIT Honors Medical Society host a number of events specifically for premedical students including special seminars of medical interest and forums in which current students can learn from experiences of those who have already taken the MCAT or been admitted to medical school. The Princeton Review offers MCAT Preparatory courses at reduced cost to IIT students in the spring semester each year. Post-baccalaureate Premedical students are invited and encouraged to attend weekly colloquia in the biological and chemical sciences and in other departments offering seminars of medical interest. Finally, IIT's location in the city of Chicago is a special advantage to students in the Post-baccalaureate Premedical Program. The city is home to six medical schools and numerous hospitals and medical research centers. It is also home to the American Medical Association. This concentration of medical practice will provide IIT Post-baccalaureate Premedical students with a wide variety of opportunities to gain experience in both clinical settings and in medical research through volunteer service and paid employment.

Academic Standards

Medical schools expect successful applicants to possess excellent grounding in the premedical sciences. The quality of a student's preparation is measured by the grades earned in premedical courses. For this reason, IIT Post-baccalaureate Premedical students will be held to high academic standards. At a minimum, students must maintain a cumulative GPA of 3.00 to remain in the program. Likewise, medical schools have high expectations about an applicant's character. Students in the IIT Post-baccalaureate Premedical Program are expected to conduct themselves with honesty and integrity inspiring confidence in their abilities to assume the responsibilities of medical practice. Students in the Post-baccalaureate Premedical Program are subject to the academic and disciplinary standards detailed in the Illinois Institute of Technology Student Handbook.

Admissions Eligibility

The student must hold the degree of Bachelor of Arts or Science from an accredited college or university in the United States or an equivalent degree from an institution outside the United States. At a minimum, successful applicants must possess a cumulative undergraduate GPA of 3.00. In most cases, students will not be eligible for admission if they have applied to medical school previously or have completed their premedical preparation elsewhere within the last five years. This is not a remedial program. Students must submit a complete application package to the Undergraduate Admission Office for full consideration.

Certificate Programs

Undergraduate Certificate Programs

The Department of Civil, Architectural and Environmental Engineering offers a certificate program in Engineering Graphics and CAD. This program is designed to prepare specialists in graphics for positions in business and industry. Students completing the specified courses with satisfactory grades will be awarded a certificate of completion. This certificate is only available to students enrolled in a degree program at IIT and does not qualify for federal financial aid. Consult the Civil and Architectural Engineering section in this bulletin for further information.

The Industrial Technology and Management program offers the Industrial Technology and Management (INTM) certificate for individuals who want to improve management, supervisory, and decision-making skills required for world-class industrial operations. This certificate does not quailify for federal financial aid. Consult the Industrial Technology and Management section in this bulletin for further information.

The College of Psychology offers a certificate in Industrial Training. This certificate is designed to help either the experienced skilled worker or a technically educated person to learn methods of knowledge delivery in industrial training settings. This certificate is only available to students enrolled in a degree program at IIT and does not qualify for federal financial aid. Consult the College of Psycology section in this bulletin for further information.

Post-Baccalaureate Certificate Programs

IIT departments that offer graduate certificate programs are: Biological and Chemical Sciences; Chemical and Biological Engineering; Civil, Architectural and Environmental Engineering; Computer Science; Electrical and Computer Engineering; Humanities; Information Technology and Management; Mechanical, Materials and Aerospace Engineering; Physics. Certificate programs are also offered by: the Institute for Food Safety and Health; the College of Psychology; and the Stuart School of Business.

For a complete list of graduate certificate programs; consult the current ***IIT Bulletin: Graduate Programs*** or **admissions.iit.edu/graduate/programs**.

Gainful Employment Requirements

As of July 1, 2011, institutions must disclose the following information about each of the institution's certificate programs that lead to gainful employment: the name of the certificate program, the CIP code, and the Standard Occupation Code (SOC); tuition and fee charges, the typical cost of books and supplies, and the average cost of room and board.

IIT's accreditor does not require the calculation of job placement rates and therefore we are unable to disclose such rates. Once the National Center of Education Statistics (NCES) publishes its methodology for calculating placement rates, IIT will use it to calculate such rates.

Per Gainful Employment guidelines, if the number of students who completed a Gainful Employment program during the award year was less than 10, for privacy reasons the school cannot disclose median loan debt and on-time completion rate.

Presently, undergraduate certificate programs do not fall under financial aid eligibility guidelines. Most undergraduate certificate programs are taken concurrently with a Bachelor's degree program.

Pre-Pharmacy Program

IIT and Midwestern University have a Dual Acceptance Program for Midwestern's Chicago College of Pharmacy (CCP). To be eligible for this program, students must meet IIT's admission requirements and also be selected for admission by the CCP Admissions Committee. Successful applicants will be ensured a seat at CCP upon successful completion of the pre-pharmacy requirements within two years at IIT; maintain a minimum cumulative pre-pharmacy GPA of 3.20; and earn a grade of C or higher in all required courses. The Pharmacy College Admissions Test (PCAT) is waived for students who successfully complete the pre-pharmacy program at IIT and who are admitted to CCP in the Dual Acceptance Program.

For further information see **www.midwestern.edu**.

Study Abroad

IIT encourages students of all majors to study abroad during part of their undergraduate careers. Studying abroad enriches the college experience by providing a different intellectual and cultural environment and enriches the academic program by giving breadth to the major discipline.

Students wishing to study abroad should contact the Study Abroad Office in the International Center for information and advising. The application process should begin approximately one year before study abroad is anticipated, with the application deadline falling one semester prior to study abroad. Only students whose applications are approved by the Study Abroad Committee are permitted to participate in study abroad. Students maintain full-time student status at IIT for the duration the study abroad program.

Further information is available on the Study Abroad website at **studyabroad.iit.edu**.

Exchange Programs

Exchange programs work on the principle of a one-for-one exchange of students, with a balance of students being maintained on a rolling basis. A student pays IIT tuition for the term abroad and takes courses at a foreign institution alongside students from the host country. Additional expenses not paid to IIT include airfare, housing, meals, books and supplies, and independent travel. Students earn IIT transfer credit with a passing grade.

Exchange programs are available for most majors, though some may be restricted to a specific department or school. Proficiency in the host language may be required, though many universities offer instruction in English. Consult the individual program pages on the Study Abroad website for more information.

IIT has undergraduate exchange programs with the following universities:

- Australia: Queensland University of Technology (QUT)
- Denmark: Technical University of Denmark (DTU)
- France: Institut National des Sciences Appliques de Lyon (INSA Lyon)
- Germany: Hochschule Pforzheim (Pforzheim University)
- Ireland: University College Cork (UCC)
- Italy: Universit Iuav di Venezia (IUAV)
- Mexico: Tecnolgico de Monterrey (ITESM)
- Singapore: Singapore Management University (SMU)
- Spain: Universitat Politecnica de Catalunya, Escola Tecnica Superior d'Arquitectura de Barcelona (UPC ETSAB)
- Spain: Universidad de Oviedo
- Sweden: KTH Royal Institute of Technology
- Switzerland: Zurich University of Applied Sciences (ZHAW)
- United Kingdom: University of Birmingham

IIT is a member of the Global Engineering Education Exchange (GE3), allowing engineering and computer science majors to study abroad under the one-for-one exchange model at one of 30 other institutions in addition to those listed above.

Partner University Visiting Programs

IIT has direct visiting student agreements with more than 30 partner universities around the world. A student takes courses at a foreign institution alongside students from the host country. Students earn IIT transfer credit with a passing grade. However, no tuition is paid to IIT for the term abroad, though a student may pay certain fees, such as a health insurance fee. Tuition, fees, and housing are typically paid to the host partner university, and students must also budget for airfare, meals, books and supplies, and independent travel.

Proficiency in the host language may be required, though many universities offer instruction in English. Consult the individual program pages on the Study Abroad website for more information.

Faculty-led Study Abroad Programs

IIT offers summer and semester study abroad programs taught by IIT faculty. Opportunities vary from year to year, and programs are posted on the Study Abroad website and are publicized by the academic departments. Recent faculty-led programs have included architecture studios in Germany, Ghana, and Italy.

A student registers for an IIT course, pays IIT tuition for the term abroad and pays a program fee which typically includes housing and group travel. Additional expenses not paid to IIT typically include airfare, meals, books and supplies, and independent travel.

External or Third Party Provider Programs

Another option for IIT students is to participate in a study abroad program organized by a third party provider. Programs of providers who participate in IIT Study Abroad Fairs on campus are included in the search engine on the Study Abroad website as external/provider programs. Students may find other programs through their own research. Although these programs are not affiliated with IIT, a student may be approved for participation in these programs by following the procedures outlined by the Study Abroad Office.

Students earn IIT transfer credit with a passing grade. No tuition is paid to IIT for the term abroad, though a student may pay certain fees, such as a health insurance fee. These programs vary considerably in terms of program structure and what is included in the program fee. It is the student's responsibility to determine program costs and application requirements and to follow the procedures outlined by IIT as well as the provider.

Joint Programs

IIT has established Joint Program agreements with the following Chicago-area institutions: Benedictine University, DePaul University, Dominican University, Elmhurst College, Lewis University, University of St. Francis, and Wheaton College. These programs differ from a 3+2 transfer program in that students earn two degrees: a Bachelor's degree in an engineering discipline from IIT and a Bachelor's degree in an approved discipline from their host school. Students will live on the campus of their host school while completing the requirements for both degrees.

Admission into the Joint Program at another institution does not guarantee admission to IIT. For additional information, students should contact the Office of Undergraduate Admission at **admission@iit.edu** (see page 7).

Dual Admission Programs

IIT has established dual admission programs with College of DuPage and Joliet Junior College. These 2+2 programs allow students to complete an Associate's degree and a Bachelor's degree in four years of study with transfer credit. The Bachelor's degree program areas include Information Technology and Management (ITM) and Psychology. For more information, see the Information Technology and Management or Psychology sections of this bulletin, or contact the Office of Undergraduate Admission (see page 7).

Reserve Officers Training Corps (ROTC)

ROTC programs are available as minors in the regular IIT degree programs. These programs enable men and women to become commissioned officers in the U.S. Air Force, Army, Marine Corps, or Navy upon graduation with a Bachelor's degree. ROTC/IIT combined scholarships in many cases allow winners to attend IIT free of charge. Contact the Office of Undergraduate Admission or any of IIT's ROTC departments for scholarship/program information.

Shimer College

Shimer College, a small liberal arts college devoted principally to studying the Great Books, is located on the IIT-Chicago campus. The study of classic texts, in discussion classes of 12 students or fewer, offers a uniquely rigorous and stimulating four-year liberal arts education.

IIT students in good standing may take courses at Shimer College. Many Shimer College courses may be used as electives in IIT degree programs. Admission to Shimer College classes is on a space-available basis and students may be asked to satisfy other requirements prior to acceptance into a Shimer College class. All students must be approved by both Shimer College and IIT to enroll in these classes. Please contact the Office of Undergraduate Academic Affairs (**ugaa@iit.edu**) for further information.

Shimer students who wish to take classes at IIT should contact the Office of Undergraduate Admission at **admission@iit.edu** (see page 7).

VanderCook College of Music

Full-time IIT students in good standing may take courses offered at VanderCook College of Music. The following VanderCook courses: HIST 203, HIST 204, HUM 301, and FT 301, may be used as humanities electives in all IIT degree programs. A maximum of three semester hours of performance courses may be used as free electives. Please contact the Office of Undergraduate Academic Affairs for further information.

Admission to VanderCook courses is on a space-available basis and students may be asked to audition or to satisfy other requirements prior to acceptance into a VanderCook course. Approval of the IIT Bursar's office also is required since there is a fee for taking a course at VanderCook.

Course Descriptions

Course Descriptions

Alpha-Numeric Indicators

Numbers in Parentheses

The required number of lecture hours, laboratory hours, and credit hours are indicated at the end of each course description. For example, (3-0-3).

Course Identifiers

- **(C)** Identifies courses that fulfill the communications general educational requirements
- **(D)** CAE design courses
- **(E)** Ethics Content
- **(H)** Identifies courses that fulfill the humanities general educational requirements
- **(N)** Identifies courses that fulfill the natural science or engineering general educational requirements
- **(P)** ECE, CPE professional elective
- **(S)** Identifies courses that fulfill the social sciences general educational requirements
- **(T)** CS technical elective

Art and Architectural History

AAH 119
History of World Architecture I
Comprehensive background as well as concentration on individual cultures and their architects from ancient to medieval times. Discussion of architectures from around the world. Specific details and expressions of more generalized theories and strategies will be explored.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

AAH 120
History of World Architecture II
Comprehensive background as well as concentration on individual cultures and their architects from the Renaissance to modern times. Discussion of architectures from around the world. Specific details and expressions of more generalized theories and strategies will be explored.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

AAH 322
19th Century American Art & Culture
This course explores the artistic history of the United States, from an agrarian society that developed into an industrialized nation with a distinguished national art. This broad chronological survey begins with the colonial art of Copley, Peale, West and Stuart, followed by the nation building iconography of the Hudson River School. The art of Mount and Bingham reflect antebellum culture, followed by Johnson in post-Civil War America on the eve of the Gilded Age. Finally, the course examines the realism of Homer and Eakins, defining a truly American iconography.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

AAH 323
20th Century American Art & Culture
This broadly chronological survey begins with Sargent and Cassett in the context of European traditions. Impressionism comes to America through the art of Chase and Hassam, and other members of "The Ten". Early Modernism follows with Henri, Glackens and Sloan, leading artists of "The Eight" and the Ashcan painters, including Bellows. The major regionalists include Benton, Wood, and O'Keefe with Hopper emerging as the most significant artist of the century. With New York as the new center of Western art in post-war America, Pollock defines abstract Expressionism, followed by Warhol and Pop-Art.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

AAH 380
Topics in Art & Architecture History
An investigation into a topic of current or enduring interest in Art and/or Architectural History which will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

AAH 491
Independent Reading & Research
For advanced students. Instructor permission required.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(Credit: Variable) **(C)(H)**

Architecture

ARCH 100
Introduction to Architecture
Orientation to contemporary local architecture practice in the context of the history of architectural theory; examination of the changing role of the architect through history; introduction to the formal language and vocabulary of the discipline. Emphasis given to developing written and presentations skills. Open only to Architecture majors.
(2-3-3) **(C)**

ARCH 107
Design Communications I: Units & Order
A comparative study of physical and digital media from the immediacy of the hand to the logical rigor of algorithmic design. Organizational systems and mapping strategies are explored as craft is developed across a broad toolkit. Instruction in object-oriented thinking begins an introduction to computer science. Open only to Architecture majors.
(2-2-3)

ARCH 108
Design Communications II: Systems & Assemblages
The full design communication process, from contextual + programmatic analysis to the digital fabrication of a system of parts, will be introduced through a series of related studies. Computationally associative design methodologies will be utilized and continue the computer science introduction. Open only to Architecture majors.
Prerequisite(s): [(ARCH 107)]
(2-2-3)

ARCH 113
Architecture Studio I: Elements
Introduction of architecture through the design of architectonic elements – walls, doors, stairs, rooms, etc. Students explore the relationship between the human body and the built environment and learn fundamentals of composition, design process, representation, research, craftsmanship, graphic and verbal communication, and analytical thinking. Open only to Architecture majors.
Prerequisite(s): [(ARCH 107*)] An asterisk (*) designates a course which may be taken concurrently.
(0-12-6) **(C)**

ARCH 114
Architecture Studio II: Unit
As an extension of the themes of ARCH 113, students explore the synthesis of architectural elements in the design of an integrated architectonic unit comprised of architectural elements. Students are introduced to urban research and further develop their skills of analytical thinking, representation, and design communication. Open only to Architecture majors.
Prerequisite(s): [(ARCH 107, ARCH 108*, and ARCH 113)] An asterisk (*) designates a course which may be taken concurrently.
(0-12-6) **(C)**

ARCH 201
Architecture Studio III: House
Continued development of architectural principles of ARCH 114 through the design of a house in the city and the study of dwelling precedents. Students are introduced to the concepts of programming, urban design, and the technical aspects of construction assemblies and further develop their understanding of design process and their skills in design communication and critical thinking. Open only to Architecture majors.
Prerequisite(s): [(ARCH 113 and ARCH 114)]
(0-12-6)

ARCH 202
Architecture Studio IV: Multiple
Continued development of architectural principles of ARCH 201 through research and design of multi-unit housing in the city. Students further their understanding of programming, urban design and the technical aspects of construction assemblies. The study of architectural scale, composition and urban relationships are explored. Development of design process and skills of design communication and critical thinking are furthered. Open only to Architecture majors.
Prerequisite(s): [(ARCH 113, ARCH 114, and ARCH 201)]
(0-12-6)

ARCH 207
Design Communications III: Analysis & Exposure
Introduction to geospatial mapping, data modeling, and data visualization processes for research, analytics, and generative design. Basic data structures, algorithms, and design patterns advance students ability to construct digital tools and communicate complexity. Open only to Architecture majors.
Prerequisite(s): [(ARCH 107 and ARCH 108)]
(2-3-3)

ARCH 208
Design Communications IV: Interaction & Immersion
Introduction to immersive, mixed media, and mixed reality experience design and physical interactivity for hybrid media practices for the built environment. Open only to Architecture majors.
Prerequisite(s): [(ARCH 107, ARCH 108, and ARCH 207)]
(2-3-3)

ARCH 230
Systems: Structural Analysis
The theory and concepts of structures are presented with a visual format and models to emphasize an intuitive comprehension of the fundamental principles of structural behavior including loading, shear and bending moments. Architectural examples of integrated structures then become format to introduce an understanding of materials and the design process to quantify the engineering. Masonry load-bearing walls and the arch are used as the initial examples to correlate intuition and engineering calculations.
Prerequisite(s): [(PHYS 123) OR (PHYS 200) OR (PHYS 211 and PHYS 212)]
(3-0-3) **(N)**

ARCH 305
Architecture Studio V: Hybrid
Continued development of architectural principles of ARCH 202 through research and design of a project of hybrid program in the city. Students further their understanding of programming, urban design and the technical aspects of construction assemblies. The study of architectural and urban space, site and context, building composition and urban relationships are explored. Development of design process and skills of design communication and critical thinking are furthered. Open only to Architecture majors.
Prerequisite(s): [(ARCH 201, ARCH 202, and ARCH 230)]
(0-12-6)

ARCH 306
Architecture Studio VI: Neighborhood
Continued development of architectural principles of ARCH 305 through the design of an urban neighborhood project. Students are introduced to urban design and larger scale planning issues and conduct broad-based research into issues impacting larger mixed-use buildings in the city. Open only to Architecture majors.
Prerequisite(s): [(ARCH 201, ARCH 202, ARCH 230, ARCH 305, and ARCH 334)]
(0-12-6)

ARCH 321
Contemporary Architecture
This course investigates the state of contemporary architecture as represented by significant practices, buildings, theories, and criticisms. Themes to be considered include globalization, the role of digital design media, the ethics and aesthetics of sustainability, contemporary urbanism, new approaches to materials and structure, and recent interests in ornament and pattern-making. Current conditions will be related historically to postwar reactions to modernism and contextually to the social and technological shifts of recent decades.
Prerequisite(s): [(AAH 119 and AAH 120)]
(3-0-3) **(C)**

ARCH 331
Visual Training I
Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.
(3-0-3)

ARCH 332
Visual Training II
Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.
Prerequisite(s): [(ARCH 331)]
(3-0-3)

ARCH 333
Visual Training III
Spatial studies with planes and volumes of various materials. Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.
Prerequisite(s): [(ARCH 331 and ARCH 332)]
(3-0-3)

ARCH 334
Material: Metal
Based on a statics and strength of materials, analysis of tension, compression and bending, timber and steel members are designed into truss or column and beam structural systems. Connections and sheer walls are studied as the transfer of moments to resolve dynamic loads in multiple frames. This engineering knowledge is then directly integrated into the parallel studio experience of developing an architectural project that focuses on steel as the structural material.
Prerequisite(s): [(ARCH 230 and PHYS 200)]
(3-0-3) **(N)**

ARCH 335
Material: Cementitious
The plastic qualities of reinforced concrete are studied as an internal distribution of forces based on the continuity of the material. These same principles also apply to all dome, cable and membrane structures. Complete structural systems of concrete are developed with footings, columns, shear walls, and horizontal plate options. More advanced applications include tension systems and thin shell construction. These engineering experiences are then integrated into the practice of designing an architectural studio project based on reinforced concrete as the structural material.
Prerequisite(s): [(ARCH 230, ARCH 334, and PHYS 200)]
(3-0-3) **(N)**

ARCH 403
Mechanical & Electrical Building Systems for Architects I
Selection and design of building support systems: heating, ventilating, air conditioning, water supply, sanitary and storm drainage, power distribution, lighting, communications and vertical transportation. Systems are analyzed for their effect on building form, construction cost and operating efficiency. Open only to Architecture majors.
Prerequisite(s): [(ARCH 201 and ARCH 202)]
(3-0-3)

ARCH 404
Mechanical & Electrical Building Systems for Architects II
Selection and design of building support systems: heating, ventilating, air conditioning, water supply, sanitary and storm drainage, power distribution, lighting, communications, and vertical transportation. Systems are analyzed for their effect on building form, construction cost and operating efficiency. Open only to Architecture majors.
Prerequisite(s): [(ARCH 403)]
(3-0-3)

ARCH 413
Architectural Practice
Lectures and practical problems dealing with specifications, specification writing, administration of construction, contracts, building law and professional practice.
(3-0-3) **(C)**

ARCH 414
Professional Practice: Building Case Studies
Case study analysis of buildings, including the design process, building detailing, construction methods, government regulation, owner satisfaction, and post-construction forensics.
(3-0-3) **(C)**

ARCH 417
Architecture Studio VII: Institution
This course introduces students to technical aspects of building design through a Comprehensive Building Design project focusing on an institutional building in the city. Building on previous design studios, students continue their investigation into urban and cultural research, and are introduced to building systems and concepts of building performance, sustainability and building envelope design. The integration of mechanical, electrical, plumbing systems, structural systems, constructional assemblies, and technology systems is addressed in lectures and studio work, and students are introduced to advanced tools related to building performance and evaluation software. Open only to Architecture majors.
Prerequisite(s): [(ARCH 230, ARCH 306, ARCH 334, ARCH 335, ARCH 403, and ARCH 404)]
(0-12-6)

ARCH 418
Architecture Studio VIII: Institution
This course continues and furthers the student's understanding of the technical aspects of building design through a Comprehensive Building Design project focusing on an institutional building in the city with a complex program. Building on previous design studios, students continue their investigation into urban, programmatic and cultural research, and further their knowledge of building systems and concepts of building performance, sustainability and building envelope design. The integration of mechanical, electrical, plumbing systems, structural systems, constructional assemblies, and technology systems is addressed in lectures and studio work, and students further their understanding of advanced tools related to building performance and evaluation software. Open only to Architecture majors.
Prerequisite(s): [(ARCH 230, ARCH 334, ARCH 335, ARCH 403, ARCH 404, and ARCH 417)]
(0-12-6)

ARCH 419
Architecture Studio IX: Metropolis
Research-based design "cloud" studio. Continued development of architectural principles of ARCH 418 (and previous studios). Development of design processes utilizing varied representational and analytical media and methodologies. Research-based design projects focus on the variety of contemporary and future modes of architecture and architectural practice in urban environments. Horizontal studio integrating advanced bachelors, masters, and doctoral students. Open only to Architecture majors.
Prerequisite(s): [(ARCH 230, ARCH 334, ARCH 335, ARCH 403, ARCH 404, ARCH 417, and ARCH 418)]
(0-12-6)

ARCH 420
Architecture Studio X: Metropolis
Research-based design "cloud" studio. Continued development of architectural principles of ARCH 419. Development of design processes utilizing varied representational and analytical media and methodologies. Research-based design projects focus on the variety of contemporary and future modes of architecture and architectural practice in urban environments. Horizontal studio integrating advanced bachelors, masters, and doctoral students. Open only to Architecture majors.
Prerequisite(s): [(ARCH 230, ARCH 334, ARCH 335, ARCH 403, ARCH 404, ARCH 417, and ARCH 418)]
(0-12-6)

ARCH 421
Energy Conscious Design I
The application of energy conservation methods and renewable energy sources, such as wind power and passive solar systems, will be examined in the development of building energy budgets for a variety of building types.
(3-0-3)

ARCH 422
Energy Conscious Design II
The application of energy conservation methods and renewable energy sources, such as wind power and passive solar systems, will be examined in the development of building energy budgets for a variety of building types.
Prerequisite(s): [(ARCH 421)]
(3-0-3)

ARCH 423
Architectural Programming
Study of the principles of problem definition, problem solving, and decision making in the process of design. Specific research methods are reviewed, including those with computer-aided data collection potential. Coursework includes: identification of client/project requirements and constraints; development of a building/project program; cost analysis; development of relevant design options; and presentation skills and development.
(3-0-3) **(C)**

ARCH 424
Architectural Construction Management
A survey of the techniques and procedures of construction management as it relates to architectural practice. The organization of the building team, the collaborative design process, cost control, project scheduling, purchasing, accounting, and field supervision are described and documented.
(3-0-3)

ARCH 429
Digital Form Generation
Introduction to the development of algorithmic design methods, a basis for computational thinking. Review programming in CAD systems, programming basics in AutoCAD, extensive creation of 2D and 3D architectural forms, wall patterns, CAD data interrogation, manipulation, and extraction. Introduction to 2D and 3D parametric and rule-based design. Investigation of form creation based on a variety of mathematical relationships including random generation and form generation based on collected data values including images. Also included is a review of CAD database procedures for space planning and bill of quantities. Includes methods for creating models for the purpose of fabrication including CNC and rapid prototyping.
Prerequisite(s): [(ARCH 125, ARCH 226, and ARCH 427) OR (ARCH 428)]
(2-2-3)

ARCH 431
Visual Training I
This elective comprises several topics. They include traditional media, e.g. sculpture, collage or free-hand drawing, digital prototyping, exhibition design, digital media production, architectural lighting, interior design, etc. The course provides students the opportunity to pursue individual paths in order to synthesize skills acquired in the previous visual training segments of the curriculum.
Prerequisite(s): [(ARCH 506 with minimum grade of C and ARCH 507 with min. grade of C)]
(1-2-3)

ARCH 432
Visual Training II
This elective comprises several topics. They include traditional media, e.g. sculpture, collage or free-hand drawing, digital prototyping, exhibition design, digital media production, architectural lighting, interior design, etc. The course provides students the opportunity to pursue individual paths in order to synthesize skills acquired in the previous visual training segments of the curriculum.
Prerequisite(s): [(ARCH 506 with minimum grade of C and ARCH 507 with min. grade of C)]
(1-2-3)

ARCH 433
Introduction to Digital Fabrication
This course offers a comprehensive exploration of computer-aided fabrication from concept development and modeling through digital file creation and cutting processes. Using CAD/CAM software, laser cutters, CNC mills, and 3D printers, students with a variety of interests can build the elements of detailed models, fabricate a range of finished objects, or even create landscapes incorporating highly articulated surfaces. The course stresses the integration of the complete thought process from concept development to pre-visualization to detailed modeling to fabrication setup and finishing. Students gain a solid understanding of the rapidly developing world of CAD/CAM techniques while acquiring specific long-term skills in software-based modeling and machine-assisted fabrication.
Prerequisite(s): [(ARCH 208) OR (ARCH 508)]
(1-1-3)

ARCH 434
Advanced Building Information Modeling Strategies
This course is an in-depth exploration of how building information modeling tools are being utilized in the architectural profession with an emphasis on Autodesk Revit. Advanced BIM modeling tools and strategies will be investigated alongside explorations into interoperability between tools.
Prerequisite(s): [(ARCH 208) OR (ARCH 508)]
(0-3-3)

ARCH 435
Digital Fabrication
This course explores the design and fabrication of components in contemporary practice. The class will investigate through the design and prototyping of a custom component. Survey of CAD/CAM/GIS use in practice and component manufacturing including modeling, simulation, and scripting. Behavioral models of components using simulation and analysis tools (flow, system dynamics, etc.). Use of CAD tools to model components for production (modeling for CNC considering toolpaths and jigs). Use of CAD tools to analyze properties of components. Material properties and related fabrication constraints. Current fabrication processes. Use of IIT-owned CNC tools to fabricate components. Rapid prototyping.
Prerequisite(s): [(ARCH 208) OR (ARCH 467)]
(1-2-3)

ARCH 436
Advanced Modeling

This course will focus on 3D modeling of complex geometric components in architecture and design. Concepts explored will concentrate on the advancement of digital design as an iterative process. Various modeling types covered are (1) Explicit Modeling, (2) Nurbs Surface Modeling, (3) Parametric Modeling, and (4) Generative Components and Response Modeling. Output will utilize digital fabrication methods as support of the iterative design process.
Prerequisite(s): [(ARCH 208) OR (ARCH 508)]
(0-3-3)

ARCH 438
Design Visualization

This course is an in-depth exploration of new visualization techniques to support and express architectural design through 3D rendering. Topics covered will include 3D modeling, cameras, lighting, material mapping, and rendering output. Presentation concepts covered include storytelling, rendering style, visual mood, and image composition.
Prerequisite(s): [(ARCH 208) OR (ARCH 508)]
(1-3-3)

ARCH 445
Prairie School & Naturalistic Landscape Design

This significant Midwestern style of landscape and architectural design provided the beginnings of ecology and continues to influence landscape design today. The course specifically addresses the work of designers such as Jens Jensen, O.C. Simonds, and Frank Lloyd Wright, and features IIT's Alfred Caldwell. Students receive an introduction to the types of plants used by these designers and the connections between landscape and architecture will be explored.
(3-0-3)

ARCH 446
History of Landscape Architecture

Survey of the history of landscape design throughout the world, including contemporary projects. The course emphasizes both analytical and holistic approaches to the study of historic designs, highlights the relationship between architecture and landscape, and stresses major concepts that directly influence present day designs. One field trip.
(3-0-3)

ARCH 447
Architecture & Furniture

Individually or in small groups, students will design and fabricate furniture as part of a collectively developed master plan. Students explore historic and contemporary furniture design, theory, materials, and fabrication techniques. Lectures and discussions will focus on the relationship between architecture and furniture in its 500-year history, the design process, fabrication technologies and techniques, drawing and modeling as a means of exploration, representation, presentation, and fabrication. Labs will allow students the opportunity to experience in a semester the traditional sequence of master plan, schematic design, design development, construction drawings, fabrication, and use.
(1-2-3)

ARCH 454
Contemporary Chicago Architecture: Case Studies

Contemporary architecture and urban design projects in Chicago present an invaluable opportunity to learn about some of the most advanced applications in practice today. By examining significant projects currently underway, this course will investigate project execution, design concepts and the various forces affecting projects' definition and results. Close scrutiny of all the components and personnel will give a better understanding of the complex synergies, advanced technologies, and adept project teams necessary for successful innovative architecture and urban planning.
(3-0-3)

ARCH 456
Topics in Modernism

Historical and critical study of a significant topic in architecture and urban design tied to important building types, architects, architectural movements, historical periods, or theoretical trends of lasting significance in the twentieth century. Conducted as a seminar, this course analyzes texts, writings, and buildings as students prepare research papers, presentations, and other projects. Recent courses have examined modernism in post-World War II Europe and the United States and the history of the skyscraper from the Chicago school to the present.
(3-0-3) **(C)**

ARCH 457
Architecture & Culture: Challenging the Global Vernacular

This course investigates the link between architecture and the cultural, climatic, political, and socio-economic environment in which it is created. Taking a different cultural case study each week, it looks at the framework in which architecture is created and examines threads between traditional vernacular and modern forms of architecture. The course will embrace external influencing factors (global) as well as internal (local). As the building typology that has had perhaps the most influence on homogenizing global culture, the course studies tall buildings in their urban fabric. Ultimately, the course is concerned with the debate on Regionalist versus Globalist approaches to architecture. Students will develop critical writing and reading skills, research techniques, and effective argumentation. Open only to Architecture majors.
(3-0-3)

ARCH 460
Integrated Building Delivery Practice/BIM

Architecture has always been a complex interdisciplinary business, where the management of allied professions and industry affiliates is critical to the success of any endeavor of significant scale. The introduction of BIM (Building Information Modeling) is an advance in project delivery tools which should be viewed as a multi-dimensional expansion of the mechanisms of management and accommodation of an ever-broadening range of participants in the organization of a project, allowing the development of a new delivery protocol, IBPD (Integrated Building Project Delivery). BIM is currently recognized as consolidating the basis for a range of functions including drawing, modeling, document management, clash detection, interdisciplinary coordination, estimating, scheduling, constructability review, production modularization, fabrication protocols, and for the analysis of myriad physical and proscriptive demands such as energy consumption, daylighting, code compliance, egress, circulation, and operation scenarios. The breadth of information embedded in a BIM model will require the emergence of facilitating professionals to an extent previously unknown in the practice and the industry. This course explores the state of the profession and the anticipated ramifications. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.
(3-0-3)

ARCH 461
Entrepreneurship & Innovation in Architecture
The course teaches future architects the practical aspects of entrepreneurial small business management, to develop a comprehensive opportunity assessment, and to develop the skills necessary to improve the odds of success. The course will consider strategies to leverage limited resources for maximum effect. The course will also cover small organization and group behavior, performance, leadership, and motivation in small business settings and will focus on the owner/manager as the principal success factor in the context of a small organization. Emphasis is placed on the circumstances and opportunities of the professional practice of architecture: practice as profession, process, organization, business, and evolving models of practice are covered. The course also provides a series of concepts, frameworks, and heuristics that enable the entrepreneur to anticipate and deal with the challenges that accompany growth of an existing business. Cases, exercises, lectures, and speakers are used to focus on choosing opportunities, allocating resources, motivating employees, and maintaining control while not stifling innovation. A key component of the course is how to sustain entrepreneurial thinking in mid-sized ventures as they continue to grow. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.
(3-0-3)

ARCH 462
Planning Law & Land Policy
Since the introduction of basic zoning laws to the numbers and complexity of ordinances attached to any land parcel have proliferated to include those addressing land use, development, density, environmental concerns both on and off site, aesthetic mandates, energy use, quality of life concerns, and infrastructure development, the growing understanding that comprehensive and integrated systems must be managed across property lines to effect sustainable planning and communities will accelerate the number of prescriptive and policy ordinances enforced at the development of a parcel. Many agencies have further created extra-legal linkages between approvals for land development and the provision of social and ideological benefits to the community. The impact on the profession of architecture of the panoply of planning options and governmental goals is the result that the navigation of the system of mandated design determinates is one of the initial and potentially most creative acts in the process of project delivery. Project designers must understand the ramifications and trade-offs inherent in the system, especially in any attempt to achieve the best use of any parcel of land and position the most appropriate built environment. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.
(3-0-3)

ARCH 463
Introduction to Real Estate Finance Fundamentals
The Art of the Deal, with the emphasis on Art, is a term best positioning the financial structuring behind any project. The ability of the project team leader in integrated practice to understand and appreciate the motivations and opportunities inherent in the initiation of the project will be essential in guiding team decisions and maintaining a leadership position. The understanding of the financial underpinnings of a project is of paramount importance to those intending to actually engage the process of initiating and effecting a construction activity. The sources, costs, and sequence of funding, budgeting, cash flow, incentives options, and tax ramifications regarding a project are to be addressed as component knowledge to an understanding of integrated project management. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.
(3-0-3)

ARCH 464
Comprehensive Opportunity Assessment & Entrepreneurship Development Project/Practicum
Two options are available to the student for the acquisition and assimilation of the breadth of knowledge required to bring project ideas to fruition. The Comprehensive Development Project is a capstone effort which will demonstrate project concept, planning resolution, land acquisition strategies, estimating, scheduling, financial pro-forma, and value capture intents. The Practicum would entail employment at a vetted office engaged in the actual process of project assembly. A position requiring a minimum of 20 hours per week, prior review and approval of the work plan, and submittal of documentation of the work undertaken would be required for this scenario. The ultimate objective is to provide a roadmap of the interaction between the architect-entrepreneur, market opportunities, and integrated building delivery practices which facilitate the development of student skills necessary to compete in a rapidly changing socio-economic environment. This course is designed to help students learn and use tools and frameworks to create, implement, and update a strategic plan to shape the future and guide an entrepreneurial organization on its path to success. This course will entail collaboration with real world organizations including city agencies, community development corporations, IIT Department of Community Affairs, or private developers. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.
(6-0-6)

ARCH 465
Construction & Project Management
The organization of deliverables from the multiple participants in a project plan, including estimating, quality control, value engineering, scheduling of work, conflict resolution, pay schedules, and project close-out and commissioning are essential to managing a building project. Many of these areas of endeavor are those most directly impacted by the developments addressed in Integrated Building Delivery Practice. This course will solidify the underpinnings and will amplify, where needed, the requisite understanding in these areas of the practice. The development of managerial skills requisite to the practice of this coordination and the basis of developing inter-professional relationships will be stressed throughout the incorporation of the technical methodologies.
(3-0-3)

ARCH 466
Entrepreneurial Design: Sector Studies/Case Studies
This course will be advanced as an independent study format. Each student will work independently to research a project option, or building type, and document the particular attributes of that case study which require specialized address. Case studies might be a particular business niche such as land sub-divisions, condo conversions, change of use conversions, or build-to-suit options. The studies might pursue particular building types, social initiatives, historic restoration strategies, or even unique construction typologies. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.
(3-0-3)

ARCH 467
Advanced Materials Workshop
This course is designed to involve students with the architectural craft of materials that can be applied to model and prototype construction. Included will be a product project of the student's own choosing.
(1-4-3)

ARCH 468
Drawing From Travel
A drawing course that develops the perceptual and technical skills critical to drawing in the field. Particular emphasis will be placed on the freehand travel sketch and its capacity to evoke both the physicality and character of a place. Production of a comprehensive drawn record of travels in the form of a journal/sketchbook is required. Various media will be explored. Requisite: European Study Program or Paris Program
(0-6-3)

ARCH 469
Urban Design in Europe
This seminar course will explore current notions of urbanity as observed in the built environment of some cities in Europe. Projects and discussions will complement the design work undertaken in the architecture design studio. Assignments will focus on documentation and analysis of the various daily patterns and rituals of habitation. Requisite: European Study Program or Paris Program
(3-0-3)

ARCH 470
Image City: Mediation of Space
This seminar surveys the interaction between media and the city from the 19th century to the present. A history of the technological innovations of the last two hundred years turns out to be, in large part, a history of the development of the contemporary city, and no account of contemporary urban issues can be considered complete without taking into account the role played in our lives by the media. Accordingly, every space we encounter or create has to be considered mediated.
(3-0-3)

ARCH 471
Architectural Freehand Rendering
Utilizing site visits, lectures, presentations, and critiques, students will learn freehand sketching, perspective, and conceptual sketching to convey building spatial ideas. Conceptual and schematic analysis of site visits will teach students to represent existing spaces, environments, and buildings as well as various building materials. Students will rely on four media to quicken their drawing skills and visual analysis – pencil, ink, pastel, and water color. Open only to Architecture majors.
Prerequisite(s): [(ARCH 109)] AND [(ARCH 110)]
(3-0-3)

ARCH 473
Conflict & Time
This seminar employs comparative studies of other arts, in particular cinema, to illuminate architectural esthetics and the creative process. It has a dual focus: it undertakes an introduction to film studies, through the analysis of films and readings in film theory and aesthetics; at the same time, it will consider architectural concepts and artifacts. The aim is not primarily to study cinema, nor to make a definitive conclusion about the congruence or divergence of architecture and cinema. The course intends to cultivate a way of seeing; you will learn to open your eyes to the relations between media, technology, geography, architecture, ideology, etc.
(3-0-3)

ARCH 474
Production/Design
This seminar examines aspects of design in motion pictures. The premise underlying the course is that the act of perception constitutes an act of design; we produce and design the world we perceive. This becomes particularly evident through analysis of the artificially constructed, illusory reality of films.
(3-0-3)

ARCH 475
Spatial Stories
This course will examine the spatial story as it appears in diverse media: short fiction, films, everyday discourse, the media architecture, etc. The course work will consist of reading and writing assignments, as well as the viewing of films and other visual artifacts. The course has two goals: to offer students the opportunity to improve their study and communication skills and to examine the social, cultural and historical aspects of spatial practices such as architecture.
(3-0-3) **(C)**

ARCH 476
Developed Surface
This course looks at models as operational and instrumental tools that assist an architect to control both the material and the meaningful. Acting as an advanced seminar and workshop, course sessions will juxtapose speculative model making with seminar discussion. Student work will be reviewed in direct relation to readings and short lectures on historical and theoretical precedents in art, architecture, and urban design. Field research will support speculative mapping and modeling systems. A project to support the studio will reconcile a conceptual interest with a technical one. (Paris Program)
(3-0-3)

ARCH 477
Building as Model
This course examines moments of paradigmatic change from the late 19th to the early 20th century in European architecture, urban planning, and urban design. Beginning with Violet-le-Duc and ending with the first iterations of OMA, the course prioritizes "building" as an act rather than as an object. The class examines moments when technical and social change reshaped dependent, but sometimes academically opposed, realms of design practice. The first realm considers architecture's relationship with power within the socio-political context. The second aspect considers architecture as a discipline of control as students examine how ideas of architectural practice were strongly connected to the story of industrial production. (Paris Program)
(3-0-3)

ARCH 478
Digital Photography
Equips students with a suite of photographic skills and strategies tailored to their work as architects. Cultivates a discursive practice by developing foundational technical competencies, building awareness of key precedents, and honing a critical perspective for reading photographic images. Topics covered include camera operation, composing, staging, lighting, post-processing, printing, editing, curating, and publishing. Field and studio assignments, case study research work, and conversations with practicing photographers.
(3-0-3)

ARCH 480
Materials & Construction
This course provides an overview of basic building materials and assemblies, how they are constructed, and the relationships between them. The objective is to introduce students to the range of material choices available to the designer, new materials and assemblies, and fundamental principles to guide design decisions. The course is organized according to the MasterFormat outline developed by the Construction Specifications Institute. Students will learn standards for writing specifications using a system of numbered categories to organize construction activities, products, and requirements into a standard order. Topics include pre-design issues, sites and foundations, concrete, masonry, metals, wood, plastics, thermal and moisture protection, glass, roofing systems, and conveying equipment. Open only to Architecture majors.
(3-0-3)

ARCH 481
Materiality in Architecture
This course examines the topic of material culture in contemporary architecture, and explores the different approaches, ideas and philosophies associated with aspects of materiality in architecture through the investigation and discussion of case study projects by contemporary architects. Students are introduced to a variety of approaches to the topic since the dawn of the Modern Movement, and explore how different contemporary architects approach the idea of materiality in their work, through their words, thoughts and built work. Thematic topics related to materiality are also presented and discussed, including materiality and landscape, materiality and technology, and materiality and memory. The class format is a lecture presentation by the professor with student discussion. The course is an elective section of the History/Theory sequence. Open only to Architecture majors. Only for 5th year Architecture majors.
(3-0-3)

ARCH 482
Material: Fibrous
A laboratory and classroom based class investigation of anisotropic fibrous materials as a building component viewed through historical timber design precedents. Topics include low and high-rise framed construction, Cross-laminated timber, CNC fabrication methods composite construction, tensile systems, wood and paper based products. Structural analysis will explore material properties and connections of a directionally grained and medium.
Prerequisite(s): [(ARCH 230, ARCH 334, and ARCH 335) OR (ARCH 485 and ARCH 486)]
(1-2-3)

ARCH 483
Material: Transparent
An exploration of historical and current technology through the work of artists, architects, craftsmen, and engineers in a brittle medium. Topics include wall systems, connections, structural design of all glass structures, and material properties. Sealants, coatings, adhesives, and impact and blast resistant interlayers will also be covered. A lab component will encourage experimentation of columns, beams, and surfaces from glass components.
Prerequisite(s): [(ARCH 230, ARCH 334, and ARCH 335) OR (ARCH 485 and ARCH 486)]
(1-2-3)

ARCH 485
Structures I: Concepts
Examination of the basic and vast range of structural concepts and solutions, in an illustrated and summary format. Examples include historic as well as contemporary structures. Statics and strength of materials, beam theory, shear and bending moment diagrams, deflection analysis. Overview of systems choices in architectural applications. History of strength of materials.
(3-0-3)

ARCH 486
Structures II: Design of Wood & Steel
Analysis, design and detailing of tectonic systems (steel and wood). Design of compression, tension and flexural members. Design of timber beams and columns. Design of steel beams and columns. The behavior of structures under static and dynamic loads. Analysis, design and detailing of concrete and masonry systems. Theory of reinforced concrete applied to beams and slabs.
Prerequisite(s): [(ARCH 485)]
(3-0-3)

ARCH 487
Eco Structures
Research seminar giving focus to new technologies, especially complex structures: biotechnic, pneumatic, ultra-tall, composite structures, etc. Students conduct research using literature, data sources, and ideas to prepare imaginative small project interdisciplinary approach to solving problems in the built environment.
(3-0-3)

ARCH 488
Long-Span & Special Structures
Introduction of structural systems for long spans and special structures. The structural behavior will be discussed and the required strength and stiffness will be evaluated. Individual projects will be assigned to students to be presented at the end of the course.
(3-0-3)

ARCH 489
Structural Systems for Tall Buildings & Long-Span Structures
This course reviews the historical development of the interaction of the structure with architecture and explores future trends and directions. The suitability of different materials and systems will be studied, with emphasis placed on efficiency.
(3-0-3)

ARCH 491
Special Problems
Independent study of projects and problems. Students must be advised and have consent of the instructor and approval of the dean.
(Credit: Variable)

ARCH 495
Technology as Design
Since the development of cast iron as a viable construction material in the mid-1800s, one path of architecture has explored the open-ended possibilities of technology. Integrated within the culture, this determination to use the technology of one's time as the creative generator of a new evolving architecture becomes the historical precedent of the thesis of this course.
(3-0-3)

ARCH 497
Special Projects
Independent study of projects and problems. Students must be advised and have consent of the instructor and approval of the dean.
(Credit: Variable)

Additional Undergraduate and Graduate Courses

Graduate courses are available under limited conditions to degree-seeking undergraduate students with the approval of the course instructor. In general, and only when maximum enrollment has not been met, undergraduates must have completed relevant advanced-level undergraduate courses in the subject. Students should notify their academic advisor when they have completed a graduate course to ensure the course is recognized as an architecture elective. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

ARCH 500
History of Architectural Ideas I

ARCH 501
History of Architectural Ideas II

ARCH 502
Advanced Topics in History and Theory I

ARCH 503
Advanced Topics in History and Theory II

ARCH 509
Topics in Advanced Technology

ARCH 553
High-Rise Building Technology I

ARCH 554
High-Rise Building Technology II

AURB 201
The Elements of Urbanism

AURB 465
Principles of Urbanism

LA 414
Professional Practice

LA 443
Forests, Preserves, Parks, and Urbanscapes

LA 501
Nature of Ecology

LA 502
Landscape Architectural History: From Antiquity to Olmsted

LA 503
Advanced Contemporary Theory: Case Studies

LA 515
Firms, Parks, Developers

LA 516
Historic Landscape Preservation

LA 545
Studio V: Advanced Landscape Design Investigations

LA 546
Studio VI: Advanced Landscape Design Investigations

LA 565
Ecology and Materials Workshop I: Plants and Planting

LA 566
Ecology and Materials Workshop II: Earthworks and Infrastructures

LA 567
Ecology and Materials Workshop III: Horticulture and Design

LA 568
Ecology and Materials Workshop IV: Manufacturing the Urban Environment

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Air Force Aerospace Studies

AS 101
The Foundations of the USAF I
Introduction to the U.S. Air Force and Air Force ROTC. This course will focus on officership and professionalism, military customs and courtesies, health and physical fitness, and drill and ceremonies. Leadership Laboratory will continue to emphasize the application of customs and courtesies, health and physical fitness, and drill and ceremonies.
(1-2-1) **(C)**

AS 102
The Foundations of the USAF II
Introduction to history and organization of the U.S. Air Force. The origin of the Air Force will be described, and the current command structure will be reviewed. Leadership Laboratory continued.
(1-2-1) **(C)**

AS 201
The Evolution of USAF Air & Space Power I
Examines general aspects of air and space power through a historical perspective. Historical examples are provided to show the development of Air Force capabilities and missions from early flight through the Korean War. Leadership Laboratory continued.
(1-2-1) **(C)**

AS 202
The Evolution of USAF Air & Space Power II
Continuing study of topics covered in AS 201. Covers the period from the Vietnam War through today. Leadership Laboratory continued.
(1-2-1) **(C)**

AS 301
Air Force Leadership Studies I
Study of leadership authority, principles and accountability, management fundamentals, oral and written presentation and counseling skills required of an Air Force junior officer. Leadership Laboratory complements this course by providing leadership experience in officer-type activities.
(3-2-3) **(C)**

AS 302
Air Force Leadership Studies II
Study of professional knowledge, motivation, empowerment, mentoring, delegation, Air Force personnel and evaluation systems, leadership ethics, and oral and written presentation skills required of an Air Force junior officer. Continuation of Leadership Laboratory.
(3-2-3) **(C)**

AS 401
National Security Affairs
This course is designed for college seniors, it gives them the foundation to understand their role as military officers in American society. The course closely examines the national security process, regional studies, Air Force doctrine, and current issues affecting the military profession. Emphasis is also given on refining oral and written communication skills. Continuation of Leadership Laboratory.
(3-2-3) **(C)**

AS 402
Preparation for Active Duty
Designed for college seniors, it gives them the foundation to understand their role as military officers in American society. This course builds upon the subject matter previously covered in AS 401 and also further examines regional studies, advanced leadership, ethics, military justice, the military as a profession, and officership. Preparation for active duty life is one of the core elements of this course, and students will learn the role of an Air Force commander in addition to different services and programs available on a military installation. Emphasis is also given on refining oral and written communication skills. Continuation of Leadership Laboratory.
(3-2-3) **(C)**

Architecture and Urbanism

AURB 201
The Elements of Urbanism
The fundamental components, structures, systems, and networks of cities. Historical and contemporary examples of urban realms along with context of Chicago are examined to develop a working knowledge of the physical and systemic components of cities.
(3-0-3)

AURB 465
Principles of Urbanism
Advanced study of infrastructure, networks, and systemic character that define the urban realm including an examination of ecologic, economic, social, and compositional frameworks. Historical and current discourse of urban conditions and planning.
Prerequisite(s): [(AURB 201)]
(3-0-3)

Biology

BIOL 100
Introduction to the Profession
Introduction to the biological sciences, scientific method, computing tools, and critical thinking.
(2-0-2) **(C)**

BIOL 105
Introduction to Biology
This course, designed for non-majors, considers basic concepts and selected topics in biology beginning at the molecular level and ending with the biosphere. Topics include the following: the chemistry and structure of cells in plants and animals; how cells obtain and use energy; basic genetics and the role of biotechnology in agriculture and medicine; evolution, natural selection, and species formation; the origin and diversity of microbial, plant, and animal life; ecology, organisms, and their environments; and the impact of human population growth and human activity on the systems and resources of our planet.
This course is not available to those students for whom BIOL 107 is a required course, including students majoring in Biology, Biochemistry, Chemical and Biological Engineering, Molecular Biochemistry and Biophysics, or any pre-health professional major or minor. BIOL 105 and BIOL 114 constitute a one-year sequence in biology. Acceptable as part of the science component of the General Education Program. Course does not satisfy graduation requirements for Biology, Biochemistry, Chemical and Biological Engineering, Molecular Biochemistry and Biophysics majors.
(3-0-3) **(N)**

BIOL 107
General Biology Lectures
This course emphasizes biology at the organismal level. It provides an introduction to the study of the structure and function of plants and animals, their origin and evolution, their reproduction and genetics, and their diversity and ecological relations. BIOL 107 plus BIOL 115 constitutes a one-year sequence in biology. Acceptable as part of the science component of the General Education Program.
(3-0-3)

BIOL 109
General Biology Laboratory
A laboratory course to accompany BIOL 107. An introduction to laboratory techniques and their application to the understanding of general biological concepts.
Prerequisite(s): [(BIOL 105*) OR (BIOL 107*)] An asterisk (*) designates a course which may be taken concurrently.
(0-3-1) **(C)**

BIOL 114
Introduction to Human Biology
This course, designed for non-majors in biology, covers selected topics in biology of particular relevance to humans and to human health and disease. Topics include: Introductory biochemistry and cell structure, organization, and regulation of body systems; human genetics; human development; biotechnology; introduction to human pathogens and infectious diseases including sexually-transmitted diseases and immunologic diseases such as AIDS; human ecology; and human evolution. This course is not available to those students for whom BIOL 115 is a required course, including students majoring in Biology, Biochemistry, Molecular Biochemistry and Biophysics, Chemical Engineering, or Biomedical Engineering, and students in any pre-health profession major or minor. BIOL 107 and BIOL 114 constitutes a one-year sequence in biology. Acceptable as part of science component of the General Education Program. Course does not satisfy graduation requirements for Biochemistry, Biology, Biomedical Engineering, Chemical Engineering or Molecular Biochemistry and Biophysics majors.
(3-0-3)

BIOL 115
Human Biology
This course covers selected topics in biology of particular relevance to humans and to human health and disease. Topics include biology of human cells and selected organ systems; neurobiology including psychoactive drugs and drug addiction; development and birth defects; genetics and genetic diseases; toxicology; the immune system and immunologic diseases such as AIDS; human nutrition and nutritional effects; microbial human diseases. BIOL 107 plus BIOL 115 constitutes a one-year sequence in biology. Acceptable as part of science component of the General Education Program.
(3-0-3)

BIOL 117
Human Biology Laboratory
A biology laboratory course to accompany BIOL 114 or BIOL 115. A cellular approach to the functional organization of organs and organ systems. Laboratories will include the application of experimental methods and techniques for understanding the relationship between cell structure and function.
Prerequisite(s): [(BIOL 114*) OR (BIOL 115*)] An asterisk (*) designates a course which may be taken concurrently.
(0-3-1) **(C)**

BIOL 210
Microbiology
This course covers basics of microbiology including structure, genetics, growth, and metabolic diversity of microorganisms. Topics relating to the importance of microorganisms in health, ecosystems, industry, and water and food safety are also covered.
Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]
(3-0-3)

BIOL 214
Genetics
An introduction to transmission and molecular genetics designed for both biology and other science and engineering majors. Applications of genetics to solution of various practical problems will also be discussed.
Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]
(3-0-3)

BIOL 225
Microbiology Laboratory
Exercises focus on sterile technique, growth requirements of microorganisms, identification of microorganisms using biochemical activities, food, and water microbiology.
Prerequisite(s): [(BIOL 210*)] An asterisk (*) designates a course which may be taken concurrently.
(0-4-2) **(C)**

BIOL 305
Human Anatomy
This course will provide a comprehensive overview of the structural, functional, and developmental anatomy of the human body. Particular consideration will be given to the bony structures, vasculature, innervation, musculature, and relationships of the various structures to one another.
Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]
(3-0-3)

BIOL 327
Introduction to Immunology
Covers general principles of innate and adaptive immunity including structure and function of immune system components, T and B cell development, responses of the immune system to infection, and consequences of immune system failure.
Prerequisite(s): [(BIOL 214)]
(3-0-3)

BIOL 401
Introductory Biochemistry
The first part of a one-year Biochemistry series. This semester covers the basic principles of biological chemistry with particular focus on: proteins, nucleic acids, carbohydrates, and lipids; their molecular structure, chemical reactions, and practical methods in characterization; and enzymes and enzyme-catalyzed reactions.
Prerequisite(s): [(BIOL 107) OR (BIOL 115)] AND [(CHEM 237)]
(3-0-3)

BIOL 402
Metabolic Biochemistry
The second part of a one-year Biochemistry series. This semester deals with biochemistry of metabolism, focusing on: glycolysis, the citric acid cycle, gluconeogenesis, electron transport, and the synthesis and breakdown of biomolecules (amino acids, nucleic acids, lipids, and carbohydrates), blood chemistry, lipid transportation, and metabolic control.
Prerequisite(s): [(BIOL 401)] AND [(CHEM 239)]
(3-0-3)

BIOL 403
Biochemistry
Molecular organization of cell structures and cell membranes. Proteins, nucleic acids, carbohydrates and lipids, their molecular structure, characterization and chemical reactions. Enzymes and enzyme-catalyzed reactions and metabolism. Does not satisfy biochemistry requirement for Biology, Biochemistry, or Molecular Biochemistry and Biophysics majors.
Prerequisite(s): [(BIOL 107) OR (BIOL 115) OR (CHE 311)] AND [(CHEM 237)]
(4-0-4)

BIOL 404
Biochemistry Laboratory
Analytical methods in the chemistry and metabolism of proteins, amino acids, and nucleic acids, including chromatography, spectrophotometry, and electrophoresis. Enzyme reactions.
Prerequisite(s): [(BIOL 401*) OR (BIOL 402*) OR (BIOL 403*)] An asterisk (*) designates a course which may be taken concurrently.
(0-6-3) **(C)**

BIOL 410
Medical Microbiology
Properties of pathogenic bacteria, fungi, viruses, and parasites and their mechanisms of pathogenesis with a focus on organisms that cause human disease.
Prerequisite(s): [(BIOL 210)]
(3-0-3)

BIOL 414
Genetics for Engineering Scientists
A course in genetics designed for advanced students in engineering and related disciplines. The course will cover transmission and molecular genetics and their application to the solution of various practical problems. A term paper will be required in addition to in-class examinations.
(3-0-3) **(C)**

BIOL 426
Concepts of Cancer Biology
The course is designed to provide a complete overview of cancer as a disease. It will cover normal and abnormal cell signaling pathways, cancer genes and their regulation, experimental chemical carcinogenesis, metastasis, cancer prevention and therapy, drug development for cancer treatment, cancers of individual organ sites and application of biotechnology for cancer detection and treatment.
Prerequisite(s): [(BIOL 107, BIOL 115, BIOL 401*, BIOL 445*, and CHEM 237)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

BIOL 430
Animal Physiology
Respiration; circulation; energy metabolism; temperature regulation; water and osmotic regulation; digestion and excretion; muscle and movement; nerve excitation; information control and integration; and chemical messengers. Emphasis on general principles with examples drawn from various animal phyla.
Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]
(3-0-3)

BIOL 431
Animal Physiology Laboratory
This course provides an introduction to some of the basic concepts of physiology through experimental procedures involving laboratory animals and humans. Experiments include EKG, producing and measuring nerve action potential, muscle contraction generation and its mechanism, human blood pressure measurement, human lung capacity measurement, and some other human noninvasive experiments.
Prerequisite(s): [(BIOL 430)]
(0-6-3)

BIOL 445
Cell Biology
Modern studies of cell structure and function at the cellular, subcellular, and molecular levels. Topics include molecular components of cells, membranes, membrane-bound organelles, microtubular and cytoskeletal components and principles of bioenergetics.
Prerequisite(s): [(BIOL 107 and CHEM 237) OR (BIOL 115 and CHEM 237)]
(3-0-3)

BIOL 446
Cell Biology Laboratory
A laboratory course in cell biology to accompany BIOL 445.
Prerequisite(s): [(BIOL 445*)] An asterisk (*) designates a course which may be taken concurrently.
(0-6-3) **(C)**

BIOL 451
Biological Literature
Library research on advanced topics in biology followed by oral presentations of this research. Requires senior standing.
Prerequisite(s): [(BIOL 400-499)]
(2-0-2) **(C)**

BIOL 490
Individual Study
Individual study. Consent of instructor required.
(Credit: Variable) **(C)**

BIOL 491
Biology Research Project
An opportunity for advanced undergraduates to participate in research. A written report covering the procedures, data, and conclusion of the problem is required.
(Credit: Variable) **(C)**

BIOL 495
Biology Colloquium
Lectures by prominent scientists. This course exposes students to current and active research in biology both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to our academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.
(1-0-1) **(C)**

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

BIOL 503
Virology

BIOL 512
Advanced Biochemistry

BIOL 514
Toxicology

BIOL 515
Molecular Biology

BIOL 526
Developmental Biology

BIOL 527
Immunology and Immunochemistry

BIOL 542
Advanced Microbiology

BIOL 550
Bioinformatics

BIOL 555
Macromolecular Structure

BIOL 562
Current Topics in Functional Genomics

Biomedical Engineering

BME 100
Introduction to the Profession
Introduces the student to the scope of the biomedical engineering profession and its role in society, and develops a sense of professionalism in the student. Provides an overview of biomedical engineering through lectures, presentations by outside speakers, hands-on exercises, and scientific literature analyses. Develops professional communication and teamwork skills. Open only to Biomedical Engineering majors.
(2-0-2) **(C)**

BME 200
Biomedical Engineering Application of MATLAB
This course will provide students an opportunity to learn how to use the MATLAB programming environment to solve biomedical engineering problems. Students will learn basic MATLAB functions for importing, analyzing, visualizing, and exporting data, as well as computational techniques for modeling and solving quantitative engineering problems. Examples will be taken from the three areas of specialization offered in the biomedical engineering department – cell and tissue engineering, neural engineering, and medical imaging. Open only to Biomedical Engineering majors.
Prerequisite(s): [(CS 115 and MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.
(1-3-2)

BME 301
Bio-Fluid Mechanics
Basic properties of fluids in motion. Lagrangian and Eulerian viewpoints, material derivative, streamlines. Continuity, energy, angular and linear momentum equations in integral and differential forms. Applications in biofluids and biomedical devices; rheology of biological fluids. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BIOL 115, MATH 251, and MMAE 200)]
(3-0-3)

BME 309
Biomedical Imaging & Sensing
An introduction to concepts of imaging and sensing that underlie a wide range of biomedical imaging modalities. Topics covered include cell imaging, multiphoton microscopy for biomedical studies, molecular imaging, infrared imaging, biomedical magnetic imaging, X-ray imaging, nuclear medicine, magnetic resonance imaging, and ultrasound imaging. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 330* and PHYS 221)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

BME 310
Biomaterials
Applications of biomaterials in different tissue and organ systems. Relationship between physical and chemical structure of materials and biological system response. Choosing, fabricating, and modifying materials for specific biomedical applications.
Prerequisite(s): [(BME 100 and CHEM 125)]
(3-0-3) **(C)**

BME 315
Instrumentation & Measurement Laboratory
Laboratory exercises stress instrumentation usage and data analysis used to determine physiological functions and variables and the relations to the physiological variability. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 200 and BME 330*)] An asterisk (*) designates a course which may be taken concurrently.
(1-3-2) **(C)**

BME 320
Fluids Laboratory
Laboratory experiments in thermodynamics, biological fluid flow, and heat transfer. Emphasis is placed on current methods, instrumentation, and equipment used in biomedical engineering; oral presentation of results; and on the writing of comprehensive reports. Open only to Biomedical Engineering majors. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BIOL 115 and BME 315)]
(0-3-1) **(C)**

BME 330
Analysis of Biosignals & Systems
This course is a junior level introduction to the theoretical and practical aspects of signal processing and dynamic systems behavior as they relate to physiological, biological, and biomedical systems. The topics covered will include sampling theory, continuous and discrete Fourier transforms and series, Laplace transforms, Linear systems theory, signal filtering, models of biological and physiological systems, and analysis of dynamic and feedback systems. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 200)] AND [(ECE 211) OR (ECE 215)] AND [(MATH 252)]
(3-0-3)

BME 331
Modeling & Control of Biological Systems
The course expands upon the systems and signal processing concepts introduced in BME 330 to develop the tools to model physiological processes and the feedback control of these processes.
Prerequisite(s): [(BME 330) OR (ECE 308)]
(3-0-3)

BME 335
Thermodynamics of Living Systems
Principles of thermodynamics and conservation of mass applied to living systems and biomedical devices. The first and second laws of thermodynamics, pHs and chemical equilibrium, metabolic stoichiometry and energetics.
Prerequisite(s): [(BME 320*, CHE 202, and MATH 251)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

BME 405
Physiology Laboratory
A laboratory course which demonstrates basic concepts of bioengineering design through experimental procedures involving humans and experimental animals. Statistical principles of experimental design. Study of possible errors. Experiments include nerve action, electrocardiography, mechanics of muscle, membranes, and noninvasive diagnostics in humans. Open only to Biomedical Engineering majors. Open only to Biomedical Engineering majors.
Corequisite(s): (BME 453)
Prerequisite(s): [(BME 315)]
(1-3-2) **(C)**

BME 418
Reaction Kinetics for BME
This course focuses on analysis of rate data and single and multiple reaction schemes. Biomedical topics include biological systems, enzymatic pathways, enzyme and receptor-ligand kinetics, pharmacokinetics, heterogeneous reactions, microbial cell growth and product formation, and the design and analysis of biological reactors.
Corequisite(s): (BME 482)
Prerequisite(s): [(BME 301, BME 335, and MATH 252)]
(3-0-3)

BME 419
Introduction to Design Concepts in Biomedical Engineering
Introduction to Design Concepts in Biomedical Engineering. This course aims to educate students on project definition, and on the design, development and technology transfer of potential biomedical products in the context of the student's major capstone project. Students will learn best practices for designing a marketable medical device, including the design process from the clinical problem definition through prototype and clinical testing to market readiness. Open only to Biomedical Engineering majors. Requires senior standing.
Prerequisite(s): [(BME 315, BME 320, and BME 330)]
(2-0-2) **(C)**

BME 420
Design Concepts in Biomedical Engineering
An introduction to the strategies and fundamental bioengineering design criteria behind the development of biomedical engineering systems and implantable devices that use either synthetic materials or hybrid (biological-synthetic)systems. Analysis and design of replacements for the heart, kidneys, and lungs. Specification and realization of structures for artificial organ systems. Students will be required to complete a team-oriented design project in their chosen track.
Prerequisite(s): [(BME 419)]
(3-0-3) **(C)**

BME 422
Mathematical Methods for Biomedical Engineers
This course integrates mathematical and computational tools that address directly the needs of biomedical engineers. The topics covered include the mathematics of diffusion, pharmacokinetic models, biological fluid mechanics, and biosignal representations and analysis. The use of MATLAB will be emphasized for numerically solving problems of practical relevance.
Prerequisite(s): [(BME 330 and MATH 252)]
(3-0-3)

BME 423
Cell Biomechanics: Principles & Biological Processes
This course will provide students an opportunity to learn about mechanical forces that develop in the human body and how they can influence cell functions in a range of biological processes from embryogenesis, wound healing, and regenerative medicine to pathological conditions such as cancer invasion. Examples of research methods for investigating cell biomechanics in various biological systems will be discussed.
Prerequisite(s): [(BME 301)]
(3-0-3)

BME 424
Quantitative Aspects of Cell & Tissue Engineering
This course is designed to cover fundamentals of cell and tissue engineering from a quantitative perspective. Topics addressed include elements of tissue development, cell growth and differentiation, cell adhesion, migration, molecular and cellular transport in tissues and polymeric hydrogels for tissue engineering and drug delivery applications.
Prerequisite(s): [(BME 418 and BME 482)]
(3-0-3)

BME 431
Modern Optics & Lasers
This is an undergraduate course covering the basics of optics and modern aspects of the field such as lasers and nonlinear optics. Connections to other fields such as acoustics, microwaves, electron-beam optics, quantum mechanics will be pointed out. The theory will be supplemented with demonstration experiments of optical phenomena. Practical problems will be discussed such as the design of an optical imaging system or precision interferometry.
Prerequisite(s): [(PHYS 221)]
(3-0-3)

BME 433
Biomedical Engineering Applications of Statistics
Application of modern computing methods to the statistical analysis of biomedical data. Sampling, estimation, analysis of variance, and the principles of experimental design and clinical trials are emphasized.
Prerequisite(s): [(MATH 251 and MATH 252)]
(3-0-3)

BME 437
Introduction to Molecular Imaging
This course provides an overview of molecular imaging, a subcategory of medical imaging that focuses on noninvasively imaging molecular pathways in living organisms. Topics include imaging systems, contrast agents, reporter genes and proteins, tracer kinetic modeling. Preclinical and clinical applications will also be discussed with an emphasis on cancer and the central nervous system.
Prerequisite(s): [(BME 330) OR (ECE 308)] AND [(MATH 252)]
(3-0-3)

BME 438
Neuroimaging
This course describes the use of different imaging modalities to study brain function and connectivity. The first part of the course deals with brain function. It includes an introduction to energy metabolism in the brain, cerebral blood flow, and brain activation. It continues with an introduction to magnetic resonance imaging (MRI), perfusion-based fMRI, BOLD fMRI, fMRI paradigm design and statistical analysis, introduction to positron emission tomography (PET) and studying brain function with PET, introduction to magneto encephalography and studying brain function with (MEG). The second part of the course deals with brain connectivity. It includes an introduction to diffusion tensor MRI, explanation to the relationship between the diffusion properties of tissue and its structural characteristics, white matter fiber tractography. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 315 and PHYS 221)]
(3-0-3)

BME 439
Advanced Medical Imaging
This course introduces advanced clinical imaging modalities, research imaging techniques, and concepts from image science and image perception. The first part of the course introduces the perception of image data by human observers and the visualization of brain structure and function. It includes an introduction to magnetic resonance imaging (MRI) and a survey of neurological imaging via functional MRI (fMRI). The second part of the course covers image science, clinical imaging applications, and novel research imaging techniques. It includes an introduction to radiation detection and image quality evaluation, a survey of clinical cases, and an overview of new imaging methods.
Prerequisite(s): [(BME 309)]
(3-0-3)

BME 443
Biomedical Instrumentation & Electronics
Principles of circuit analysis are applied to typical transducer and signal recording situations found in biomedical engineering. Open only to Biomedical Engineering majors. Requires junior standing.
Prerequisite(s): [(BME 315)]
(3-0-3)

BME 445
Quantitative Neural Function
Computational approach to basic neural modeling and function, including cable theory, ion channels, presynaptic potentials, stimulation thresholds, and nerve blocking techniques. Synaptic function is examined at the fundamental level.
Prerequisite(s): [(BME 315)]
(3-0-3)

BME 450
Animal Physiology
Respiration; circulation; energy metabolism; temperature regulation; water and osmotic regulation; digestion and excretion; muscle and movement; nerve excitation; information control and integration; chemical messengers. Emphasis on general principles with examples drawn from various animal phyla. Same as BIOL 430.
Prerequisite(s): [(BIOL 107) OR (BIOL 115)]
(3-0-3)

BME 452
Control Systems for Biomedical Engineers
Control systems design and analysis in biomedical engineering. Time and frequency domain analysis, impulse vs. step response, open vs. closed loop response, stability, adaptive control, system modeling. Emphasis is on understanding physiological control systems and the engineering of external control of biological systems.
Prerequisite(s): [(BME 330)]
(3-0-3)

BME 453
Quantitative Physiology
The primary objective of this course is to introduce students to basic physiological concepts using a quantitative approach. The main systems that control the human body functions will be reviewed to enable the students to understand the individual role of each major functional system as well as the need for the integration or coordination of the activities of the various systems. Attempts will be made to highlight the patho-physiological consequences of defects or failures in the organ systems, and the relevant corrective approaches. This course will include lectures from individuals who have relevant expertise in the different organ systems because of the complexity of the human body.
Corequisite(s): (BME 405)
Prerequisite(s): [(BME 100)]
(3-0-3)

BME 455
Cardiovascular Fluid Mechanics
Anatomy of the cardiovascular system. Scaling principles. Lumped parameter, one-dimensional linear and nonlinear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system. Steady and pulsatile flow in rigid and elastic tubes. Form and function of blood, blood vessels, and the heart from an engineering perspective. Sensing, feedback, and control of the circulation. Possible project using custom software to run blood flow simulations. Same as MMAE 455.
Prerequisite(s): [(BME 301) OR (MMAE 310) OR (MMAE 313)]
(3-0-3)

BME 475
Neuromechanics of Human Movement
Concepts from mechanics and neurophysiology will be introduced and employed to analyze and model human movement, especially of the extremities. Topics will include forward and inverse kinematics and dynamics, muscle modeling, and feedback control.
Prerequisite(s): [(BME 330) OR (ECE 308) OR (MMAE 305)]
(3-0-3)

BME 482
Mass Transport for Biomedical Engineers
This course seeks to provide students with an introduction to advanced concepts of mass transport with an emphasis on biological systems. Students will be exposed to derivation of the conservation equations for heat, mass, and momentum. Following derivation of these laws, focus will be placed on mass transport applications, including diffusion, convection-diffusion, diffusion with reactions, and facilitated diffusion. Students will be able to apply mass transport equations to solve problems in biological systems.
Prerequisite(s): [(BME 301 and CHE 202)]
(3-0-3)

BME 490
Senior Seminar
Professional issues in bioengineering. Role of bioengineers in industry. Professional identity. Structure of bioengineering industries and product development process. Job market analysis. Current employment opportunities. Recruiting process and interview. Analysis of employer. Marketing versus engineering. Management by objective. Role of higher degrees.
(1-0-1) **(C)**

BME 491
Independent Study
Focused reading and study under the supervision of a BME faculty member. A final written report is required to receive credit.
(Credit: Variable) **(C)**

BME 492
Undergraduate Research
Independent research (experimental or theoretical/computational) under the supervision of a BME faculty member. A final written report is required to receive credit.
(Credit: Variable) **(C)**

BME 493
BME Undergraduate Project
Research or design projecting involving 2 or more students under supervision of a BME faculty member. A final written report from each student is required to receive credit.
(3-0-3)

BME 497
Special Problems
Design, development, analysis or research on special topics defined by a faculty member or the department.
(0-0-3)

Business

BUS 100
Introduction to Business
This course introduces students not only to the business environment but also to the different purposes and functions of businesses. Students will obtain a broad understanding of the fundamentals of business organizations and their operations and, in the process, learn the basic terminology and concepts employed in the business world. Students will also gain experience using computer applications popular in the business community such as Excel, Word, and Access Database. Open only to Business majors.
(3-0-3) **(C)(E)**

BUS 102
Computing Tools for Business Analysis
This course builds competency with the most commonly used software tools used in business (Microsoft Excel, Access, Word, and Power Point) while also reinforcing business concepts, modes of thinking, and communication skills. Course sessions, held in a PC lab, will cover basic-through-intermediate skills for each application using exercises and mini-cases that require students to analyze business problems and consider how best to communicate information, results, and findings. Course work will be integrated across the various tools in the Office suite and also across various business disciplines. Students will learn not just the computing tools themselves but also how such tools are used in today's business environment to manage information, analyze data, and communicate more effectively.
(1-0-1)

BUS 103
Ideation: What Are My Interests?
This course introduces students to methods of exploration and analysis of ideas. Students will participate in creativity exercises, practice brainstorming, and use tools (such as SWOT) that will provide a framework for analyzing interests and understanding comparative values. Students will practice storyboarding techniques and learn to present their ideas in a clear and concise manner.
(0-1-1)

BUS 104
Needs Analysis & Opportunity Analysis Aligned with My Interests
This course introduces students to user observation and research tools. Students will apply these tools to their project idea. Students will learn research planning and employ several methods, such as ethnographic interviewing techniques or journals/diaries, and translate their findings into a report.
(1-0-1)

BUS 203
Identification & Evaluation of Prospective Consumers
This course introduces students to primary and secondary market research tools and analysis. Students will be expected to go into the field to research prospective consumers relevant to their project. Students will learn of research sources beyond Google. Students will also learn and apply analytical techniques to understand the data.
Prerequisite(s): [(BUS 104)]
(1-0-1)

BUS 204
Identification & Evaluation of Competitive Advantage
Students will be expected to determine the strengths and weaknesses of the competitors within the target market, strategies that will provide the startup with a distinct advantage, the barriers that can be developed to make the competitive advantage sustainable, and any weaknesses that can be exploited within the product development cycle.
Prerequisite(s): [(BUS 203)]
(1-0-1)

BUS 210
Financial & Managerial Accounting
This course introduces the student to basic financial and managerial accounting topics: GAAP, the major financial statements, accrual accounting, financial reporting alternatives, financial statement analysis, cost behavior, cost systems, short-term and long-term decision-making, and product costing. BUS 210 should not be taken by business majors.
(3-0-3)

BUS 211
Measuring & Assessing Entity Financial Performance
This course introduces students to the financial reporting practices of firms ranging in size from sole proprietorships to Fortune 500 companies. Although the predominant focus will be on reporting principles used in the United States, the course will consider international reporting standards as well. Students will learn some of the metrics (ratios) by which one measures the financial health of a firm, whether small or large, domestic or international. Finally, using a popular financial management software package, students not only will learn how businesses track their day-to-day transactions and report on operations but also will be able to apply this knowledge to their personal and/or business finances. Open only to Business majors.
Prerequisite(s): [(BUS 100)]
(3-0-3) **(E)**

BUS 212
Managerial Decision-Making & Control
This course introduces students to how managers use accounting information to make decisions and to monitor and control the operations of their businesses. Students will learn how an entity's profits respond to changes in sales volume, selling prices, and costs. They will also learn how to distinguish between relevant and irrelevant information and use the former to make sound business decisions. The principles introduced in this course are applicable to domestic and international businesses of all sizes. Open only to Business majors.
Prerequisite(s): [(BUS 211)]
(3-0-3)

BUS 221
Analytics for Informed Decision-Making
Business decisions are often difficult and risky because decisions have to be made with incomplete and imperfect information. The primary purpose of this course is to introduce the basics of modeling and analyzing complex problems that involve business decision-making under uncertainty. Students will learn probability theory and some basic statistical concepts and procedures. The course emphasizes techniques for formulating decision problems and analyzing data. Students will also learn how to use computer software in decision and statistical analyses. Open only to Business majors.
Prerequisite(s): [(BUS 100 and MATH 151)]
(3-0-3)

BUS 301
Designing & Structuring the Organization for Strategic Decision-Making
Successful managers are able to align business strategies with the organization's culture and core competencies. In this course, students will develop the managerial skills needed to succeed in today's increasingly competitive global economy. The course explores how individuals are motivated to learn, decide, and coordinate in individual versus group settings. Students will apply these concepts to resolve a wide array of problems in real world organizational settings, such as creating an innovative culture, developing an effective performance management system, and managing a diverse workforce. Particular emphasis will be given to development of leadership skills and entrepreneurism.
Prerequisite(s): [(BUS 100 and ECON 151) OR (ECON 211)]
(3-0-3) **(C)(E)**

BUS 303
Financial Analysis: Pro-Forma Financial Statements
Financial Analysis: Pro-Forma Financial Statements requires students to develop pro-forma financial statements for a business of their own choosing. They will begin by subjecting at least two similar firms (the "comparable" firms) to a rigorous financial analysis with the objective of identifying their strengths and weaknesses. In the process, students will investigate measures of liquidity (short-term and long-term), efficiency, and profitability. Utilizing the strengths and weaknesses of the comparable firms, students will develop pro-forma financial statements for their own business.
Prerequisite(s): [(BUS 204 and BUS 351)]
(1-0-1)

BUS 305
Contemporary Design of Business Processes & Business Models
This course introduces students to concepts and techniques related to the design, planning, control, and improvement of both service and manufacturing operations. The course helps students become conversant in the language of operations management and provides them with the quantitative and qualitative tools needed to analyze basic operations issues. It also describes the role of operations management in the overall strategy of a firm. The topics covered include process analysis, waiting line management, project management, inventory and supply chain management.
Prerequisite(s): [(BUS 100 and MATH 151)]
(3-0-3)

BUS 311
Strategic Cost Management
This course explores the uses and limitations of accounting information as an integral part of a manager's decision process. BUS 311 goes beyond BUS 211 and 212 by integrating economics, finance, and statistics among other disciplines in the consideration of actual business cases. Some of the topics included will be cost estimation, activity-based costing, quality control, transfer pricing, and divisional performance evaluation.
Prerequisite(s): [(BUS 212 and BUS 351)]
(3-0-3)

BUS 321
Quantitative Models for Effective Decision-Making
The role of business decision-making is often how to best design and operate a system. Many managerial decisions, regardless of their functional orientation, are, therefore, increasingly based on analysis using quantitative models from the discipline of management science. Management science tools, techniques and concepts have dramatically changed the way business operates in manufacturing, service operations, marketing, and finance. BUS 321 introduces students to various ways of modeling, or thinking structurally about, decision problems in order to enhance decision-making skills. Students will gain experience using spreadsheets to deal with complex managerial decision problems.
Prerequisite(s): [(BUS 221)]
(3-0-3)

BUS 341
Business Law for Entrepreneurs in the Modern Global Economy
BUS 341 surveys the many challenges and opportunities faced by the entrepreneur in the modern global economy. Starting with basic contract law, corporate law, and intellectual property law, the course then explores issues of business organization for entrepreneurs, the legal implications of debt and equity financing, the protection of the expression of ideas that is afforded by copyrights, and the protection of corporate goodwill that is afforded by trademark law as well as the statutory restraints imposed by statutes such as the Financial Services Modernization Act, the Health Insurance Portability and Accountability Act ("HIPPA"), and Children's Online Privacy Protection Act ("COPPA"). The course will broaden the student's perspective into the international environment by studying cross-border data privacy as well as statutes such as the Foreign Corrupt Practices Act ("FCPA").
Prerequisite(s): [(BUS 100)]
(3-0-3) **(E)**

BUS 351
Effective Financial Decision-Making
BUS 351 introduces students to time value of money concepts and how these concepts are used in making long-term financial decisions. In addition, the course will expose students to after-tax cash flow analysis using a variety of decision models that are appropriate for sole proprietorships, partnerships, and corporations, whether they are newly-founded or established firms. Many of the principles introduced here can be applied to personal financial decisions such as retirement planning, car loan analyses and home mortgage analyses, for example. Open only to Business majors.
Corequisite(s): (BUS 212)
Prerequisite(s): [(BUS 212* and BUS 221)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

BUS 361
Entrepreneurial Thinking & Practice in a Complex Organization
BUS 361 focuses on the role of entrepreneurship within larger, established companies. It provides students wishing to become either corporate managers or entrepreneurs with the information, frameworks and techniques needed to plan, start, evaluate, control, and successfully operate corporate ventures.
Prerequisite(s): [(BUS 351)]
(3-0-3) **(C)(E)**

BUS 371
Strategies for Reaching New Markets
BUS 371 focuses on the information, frameworks and techniques required to devise a marketing strategy for the organization. The course begins with an understanding of how to design products and services for consumers based on their needs and their budget constraints. It then moves to an evaluation of the capabilities of the firm, its collaborators, and its competitors in service of developing appropriate price and promotion strategies when going to market. This course has no formal pre-requisites, but students will benefit from a basic background in microeconomics and basic statistics.
(3-0-3) **(C)(E)**

BUS 382
Behavioral Economics of Managerial & Consumer Decision Making
The course is designed to provide students with fundamentals of strategic analysis for business decision making. Students will learn how to recognize decision problems, how to represent the essential structures of decision situations, and how to analyze problems using decision-theoretic tools. Then, using foundations of psychology and behavioral economics, students will learn how to think effectively about the inputs to a decision analysis, whether or not to trust the analysis, and how to use the outputs of the analysis to guide actions by themselves and their firms. Finally, students will be asked to make effective, unaided intuitive decisions and to recognize the limits of their intuitive skills in applied settings. The course will use principles of game theory, cases and real world examples, and will develop students' skills in live negotiation analysis.
Prerequisite(s): [(ECON 151) OR (ECON 211)]
(3-0-3) **(C)**

BUS 403
Developing a Strategically Competitive Business Plan
This course introduces students to the research process for developing business plans. They will evaluate a business concept, collect, analyze and organize market research data into a marketing plan; formulate a business model; and prepare financial projections, among other key components of a formal business plan.
Prerequisite(s): [(BUS 304)]
(1-0-1)

BUS 404
Selling Your Business Plan
In BUS 404 students will be expected to explore various options in raising money to fund a business, their advantages and disadvantages, the right ways to negotiate and close the deals.
Prerequisite(s): [(BUS 403)]
(1-0-1)

BUS 452
International Finance
International finance is a combination of macroeconomics and finance. The course covers macroeconomic models of exchange rate and interest rate determination and it also covers the participants and instruments that trade in the foreign exchange market. By the end of the course, participants should be able to construct portfolios and analyze the risk of their positions.
Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 454
Valuation & Portfolio Management
The course is a survey of asset pricing theory. The fundamentals of bond and option pricing are covered as well as the CAPM, APT and the Fama French models. Excel spreadsheet modeling is used to illustrate and understand the concepts of Markowitz's Mean Variance Optimization, equity valuation, option pricing, and utility theory.
Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 455
Corporate Finance
This course is an advanced introduction to modern corporate finance. Topics include cash flow forecasting, optimal dividend policies, mergers and acquisitions, structured finance, capital at risk, and the risk of adjusted return on capital. The philosophical foundation of the course is the concept of shareholder value added. Students will learn how financial decisions can contribute to the value of modern corporation.
Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 456
Financial Economics I
This course provides a systematic exposition of the primary mathematical methods used in financial economics. Mathematical concepts and methods include logarithmic and exponential functions, algebra, mean-variance analysis, summations, matrix algebra, differential and integral calculus, and optimization. The course will include a variety of financial applications including compound interest, present and future value, term structure of interest rates, asset pricing, expected return, risk and measures of risk aversion, capital asset pricing model (CAPM), portfolio optimization, expected utility, and consumption capital asset pricing (CCAPM).
Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 457
Financial Modeling I
This course is the first of three subjects that form the Financial Modeling Sequence. It is designed to provide students with the necessary programming skills necessary to create realistic financial models. It is an essential core subject and must be completed in order to obtain the MSF degree. Modeling I focuses on the implementation of financial models in MS Excel using Visual Basic for Application (VBA).
Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 458
Futures Options & OTC Derivatives
This course provides the foundation for understanding the price and risk management of derivative securities. The course starts with simple derivatives (e.g., forwards and futures) and develops the concept of arbitrage-free pricing and hedging. Based upon the work of Black, Scholes, and Merton, the course extends their pricing model through the use of lattices, Monte Carlo simulation methods, and more advanced strategies. Mathematical tools in stochastic processes are gradually introduced. Particular emphasis is given to the pricing of interest rate derivatives.
Prerequisite(s): [(BUS 221, BUS 321, and BUS 351)]
(3-0-3)

BUS 467
Managing Entrepreneurial Enterprise & the Global Marketplace
BUS 467 focuses on the behaviors of entrepreneurs (both successful and unsuccessful), entrepreneurial networks, the venture creation process, new venture strategies, identification and evaluation of new venture opportunities, new venture financing, legal and tax considerations, market entry strategies, and the development of a formal business plan in a global context.
Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 469
Entrepreneurship Minor Summit Course
BUS 469 provides students a hands-on, real world opportunity to: 1) identify, investigate and/or evaluate the suitability of a product or service to the marketplace; 2) work with an existing company to evaluate and/or investigate a product or service opportunity for the company; or 3) investigate and/or evaluate a research-based technology for suitability as a product or service. Students will either build or join a small team to develop a prototype, engage customers/partners, and identify support and/or funding. Business students who have taken the prerequisite (or equivalent) courses may register with instructor approval. Prerequisite: Entrepreneurship Minor Classes (4) and IPRO
(3-0-3)

BUS 471
Marketing Management
The Marketing Management course is designed to provide students with an overview of the decision making process in marketing. Marketing decision-making is a process that is essentially wrapped around the fundamental goal of creating value in the marketplace. This requires a professional knowledge of market drivers, competitors' capabilities, technological trends, and the market dynamics of value. The orientation is toward the kinds of marketing decisions that managers must make within the modern business environment. A primary goal of this course is to provide a thorough understanding of the rapidly changing business environment and the various stakeholders that influence the marketing management function.
Prerequisite(s): [(BUS 371)]
(3-0-3) **(C)**

BUS 472
New Product Development
This course offers students a solid grounding in the theory and practice of new product development. Using a combination of theory-based lecture, hands-on exercises and assignments, and discussion, students will develop skills across the entire product development process–from opportunity identification through product launch.
Prerequisite(s): [(BUS 371)]
(3-0-3) **(C)**

BUS 473
Marketing Research
This course provides students with a detailed exposure to state-of-the-art marketing research techniques and their applications. Topics include: problem definition, research design, exploratory research, the use of secondary and syndicated data sources and questionnaire development and analysis. Course exercises and projects will emphasize the use of research information for effective marketing decision making.
Prerequisite(s): [(BUS 371)]
(3-0-3) **(C)(E)**

BUS 475
Sales Management
Addressing modern technology and methods of selling and presenting highly technical subjects is the basis of this course. Engineers, Information Technologists, Architects, and those dealing with state of the art products will benefit from this new created course that will address the rapidly changing profession of highly skilled representatives, sales persons, and entrepreneurs. The class content will include guest speakers from technical corporations, leading promotion and e-commerce firms to discuss basic requirements for sustaining current customer base and increase gross sales. Application, simulation and case studies from small and mid-sized firms will be reviewed.
Prerequisite(s): [(BUS 371)]
(3-0-3)

BUS 476
Consumer Behavior
Good marketing practice requires an understanding of consumers: their needs, why they buy, and how they buy. this course draws on the fields of psychology, sociology, economics, demography, and anthropology to study the various internal and external influences on consumer behavior and decision making. Topics include: perception, memory and learning, motivation, attitudes and attitude change, involvement, cultural and cross-cultural influences, communications and influence tactics, and customer satisfaction.
Prerequisite(s): [(BUS 371)]
(3-0-3)

BUS 480
Strategic Management & Design Thinking for the Next Economy
BUS 480 presents a conceptual and analytical framework for understanding the operation of the firm within a changing business environment from the perspective of the upper management team. The course develops the student's ability to think constructively about the pursuit of sustainable competitive advantage through the systematic identification, evaluation and creation of attractive business and corporate opportunities. Requires senior standing.
Prerequisite(s): [(BUS 467)]
(3-0-3) **(C)(E)**

BUS 497
Independent Study in Business
Independent study in Business as designed to provide the student with an option to study a specific area of Business in more depth than is offered in the curriculum. For example, a student could expand upon subject matter contained in the existing curriculum, or the student could explore an area of business not currently in the curriculum. In either event, the student, the instructor, and the student's advisor must agree upon a plan of study prior to enrolling in the course.
(Credit: Variable)

Civil, Architectural, and Environmental Engineering

CAE 100
Introduction to Engineering Drawing & Design
Introduction to engineering graphics as a problem-solving tool. Basic traditional techniques of orthographic projection, multi-view, pictorial, auxiliary views, dimensioning and tolerance, sectioning, detail drawing. Use of ANSI standards; applications in civil and architectural engineering.
(1-2-2) **(C)**

CAE 101
Introduction to AutoCAD Drawing & Design
A continuation of CAE 100. Use of PC-based CAD (Computer-Aided Drawing and Design) software for presentation and problem solving in civil and architectural engineering applications. Introduction to basic principles of design.
Prerequisite(s): [(CAE 100)]
(0-4-2) **(C)**

CAE 105
Geodetic Science
Measurement of distances and angles. Theory of errors. Study of leveling, traversing, topographic mapping, route surveying, earthwork computation, photometry, and boundary surveys. Practice in the use of tapes, levels, total stations, and PC-based methodology.
Prerequisite(s): [(CAE 100*)] An asterisk (*) designates a course which may be taken concurrently.
(2-2-3)

CAE 110
Professional Practice I
This course is an introduction to the engineering profession. The content and delivery have been designed to challenge the student's perspective of oneself and thus make the student a better engineer. The class focus is on developing the skills to become a professional learner and a successful student, increasing team learning skills, self-reflection, enhancing ethical perception and decision making abilities, and understanding the responsibilities as an engineer. In simple terms, the student will begin to "act as an engineer acts." Requires first-year standing.
(0-1-1)

CAE 111
Professional Practice II
This course continues the introduction to the engineering profession with further studies of team learning, specializations in engineering, enhancing ethical perception and decision making abilities, and understanding the responsibilities as an engineer. The course also looks deeply at the need for continuous innovation by studying and practicing the entrepreneurial mindset needed to create value for oneself as the student, for one's company, and for society. In simple terms, the student will begin to "act as an engineer acts" and "think like an entrepreneur thinks." Requires first-year standing.
(0-1-1)

CAE 208
Thermal-Fluids Engineering I
Basic principles of thermodynamics applied to engineering systems using pure substances and mixtures as working fluids. Direct application of the laws of thermodynamics to analysis of closed and open systems, mass and energy flow. Extensive analysis of isentropic processes in cycles, analysis of gas mixtures and psychometrics in heating and cooling systems. Introduction to fluid mechanics and analysis of fluid statics problems.
Prerequisite(s): [(CHEM 124, CS 104-105, MATH 251*, and PHYS 123)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

CAE 209
Thermal-Fluids Engineering II
Complete the development of fluid mechanics and introduce and develop heat and mass transfer analysis techniques. Description and analysis of fluid kinematics, energy and momentum equations applied to internal/external flow in building engineering systems. Development and application of convection, conduction and radiation to one-, two- and three-dimensional systems in steady state and transient regimes of operation as applied to building materials and geometries.
Prerequisite(s): [(CAE 208 and MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

CAE 221
Engineering Geology
Geology and its relationship to civil engineering; minerals; rocks; soil formation; geologic structure; groundwater hydraulics; frost action in soils, landslides, shoreline erosion, bluff instability; earthquakes; air photo interpretation, soil and rock mechanics in relation to engineering geology; subsurface exploration; dams, reservoirs, tunnels; case-history illustrations.
(2-2-3)

CAE 286
Theory & Concept of Structural Mechanics
Equilibrium for particles and rigid bodies. Distributed forces, centroids, centers of gravity, and moments of inertia. Free body diagrams. Application to truss structures. Kinetics of particles: Newton's Laws of motion, energy, and momentum. Kinematics of particles.
Prerequisite(s): [(MATH 152 and PHYS 123)]
(3-0-3)

CAE 287
Mechanics of Structural Materials
The concepts of deformation, strain, and stress. Application of free body diagram in shear force and bending moment diagram. Elementary bending theory, normal and shear stresses in beams, and beam deflection. Axially loaded members and Euler buckling theory. Plane stress and strain, Mohr's circle, and torsion of circular sections. Combined loading.
Prerequisite(s): [(CAE 286) OR (MMAE 200)]
(3-0-3)

CAE 302
Fluid Mechanics & Hydraulics
Fundamental concepts; fluid statics; properties of fluid in motion; fluid flows through orifices, weirs and venturi meters; laminar and turbulent flow in closed conduits; flow in open channels; turbo machinery; measurement in fluid mechanics and hydraulics.
Prerequisite(s): [(MATH 252)]
(3-0-3)

CAE 303
Structural Design I
Design loads, factors of safety; load and resistance factors for steel structures. Experimental and analytical study of steel materials subjected to various states of stress. Failure theories, yield and post-yield criteria are treated. Fatigue and facture mechanics phenomena are related to design practice. The design of tension member, beams, and columns in steel.
Prerequisite(s): [(CAE 287) OR (MMAE 202)]
(3-0-3) **(D)**

CAE 304
Structural Analysis I
The analysis of statically determinate trusses and frames. Determination of internal forces and calculation of deflections. Application of the principle of virtual work and energy methods. Column stability.
Prerequisite(s): [(CAE 287) OR (MMAE 202)] AND [(MATH 252)]
(2-2-3)

CAE 307
Structural Design II
Design loads, factor of safety, load and resistance factors for concrete structures. Properties of concrete-making materials and the proportioning of concrete mixtures. Experimental and analytical study of plain and reinforced concrete subjected to various states of stress. Failure theories and the ultimate strength of plain and reinforced concrete structural components. The design of beams, columns, and slabs in reinforced concrete.
Prerequisite(s): [(CAE 304 and CAE 315*)] An asterisk (*) designates a course which may be taken concurrently.
(2-3-3) **(C)(D)**

CAE 312
Engineering Systems Analysis
Applications of engineering and economic concepts and analysis to civil engineering systems; practical applications of elementary probability and statistics, operations research and economics in civil engineering. Instructor's consent may be granted to students who do not meet the prerequisite.
Prerequisite(s): [(MATH 251)]
(3-0-3) **(C)**

CAE 315
Materials of Construction
Physical principles of elastic and plastic deformation of construction. Mechanical testing methods including tensile, compressive, toughness, creep and fatigue. Properties of concrete, wood, iron and steel and other construction materials. The emphasis is on concepts from solid mechanics which explain the behavior of materials to the extent needed in the design of load-bearing constructs.
Prerequisite(s): [(CAE 287) OR (MMAE 202)]
(2-3-3) **(C)**

CAE 323
Introduction to Geotechnical Engineering
Physical and mechanical properties of soil; elementary principles of soil identification and testing. Principles of soil permeability and seepage, consolidation, failure theories, earth pressures, and bearing capacity. Laboratory included.
Prerequisite(s): [(CAE 209) OR (CAE 302)] AND [(CAE 287) OR (MMAE 202)]
(2-3-3) **(C)**

CAE 331
Building Science
Study of the physical interaction of climate (humidity, temperature, wind, sun, rain, snow, etc.) and buildings. Topics include psychrometrics, indoor air quality, indoor thermal comfort, heat transfer, air infiltration, solar insolation, and heating and cooling load calculation.
Prerequisite(s): [(CAE 209) OR (CHE 302) OR (MMAE 322)]
(3-0-3)

CAE 383
Electrical & Electronic Circuits
Introduction to electrical and electronic circuits. AC and DC steady state and transient network analysis. Phasors, AC and Three Phase Power. Diodes, transistors, and operational amplifiers. Course does not satisfy graduation requirements for Computer Engineering or Electrical Engineering majors.
Prerequisite(s): [(MATH 252 and PHYS 221)]
(3-0-3)

CAE 401
Hydraulics, Hydrology, & Their Applications
Collection and distribution of water. Flow of fluids through orifices, weirs, venturi meters. Laminar and turbulent flow in closed conduits. Open channel flow. Model analysis using the principles of dimensional analysis. Rainfall and runoff.
Prerequisite(s): [(MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.
(2-3-3)

CAE 403
Sound & Vibration Control in Buildings
Basic sound physics and sound propagation in enclosed spaces. Sound and vibration sources in and out of buildings. Theories of sound transmission through building elements. Effects of noise and vibration on man and buildings, criteria and standards. Design of noise control systems. Calculation of airborne and impact sound insulation. Noise and vibration control implementations in various indoor spaces, such as residential units, offices, schools and mechanical rooms. Requires junior standing.
(2-1-3)

CAE 408
Bridge & Structural Design
Design of modern bridges, bridge design requirements, LRFD approach, seismic and wind effects, fatigue in bridges, support design.
Prerequisite(s): [(CAE 431*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(D)**

CAE 409
Analysis & Design of Acoustic Performance Spaces
This course will discuss the design of acoustic spaces such as conference rooms, classrooms, lecture halls, music halls, theater, churches, recording studio, and home theater. Course covers the selection and determination of appropriate steady state, spatial, and temporal acoustic measures such as background noise levels, reverberation time, speech transmission index, and interaural cross correlation, as well as the selection of building materials and layout of rooms to meet those requirements.
Prerequisite(s): [(CAE 403)]
(3-0-3)

CAE 410
Introduction to Wind & Earthquake Engineering
Kinematics of Particles, Newton's laws of motion, energy and momentum. Kinematics of rigid bodies. Fundamentals of free, forced, and transient vibration of single and multi-degree of freedom structures. Analysis and design of structures for wind and earthquake loadings. Building code requirements. Instructor's consent may be granted to students who do not meet the prerequisite.
Prerequisite(s): [(CAE 411*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

CAE 411
Structural Analysis II
The analysis of statically indeterminate frames. Application of classical methods including superposition, slope deflection, and moment distribution. Introduction to the direct stiffness method and computer analysis of structures.
Prerequisite(s): [(CAE 304)]
(2-3-3)

CAE 412
Traffic Engineering Studies & Design
Basic traffic engineering studies including traffic volume, speed, accident, and parking studies. Capacity and analysis for various traffic facilities. Design of traffic control devices. Requires senior standing.
(3-0-3) **(D)**

CAE 415
Pavement Design, Construction & Maintenance
Pavement types, stresses in flexible and rigid pavements, vehicle pavement interaction. Mathematical models for pavement systems, sub grade support, design of flexible and rigid pavements. Construction procedure, drainage considerations, environmental effects. Rehabilitation and maintenance of pavements.
Prerequisite(s): [(CAE 323)]
(3-3-4)

CAE 416
Facility Design of Transportation Systems
Design and analysis of facilities of transportation systems. Integration of select transportation components and their interrelationships. Design of specific facilities: guide ways, terminals, and other elements for railroads, airports, and harbors. Requires senior standing.
(3-0-3) **(D)**

CAE 417
Railroad Engineering & Design
History of railroad industry. Train operation, train make-up, and handling. Design and analysis of railroad track structure, track irregularities, and their representation. Vehicle/track interaction and dynamic problems associated with it. Performance of railway vehicles. Requires junior standing.
(3-0-3) **(C)(D)**

CAE 419
Introduction to Transportation Engineering & Design
Highway functions, design controls and criteria, element of design, cross-section elements, local roads and streets, at-grade intersections, grade separation and interchanges, highway capacity analysis, and introduction to pavement management. Requires junior standing.
(3-0-3) **(D)**

CAE 421
Risk Assessment Engineering
Description and concept of risk, relationship between the likelihood of loss and the impact of loss, engineering hazards assessment and risk identification and evaluation using fault tree analysis, failure mode and effect analysis, etc., risk analyses applications with practical statistics.
(3-0-3)

CAE 422
Sprinklers, Standpipes, Fire Pumps, Special Suppression, & Detection Systems
Review and introduction to fluid dynamics applied to sprinklers, standpipes, fire pumps, and special suppression systems; hydraulic design criteria and procedures for sprinklers requirements, standpipes, fire pumps, special suppression systems, and detection and alarm systems using nationally recognized design (National Fire Protection Association) standards, water supply requirement systems and distributions.
Prerequisite(s): [(CAE 209) OR (CAE 302)]
(3-0-3)

CAE 424
Introduction to Fire Dynamics
Introduction to fire, physics and chemistry, and mass and heat transfer principles, fire fluid mechanic fundamentals, fundamentals and requirements of the burning of materials (gases, liquids, and solids), fire phenomena in enclosures such as pre-flashover and post-flashover.
Prerequisite(s): [(CAE 209)]
(3-0-3)

CAE 425
Fire Protection & Life Safety in Building Design
Fundamentals of building design for fire and life safety. Emphasis on a systematic design approach. Basic considerations of building codes, fire loading, fire resistance, exit design, protective systems, and other fire protection systems.
(3-0-3)

CAE 430
Probability Concepts in Civil Engineering Design
Introduction to probability, modeling, and identification of nondeterministic problems in civil engineering. Development of stochastic concepts and simulation models and their relevance to design and decision problems in various areas of civil engineering.
Prerequisite(s): [(MATH 252)]
(3-0-3) **(D)**

CAE 431
Steel Design
Design of steel beams, plate girders, and beam columns. Bolted and welded connections. Design of typical frame systems.
Prerequisite(s): [(CAE 303, CAE 304, and CAE 315*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(D)**

CAE 432
Concrete & Foundation Design
Design of reinforced concrete building frames and continuous structures. Design of girders, slabs, columns, foundations, and retaining walls.
Prerequisite(s): [(CAE 307)]
(3-0-3) **(D)**

CAE 433
Repair of Existing Building Structures
Building repair and retrofit issues are discussed. Specific requirements of a building for repair and/or reconstruction are emphasized. Methods of assessing building conditions, including forensic structural engineering are covered. Repair and strengthening methods based on types of materials (steel, concrete, masonry, timber), occupancy and function (residential, commercial), and building values are covered along with demonstration case studies and illustrative examples.
Prerequisite(s): [(CAE 431 and CAE 432)]
(3-0-3)

CAE 435
Experimental Analysis of Structures
The analysis of structures (prototypes) with the aid of models constructed from metal, wood, plastics, and other materials. Geometrical, mathematical, demonstration, graphical and direct and indirect models will be treated. Comparisons of experimental results with results from computer models will be made. Similitude and the theory of models will be treated. Individual and group project work will be emphasized.
Prerequisite(s): [(CAE 304 and CAE 411)]
(2-2-3)

CAE 436
Design of Masonry & Timber Structures
Design of unreinforced and reinforced masonry structural elements and structures. Serviceability and ultimate capacity design. Seismic response, resistance, and design. Design of wood columns and bending members. Mechanical fasteners and connectors. Instructor's consent may be granted to students who do not meet the prerequisite.
Prerequisite(s): [(CAE 307)]
(3-0-3) **(D)**

CAE 437
Homeland Security Concerns in Engineering Systems
Review of blast effects produced by solid phase weapons and their effects on structures and people. Estimation of the risk of threats to security of public and private systems and facilities. Review of simplified structural methods for the analysis and design of structures to meet homeland security concerns and procedures to minimize casualties. Analysis of post-attack fires and how to prevent them. Examination of potential risk to security of infrastructure systems. Development of contingency plans to include evacuation preparedness at time of emergency. Requires senior standing.
(3-0-3)

CAE 439
Introduction to Geographic Information Systems
Geographic information system (GIS) technology allows databases which display and query information in new ways. This course will teach general GIS and GPS skills and concepts, useful to students and practitioners in a variety of disciplines. Students will complete a final GIS project relevant to their field of study. This hands-on class will use ESRI's Arc View and Spatial Analyst products, as well as Trimble GeoExplorer GPS units.
(3-0-3)

CAE 457
Geotechnical Foundation Design
Methods of subsoil exploration. Study of types and methods of design and construction of foundations for structures, including single and combined footings, mats, piles, caissons, retaining walls, and underpinning. Drainage and stabilization.
Prerequisite(s): [(CAE 302 and CAE 323)]
(3-0-3) **(D)**

CAE 461
Plumbing & Fire Protection Design
Study of plumbing systems, water supply, and venting systems. Study of fire protection systems for buildings including pipe sizing, pumps, sprinklers, gravity and pressure vessels, and controls.
Prerequisite(s): [(CAE 209) OR (CAE 302) OR (MMAE 310)]
(3-0-3) **(D)**

CAE 463
Building Enclosure Design
Design of building exteriors, including the control of heat flow, air and moisture penetration, building movements, and deterioration. Study of the principle of rain screen walls and of energy conserving designs. Analytical techniques and building codes are discussed through case studies and design projects.
Prerequisite(s): [(CAE 331)]
(3-0-3) **(D)**

CAE 464
HVAC Systems Design
Study of the fundamental principles and engineering procedures for the design of heating, ventilating, and air conditioning systems; HVAC system characteristics; system and equipment selection; duct design and layout. Attention is given to energy conservation techniques and computer applications.
Prerequisite(s): [(CAE 331) OR (CAE 513 with min. grade of C) OR (MMAE 322)]
(3-0-3) **(D)**

CAE 465
Building Energy Conservation Technologies
Identification of the optimal energy performance achievable with various types of buildings and service systems. Reduction of infiltration. Control systems and strategies to achieve optimal energy performance. Effective utilization of daylight, heat pumps, passive and active solar heaters, heat storage and heat pipes in new and old buildings.
Prerequisite(s): [(CAE 331) OR (CAE 531)]
(3-0-3) **(D)**

CAE 466
Building Electrical Systems Design
Study of the analysis and design of electrical systems in buildings utilizing the National Electric Code. Topics include AC, DC, single-phase and three-phase circuits, transients, branch circuits, panel boards, system sizing, fault calculations and overcurrent protection design. Also studies the design and specification of emergency power backup and alternative power systems.
Prerequisite(s): [(CAE 383) OR (ECE 215 and ECE 216)]
(3-0-3)

CAE 467
Lighting Systems Design
An intensive study of the calculation techniques and qualitative aspects of good luminous design. Topics covered include: photometric quantities and color theory, visual perception, standards, daylight and artificial illumination systems, radiative transfer, fixture and lamp characteristics, control devices, and energy conservation techniques. Design problems, field measurements, computer, and other models will be used to explore major topics. Requires junior standing.
(3-0-3)

CAE 468
Architectural Design
Architectural Design is the first of a two-part sequence of architectural design and planning for architectural engineers. Students learn the basic theory and practice of the architectural design process from the architect's perspective. Topics include the logical process of architectural design development, integration of code requirement, design approach, and architectural presentation techniques taught through lecture and lab instruction. Requires senior standing.
Prerequisite(s): [(CAE 331)]
(2-2-3)

CAE 470
Construction Methods & Cost Estimating
The role of estimating in construction contract administration. Types of estimates. Unit costs and production rates; job costs. Preparing bid for complete building project using manual methods and the CSI format; checking quantity take-off and cost estimating in selected divisions using a computer package. Requires senior standing.
(3-0-3) **(D)**

CAE 471
Construction Planning & Scheduling
Planning, scheduling, and progress control of construction operations. Critical Path Method and PERT. Resource leveling of personnel, equipment, and materials. Financial control/hauling of construction projects. Impact of delay on precedence networks. Construction contract administration. Computer applications. Requires senior standing.
(3-0-3) **(C)(D)**

CAE 472
Construction Site Operation
Construction site layout and mobilization. Liabilities of the parties. Methods of construction. Concrete form design and fabrication. Scaffolding, temporary facilities, and equipment. Safety on sites. Introduction to construction productivity. Requires senior standing.
(3-0-3)

CAE 473
Construction Contract Administration
Characteristics of the construction industry. Project delivery systems. Duties and liabilities of the parties at the precontract stage. Bidding. Contract administration including duties and liabilities of the parties regarding payments, retainage, substantial and final completion, scheduling and time extensions, change orders, changed conditions, suspension of work, contract termination, and resolution of disputes. Contract bonds. Managing the construction company. Labor law and labor relations. Requires senior standing.
(3-0-3)

CAE 482
Hydraulic Design of Open Channel Systems
Uniform flow design; backwater profiles in natural streams; gradually varied flow practical problems; spatially varied flow; flow through nonprismatic and nonlinear channels; gradually varied unsteady flow; rapidly varied unsteady flow; flood routing; numerical solutions of open channels.
(3-0-3) **(D)**

CAE 486
Soil & Site Improvement
Theory of water flow through porous media. Site improvement techniques including grading and drainage, dewatering, reinforcement, and slurry trenches. Soil improvement techniques including replacement, in situ compaction, preloading and subsurface drainage, grouting, freezing, prewetting, and heating.
Prerequisite(s): [(CAE 323)]
(3-0-3)

CAE 491
Undergraduate Research
Special research problems in civil and architectural engineering under individual supervision of instructor. Seminar presentation is required. (Credit: Variable; maximum 4 credit hours). Prerequisite: Senior standing, minimum GPA of 3.0, and consent of the instructor.
(Credit: Variable)

CAE 495
Capstone Senior Design
A group project requiring the integration of multiple engineering disciplines to satisfy client requirements for a real engineering project. Students will be required to demonstrate mastery in the application of numerous engineering disciplines to a project, work as a member of an integrated engineering team, and demonstrate the ability to understand and communicate engineering solutions to a client verbally, visually, and in written form. Course is required to satisfy ABET program objectives. Requires senior standing.
(3-1-3)

CAE 497
Special Project
Special design project under individual supervision of instructor. Prerequisite: Senior standing, minimum GPA of 3.0, and consent of instructor.
(Credit: Variable)

Chemical Engineering

CHE 100
Introduction to the Profession I
Introduction to chemical engineering and engineering productivity software. Communication skills development, technical reporting and presentation, engineering ethics, and a variety of topics are discussed.
(1-2-2) **(C)**

CHE 101
Introduction to the Profession II
A continuation of CHE 100. Advanced engineering applications of productivity software. Engineering graphics and technical flow sheeting. Team project research and project management skills. Internet publishing.
Prerequisite(s): [(CHE 100) OR (MMAE 100)]
(1-2-2) **(C)**

CHE 202
Material Energy Balances
Material and energy balances for engineering systems subjected to chemical and physical transformations. Calculations on industrial processes. Open only to Biomedical Engineering or Chemical Engineering majors.
Prerequisite(s): [(CHEM 100-499 and MATH 152)] AND [(CS 104) OR (CS 105) OR (CS 115)]
(3-0-3) **(C)**

CHE 301
Fluid Mechanics
Flow of fluids. Fundamentals of fluid flow design equations as applied to selected unit operations.
Prerequisite(s): [(CHE 202 and MATH 252)]
(3-0-3)

CHE 302
Heat & Mass Transfer Operations
Fundamentals of heat and mass transfer. Heat and mass transfer design equations as applied to selected unit operations. Mass transfer in stage-wise and continuous contacting equipment. Unsteady state operations in mass transfer equipment.
Prerequisite(s): [(CHE 301)]
(3-0-3)

CHE 311
Foundations of Biological Science for Engineering
This introductory course will introduce engineering students to basic principles of Biological Sciences, which will enable them to understand more advanced courses on the topic and provide a solid base for further study in all life sciences-related topics required in their individual programs.
Prerequisite(s): [(CHEM 125)]
(3-0-3)

CHE 317
Chemical & Biological Engineering Laboratory I
Laboratory work in the unit operations of chemical engineering, fluid flow, heat transfer, and other selected topics.
Prerequisite(s): [(CHE 301)]
(1-3-2) **(C)**

CHE 351
Thermodynamics I
Laws of thermodynamics and their application to chemical engineering operations.
Prerequisite(s): [(CHE 202 and CHEM 343)]
(3-0-3)

CHE 406
Transport Phenomena
The equations of change in different coordinate systems (mass, momentum, and energy transport). Velocity distribution in laminar and turbulent flow. Formulation and analytical solutions to the problems of viscous flow, molecular diffusion, heat conduction and convection.
Prerequisite(s): [(CHE 301, CHE 302, and MATH 252)]
(3-0-3)

CHE 412
Foundations of Biological Science for Engineering
This introductory course will introduce graduate engineering students to basic principles of Biological Sciences, which will enable them to understand more advanced courses on the topic and provide a solid base for further study in all life sciences-related topics required in their individual programs.
Prerequisite(s): [(CHEM 125)]
(3-0-3)

CHE 418
Chemical & Biological Engineering Laboratory II
Laboratory work in distillation, humidification, drying, gas absorption, filtration, and other areas.
Prerequisite(s): [(CHE 302 and CHE 317)]
(1-3-2) **(C)**

CHE 423
Chemical Reaction Engineering
Introduction to the fundamentals of chemical kinetics. The design, comparison, and economic evaluation of chemical reactors. Emphasis on homogeneous systems.
Prerequisite(s): [(CHE 302, CHE 351, and CHE 433)]
(3-0-3)

CHE 426
Statistical Tools for Engineers
Descriptive statistics and graphs, probability distributions, random sampling, independence, significance tests, design of experiments, regression, time series analysis, statistical process control, and introduction to multivariate analysis. Requires junior standing.
Prerequisite(s): [(MATH 151)]
(3-0-3)

CHE 433
Process Modeling & System Theory
Principles of process modeling. Modeling of non-reactive and reactive dynamic processes. Transfer functions. Modeling of multistage and non-linear processes. Discrete-event processes, Markov processes, and automata theory.
Prerequisite(s): [(CHE 302 and CHE 351)]
(3-0-3)

CHE 435
Process Control
Dynamic process models, stability assessment, feedback, and feed forward control strategies, design and tuning of closed-loop controllers, time domain and frequency domain design and performance assessment methods. Multivariable systems, interaction, multi-loop control. Software for process simulation and controller design.
Prerequisite(s): [(CHE 302 and CHE 433)]
(3-0-3)

CHE 439
Numerical & Data Analysis
Utilization of numerical methods to find solutions to a variety of chemical engineering problems. Emphasis placed on problem formulation, development of computer code, and interpretation of results. Techniques covered include: systems of algebraic equations, linear regression, and statistics. Numerical differentiation and integration, solution of ordinary and partial differential equations.
Prerequisite(s): [(CHE 406*, CHE 423, and CHE 435)] AND [(MATH 252)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

CHE 451
Thermodynamics II
Second law analysis of cooling, separation, combustion, and other chemical processes. Chemical reaction equilibrium and processing applications.
Prerequisite(s): [(CHE 351)]
(3-0-3)

CHE 455
Polymer Processing
Considerations of transport processes in the polymer industry. Analysis of heat, mass, and momentum transfer in molten polymers and polymer solutions. The polymer flow processes to be discussed will include: extrusion, calendaring, fiber spinning, injection molding, mixing, and polymerization reaction.
Prerequisite(s): [(CHE 301 and CHE 302)]
(3-0-3)

CHE 465
Electrochemical Energy Conversion
Thermodynamics, kinetic and mass-transfer fundamentals of electrochemical devices. Potential and potential measurement. Batteries and fuel cells. Fundamentals of corrosion and corrosion prevention.
Prerequisite(s): [(CHE 302)]
(3-0-3)

CHE 467
Fuel Cell System Design
System or chemical reactor perspective of fuel cell design. Macro-scale modeling of fuel cell applications. Description of electrode/electrolyte assemblies and the three phase region, polarization curve characterization, analysis of continuous flow systems, typical fuel cell stack configurations, analysis of spatial non-uniformities in stacks, and balance of plant design.
Prerequisite(s): [(CHE 423)]
(3-0-3)

CHE 470
Introduction to Polymer Science
An introduction to the basic principles that govern the synthesis, processing and properties of polymeric materials. Topics include classifications, synthesis methods, physical and chemical behavior, characterization methods, processing technologies and applications. Same as CHEM 470 and MMAE 470.
Prerequisite(s): [(CHEM 124, MATH 251, and PHYS 221)]
(3-0-3)

CHE 489
Fluidization
Regimes of fluidized beds, rheology behavior of fluidized beds, particle classification, properties of the bubble, emulsion, elutriation, and jet. Fluid mechanic theory and heat and mass transfer in fluidized beds. Design aspects of fluidized beds and pneumatic conveying. Industrial applications of fluidized beds (catalytic reactors, drying, coal conversion, waste treatment).
Prerequisite(s): [(CHE 302)]
(3-0-3)

CHE 491
Undergraduate Research
Students undertake an independent research project under the guidance of a chemical and biological engineering faculty member.
(Credit: Variable)

CHE 494
Process Design I
Introduction to design techniques and economic aspects of chemical processes. The technical and economic aspects of equipment selection and design, and alternative methods of operation.
Prerequisite(s): [(CHE 302, CHE 423*, CHE 433, CHE 435*, and CHE 451)] An asterisk (*) designates a course which may be taken concurrently.
(2-2-3) **(C)**

CHE 496
Process Design II
Group project in process design. Integration of technical, safety, environmental, economic, and societal issues in process development and design. Final part of the IPRO project package. Project teams consist of chemical engineering students and students from other disciplines and professions. Students from other academic units should register for designated section of IPRO 497 (three credits) and their contribution to the project tasks will be defined accordingly. Only CHE students should register for this course. Same as IPRO 496. Open only to Chemical Engineering majors.
Prerequisite(s): [(CHE 423*, CHE 435*, and CHE 494)] An asterisk (*) designates a course which may be taken concurrently.
(2-2-3) **(C)**

CHE 497
Special Projects
Special projects.
(Credit: Variable)

CHE 498
Chemical Process Safety Design
The purpose of the course is to apply process design disciplines to integrate safety as a principal of the design process. Typical subjects are: thermodynamics of explosions, identification of process hazards, chemical reactivity hazards, dispersion models of release of toxic materials, fires and fire protection, and HAZOP and Fault Tree analysis.
Prerequisite(s): [(CHE 494)]
(3-0-3)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

CHE 503
Thermodynamics

CHE 505
Fluid Properties

CHE 506
Entrepreneurship and Intellectual Property Management

CHE 508
Process Design Optimization

CHE 510
Fluid Dynamics

CHE 511
Regulatory Issues in Pharmaceutical Processes

CHE 512
Heat Transfer

CHE 514
Process Analytical Technology

CHE 515
Natural Gas Processing

CHE 518
Mass Transfer

CHE 519
Biosensors

CHE 522
Fundamentals of Combustion

CHE 524
Industrial Catalysis

CHE 525
Chemical Reaction Engineering

CHE 530
Advanced Process Control

CHE 533
Statistical Analysis of Systems

CHE 535
Applications of Mathematics to Chemical Engineering

CHE 536
Computational Techniques in Engineering

CHE 538
Polymerization Reaction Engineering

CHE 541
Renewable Energy Technologies

CHE 542
Fluidization and Gas-Solids Flow Systems

CHE 543
Energy, Environment and Economics

CHE 545
Metabolic Engineering

CHE 551
Advanced Transport Phenomena

CHE 553
Advanced Thermodynamics

CHE 555
Polymer Processing

CHE 560
Statistical Quality and Process Control

CHE 565
Fundamentals of Electrochemistry

CHE 566
Electrochemical Engineering

CHE 573
Bioseparations

CHE 575
Polymer Rheology

CHE 577
Bioprocess Engineering

CHE 580
Biomaterials

CHE 582
Interfacial and Colloidal Phenomena with Applications

CHE 583
Pharmaceutical Engineering

CHE 584
Tissue Engineering

CHE 585
Drug Delivery

CHE 586
Particulate Technology

Chemistry

CHEM 100
Introduction to the Profession
Introduction to the chemical sciences, scientific method, computing tools, and interrelations of chemical sciences with biology, physics and other professions.
(2-0-2) **(C)**

CHEM 122
Principles of Chemistry I Without Laboratory
Foundations of chemistry, atoms and molecules, stoichiometry of chemical reactions, thermo chemistry, properties of gases, states of matter, chemical solutions, kinetics. Molecular basis for chemical reactivity; atomic structure, periodicity, chemical bonding. Same as CHEM 124 except without the laboratory.
(3-0-3)

CHEM 123
General Chemistry Laboratory
General chemistry laboratory. The laboratory portion of CHEM 124.
(0-3-1)

CHEM 124
Principles of Chemistry I with Laboratory
Foundations of chemistry, atoms and molecules, stoichiometry of chemical reactions, thermo chemistry, properties of gases, states of matter, chemical solutions, kinetics. Molecular basis for chemical reactivity; atomic structure, periodicity, chemical bonding.
(3-3-4) **(C)**

CHEM 125
Principles of Chemistry II with Laboratory
Chemical equilibria, the chemistry of acids and bases, solubility and precipitation reactions. Introduction to thermodynamics and electrochemistry. Chemistry of selected elements and their compounds.
Prerequisite(s): [(CHEM 124) OR (IIT Chemistry Placement: 125)]
(3-3-4) **(C)**

CHEM 126
Principles of Chemistry II Without Laboratory
Same as CHEM 125 except without the laboratory.
Prerequisite(s): [(CHEM 122) OR (CHEM 124)]
(3-0-3)

CHEM 140
Principles of Chemistry II Lab
Laboratory portion of CHEM 125 (Principles of Chemistry II) covering Chemical Equilibria, the chemistry of acids and bases, solubility, and precipitation reactions. Introduction to thermodynamics and electrochemistry. Chemistry of selected elements and their compounds.
Prerequisite(s): [(CHEM 126)]
(0-3-1)

CHEM 235
Organic Chemistry I-Lecture
The constitution and properties of the different classes of organic compounds, with considerable attention to stereochemistry, reaction mechanisms, synthetic organic and bio-organic chemistry, and spectroscopy. The laboratory work involves an introduction to major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds and the isolation of compounds from natural sources. Lecture only.
Prerequisite(s): [(CHEM 125) OR (CHEM 126)]
(3-0-3)

CHEM 236
Organic Chemistry I-Lab
Introduction to the major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds from natural sources.
Prerequisite(s): [(CHEM 125) OR (CHEM 126)]
(0-4-1)

CHEM 237
Organic Chemistry I
The constitution and properties of the different classes of organic compounds, with considerable attention to stereochemistry, reaction mechanisms, synthetic organic and bio-organic chemistry, and spectroscopy. The laboratory work involves an introduction to the major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds and the isolation of compounds from natural sources.
Prerequisite(s): [(CHEM 125) OR (CHEM 126)]
(3-4-4) **(C)**

CHEM 239
Organic Chemistry II
Sequel to Organic Chemistry I. Constitution and properties of organic compounds at a fundamental level. Introduction to biological materials and synthetic polymers.
Prerequisite(s): [(CHEM 235 and CHEM 236) OR (CHEM 237)]
(3-0-3)

CHEM 240
Organic Chemistry Laboratory
Laboratory part of CHEM 239. Techniques for advanced organic preparations. Identification and characterization of organic compounds, including modern instrumental methods.
Prerequisite(s): [(CHEM 239*)] An asterisk (*) designates a course which may be taken concurrently.
(1-4-2) **(C)**

CHEM 247
Analytical Chemistry
Introduction to the theory and applications of analytical chemistry. Laboratory emphasis on obtaining and interpreting quantitative data. Statistical data analysis, equilibrium expressions, pH, volumetric and gravimetric analysis, fundamentals of spectroscopy, fundamentals of electrochemistry, and analytical separations. Laboratory experiments include acid-base behavior, potentiometry with ion-specific electrodes, spectroscopy (UV-visible and atomic absorption), and chromatography (ion-exchange, high pressure liquid, and gas-liquid).
Prerequisite(s): [(CHEM 125)]
(2-4-3) **(C)**

CHEM 321
Instrumental Analysis
Theory and application of modern instruments in chemical procedures. Standard spectroscopic methods including Fourier transform infrared spectroscopy, nuclear magnetic resonance spectroscopy and ultraviolet spectroscopy. Separation techniques using high pressure liquid chromatography and gas chromatography. Other topics relevant to advanced chemical instrumentation will also be covered.
Prerequisite(s): [(CHEM 247)]
(2-6-4) **(C)**

CHEM 343
Physical Chemistry I
Equations of state; kinetic molecular theory; temperature dependent enthalpies and heat capacities of chemical compounds and of chemical reactions; entropy and the Gibbs free energy; chemical equilibrium; phases with variable composition; solutions of charged particles; surface phenomena.
Prerequisite(s): [(MATH 251) OR (MATH 252)]
(3-0-3)

CHEM 344
Physical Chemistry II
Quantum theory, molecular structure and spectroscopy, chemical equilibrium constants from statistical mechanics, phenomenological and mechanistic chemical reaction kinetics, transport phenomena from molecular perspective. The laboratory will include experiments dealing with gases, thermo chemistry, liquid solutions, phase equilibria, electrochemistry, chemical kinetics, spectra, molecular structure, and treatment of data.
Prerequisite(s): [(CHE 202) OR (CHEM 247)] AND [(CHEM 343 and PHYS 221)]
(3-4-4) **(C)**

CHEM 410
Science of Climate Change
This course will focus on the science underlying global warming/climate change. How can we continue to lead the good life while living in harmony with nature? Although obviously important, commercial/political aspects are not considered here. However, any serious debate about climate change issues eventually has to rest on the underlying scientific facts so we need to be informed. Ultimately the sun is our primary source of power. How do we responsibly access that power in the short, intermediate and long terms? Bio-fuels, carbon dioxide, polar ice caps, and solar power are some of the topics to be discussed. Class time will be divided between lectures and recitation. Permission of instructor required.
Prerequisite(s): [(CHEM 124) OR (PHYS 221)]
(3-0-3)

CHEM 415
Inorganic Chemistry
In-depth introduction to the vast subfield of the discipline dealing with all of the elements in the periodic table. Presents balanced blend of facts and theories in modern inorganic chemistry. Emphasis is on bonding, electronic, magnetic, and structural features exhibited by inorganic and organometallic compounds and their reactivities. Modern concepts including symmetry and group theory and their relevance in solving chemical problems. Bioinorganic chemistry and high tech inorganic materials and solids are introduced.
Prerequisite(s): [(CHEM 239)]
(3-0-3)

CHEM 416
Advanced Chemistry Laboratory
An advanced laboratory with emphasis on synthesis and characterization of inorganic and organometallic compounds.
Prerequisite(s): [(CHEM 240 and CHEM 415)]
(1-7-3) **(C)**

CHEM 434
Spectroscopic Methods in Identification & Analysis
Characterization and analysis by mass, vibrational, nuclear magnetic resonance, and electronic spectroscopy. Structure-spectra correlations applied to organic and inorganic compounds with examples drawn from diverse areas, e.g., pollutants, toxic materials, polymers, etc. The laboratory work includes characterization of prepared or separated organic compounds by chromatographic, chemical, and spectroscopic methods.
Prerequisite(s): [(CHEM 240 and CHEM 247)]
(3-4-4)

CHEM 450
Introduction to Research
Required for chemistry majors. Designed to give research experience in a faculty research laboratory.
(0-8-3) **(C)**

CHEM 451
Modern Techniques in Chemical Literature
A guide to the use of traditional and automated methods for the storage and retrieval of chemical information.
(3-0-3)

CHEM 454
Chemical Modeling & Simulation
A computer applications course for chemists, chemical engineers, and scientists emphasizing software application rather than hardware. This class is intended to provide an introduction to computational chemistry for non-specialists and to demonstrate how these techniques can pragmatically impact the chemical industry. The subject matter is presented using practical industrial problems that emphasize scientific solutions. Class work involves "hands on" learning that extensively involves the interactive use of computers. Lectures emphasize the theoretical foundations for a particular topic and follow up practical assignments reinforce that material. Both the lectures and the home works demonstrate the power and limitations of modern molecular modeling by addressing the use of computers in the design of materials. By the end of the course, students will understand the basic concepts and language of chemistry modeling so that they may successfully incorporate it into their work.
Prerequisite(s): [(CHEM 344, CS 105, and MATH 152)]
(3-0-3)

CHEM 455
Advanced Organic Chemistry
A survey of organic name reactions and modern reagents for organic synthesis with an emphasis on their utility in multistep synthesis.
Prerequisite(s): [(CHEM 239 and CHEM 344)]
(3-0-3)

CHEM 470
Introduction to Polymers
Basic introduction to Polymer Science. The course will cover basics of polymer nomenclature, synthesis, characterization, and the relationship between polymer structures and properties. Examples of major applications of polymeric materials including biopolymers will be presented.
Prerequisite(s): [(CHEM 239)]
(3-0-3)

CHEM 485
Chemistry Colloquium
Lectures by prominent scientists. This course exposes students to current and active research in chemistry both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to the academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.
(1-0-1)

CHEM 487
Senior Thesis in Chemistry
Original work carried on by the student under the guidance of a staff member. A careful search of the literature is required before the study is begun, and continued reference to the chemical literature is expected as the work progresses. A written report is required.
Prerequisite(s): [(CHEM 450 and CHEM 451)]
(0-12-4) **(C)**

CHEM 497
Special Projects
For juniors and seniors. Requires junior standing.
(Credit: Variable) **(C)**

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

CHEM 500
Advanced Analytical Chemistry

CHEM 502
Gas Chromatography, Gas Chromatography Mass Spectrometry

CHEM 504
Electroanalytical Chemistry

CHEM 505
Spectroscopic Methods

CHEM 506
Sampling and Sample Preparation

CHEM 508
Analytical Methods Development

CHEM 509
Physical Methods of Characterization

CHEM 510
Electronics and Interfacing

CHEM 518
Understanding the International Conference on Harmonization Guidelines

CHEM 520
Advanced Inorganic Chemistry

CHEM 521
Structural Inorganic and Materials Chemistry

CHEM 522
Efficient Chemical and Materials Synthesis

CHEM 524
Synthesis and Intellectual Property Management

CHEM 530
Organic Reaction Mechanisms

CHEM 531
Tactics in Organic Synthesis

CHEM 535
Polymer Synthesis

CHEM 537
Polymer Chemistry Laboratory

CHEM 538
Physical Biochemistry

CHEM 539
Introduction to Pharmaceutical Chemistry

CHEM 542
Polymer Characterization and Analysis

CHEM 550
Chemical Bonding

CHEM 552
Chemical Kinetics

CHEM 553
Introduction to Chemical Thermodynamics

Communication

COM 101
Writing in the University
A study of the use of writing, reading, and discussion as a means of discovering, questioning, and analyzing ideas, with an emphasis on audience, context and the use of revision. This course satisfies the Basic Writing Proficiency Requirement. It does not satisfy a general education requirement in the Humanities and Social or Behavioral Sciences.
(3-0-3) **(C)**

COM 125
Language & Culture I
The first of a two-semester sequence, this course and its sequel will introduce students to a particular language and culture, which will change annually. May be repeated for different languages. This course does not satisfy the HUM 102, 104, or 106 general education requirement.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

COM 126
Language & Culture II
The second of a two-semester sequence, this course and its predecessor will introduce students to a particular language and culture, which will change annually. May be repeated for different languages. This course does not satisfy the HUM 102, 104, or 106 general education requirement.
Prerequisite(s): [(COM 125)] AND Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

COM 201
Digital Writing
The rhetorical theory and applied practice of digital writing. Topics include word processor alternatives, social media for professional development, multimedia writing, and collaboration and project management.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)**

COM 225
Languages & Cultures III
Third-semester generic language and culture course designed to be applicable to various languages. Students should have already taken COM 126 in same language.
Prerequisite(s): [(COM 125)]
(3-0-3) **(H)**

COM 226
Languages & Cultures IV
Fourth-semester generic language and culture course designed to be applicable to various languages. Students should have already taken COM 225 in the same language.
Prerequisite(s): [(COM 225)]
(3-0-3) **(H)**

COM 301
Introduction to Linguistics
An introduction to the systematic study of language. Focus on the core areas of linguistics, such as sound patterns of language (phonology), form (syntax, morphology), and meaning (semantics, pragmatics), as well as applied areas, such as language, variation, language acquisition, psychology of language, and the origin of language.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 306
World Englishes
This course surveys dialects of English around the world, including the U.S., U.K., Canada, India, Africa, and the Caribbean, focusing on vocabulary, word and sentence formation, and sound patterning.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 308
Structure of Modern English
This course examines the structure of the English language from four different approaches: traditional-prescriptive, descriptive, generative, and contextual.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 309
History of the English Language
Beginning with basic concepts in language development, this course traces the evolution of modern English, from its Indo-European roots, through Germanic, Anglo-Saxon, Middle English and Early Modern English.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 310
The Human Voice: Description, Analysis & Application
Analysis of human and synthetic speech intended for technology mediated environments and devices. Focus on talker characteristics that affect speech intelligibility and social factors that affect talker characteristics. Attention to design characteristics of technology-mediated speech and how humans react to it.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 311
Linguistics for Technical Communication
This course examines linguistic theory as it relates to everyday problems. The course is divided into four sections, each of which exposes students to an application of these topics to broader issues. Topics include sound patterns of speech, sentence structure, meaning and language and society.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 315
Discourse Analysis
The analysis of language "flow" beyond sentence boundaries. Working with both spoken and written discourse, students will consider culture and gender-related patterns, and will apply findings from discourse analysis to communication problems in politics, education, healthcare, and the law.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 323
Communicating Science
This course focuses on strategies for communicating scientific information in professional and general settings. Students develop genre documents, learn how to adapt scientific information to various audiences, and complete exercises on style, grammar, and other elements of effective professional communication. Emphasis on usability, cohesion, and style in all assignments.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)**

COM 327
Standards-Based Web Design
This course introduces the theory and practice of standards-based web design and development. The course focuses on an agile, incremental approach to building accessible, usable, and sustainable web pages that work across all modern browsers and web-enabled mobile devices. The course also provides a rhetorical and technological foundations for quickly establishing competencies in other areas of digital communication, such as web application development.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 371
Persuasion
The study of covert and overt persuasion and their influences on society and individuals.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 372
Mass Media & Society
The history and structure of mass media, from print through film and broadcasting to the Internet, and their influences on American society.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 374
Communication in Politics
This course introduces students to the general theories and practices of political campaign communication today. It investigates how those rules and types apply in the current presidential campaign. More generally, the course teaches students to produce written and oral discourse appropriate to the humanities.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 377
Communication Law & Ethics
Explores ethical and legal issues concerning communication in diverse contexts, such as: the mass media - e.g. print, broadcast, and electronic; government and politics; organizational hierarchies - e.g. public and private sector workplaces; academic life - e.g. the classroom, student, and faculty affairs; and interpersonal relations - e.g. love, friendship, marriage.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 380
Topics in Communication
An investigation into a topic of current interest in communication, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 381
Topics in Communication
An investigation into a topic of current interest in communication, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)**

COM 383
Social Networks
This course will discuss a variety of measures and properties of networks, identify various types of social networks, describe how position within and the structure of networks matter, use software tools to analyze social network data, and apply social network analysis to areas such as information retrieval, social media and organizational behavior.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 384
Humanizing Technology
This course will investigate and experiment with both conceptual and applied efforts to humanize technology. We will question the goals of humanization and its relationships to concepts such as design ethics and user-centered and emotional design. While the focus of the class will be on computer technology and programming languages, we will also look at humanization with regard to industrial design, engineering, architecture and nanotechnologies.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 421
Technical Communication
Principles and practice in the communication of technical materials. Students work on the design, writing, and revising of reports, articles, manuals, procedures, proposals, including the use of graphics. Works by modern writers are analyzed.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)**

COM 424
Document Design
Principles and strategies for effective document and information design, focusing on print media. Students design, produce, and evaluate documents for a variety of applications, such as instructional materials, brochures, newsletters, graphics, and tables.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)**

COM 425
Editing
Principles and practical applications of editing at all levels, working with both hard and soft copy and including copymarking, copyediting, proofreading, grammar and style, and comprehensive editing. Attention primarily to documents from science, technology, and business.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)**

COM 428
Verbal & Visual Communication
Introduces students to the issues, strategies, and ethics of technical and professional presentations, and provides students with opportunities to engage in public address, video presentations and conferencing, and group presentations. Analysis of audience types and presentation situations, group dynamics, persuasive theories, language, and mass media.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)**

COM 435
Intercultural Communication
An introduction to the problems of communication across cultures, with emphasis on the interplay of American civilization with those of other cultural areas.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 440
Introduction to Journalism
Introduction to the principles and practices of modern American journalism. Students will analyze news stories and media, and will cover and report on campus area events. Student-generated news stories will be discussed, analyzed and evaluated.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

COM 485
Undergraduate Internship in Technical Communication
A cooperative arrangement between IIT and industry, the internship provides students with hands-on experience in the field of technical communication.
(Credit: Variable)

COM 491
Independent Reading & Research
Consent of department. For advanced students. Based on the selected topic, this course may or may not be applied to the humanities general education requirement. Consult the course instructor.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) **(C)(H)**

Computer Science

CS 100
Introduction to the Profession
An introduction to science and engineering as a profession. Examines the problem-solving process used in engineering and science. Emphasizes the interdisciplinary and international nature of problem-solving and the need to evaluate solutions in terms of a variety of constraints: computational, financial, and social.
(1-2-2) **(C)**

CS 104
Introduction to Computer Programming for Engineers
Introduces the use of high-level programming language as a problem-solving tool in engineering including basic data structures and algorithms, structured programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming.
(2-1-2)

CS 105
Introduction to Computer Programming
Introduces the use of high-level programming language as a problem-solving tool, including basic data structures and algorithms, structured programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming.
(2-1-2)

CS 110
Computing Principles
An introduction to the following "big ideas" of computer science: (1) computing is a creative activity; (2) abstraction reduces information and detail to facilitate focus on relevant concepts; (3) data and information facilitate the creation of knowledge; (4) algorithms are used to develop and express solutions to computational problems; (5) programming enables problem solving, human expression, and creation of knowledge; (6) the internet pervades modern computing; and (7) computing has global impacts. Course does not satisfy graduation requirements for Computer Information Systems or Computer Science majors. Course does not satisfy graduation requirements for students in the Armour College of Engineering or the College of Architecture.
(2-0-2)

CS 115
Object-Oriented Programming I
Introduces the use of a high-level object-oriented programming language as a problem-solving tool, including basic data structures and algorithms, object-oriented programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming. For students in CS and CS-related degree programs.
(2-1-2)

CS 116
Object-Oriented Programming II
Introduces more advanced elements of object-oriented programming, including dynamic data structures, recursion, searching and sorting, and advanced object-oriented programming techniques. For students in CS and CS-related degree programs.
Prerequisite(s): [(CS 115 with min. grade of C)]
(2-1-2)

CS 201
Accelerated Introduction to Computer Science
Problem-solving and design using an object-oriented programming language. Introduces a variety of problem-solving techniques, algorithms, and data structures in object-oriented programming.
Prerequisite(s): [(CS 105) OR (CS 115)]
(3-2-4)

CS 330
Discrete Structures
Introduction to the use of formal mathematical structures to represent problems and computational processes. Topics covered include Boolean algebra, first-order logic, recursive structures, graphs, and abstract language models. Credit will not be granted for both CS 330 and MATH 230.
Prerequisite(s): [(CS 116) OR (CS 201)]
(3-1-3)

CS 331
Data Structures & Algorithms
Implementation and application of the essential data structures used in computer science. Analysis of basic sorting and searching algorithms and their relationship to these data structures. Particular emphasis is given to the use of object-oriented design and data abstraction in the creation and application of data structures.
Prerequisite(s): [(CS 116) OR (CS 201)]
(3-1-3)

CS 350
Computer Organization & Assembly Language Programming

Introduction to the internal architecture of computer systems, including micro-, mini-, and mainframe computer architectures. Focuses on the relationship among a computer's hardware, its native instruction set, and the implementation of high-level languages on that machine. Uses a set of assembly language programming exercises to explore and analyze a microcomputer architecture. Credit will not be granted for both CS 350 and ECE 242.
Prerequisite(s): [(CS 116*) OR (CS 201*)] An asterisk (*) designates a course which may be taken concurrently.
(3-1-3) **(C)**

CS 351
Systems Programming

Examines the components of sophisticated multilayer software systems, including device drivers, systems software, applications interfaces, and user interfaces. Explores the design and development of interrupt-driven and event-driven software.
Prerequisite(s): [(CS 331 and CS 350) OR (CS 331 and ECE 242)]
(3-1-3)

CS 397
Special Projects

(Credit: Variable)

CS 411
Computer Graphics

Overview of display devices and applications. Vector graphics in two and three dimensions. Image generation, representation, and manipulation. Homogeneous coordinates. Modeling and hidden line elimination. Introduction to raster graphics. Perspective and parallel projections.
Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]
(3-0-3) **(T)**

CS 422
Data Mining

This course will provide an introductory look at concepts and techniques in the field of data mining. After covering the introduction and terminologies to Data Mining, the techniques used to explore the large quantities of data for the discovery of meaningful rules and knowledge such as market basket analysis, nearest neighbor, decision trees, and clustering are covered. The students learn the material by implementing different techniques throughout the semester.
Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]
(3-0-3) **(C)(T)**

CS 425
Database Organization

Overview of database architectures, including the Relational, Hierarchical, Network, and Object Models. Database interfaces, including the SQL query language. Database design using the Entity-Relationship Model. Issues such as security, integrity, and query optimization.
Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]
(3-0-3) **(C)(T)**

CS 429
Information Retrieval

Overview of fundamental issues of information retrieval with theoretical foundations. The information-retrieval techniques and theory, covering both effectiveness and run-time performance of information-retrieval systems are covered. The focus is on algorithms and heuristics used to find documents relevant to the user request and to find them fast. The course covers the architecture and components of the search engine such as parser, stemmer, index builder, and query processor. The students learn the material by building a prototype of such a search engine. Requires strong programming knowledge.
Prerequisite(s): [(CS 331) OR (CS 401)]
(3-0-3) **(C)(T)**

CS 430
Introduction to Algorithms

Introduction to the design, behavior, and analysis of computer algorithms. Searching, sorting, and combinatorial algorithms are emphasized. Worst case, amortized, and expected bounds on time and space usage.
Prerequisite(s): [(CS 330 and CS 331) OR (CS 331 and MATH 230) OR (CS 401) OR (CS 403)]
(3-1-3) **(C)(T)**

CS 440
Programming Languages & Translators

Study of commonly used computer programming languages with an emphasis on precision of definition and facility in use. Scanning, parsing, and introduction to compiler design. Use of compiler generating tools.
Prerequisite(s): [(CS 330 and CS 331) OR (CS 331 and MATH 230) OR (CS 401) OR (CS 403)]
(3-0-3) **(T)**

CS 442
Mobile Applications Development

Students will learn a variety of software engineering techniques and design patterns to assist in the rapid development and prototyping of applications, leveraging frameworks and APIs provided by current mobile development platforms (such as Android and iOS). Application lifecycles, data management and persistence mechanisms, and user interface design, among other topics, will be covered. Industry speakers will be invited to speak about best practices. Students (individually or in teams) will take ideas from concept to final implementation and will present their work at the end of the semester. When appropriate, students may take the additional step of deploying their work on the appropriate application marketplace(s).
Prerequisite(s): [(CS 331) OR (CS 401)] AND [(CS 351*) OR (CS 402*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(T)**

CS 443
Compiler Construction

This course covers the design and implementation of a compiler for modern languages by implementing the following: abstract syntax trees; intermediate representations; static analysis; fix-point operations; symbol tables and type checking; and first-order and high-order function implementation. Students will incrementally create a series of compilers.
Prerequisite(s): [(CS 440)]
(3-0-3)

CS 445
Object Oriented Design & Programming

Introduction to methodologies for object-oriented design and programming. Examines the object model and how it is realized in various object-oriented languages. Focuses on methods for developing and implementing object-oriented systems.
Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]
(3-0-3) **(T)**

CS 447
Distributed Objects

This course provides an introduction to architecture, analysis, design, and implementation of distributed, multi-tier applications using distributed object technology. The course focuses on the services and facilities provided by an Object Request Broker (ORB). Students will use a commercially available ORB and Database Management System to develop distributed object applications.
Prerequisite(s): [(CS 445)]
(3-0-3) **(C)(T)**

CS 450
Operating Systems

Introduction to operating system concepts-including system organization for uniprocessors and multiprocessors, scheduling algorithms, process management, deadlocks, paging and segmentation, files and protection, and process coordination and communication.
Prerequisite(s): [(CS 351) OR (CS 401 and CS 402) OR (CS 403)]
(3-0-3) **(T)**

CS 451
Introduction to Parallel & Distributed Computing

This course covers general introductory concepts in the design and implementation of parallel and distributed systems covering all the major branches such as cloud computing, grid computing, cluster computing, supercomputing, and many-core computing.
Prerequisite(s): [(CS 450)]
(3-0-3)

CS 455
Data Communications

Introduction to data communication concepts and facilities with an emphasis on protocols and interface specifications. Focuses on the lower four layers of the ISO-OSI reference model.
Prerequisite(s): [(CS 450)]
(3-0-3) **(T)**

CS 456
Introduction to Wireless Networks & Performance

This class provides an opportunity for students to obtain a fundamental understanding of the nature and operation of the full range of wireless networks (personal, local area, wide area, and satellite) and their performance characteristics, future potential, and challenges through class lectures, assigned readings, homework, projects, and various hands-on experiences.
Prerequisite(s): [(CS 350) OR (CS 401 and CS 402) OR (CS 403) OR (ECE 242)]
(3-0-3) **(T)**

CS 458
Information Security

An introduction to the fundamentals of computer and information security. This course focuses on algorithms and techniques used to defend against malicious software. Topics include an introduction to encryption systems, operating system security, database security, network security, system threats, and risk avoidance procedures.
Prerequisite(s): [(CS 425 and CS 450)]
(3-0-3) **(C)(T)**

CS 470
Computer Architecture

Introduction to the functional elements and structures of digital computers. Detailed study of specific machines at the register transfer level illustrates arithmetic, memory, I/O and instruction processing.
Prerequisite(s): [(CS 350 and ECE 218) OR (ECE 218 and ECE 242)]
(2-2-3) **(C)(T)**

CS 480
Artificial Intelligence Planning & Control

Introduction to computational methods for intelligent control of autonomous agents, and the use of programming paradigms that support development of flexible and reactive systems. These include heuristic search, knowledge representation, constraint satisfaction, probabilistic reasoning, decision-theoretic control, and sensor interpretation. Particular focus will be places on real-world application of the material.
Prerequisite(s): [(CS 331 and MATH 474*) OR (CS 401 and CS 402)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(T)**

CS 481
Artificial Intelligence Language Understanding

Theory and programming paradigms that enable systems to understand human language texts and extract useful information and knowledge. For example, extraction of structured event representations from news stories or discovering new research hypotheses by analyzing thousands of medical research articles. the course covers a variety of text analysis and text mining methods, with an emphasis on building working systems. Connections to information retrieval, data mining, and speech recognition will be discussed.
Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)] AND [(MATH 474)]
(3-0-3) **(T)**

CS 482
Information & Knowledge Management Systems

This capstone course is designed as a project course whose purpose is to enable students to see how the various algorithms and systems they have learned about in their prerequisite courses can be used in context to create useful knowledge management tools. Class periods will be divided among discussion of design of information and knowledge management systems, lectures on effective project management techniques, and hands-on advising of student project group meetings.
Prerequisite(s): [(CS 422, CS 425, and CS 429) OR (CS 422, CS 425, and CS 481) OR (CS 425, CS 429, and CS 481)]
(3-0-3) **(C)(T)**

CS 485
Computers & Society

Discussion of the impact of computer technology on present and future society. Historical development of the computer. Social issues raised by cybernetics.
Prerequisite(s): [(COM 421) OR (COM 428)]
(3-0-3) **(C)**

CS 487
Software Engineering I

Study of the principles and practices of software engineering. Topics include software quality concepts, process models, software requirements analysis, design methodologies, software testing and software maintenance. Hands-on experience building a software system using the waterfall life cycle model. Students work in teams to develop all life cycle deliverables: requirements document, specification and design documents, system code, test plan, and user manuals.
Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)] AND [(CS 425)]
(3-0-3) **(C)(T)**

CS 491
Undergraduate Research
(Credit: Variable)

CS 495
Topics in Computer Science
This course will treat a specific topic, varying from semester to semester, in which there is particular student or staff interest.
(Credit: Variable)

CS 497
Special Projects
Special projects.
(Credit: Variable)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

CS 511
Topics in Computer Graphics

CS 512
Topics in Computer Vision

CS 520
Data Integration, Warehousing, and Provenance

CS 521
Object-Oriented Analysis and Design

CS 522
Data Mining

CS 525
Advanced Database Organization

CS 529
Information Retrieval

CS 530
Theory of Computation

CS 531
Topics in Automata Theory

CS 532
Formal Languages

CS 533
Computational Geometry

CS 535
Design and Analysis of Algorithms

CS 536
Science of Programming

CS 537
Software Metrics

CS 538
Combinatorial Optimization

CS 540
Syntactic Analysis of Programming Languages

CS 541
Topics in Compiler Construction

CS 542
Computer Networks I Fundamentals

CS 544
Computer Networks II: Network Services

CS 545
Distributed Computing Landscape

CS 546
Parallel and Distributed Processing

CS 547
Wireless Networking

CS 548
Broadband Networks

CS 549
Cryptography and Network Security

CS 550
Advanced Operating Systems

CS 551
Operating System Design and Implementation

CS 552
Distributed Real-Time Systems

CS 553
Cloud Computing

CS 555
Analytic Models and Simulation of Computer Systems

CS 560
Computer Science in the Classroom

CS 561
The Computer and Curriculum Content

CS 570
Advanced Computer Architecture

CS 580
Topics in Machine Learning

CS 581
Topics in Artificial Intelligence

CS 582
Computational Robotics

CS 583
Probabilistic Graphical Models

CS 584
Machine Learning

CS 585
Natural Language Processing

CS 586
Software Systems Architectures

CS 587
Software Project Management

CS 588
Advanced Software Engineering Development

CS 589
Software Testing and Analysis

CS 595
Topics in Computer Science

Electrical and Computer Engineering

ECE 100
Introduction to the Profession I
Introduces the student to the scope of the engineering profession and its role in society and develops a sense of professionalism in the student. Provides an overview of electrical engineering through a series of hands-on projects and computer exercises. Develops professional communication and teamwork skills.
(2-3-3) **(C)**

ECE 211
Circuit Analysis I
Ohm's Law, Kirchhoff's Laws, and network element voltage-current relations. Application of mesh and nodal analysis to circuits. Dependent sources, operational amplifier circuits, superposition, Thevenin's and Norton's Theorems, maximum power transfer theorem. Transient circuit analysis for RC, RL, and RLC circuits. Introduction to Laplace Transforms. Laboratory experiments include analog and digital circuits; familiarization with test and measurement equipment; combinational digital circuits; familiarization with latches, flip-flops, and shift registers; operational amplifiers; transient effects in first-order and second-order analog circuits; PSpice software applications. Concurrent registration in MATH 252 and ECE 218.
Prerequisite(s): [(ECE 218* and MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)**

ECE 213
Circuit Analysis II
Sinusoidal excitation and phasors. AC steady-state circuit analysis using phasors. Complex frequency, network functions, pole-zero analysis, frequency response, and resonance. Two-port networks, transformers, mutual inductance, AC steady-state power, RMS values, introduction to three-phase systems and Fourier series. Design-oriented experiments include counters, finite state machines, sequential logic design, impedances in AC steady-state, resonant circuits, two-port networks, and filters. A final project incorporating concepts from analog and digital circuit design will be required. Prerequisites: ECE 211 with a grade C or better.
Prerequisite(s): [(ECE 211 with min. grade of C)]
(3-3-4) **(C)**

ECE 215
Circuit Analysis I
Ohm's Law, Kirchoff's Laws, and network element voltage-current relations. Application of mesh and nodal analysis to circuits. Dependent sources, operational amplifier circuits, superposition, Thevenin's and Norton's Theorems, maximum power transfer theorem. Transient circuit analysis for RC, RL, and RLC circuits. Introduction Laplace Transforms. Note: ECE 215 is for non-ECE majors. Course does not satisfy graduation requirements for Computer Engineering, Electrical and Computer Engineering or Electrical Engineering majors.
Prerequisite(s): [(MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

ECE 216
Circuit Analysis II
Sinusoidal excitation and phasors. AC steady-state circuit analysis using phasors. Complex frequency, network functions, pole-zero analysis, frequency response, and resonance. Two-port networks, transformers, mutual inductance, AC steady-state power, RMS values, introduction to three-phase systems and Fourier series. Note: ECE 216 is for non-ECE majors. Course does not satisfy graduation requirements for Computer Engineering, Electrical and Computer Engineering or Electrical Engineering majors.
Prerequisite(s): [(ECE 211 with min. grade of C) OR (ECE 215 with min. grade of C)]
(3-0-3)

ECE 218
Digital Systems
Number systems and conversions, binary codes, and Boolean algebra. Switching devices, discrete and integrated digital circuits, analysis and design of combinational logic circuits. Karnaugh maps and minimization techniques. Counters and registers. Analysis and design of synchronous sequential circuits. Concurrent registration in ECE 211 and ECE 212 is strongly encouraged. Requires sophomore standing.
(3-0-3)

ECE 242
Digital Computers & Computing
Basic concepts in computer architecture, organization, and programming, including: integer and floating point number representations, memory organization, computer processor operation (the fetch/execute cycle), and computer instruction sets. Programming in machine language and assembly language with an emphasis on practical problems. Brief survey of different computer architectures.
Prerequisite(s): [(CS 116 and ECE 218)]
(3-0-3)

ECE 307
Electrodynamics
Analysis of circuits using distributed network elements. Response of transmission lines to transient signals. AC steady-state analysis of lossless and lossy lines. The Smith Chart as an analysis and design tool. Impedance matching methods. Vector analysis applied to static and time-varying electric and magnetic fields. Coulomb's Law, electric field intensity, flux density and Gauss's Law. Energy and potential. Biot-Savart and Ampere's Law. Maxwell's equations with applications including uniform-plane wave propagation.
Prerequisite(s): [(ECE 213, MATH 251, and PHYS 221)]
(3-3-4)

ECE 308
Signals & Systems
Time and frequency domain representation of continuous and discrete time signals. Introduction to sampling and sampling theorem. Time and frequency domain analysis of continuous and discrete linear systems. Fourier series convolution, transfer functions. Fourier transforms, Laplace transforms, and Z-transforms.
Prerequisite(s): [(ECE 213 and MATH 333*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

ECE 311
Engineering Electronics
Physics of semiconductor devices. Diode operation and circuit applications. Regulated power supplies. Bipolar and field-effect transistor operating principles. Biasing techniques and stabilization. Linear equivalent circuit analysis of bipolar and field-effect transistor amplifiers. Laboratory experiments reinforce concepts.
Prerequisite(s): [(ECE 213)]
(3-3-4) **(C)**

ECE 312
Electronic Circuits
Analysis and design of amplifier circuits. Frequency response of transistor amplifiers. Feedback amplifiers. Operational amplifiers: internal structure, characteristics, and applications. Stability and compensation. Laboratory experiments reinforce concepts.
Prerequisite(s): [(ECE 311)]
(3-3-4) **(C)**

ECE 319
Fundamentals of Power Engineering
Principles of electromechanical energy conversion. Fundamentals of the operations of transformers, synchronous machines, induction machines, and fractional horsepower machines. Introduction to power network models and per-unit calculations. Gauss-Seidel load flow. Lossless economic dispatch. Symmetrical three-phase faults. Laboratory considers operation, analysis, and performance of motors and generators. The laboratory experiments also involve use of PC-based interactive graphical software for load flow, economic dispatch, and fault analysis.
Prerequisite(s): [(ECE 213)]
(3-3-4) **(C)**

ECE 401
Communication Electronics
Radio frequency AM, FM, and PM transmitter and receiver principles. Design of mixers, oscillators, impedance matching networks, filters, phase-locked loops, tuned amplifiers, power amplifiers, and crystal circuits. Nonlinear effects, intermodulation distortion, and noise. Transmitter and receiver design specification. Credit will be given for either ECE 401 or ECE 409, but not for both.
Prerequisite(s): [(ECE 307, ECE 312, and ECE 403*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(P)**

ECE 403
Digital & Data Communication Systems
Introduction to Amplitude, Phase, and Frequency modulation systems. Multiplexing and Multi-Access Schemes; Spectral design considerations. Sampling theorem. Channel capacity, entropy; Quantization, wave shaping, and Inter-Symbol Interference (ISI), Matched filters, Digital source encoding, Pulse Modulation systems. Design for spectral efficiency and interference control. Probability of error analysis, Analysis and design of digital modulators and detectors.
Prerequisite(s): [(ECE 308 and MATH 474)]
(3-0-3) **(P)**

ECE 405
Digital & Data Communication Systems with Laboratory
Introduction to Amplitude, Phase, and Frequency modulation systems. Multiplexing and Multi-Access Schemes; Spectral design considerations. Sampling theorem. Channel capacity, entropy; Quantization, wave shaping, and Inter-Symbol Interference (ISI), Matched filters, Digital source encoding, Pulse Modulation systems. Design for spectral efficiency and interference control. Probability of error analysis, Analysis and design of digital modulators and detectors.
Prerequisite(s): [(ECE 308* and MATH 474)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)(P)**

ECE 406
Introduction to Wireless Communication Systems
The course addresses the fundamentals of wireless communications and provides an overview of existing and emerging wireless communications networks. It covers radio propagation and fading models, fundamentals of cellular communications, multiple access technologies, and various wireless networks including past and future generation networks. Simulation of wireless systems under different channel environments will be an integral part of this course.
Prerequisite(s): [(ECE 403)]
(3-0-3)

ECE 407
Introduction to Computer Networks with Laboratory
Emphasis on the physical, data link, and medium access layers of the OSI architecture. Different general techniques for networking tasks, such as error control, flow control, multiplexing, switching, routing, signaling, congestion control, traffic control, scheduling will be covered along with their experimentation and implementation in a laboratory. Credit given for ECE 407 or ECE 408, not both. Requires senior standing.
(3-3-4) **(C)(P)**

ECE 408
Introduction to Computer Networks
Emphasis on the physical, data link and medium access layers of the OSI architecture. Different general techniques for networking tasks, such as error control, flow control, multiplexing, switching, routing, signaling, congestion control, traffic control, scheduling will be covered. Credit given for ECE 407 or ECE 408, not both. Requires senior standing.
(3-0-3) **(P)**

ECE 411
Power Electronics
Power electronic circuits and switching devices such as power transistors, MOSFET's, SCR's, GTO's, IGBT's and UJT's are studied. Their applications in AC/DC DC/DC, DC/AC and AC/AC converters as well as switching power supplies are explained. Simulation mini-projects and lab experiments emphasize power electronic circuit analysis, design and control.
Prerequisite(s): [(ECE 311)]
(3-3-4) **(C)(P)**

ECE 412
Electric Motor Drives
Fundamentals of electric motor drives are studied. Applications of semiconductor switching circuits to adjustable speed drives, robotic, and traction are explored. Selection of motor drives, calculating the ratings, speed control, position control, starting, and braking are also covered. Simulation mini-projects and lab experiments are based on the lectures given.
Prerequisite(s): [(ECE 311 and ECE 319)]
(3-3-4) **(C)(P)**

ECE 415
Solid-State Electronics
Comprehensive introduction to the basic concepts of Solid State Physics as applied to electronic devices, including heat and charge transport and electron spin effects in materials such as Silicon, Gallium Arsenide, and Gallium Nitride. The electronic structure of crystalline solids is described, as well as their phonon spectra. Carrier dynamics is discussed in detail by emphasizing the importance of the Boltzmann transport equation for both electrons and phonons. Spin transport in semiconductors will be introduced as well. Credit will be given for either ECE 415 or PHYS 415, but not for both.
Prerequisite(s): [(ECE 307) OR (PHYS 348)]
(3-0-3) **(P)**

ECE 417
Power Distribution Engineering

This is an introduction into power distribution systems from the utility engineering perspective. The course looks at electrical service from the distribution substation to the supply line feeding a customer. The course studies the nature of electrical loads, voltage characteristics and distribution equipment requirements. The fundamentals of distribution protection are reviewed including fast/relay coordination. Finally, power quality and reliability issues are addressed.
Prerequisite(s): [(ECE 319)]
(3-0-3) **(P)**

ECE 418
Power System Analysis

Transmission systems analysis and design. Large scale network analysis using Newton-Raphson load flow. Unsymmetrical short-circuit studies. Detailed consideration of the swing equation and the equal-area criterion for power system stability studies. Credit will be given for ECE 418 or ECE 419, but not for both.
Prerequisite(s): [(ECE 319)]
(3-0-3) **(P)**

ECE 419
Power Systems Analysis with Laboratory

Transmission systems analysis and design. Large scale network analysis using Newton-Raphson load flow. Unsymmetrical short-circuit studies. Detailed consideration of the swing equation and the equal-area criterion for power system stability studies. Use of commercial power system analysis tool to enhance understanding in the laboratory.
Prerequisite(s): [(ECE 319)]
(3-3-4) **(C)(P)**

ECE 420
Analytical Methods in Power Systems

Fundamentals of power systems operation and planning. Economic operation of power systems with consideration of transmission losses. Design of reliable power systems, power systems security analysis, optimal scheduling of power generation, estimation of power system state.
Prerequisite(s): [(ECE 319)]
(3-0-3) **(P)**

ECE 421
Microwave Circuits & Systems

Maxwell's equations, waves in free space, metallic and dielectric waveguides, microstrips, microwave cavity resonators and components, ultra-high frequency generation and amplification. Analysis and design of microwave circuits and systems. Credit will be given for either ECE 421 or ECE 423, but not for both.
Prerequisite(s): [(ECE 307)]
(3-0-3) **(P)**

ECE 423
Microwave Circuits & Systems with Laboratory

Maxwell's equations, waves in free space, metallic and dielectric waveguides, microstrips, microwave cavity resonators and components, ultra-high frequency generation and amplification. Analysis and design of microwave circuits and systems. Credit will be given for either ECE 421 or ECE 423, but not for both.
Prerequisite(s): [(ECE 307)]
(3-3-4) **(C)(P)**

ECE 425
Analysis & Design of Integrated Circuits

Contemporary analog and digital integrated circuit analysis and design techniques. Bipolar, CMOS and BICMOS IC fabrication technologies, IC Devices and Modeling, Analog ICs including multiple-transistor amplifiers, biasing circuits, active loads, reference circuits, output buffers; their frequency response, stability and feedback consideration. Digital ICs covering inverters, combinational logic gates, high-performance logic gates, sequential logics, memory and array structures.
Prerequisite(s): [(ECE 312)]
(3-0-3) **(P)**

ECE 429
Introduction to VLSI Design

Processing, fabrication, and design of Very Large Scale Integration (VLSI) circuits. MOS transistor theory, VLSI processing, circuit layout, layout design rules, layout analysis, and performance estimation. The use of computer aided design (CAD) tools for layout design, system design in VLSI, and application-specific integrated circuits (ASICs). In the laboratory, students create, analyze, and simulate a number of circuit layouts as design projects, culminating in a term design project.
Prerequisite(s): [(ECE 218 and ECE 311)]
(3-3-4) **(C)(P)**

ECE 436
Digital Signal Processing I with Laboratory

Discrete-time system analysis, discrete convolution and correlation, Z-transforms. Realization and frequency response of discrete-time systems, properties of analog filters, IIR filter design, FIR filter design. Discrete Fourier Transforms. Applications of digital signal processing. Credit will be given for either ECE 436 or ECE 437, but not for both.
Prerequisite(s): [(BME 330) OR (ECE 308)]
(3-3-4) **(C)(P)**

ECE 437
Digital Signal Processing I

Discrete-time system analysis, discrete convolution and correlation, Z-transforms. Realization and frequency response of discrete-time systems, properties of analog filters, IIR filter design, FIR filter design. Discrete Fourier Transforms. Applications of digital signal processing. Credit will be given for either ECE 436 or ECE 437, but not for both.
Prerequisite(s): [(BME 330) OR (ECE 308)]
(3-0-3) **(P)**

ECE 438
Control Systems

Signal-flow graphs and block diagrams. Types of feedback control. Steady-state tracking error. Stability and Routh Hurwitz criterion. Transient response and time domain design via root locus methods. Frequency domain analysis and design using Bode and Nyquist methods. Introduction to state variable descriptions.
Prerequisite(s): [(ECE 308)]
(3-0-3) **(P)**

ECE 441
Microcomputers

Microprocessors and stored program controllers. Memories. Standard and special interfaces. Hardware design. Software development. Interrupt systems. Hardware and software design tools. System design and troubleshooting. Emphasis on examples.
Prerequisite(s): [(CS 350) OR (ECE 242)] AND [(CS 470) OR (ECE 218)]
(3-3-4) **(C)(P)**

ECE 443
Introduction to Computer Security
This course introduces threats and defense mechanisms for computer systems by introducing classic cryptographic algorithms, security protocols, computer and network vulnerabilities, attacks, and security management tools. Labs on malicious software scanning, password cracking, DOS attack, OS system patch management, VPN, and windows firewall are practiced. Requires senior standing.
(3-3-4)

ECE 446
Advanced Logic Design
Design and implementation of complex digital systems under practical design constraints. Timing and electrical considerations in combinational and sequential logic design. Digital system design using Algorithmic State Machine (ASM) diagrams. Design with modern logic families and programmable logic. Design-oriented laboratory stressing the use of programmable logic devices.
Prerequisite(s): [(ECE 218 and ECE 311)]
(3-3-4) **(C)(P)**

ECE 449
Object-Oriented Programming & Computer Simulation
The use of object-oriented programming to develop computer simulations of engineering problems. Programming with the C++ language in a UNIX environment. OOP concepts including classes, inheritance, and polymorphism. Programming with classes, inheritance, and polymorphism. Programming with class libraries. Event-driven simulation techniques in an object-oriented environment. Programming projects will include the development of a simulator for an engineering application.
Prerequisite(s): [(CS 116 and CS 350) OR (CS 116 and ECE 242)]
(3-0-3) **(P)**

ECE 481
Image Processing
Mathematical foundations of image processing, including two-dimensional discrete Fourier transforms, circulant and block-circulant matrices. Digital representation of images and basic color theory. Fundamentals and applications of image enhancement, restoration, reconstruction, compression, and recognition.
Prerequisite(s): [(ECE 308 and MATH 474*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(P)**

ECE 485
Computer Organization & Design
This course covers basic concepts and state-of-the-art developments in computer architecture: computer technology, performance measures, instruction set design, computer arithmetic, controller and datapath design, memory systems, pipelining, array processing, parallel processing, multiprocessing, abstract analysis models, input-output systems, relationship between computer design and application requirements, and cost/performance tradeoffs. Students will complete a project implementing a version of multiple-cycle processor. Credit will be given for either ECE 485 or CS 470, but not both.
Prerequisite(s): [(ECE 218 and ECE 242)]
(3-0-3) **(P)**

ECE 491
Undergraduate Research
Independent work on a research project supervised by a faculty member of the department. Prerequisite: Consents of academic advisor and instructor.
(Credit: Variable) **(P)**

ECE 494
Undergraduate Projects
Students undertake a project under the guidance of an ECE department faculty member. (1-4 variable) Prerequisite: Approval of the ECE instructor and academic advisor.
(Credit: Variable) **(P)**

ECE 497
Special Problems
Design, development, analysis of advanced systems, circuits, or problems as defined by a faculty member of the department. Prerequisite: Consents of academic advisor and instructor.
(Credit: Variable) **(P)**

Special Note
ECE undergraduate students are not permitted to take any ECE courses via internet, unless they have the written approval of the course instructor, their academic advisor, and the ECE chair.

GRADUATE COURSES
Any ECE undergraduate student wishing to take a graduate course for a degree program must have the written approval of the course instructor, their academic advisor, and the ECE chair. Generally, a 3.5/4.0 major GPA is required for departmental approval. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

ECE 502
Basic Network Theory

ECE 505
Applied Optimization for Engineers

ECE 506
Analysis of Nonlinear Systems

ECE 507
Imaging Theory & Applications

ECE 508
Video Communications

ECE 509
Electromagnetic Field Theory

ECE 511
Analysis of Random Signals

ECE 513
Communication Engineering Fundamentals

ECE 514
Digital Communication Principles

ECE 515
Modern Digital Communications

ECE 516
Coding Distributed Storage Systems

ECE 519
Coding for Reliable Communications

ECE 521
Quantum Electronics

ECE 524
Advanced Electronic Circuit Design

ECE 525
RF Integrated Circuit Design

ECE 526
Active Filter Design

ECE 527
Performance Analysis of RF Integrated Circuits

ECE 529
Advanced VLSI Systems Design

ECE 530
High Performance VLSI IC Systems

ECE 531
Linear System Theory

ECE 535
Discrete Time Systems

ECE 537
Optimal Feedback Control

ECE 538
Renewable Energies

ECE 539
Computer Aided Design of Electric Machines

ECE 540
Reliability Theory and System Implementation

ECE 541
Performance Evaluation of Computer Networks

ECE 542
Design and Optimization of Computer Networks

ECE 543
Computer Network Security

ECE 544
Wireless and Mobile Networks

ECE 545
Advanced Computer Networks

ECE 546
Wireless Network Security

ECE 548
Energy Harvesting

ECE 549
Motion Control Systems Dynamics

ECE 550
Power Electronic Dynamics and Control

ECE 551
Advanced Power Electronics

ECE 552
Adjustable Speed Drives

ECE 553
Power System Planning

ECE 554
Power System Relaying

ECE 555
Power Market Operations

ECE 556
Power Market Economics and Security

ECE 557
Fault-Tolerant Power Systems

ECE 558
Power System Reliability

ECE 559
High Voltage Power Transmission

ECE 560
Power Systems Dynamics and Stability

ECE 561
Deregulated Power Systems

ECE 562
Power System Transaction Management

ECE 563
Computational Intelligence in Engineering

ECE 564
Control and Operation of Electric Power Systems

ECE 565
Computer Vision and Image Processing

ECE 566
Statistical Pattern Recognition

ECE 567
Statistical Signal Processing

ECE 568
Digital Speech Processing

ECE 569
Digital Signal Processing II

ECE 570
Fiber-Optic Communication Systems

ECE 571
Nanodevices and Technology

ECE 575
Electron Devices

ECE 576
Antenna Theory

ECE 578
Microwave Theory

ECE 580
Elements of Sustainable Energy

ECE 581
Elements of Smart Grid

ECE 583
High Speed Computer Arithmetic

ECE 584
VLSI Architecture for Signal Processing and Communication Systems

ECE 585
Advanced Computer Architecture

ECE 586
Fault Detection in Digital Circuits

ECE 587
Hardware/Software Codesign

ECE 588
CAD Techniques for VLSI Design

ECE 589
Computer-Aided Design of Analog IC

Economics

ECON 151
Making Strategic Decisions in the Marketplace

This course develops and applies economic models to understand the behavior of firms and consumers in the marketplace. The course explores microeconomic concepts such as demand and supply, market structures and pricing, market efficiency, public goods, externalities, and equilibrium. Combining knowledge from microeconomics and game theory, students will study interactions among firms and consumers given a wide range of market conditions, regulatory regimes, and competitive landscapes. Open only to Business majors.
(3-0-3) **(S)**

ECON 152
Understanding & Competing in the Global Marketplace

This course exposes students to the economic framework for understanding global macroeconomic events, foreseeing the evolution of macro variables, and applying this knowledge to professional decision-making. Students will use international case studies along with data about global indicators from the international business and economics media to provide different perspectives on monetary, fiscal, and public policy issues in the global marketplace. In addition, the course will explore macroeconomic concepts including inflation, unemployment, trade, GDP, and economic growth and development. Open only to Business majors.
Prerequisite(s): [(ECON 151) OR (ECON 211)]
(3-0-3) **(E)(S)**

ECON 211
Principles of Economics

The determination of output, employment and the rate of inflation. Topics include a broad-based discussion of the controversies in macro-economics, the appropriate use of fiscal and monetary policy, the effects of a budget deficit, determination of the rate of exchange, and the trade deficit. Offered in fall and spring.
(3-0-3) **(S)**

ECON 423
Economic Analysis of Capital Investments

This course explores the valuation of proposed capital investments in both the public and private sectors. Students will learn how to determine the relevant cash flows associated with a proposed capital investment. Then, they will subject these cash flows to analysis by three major decision models that incorporate time value of the following money concepts: Net Present Value; Equivalent Uniform Benefit/Cost; and Internal Rate of Return. Students will also learn how to incorporate income taxes, inflation, risk, and capital rationing in the analysis of a project.
(3-0-3) **(S)**

Engineering Graphics

EG 225
Engineering Graphics for Non-Engineers

Designed for students in business, liberal arts and non-technical programs. Basic drafting techniques and applications, lettering, geometric constructions, charts and graphs, technical sketching, multiview projection, pictorial drawings, dimensioning, blueprint reading and working drawings. Introduction to computer graphics. Credit for this course is not applicable to an engineering degree.
(2-1-3)

EG 305
Advanced Engineering Graphics & Design

Advanced study of auxiliary views and sectioning, gears and cams, threads and fasteners, working drawings, assembly drawings, electronic drafting, ANSI drafting standards, and computer-aided drawing and design. Engineering design project.
Prerequisite(s): [(CAE 101) OR (MMAE 232)]
(2-1-3)

EG 306
Engineering Descriptive Geometry

Graphic solutions of problems involving point, line, and plane relationships by auxiliary views and revolutions. Developments and intersections of surfaces. Parallelism and perpendicularity, vectors, mining and civil engineering applications. Shades and shadows, conics, map projection and spherical triangles. Emphasis on applications which promote visualization and introduce new engineering experiences. Applications of computers to problem solving.
Prerequisite(s): [(CAE 101) OR (MMAE 232)]
(2-2-3)

EG 325
Advanced Engineering Graphics for Non-Engineers

Threads and fasteners, sectioning and auxiliary views, limit dimensioning, detail and assembly drawings, data representation, principles of descriptive geometry, manufacturing processes and computer graphics/CAD. Credit for this course is not applicable to an engineering degree.
Prerequisite(s): [(EG 225)]
(2-1-3)

EG 329
Graphic Representation for Non-Engineers

Basic techniques of graphics applied to communications and report writing. Use of computer graphics to generate charts and graphs including line charts, two- and three-dimensional bar charts, and pie charts. Integration of graphical presentations into technical and business reports. Credit for this course is not applicable to an engineering degree.
Prerequisite(s): [(EG 225)]
(3-0-3)

EG 405
Mechanical Design Graphics

Basic concepts of mechanical design and analysis. Advanced design layouts, details, assemblies, tolerance systems, surface finish control, materials, processes, ANSI drafting standards, engineering design processes, systems and procedures, application of computers to design, and CAD/CAM. Requires junior standing. Requires junior standing.
Prerequisite(s): [(EG 305)]
(2-2-3)

EG 406
Technical & Pictorial Illustration

Theory and construction of parallel and perspective pictorial projections, axonometric and oblique projections, parallel and angular perspective. Exploded pictorial assemblies. Basic rendering techniques used in technical illustration. Introduction to computer-generated pictorials. Requires junior standing. Requires junior standing.
Prerequisite(s): [(CAE 101) OR (MMAE 232)]
(2-2-3)

EG 409
Computer-Generated Pictorial Projections

Study of computer-generated representations of three-dimensional objects. Projections include multiview, perspective, axonometric (isometric, dimetric, and trimetric), and oblique.
Prerequisite(s): [(EG 406)]
(2-2-3)

EG 419
Computer Graphics in Engineering
Techniques of PC-based (AutoCAD) computer-aided drawing and design. Study of computer graphic hardware and software systems through demonstrations and use. Both 2D and 3D representation of components and assemblies from various engineering disciplines. Requires junior standing. Requires junior standing.
Prerequisite(s): [(CAE 101) OR (MMAE 232)]
(2-2-3)

EG 425
Computer Graphics for Non-Engineers
Principles and applications of computer graphics in business and nontechnical fields. Study of computer graphics hardware and software systems. Use of computer in producing charts, graphs, and technical drawings. Use of PC-CAD in problem solving and design. Credit for this course is not applicable to an engineering degree. Requires junior standing. Requires junior standing.
Prerequisite(s): [(EG 325)]
(2-1-3)

EG 429
Computer Graphics for Desktop Publishing
Integration of computer graphic-generated images into technical and business reports produced with popular desktop publishing software. Emphasis on creation and selection of graphical presentations for optimum readability. Scanning and retouching techniques for two- and three-dimensional presentations. Introduction to multi-media and slide presentations. Credit for this course is not applicable to an engineering degree. Junior standing required. Requires junior standing.
Prerequisite(s): [(EG 329)]
(2-2-3)

EG 430
Introduction to Building Information Modeling
Fundamentals and practical use of information technologies in design; basic concepts of building information modeling (BIM); review of software and technology available for BIM; practical use of BIM in design for creating a site, viewing a model, starting a project, working in the AutoDesk "Revit" Environment, adding basic building elements to a project, conceptual energy analysis, designing a preliminary layout, and presenting a project. Requires senior standing.
(3-0-3)

EG 497
Special Problems
Special problems. Requires junior standing. Requires junior standing.
(Credit: Variable)

Engineering Management

EMGT 363
Creativity, Inventions, & Entrepreneurship for Engineers & Scientists
This course will introduce students to theories, processes, and best practices that invoke creativity, innovation, inventions, and entrepreneurship in engineers and scientists to create a patentable technology by the end of the semester. Skills will be developed in understanding and searching for patents, learning and applying brainstorming, team learning, exploring deep needs, market and industry analysis, finding "white space," and creating effective elevator pitches for your idea. Students will learn to support and pitch the need, uniqueness of their approach, cost versus benefits, competition, and alternatives so their ideas can take advantage of the exponential economy.
(3-0-3)

EMGT 406
Entrepreneurship & Intellectual Property Management
This course intends to introduce and develop a number of diversified professional skills necessary for success in an engineering research and development environment. Selected topics in the areas of technology entrepreneurship, opportunity assessment, creativity and innovation, project management, management of organizational change, and entrepreneurial leadership are discussed. Significant effort is placed on understanding and managing intellectual property.
(3-0-3)

EMGT 470
Project Management
Introduction and practice of project form of organization for accomplishing tasks in engineering firms. Develops the attributes required of a project manager. Introduction to project management form most appropriate for engineering tasks, evaluating projects for funding, establishing planning, budgeting, and initiation process, extensive analysis of scheduling techniques, resource allocation during scheduling, monitoring project progress, the project control cycle, avoiding scope creep, auditing projects and completion of the project. The case study method is used throughout the class to provide students experiential-learning opportunities. This class cannot be substituted for courses in the construction management major in CAEE.
(3-0-3)

Engineering

ENGR 100
Engineering Physics
The overall objective of the course is to prepare secondary school students to be successful in a typical university freshmen-level introduction to engineering curriculum. Students will use hands-on project work, presentations, and discussion to gain a broad perspective of a number of individual engineering disciplines. Students will understand and apply the various aspects of the engineering design process, understand and apply creative and analytical problem solving methods to various situations and improve their ability to use technical-based communication. The format of projects will be written, oral, or graphical.
(3-0-3)

ENGR 111
Introduction to Engineering & Design
This course introduces the student to the basic concepts and practices common to engineering. The engineering design process is presented through examples and hands-on projects. Along with fundamental engineering principles, communication skills, computer applications, and professional ethics will be included. Upon successful completion, the student will have been provided a foundation for further study in engineering.
(2-0-2)

ENGR 200
Entrepreneurship NOW! – Introduction to the Entrepreneurial Mind Set
This course introduces students to the basic skill set that changes a student's perspective from one of passive reception and learning to active participation and purposeful exploration to create value. This is a hands-on course where students learn to climb Mount Everest as a team, learn and practice the five disciplines for creating value, spark creativity and invention, learn the IIT-way to design, prototype, prototype and prototype, elevator pitching, and practice what they have learned by competing in a mini-innovation chase. The winners receive free courses at IIT to continue their journey to perfect the entrepreneurial mind set.
(0-2-2)

ENGR 497
Special Topics: Introduction to Research
This course introduces students to research methods, techniques for measurement and data analysis, lab safety, and contemporary issues related to research in a university setting. Students will be introduced to research proposal development, scientific literature reviews, measurement techniques, statistical data analysis, design of experiments, good laboratory practice, and proper presentation techniques. Ethics and intellectual property topics related to research will also be covered. During this course, students will be involved in hands-on experimentation in order to practice their measurement and data analysis skills as well as test their hypotheses. Experiments will focus on the engineering themes of energy, water, health, and security.
(0-0-3)

Environmental Engineering

ENVE 310
Introduction to Environmental Engineering
This course provides an overview of how environmental engineers integrate biological, chemical, and physical sciences with engineering to develop solutions to environmental problems. Topics include air pollution, water pollution, solid waste, fate and transport of contaminants, and pollution prevention.
(3-0-3)

ENVE 401
Introduction to Water-Resources Engineering
The theory and practice involved in planning and design of urban water systems are introduced in this course. Topics include storm water management, water supply distribution, and waste water collection and transport systems.
(3-0-3)

ENVE 404
Water & Wastewater Engineering
Water quality and water supply issues make up this course including the physical, chemical, and biological processes involved in water treatment. Process design, operations, and management are also considered. Requires junior standing.
(3-0-3)

ENVE 463
Introduction to Air Pollution Control
Air pollution sources and characteristics of source emissions, atmospheric reactions, effects of pollutants, and techniques of emission control are presented in this course. Legal and administrative aspects of air pollution control are also described.
(3-0-3)

ENVE 476
Engineering Control of Industrial Hazards
Design of control systems to enhance occupational safety and health; how to recognize and control existing or potential safety and health hazards.
Prerequisite(s): [(ENVE 426*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

ENVE 485
Industrial Ecology
This course provides an overview of industrial ecology, the study of the science and engineering relationships between cultural and ecological systems, and how those relationships can be managed to achieve a more sustainable economy. Because it is an interdisciplinary field, topics include technology (science and engineering), public policy and regulatory issues, and business administration.
(3-0-3)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

ENVE 501
Environmental Chemistry

ENVE 503
Water and Wastewater Analysis

ENVE 506
Chemodynamics

ENVE 513
Biotechnological Processes in Environmental Engineering

ENVE 545
Environmental Regulations and Risk Assessment

ENVE 570
Air Pollution Meteorology

ENVE 572
Ambient Air Monitoring

ENVE 576
Indoor Air Pollution

ENVE 585
Groundwater Contamination and Pollutant Transport

Food Science and Nutrition

FDSN 300
Nutrition Through the Life Cycle
This course analyzes the changing nutritional requirements and relative dietary and psycho-social issues which are specific to the different stages of the life cycle. Expected student outcomes include the following: (1) the student will be able to identify specific nutrient requirements for each stage of the life cycle; (2) the student will be able to relate nutrient needs to developmental levels, including biochemical and physiological structure/function of the body, and have a general understanding of dietary planning that will adequately meet nutritional needs of given levels; (3) the student will be able to describe the importance of environment, feeding skills, psychosocial situations, and other factors to total nutrition and eating habits through the life cycle (development through aging); (4) the student will be able to identify risk factors associated with major health problems over the life span and acquire appropriate knowledge for addressing through dietary and lifestyle choices; (5) the student will be able to select, utilize, and evaluate appropriate materials and methods for communication of nutrition information to a given audience; (6) the student will be able to evaluate dietary intakes and feeding programs for individuals throughout the life cycle; and (7) the student will effectively communicate knowledge through exams, writing, and/or oral projects.
Prerequisite(s): [(BIOL 107) OR (BIOL 115)] AND [(FPE 201) OR (FPE 401) OR (FST 201) OR (FST 401)]
(3-0-3) **(N)**

Food Process Engineering

FPE 201
Nutrition & Wellness
Introduction to the basic principles of nutrition and the relationship of the human diet to health. Overview of the nutrition profession, the biological uses of nutrients, and tools for dietary planning and assessment in various settings. Examination of specific issues such as weight management, sports nutrition, food safety, the diet-disease relationship, and global nutrition. Analysis of special nutritional requirements and needs during the life cycle. Same as FST 201.
(3-0-3)

FPE 401
Nutrition, Metabolism & Health
Study of chemical structures, types, and metabolism of carbohydrates, lipids, and proteins. Discussion of the biological and chemical roles of vitamins and minerals. Application and integration of metabolic knowledge with health promotion and chronic disease.
(3-0-3)

FPE 402
Research Project: Design, Delivery, & Dissemination
This course is an introduction to designing, conducting, and reporting on scientific research. Topics will include defining a problem and creating a research proposal, experimental design, data collection and analysis, and a written and oral presentation of results. Same as FST 402.
(3-0-3)

Food Safety and Technology

FST 201
Nutrition & Wellness
Introduction to the basic principles of nutrition and the relationship of the human diet to health. Overview of the nutrition profession, the biological uses of nutrients, and tools for dietary planning and assessment in various settings. Examination of specific issues such as weight management, sports nutrition, food safety, the diet-disease relationship, and global nutrition. Analysis of special nutritional requirements and needs during the life cycle. Same as FPE 201.
(3-0-3)

FST 401
Nutrition, Metabolism, & Health
Study of chemical structures, types, and metabolism of carbohydrates, lipids, and proteins. Discussion of the biological and chemical roles of vitamins and minerals. Application and integration of metabolic knowledge with health promotion and chronic disease.
(3-0-3)

FST 402
Research Project: Design, Delivery, & Dissemination
This course is an introduction to designing, conducting, and reporting on scientific research. Topics will include defining a problem and creating a research proposal, experimental design, data collection and analysis, and a written and oral presentation of results. Same as FPE 402.
(3-0-3)

History

HIST 300
World History to 1500
Development of Greek and Roman civilization; beginnings of Christianity; Europe in the Middle Ages; feudalism and manorialism; organization of the Church; the Crusades; medieval intellectual life; the Renaissance.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 301
World History from 1500
Protestant Reformation; the Scientific Revolution; Age of Louis XIV; Enlightenment; the Age of Democratic Revolution; Industrial Revolution; Nationalism and Imperialism; World War I; Communism and Fascism; World War II and after.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 305
Latin America: 1810-Present
The history of Latin America from colonial times emphasizing the political evolution of the several republics. Special consideration will be given to the political, economic, military, and social relations of the U.S. with Latin American countries in the 20th century.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 306
Women in Latin American History
This course will students understand how ideas about gender have shaped the lives of women and men in Latin America and how women and men have, in turn, influenced ideas about gender. The course will improve students ability to understand and analyze historical documents, processes, and writings, and will improve students' verbal and written skills though public speaking and writing.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 307
History of Latin American Cinema
An overview of the historical development of Latin American film, from early to contemporary films, along with a study of the methods of critical inquiry developed to analyze film and cultural and political history in Latin America. This course provides differing visions of Latin American history as constructed through film. We analyze some of the major films of Latin American cinema with a view to the characteristic marks of this cinema, its aesthetic, major themes, the various ways that it impacts political, social and cultural systems and how social-political changes in turn impact the production and politics of film. Films will be in Spanish and English subtitles.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 311
Twentieth Century Europe: 1890-1945
Nationalism and nation states; patterns of diplomacy; origins, conduct, and settlement of World War I; Russian Revolution; fate of democracy; rise of totalitarianism; World War II and the Holocaust.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 321
World Religions I: Christianity, Islam, & Hinduism
The history of the "Big 3" of the world's religions – Christianity, Islam, and Hinduism – is traced from antiquity to the present day. Key individuals, texts, theological innovations, and reformations will be discussed and analyzed. This is predominantly a lecture-style course, although there will be occasional class discussions on primary or secondary religious texts. May not be taken for credit by students who have completed HIST 380 World Religions I.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 322
World Religions II: Judaism, Buddhism, & Nature Religions
The history of Judaism, Buddhism, and a number of faiths with a similar worldview that have been placed under the heading of Nature Religions is traced from antiquity to the present day. Key individuals, texts, theological innovations, and reformations will be discussed and analyzed. This is predominantly a lecture-style course, although there will be occasional class discussions on primary or secondary religious texts. May not be taken for credit by students who have completed HIST 380 World Religions II.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 332
American Women 1840-1990
An examination of how women shaped the course of US history and of how key political and social events shaped their lives. Since no single experience conveys the history of all American women, this course will discuss the diverse realities of women of different races, classes, ethnicities, and political tendencies. It looks at how and why the conditions, representations, and identities of women changed or remained the same. By incorporating women into our vision of history, we develop a more complete understanding of our past.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 333
Ethnicity in American History & Life
Examines the creation of the American nationality from its diverse roots, which include almost all the world's great cultures. Special stress on immigration, African American history, and the relationships among concepts of race, class, and gender.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 336
The Industrialization of America: 1789-1898
Traces America's transformation from agrarian republic to Industrial Empire. Stresses impact of industrialization on all aspects of life, the nature of slavery, the failures of "Reconstruction", and the western and urban frontiers. Explores the adventures that made America a great power.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 337
The American Century: 1898-1975
Traces how America attained economic and military power and what it did with that power at home and abroad. Discusses the World Wars, the Great Depression, the limits of the "welfare state," the movement for Black equality, and the transformations of the 1960's.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 338
Contemporary America: 1960 & After
Explores the historical roots of contemporary issues. Topics vary by semester but always include the Cold War and America's international position, tensions over immigration and racial integration, and the historic roots of changes in popular culture and daily life.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 341
History of the Middle East 600-1650
Presents an overview of developments in the Middle East from prehistory through the Crusades. Readings drawn from history, literature and philosophy.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(H)**

HIST 342
History of the Middle East II
This course will introduce students to the development of Middle Eastern culture and political structures from the Mongol Invasions to modern times. The course will enhance students ability to read and interpret primary and secondary sources. The course will enhance students' ability to produce written and oral discourse appropriate to history.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 344
History of the Ancient Mediterranean
Students gain an understanding of the history and culture of Greece, Rome, and ancient Palestine. Walk a mile in someone else's sandals while tracing the early foundations of Western culture. Using disciplined analysis and creative interpretation to reconstruct aspects of ancient civilizations, students are challenged to escape their own personal and cultural perspectives.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 345
Women & the World: 20th Century
This course examines how women in different regions of the world have helped to shape their nation's society and history. It also explores the connections and/or lack of connections between women, women's movements, and key political events during the twentieth century. The course will both draw some general themes and look at some specific case studies.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 350
US Urban History
Basic facts and issues of U.S. urban history; reasons for the growth, development, and decay of cities; origins of contemporary urban political, social, and economic problems.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 351
The City in World History
This course explores the city throughout world history as both place and space. The course begins by examining the early history of cities in the ancient world around the globe and then moves across time to examine the medieval, early modern, and modern/contemporary city. By the end of the course students will be expected to understand how and why cities have been constructed and how cities and the idea of the city have, over time, been historically interconnected even before the global urban world of today.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 352
History of Chicago
Basic institutions of the contemporary city studied in their historical context, using Chicago as a case study. Political machines, social and political reform traditions, planning agencies, ethnic neighborhoods, organized crime and many other urban institutions.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 374
Disasters!
This course investigates different disasters throughout history to show how disasters catalyze legislative and technological change. Since our understanding of what constitutes a disaster is constructed through public discourse and popular media, this course will employ a variety of media and teaching techniques. In addition to discussion, lecture, and required readings, students will watch documentaries and read news articles to piece together the histories of regulatory changes effected by disasters in the realms of power production, environmental stewardship, manufacturing, transportation, infrastructure, public health, reproduction, food production, and more.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(E)(H)**

HIST 375
History of Computing
This course addresses the question "How do technologies change the world?" through examining the history of computing. Readings and discussions on the people, technologies, ideas, and institutions of modern computing; and the uses of computers in computation, control, simulation, communication, and recreation. We'll learn about hardware heavyweights, software moguls, and where the World Wide Web came from.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 380
Topics in History
An investigation into a topic of current or enduring interest in history, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 382
Technology in History: 1500-1850
Explores the process of technological change during the birth of industrial societies. Considers the context of early industrial development in Europe, then examines the industrial revolution in Britain and America. Concludes by assessing technology's role in European domination of Asia and Africa.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 383
Technology in History: 1850 to Present
Examines technological change as a characteristic activity of modern societies. Investigates the science-based "second" Industrial Revolution in Europe and America. Explores the varied responses of artists, writers, architects, and philosophers to the machine age. Concludes by discussing technology's place in the modern nation-state.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HIST 491
Independent Reading & Research
Consent of department. For advanced students.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(Credit: Variable) **(C)(H)**

Humanities

HUM 200
Topics in Humanities
One-time or initial versions of course topics equivalent to HUM 202, 204, 206, and 208. Topics will introduce students to the humanities at IIT and to provide intensive instruction in writing.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

HUM 202
Industrial Culture
An interdisciplinary course that examines the development of modern industrial society and the impact of science and technology on our culture. Readings drawn from history, literature, and philosophy. This course is also writing instruction intensive.
Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) **(C)(H)**

HUM 204
Age of Darwin
An introduction to the humanities through an investigation of important changes in our culture associated with Darwin's theory of evolution. Readings drawn from literature, philosophy, and science. This course is also writing instruction intensive.
Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) **(C)(H)**

HUM 206
Life Stories
An interdisciplinary study of biographies and autobiographies. In addition to considering such works as a genre, the course examines the historical events and the philosophical issues that have shaped the lives and attitudes of the writers/subjects. This course is also writing instruction intensive.
Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) **(C)(H)**

HUM 208
Digital Culture
Introduces major topics in digital culture while providing instruction in scholarly practice with emphasis on research and writing. Topics include technical and cultural history of the internet, academic writing, and humanities research methods.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

HUM 321
Introduction to Women's Studies
Introduction to Women's Studies is an interdisciplinary course with an American lens that draws on feminist ideas and scholarship to develop a set of tools for analyzing women's experiences in social, cultural, and political contexts. The course aims to sharpen students' critical awareness of how gender operates in institutional and cultural contexts and in their own lives as well as to give them an opportunity to imagine participating in social change. May not be taken for credit by students who have completed HUM 380 Introduction to Women's Studies.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HUM 341
Introduction to Music
Introduction to music strives to provide an appreciation and understanding of Western music of the past 1500 years. In addition to its own structure and culture, music is an important reflection of the development of Western civilization. Its understanding will add to one's other studies of this process. It is also hoped that one's enjoyment of concerts and recordings will be greatly enhanced. May not be taken for credit by students who completed HUM 380 Music Appreciation.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HUM 343
American Music
This course will trace the roots of music in America, from Native American music to the present. It will cover music through the Colonial period, patriotic songs, folk music, jazz, and classical music. The class will attend two live performances.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

HUM 352
Gender & Technological Change
Have you ever wondered why more men choose to portray themselves as women online than the reverse? Or why there are more boys than girls in China? Or why vibrator technology was seen as a medical necessity in the 19th century? Have you ever thought about how the interplay between technology and gender constructs everything from our modern military to how we choose to spend our free time? To where we work? This course explores the history of technology by using gender as a category of analysis. It also looks at how technological objects and tools participate in molding elements of our culture that we may take for granted as logical or timeless. By looking at change over time, we will analyze the different ways technology affects how we live and see ourselves and how gender defines technological priorities.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(E)(H)**

HUM 354
Science & Technology Studies
This course focuses on the latest work in science and technology studies and the history of technology from ethics in genetic engineering to the social dimensions of computing. Other topics include the intersection of gender and sexuality with new technologies, the role of communications media in "rewiring" our brains and our social connections, and the role of the world wide web in constructing national and global technocracy. Students will read and discuss works by academics as well as journalists in order to offer grounding in the historical, social, and economic background of key technical topics and the presentation of technical topics for wider audiences. Students will also learn about the ways in which authors leverage different information technologies to communicate to wider audiences and how those methods are evolving.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(E)(H)**

HUM 380
Topics in Humanities
An investigation into a topic of current or enduring interest in the humanities, which does not fit neatly into standard categories.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)] AND Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

HUM 491
Independent Reading/Research
Independent reading or research.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(Credit: Variable) **(C)(H)**

Industrial Technology and Management

INTM 301
Communications for the Workplace
Review, analyze and practice verbal and written communication formats found in the workplace. Emphasis is on developing skills in technical writing, oral presentations, business correspondence, and interpersonal communication using electronic and traditional media. Credit not granted for both INTM 301 and COM 421.
(3-0-3) **(C)**

INTM 314
Maintenance Technology & Management
Maintenance of facilities is a major concern for all industrial operations. Course covers technologies involved as well as the management aspects of maintaining buildings, construction and equipment installation and maintenance for all types of operations.
(3-0-3)

INTM 315
Industrial Enterprises
An introduction to the world of industrial enterprises and the organizational priorities required to achieve efficiency and competitiveness. Students learn to assess the present state of a company, address performance issues, foster functional communication and cooperation between departments, identify sources and impacts of waste, identify value-added activities, and transform outdated business practices into flexible, customer-driven processes.
(3-0-3)

INTM 319
Electronics in Industry
Basic overview of electrical and electronic technology in industry. Emphasis on electrical and electronic components, industrial devices, electrical theory, application and basic troubleshooting. Students select and complete an electrical or electronic class project.
(3-0-3)

INTM 322
Industrial Project Management
Projects are the driving force behind innovation and improvement in any organization. This course identifies the tools and techniques needed to lead any project to its intended conclusion. Topics include project plans, managing expectations and contingencies, building a winning team, gaining commitments, managing project risks, and development of personal skills critical to the successful project manager.
(3-0-3) **(C)**

INTM 404
Marketing, Sales, & Product Introduction
This course examines marketing and sales and the differences and details of these activities as applied within industry. The range of marketing types is covered to include business-to-business, industrial, commercial, retail, internet, social media, and entrepreneurial/professional. Sales fundamentals include understanding the customer and the competition, sales strategy, sales management, product positioning, product life cycle, sales structures, margins, and prospecting for new customers. Product development is addressed throughout the course inclusive of market feedback, product evaluation, opportunity assessment, prototyping, field trials and market testing, and product launch.
(3-0-3) **(C)**

INTM 406
Quality Control
This course focuses on how organizations manage quality in a competitive marketplace regardless of the nature of the industry. Topics include principles of quality, cost of quality, inspection and receiving, audits, corrective and preventive action systems, supplier performance management (SPM), FMEA and control plans, process capability studies and statistical process control (SPC), measurement system analysis, quality management systems (QMS), process improvement methodologies (Lean, Six Sigma, and Kaizen), and creation of a performance dashboard.
(3-0-3)

INTM 407
Construction Technology
Introduces the full range of technologies involved in construction of both new and modified facilities, including steel, concrete and timber construction as well as supporting specialties such as HVAC, electrical, plumbing, etc. the interaction between the various construction trades will be covered along with the role of the architects and engineers.
(3-0-3)

INTM 408
Cost Management
Accounting basics are introduced with primary emphasis on the costing and estimating procedures as used in industry. The objective of this course is to provide a good understanding of financial activities and hands-on experience in working with a variety of costing and accounting systems.
(3-0-3)

INTM 409
Inventory Control
Fundamentals of inventory control including inventory classifications, i.e. raw materials, work-in-process (WIP), and finished goods. Topics include inventory record keeping, inventory turnover, the 80/20 (or ABC) approach, safety stock, forecasting, dependent and independent demand, lead times, excess/obsolete inventory, and inventory controls. Material Resource Planning (MRP) and Enterprise Resource Planning (ERP) are included.
(3-0-3) **(C)**

INTM 410
Operations Management
Focuses on core processes within an organization – the activities that add value. An operations strategy depends on the industrial sector as well as the organization. This course introduces a variety of qualitative and quantitative tools for such activities as project management, process analysis, job design, forecasting, resource planning, productivity, quality, inventory, and scheduling. The objective of this course is to provide the framework for integrating approaches covered in other INTM courses.
(3-0-3) **(C)**

INTM 412
Manufacturing Processes for Metals & Mechanical Systems
A broad range of manufacturing processes are studied including casting, forging, rolling, sheet metal processing, machining, joining, and non-traditional methods such as powder, EDM, and additive processes. Particular attention on interrelationships between manufacturing processes and properties developed in the work piece, both intended and unintended. Economic considerations and tradeoffs as well as computer-integrated manufacturing topics are also covered.
(3-0-3)

INTM 413
Facilities & Construction Administration
This course covers fundamentals of project administration and characteristics of the construction industry. Pre-construction discussion includes technical and economic feasibility, project delivery systems, documents, bonding, and bidding. Duties and liabilities of parties at pre-contract stage and during contract administration to include scheduling and time extensions, payments, retainage, substantial and final completion, change orders, suspension of work, contract termination, and dispute resolution. Labor law, labor relations, safety, and general management of a construction company.
(3-0-3)

INTM 414
Topics in Industry
Provides overview of multiple industrial sectors and the influences that are forcing change. All aspects of industry are considered: history of industry; inventory; supply chain; e-commerce; management; manufacturing; industrial facilities; resource management; electronics and chemical industries; alternate energies; marketing; entrepreneurship; computers as tools; and other specialty areas.
(3-0-3) **(C)**

INTM 415
Advanced Project Management
This course covers project management in the PMP framework and provides a structured approach to managing projects using Microsoft Project and Excel. Coverage includes creation of key project management charts (Gantt, Pert, CPM, timelines and resource utilization), basic statistics used in estimating task times, critical path generation in Excel and Project, project cost justification in Excel, SPC and acceptance sampling for machine acceptance, project analysis via simulation, and management of personnel, teams, subcontractors and vendors. Case studies are utilized to demonstrate core concepts and dynamic scheduling.
(3-0-3)

INTM 417
Construction Estimating
General approaches for estimating construction costs are covered. Several commercially available software packages are introduced. Emphasis is on acquiring the knowledge required to develop cost estimates for construction, renovation and maintenance projects for buildings, facilities and equipment.
(3-0-3)

INTM 418
Industrial Risk Management
Each year, industrial companies are affected by critical incidents which cause disruption in operations and significant monetary losses due to repairs and/or lost revenue. Whether it is a small fire, an extended electrical outage or an incident of a more serious magnitude, all company stakeholders - from the board of directors to the employees to the customers - are impacted. The key to understanding the complexities of industrial resiliency lies in focusing on the issues of preparedness: prevention, mitigation, and control. This course is designed to prepare the student for managing a critical incident, including understanding risk and business impact, emergency preparedness, contingency planning and damage control.
(3-0-3)

INTM 420
Applied Strategies for the Competitive Enterprise
Course covers the application of proven management principles and operational practices. Learn how high performance companies create a competitive advantage despite economic challenges and a transitional customer base. Factors covered include strategy deployment, financial analysis, new product development, quality, customer service, and attaining market leadership. Case studies illustrate variable impacts on business situations.
(3-0-3)

INTM 425
Human Resource Management
This course will introduce students to key aspects of HR management, including legal requirements for all normal HR activities as well as techniques for dealing with employees when hiring, evaluating, promoting and terminating.
(3-0-3) **(C)**

INTM 427
E-Commerce
This course reviews electronic commerce and its role in industrial organizations. Topics include a history of e-commerce, business-to-business (B2B) models, and business-to-consumer (B2C) models. The impact of this paradigm shift on all aspects of business is also covered.
(3-0-3) **(C)**

INTM 430
Transportation
This course covers transportation practices and strategies for the 21st century. The role and importance of transportation in the economy and its relationship to the supply chain will be covered in detail. Transportation modes - trucks, rail, air, and water - will be examined for both domestic and global transportation. Costing and pricing strategies and issues will be discussed as well as security issues in domestic and international transportation.
(3-0-3)

INTM 431
Manufacturing Processes for Electronics & Electrical Systems
The materials used in Electronic and Electrical (E&E) manufacturing will be reviewed including materials and components that are used to produce chips, PCBs, and wiring systems. Focus will be on the processes for producing the range of parts and products included in this broad sector. Automation for producing parts and assemblies will be covered. Techniques covered will include surface-mounted technology (SMT), wave soldering, automation insertion, automated inspection, etc. The industrial structure that makes up this sector of manufacturing will be covered.
(3-0-3)

INTM 432
Sales & Operations Planning
This course covers sales and operations planning (S&OP) processes, objectives, and procedures utilized by leading global supply chain companies. Key elements of the S&OP process are explained, including demand plans, forecasts, and capacity plans. Students also learn how to develop, maintain, and manage supplier relationships (SRM) and how companies use customer relationship management (CRM) tools to enhance business relationships.
(3-0-3) **(C)**

INTM 433
Manufacturing Processes in Chemical Industries
This course provides a survey overview of the many chemical manufacturing processes found in the energy, food, drug, and synthetic polymer sectors. Related societal, environmental, and regulatory impacts are discussed such as sustainability, OSHA, and EPA. Implications for recovery and reuse as well as new non-polluting processes are explored. The overall industrial structure that makes up this sector of manufacturing will be covered.
(3-0-3) **(C)**

INTM 441
Supply Chain Management
This course covers the full range of activities involved in the supply chain. This includes management tools for optimizing of supply chains, relationships with other parts of the organization, in-house versus third party approaches, and suitable performance measurements. Topics covered include: Warehouse Management Systems (WMS), Transportation Management Systems (TMS), Advanced Planning and Scheduling Systems (APS), as well as cost benefit analysis to determine the most appropriate approach.
(3-0-3) **(C)**

INTM 442
Warehousing & Distribution
This course covers warehouse layout and usage based on product requirements such as refrigeration, hazardous material, staging area, and value added activities. Processes covered include receiving, put-away, replenishment, picking and packing. The requirement for multiple trailer/rail cars loading and unloading is considered as well as equipment needed for loading, unloading, and storage. Computer systems for managing the operations are reviewed. Emphasis is on material handling from warehouse arrival through warehouse departure.
(3-0-3) **(C)**

INTM 443
Purchasing
Purchasing responsibilities, processes, and procedures are included. Topics covered include: supplier selection and administration, qualification of new suppliers, preparing purchase orders, negotiating price and delivery, strategic customer/vendor relationships, and resolution of problems. All aspects of Supplier Relation Management (SRM) are covered.
(3-0-3) **(C)**

INTM 444
Export/Import
Internationalization of industry requires special expertise and knowledge, which must be taken into consideration throughout all interactions with overseas companies either as customers or suppliers. Topics covered include custom clearance, bonded shipping, international shipping options, import financing and letters of credit, customer regulations, insurance, import duties and trade restrictions, exchange rates, and dealing with different cultures.
(3-0-3) **(C)**

INTM 446
Manufacturing & Logistics Information Systems
This course provides an overview of manufacturing and supply chain information systems, tools, and techniques utilized for effective decision making. Current state-of-the-art and commercially available industrial software packages, such as MRP, WMS, TMS, APS, etc., will be used and their impact on management decision making analyzed.
(3-0-3)

INTM 449
Telecommunications Over Data Networks
This course covers a suite of application protocols known as Voice over IP (VoIP). It describes important protocols within that suite including RTP, SDP, MGCP and SIP, and the architecture of various VoIP installations including on-net to on-net, on-net to PSTN, and Inter-domain scenarios. The functions of the Network Elements that play significant roles in this architecture will be defined. Examples of network elements that are currently available as products will be examined.
Prerequisite(s): [(ITM 440) OR (ITM 540)]
(3-0-3)

INTM 459
Issues in Industrial Sustainability
Examines the concept of sustainability and its application in the industrial environment. Identifies underlying stresses on natural and human environments and the resultant problems for business and society including legal, ethical, and political issues related to sustainability. Global warming, peak oil, and commodity pricing are considered as indicators of the need for improvements in sustainability. Industrial ecology will be discussed as well as strategies for developing sustainable practices in manufacturing, power generation, construction, architecture, logistics, and environmental quality. Coverage includes case studies on businesses that have developed successful sustainability programs.
(3-0-3)

INTM 460
Sustainability of Critical Materials
This course explores the limitations in supply and the need for sustainable use of carbon and non-carbon-based materials such as oil, minerals, food, water, and other natural resources used by industry. Limitations in the global availability of such resources pose challenges to industry which will require careful consideration and planning to ensure continued prosperity for current and future generations. Course will cover strategies and options to mitigate anticipated shortages and optimize the use of non-renewable natural resources, review of fuel and raw material pricing, and cost/benefit analysis of sustainable development proposals. Technical analyses will be presented during class discussions, but a technical background is not required.
(3-0-3) **(C)**

INTM 461
Energy Options for Industry
Carbon-based fuels are a limited resource and within decades will be in very short supply. Associated energy costs will increase and industry will be required to incorporate alternate fuels and/or power sources, such as uranium (for nuclear power), hydroelectric, geothermal, wind, wave, solar, etc. This course presents such energy options and explores the anticipated impact on industry.
(3-0-3) **(C)**

INTM 462
Special Topics in Sustainability
This course allows the student to research and report on an industrial sustainability issue of interest and relevance to their career objectives. Topics may touch on industrial ecology, ethics, regulations, environment, resource use, alternative manufacturing methods, facilities, logistics, etc. This is the fourth course in a specialization in Industrial Sustainability.
(0-0-3)

INTM 477
Entrepreneurship in Industry
Introduces various forms of entrepreneurship with emphasis towards industrial organizations. Provides helpful tools for developing and implementing significant "game-changing" actions to effect change within an existing organization or develop a new business venture. Students complete an opportunity assessment (OPASS) project wherein they identify, evaluate, and develop an approach for a "real-life" business and produce a formal report and presentation.
(3-0-3) **(C)**

INTM 491
Undergraduate Research
Undergraduate research.
(Credit: Variable)

INTM 497
Special Projects INTM
Special projects.
(Credit: Variable)

Interprofessional Projects

IPRO 397
IPRO I: Interprofessional by Design
The IPRO I course is an immersive, action-oriented, dynamic learning experience guided by a team of instructors from the fields of design, engineering, business, law, architecture, psychology, and social sciences. IPRO I introduces students to the interprofessional project concept and its underlying body of knowledge by: incorporating hands-on, small group, user-centered design projects informed by instructor-lead discussions and guest speakers; stimulating and facilitating project idea development that involves a collaborative innovation process; developing an understanding of the socio-economic context of themed clusters of workplace project possibilities (e.g., venture development, service learning, process improvement, sustainability, research); and forming the core of an IPRO II team and developing its project plan.
(1-6-3) **(C)**

IPRO 497
Interprofessional Project (IPRO)
Interprofessional projects allow students to learn teamwork, leadership and project management skills, while working in multidisciplinary teams on projects involving technical, ethical, environmental, economic, public policy, and legal issues. IPRO project teams are typically comprised of 10-12 students from sophomore through graduate level and from all disciplines that can contribute to a project. Every effort will be made to accommodate students' first choices; however, it may be necessary to balance students across all projects scheduled for the semester or to consolidate students into fewer projects to meet minimum team requirement. Specific rules about selection of IPRO projects may apply to certain degree programs. Some projects may carry Humanities or Social Science credit. Students are encouraged to consult the lead faculty member for the project and their faculty advisor before registering for a project.
(1-6-3) **(C)**

Information Technology and Management

ITM 100
Introduction to Information Technology as a Profession
This course introduces students to the steps necessary to analyze a problem in information technology and identify and define the computing requirements appropriate to its solution, with a focus on how to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. Students learn to analyze the local and global impact of computing on individuals, organizations, and society. This course leads students to recognize the need for continuing professional development and imparts an understanding of professional, ethical, legal, security and social issues, and responsibilities in information technology. Students write and present, building their ability to communicate effectively with a range of audiences, and work in teams learning to function effectively together to accomplish a common goal.
(2-0-2) **(C)**

ITM 300
Communication in the Workplace
Review, analyze and practice verbal and written communication formats found in the workplace. Emphasis on developing skills in technical writing and oral presentations using electronic and traditional media. Credit not granted for both ITM 300 and COM 421. INTM 301 may be substituted for this course.
(3-0-3) **(C)**

ITM 301
Introduction to Contemporary Operating Systems & Hardware I
Students study the basics of computer architecture and learn to use a contemporary operating system. Hardware requirements, hardware components, software compatibility, and system installation topics are covered along with post-installation, storage, security and system diagnosis, and repair. Topics also include discussion of current and future technology industry trends.
(2-2-3)

ITM 311
Introduction to Software Development
A broad introduction to object-oriented programming and the related knowledge necessary to program in a contemporary programming language. This would include coverage of an Application Development Kit, a standard integrated Development environment, and the use of GUI components.
(2-2-3)

ITM 312
Introduction to Systems Software Programming
Introduces basic concepts of systems programming. Students learn to apply basic programming concepts toward solving problems, create source files and implement header files, work with and effectively use basic data types, abstract data types, control structures, code modularization and arrays. Students will be introduced to object paradigm including, classes, inheritance, and polymorphism applications.
(2-2-3)

ITM 497
Independent Study
Special projects.
(Credit: Variable)

Information Technology and Management: Development

ITMD 411
Intermediate Software Development
This course covers a broad spectrum of object-oriented programming concepts and application programming interfaces. The student considers the details of object-orientated development in topics of multi-threading, data structure collections, stream I/O and client interfaces. Software engineering topics of packaging and deployment are covered as well. Hands-on exercises reinforce concepts taught throughout the course.
Prerequisite(s): [(ITM 311)]
(2-2-3)

ITMD 412
Advanced Structured & Systems Programming
Structured programming continues with advanced concepts including strings, arrays, pointers, data structures, file manipulation, and dynamic memory management. Students create more complex applications that work with user input, manipulate user supplied text or text obtained from a file, apply standard library routines for working with literal text, use pointers to store complex structures within arrays, and read and write data from files, the console, and the terminal. The object-oriented programming (OOP) paradigm is covered in depth including the philosophy of OOP, classes and objects, inheritance, template classes, and making use of class libraries.
Prerequisite(s): [(ITM 312)]
(2-2-3)

ITMD 413
Open Source Programming
Contemporary open-source programming languages and frameworks are presented. The student considers design and development topics in system, graphical user interface, network, and web programming. Dynamic scripting languages are covered using object-oriented, concurrent, and functional programming paradigms. Concepts gained throughout the course are reinforced with numerous exercises which will culminate in an open-source programming project.
Prerequisite(s): [(ITMD 411)]
(2-2-3)

ITMD 415
Advanced Software Development
This course considers Web container application development for enterprise systems. The primary focus is on database connectivity (JDBC) integration with Web application programming using an enterprise-level application framework. A Web application term project considers the design and implementation of a database instance that serves as the information tier in a contemporary 3-tier enterprise solution.
Prerequisite(s): [(ITMD 411)]
(2-2-3)

ITMD 419
Topics in Software Development
This course will cover a particular topic in software development, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMD 419/519 credit may be applied to a degree.
(Credit: Variable)

ITMD 421
Data Modeling & Applications
Basic data modeling concepts are introduced. Hands-on database design, implementation, and administration of single-user and shared multi-user database applications using a contemporary relational database management system.
(2-2-3)

ITMD 422
Advanced Database Management
Advanced topics in database management and programming including client server application development are introduced. Expands knowledge of data modeling concepts and introduces object-oriented data modeling techniques. Students will learn the use of Structured Query Language in a variety of application and operating system environments.
Prerequisite(s): [(ITMD 421)]
(3-0-3) **(C)**

ITMD 434
Human/Computer Interaction
Introduction to human-computer interaction, a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use. Emphasis is given to the structure of communication between people and computers, capabilities of people to use computers, concerns that arise in designing and building interfaces, design trade-offs, and the process of specification, design, and implementation of user interfaces. Particular emphasis is placed on practical design and usability of computer system user interfaces.
(3-0-3)

ITMD 455
Intelligent Device Applications
Intelligent device application development is covered with various technologies on mobile and robotic platforms. Utilizing contemporary toolkits, the student considers design and development on emulated and real “smart” devices including smart phones, personal digital assistants, sensors, actuators, and robots. Numerous exercises reinforce concepts gained throughout the course. A term project will integrate course topics into a comprehensive intelligent device application. This course may be taken more than once but only 9 hours of ITMD 455/555 credit may be applied to a degree.
Prerequisite(s): [(ITM 311)]
(Credit: Variable)

ITMD 460
Fundamentals of Multimedia
Students are introduced to computer-based multimedia theory, concepts, and applications. Topics include desktop publishing, hypermedia, presentation graphics, graphic images, animation, sound, video, multimedia on the World Wide Web and integrated multimedia authoring techniques.
(2-2-3) **(C)**

ITMD 461
Internet Technologies & Web Design
This course will cover the creation of Web pages and sites using HTML, CSS, Javascript and graphical applications. Networked multimedia distribution technologies are also explored. The design of effective Web site including page layout, user interface design, graphic design, content flow and site structure as well as management of Web site resources including intranet management and design considerations are addressed. Students design and create a major Web site with multiple pages and cross-linked structures.
(2-2-3) **(C)**

ITMD 462
Web Site Application Development
Programming the Common Gateway Interface (CGI) for Web pages is introduced with emphasis on creation of interfaces to handle HTML form data. CGI programming is taught in multiple languages. Security of Web sites is covered with an emphasis on controlled access sites. Setup, administration and customization of content management systems including blog and portal sites is introduced. Students design and create a Web site including basic CGI programs with Web interfaces and process data flows from online forms with basic database structures.
Prerequisite(s): [(ITMD 461)]
(2-2-3) **(C)**

ITMD 463
Intermediate Web Application Development
In-depth examination of the concepts involved in the development of Internet applications. Students will learn the differences and similarities between Internet applications and traditional client/server applications. A discussion of the technologies involved in creating these Internet applications is included, and students will learn to use these technologies to create robust server-side applications
Prerequisite(s): [(ITMD 411 and ITMD 461)]
(2-2-3)

ITMD 464
Advanced Web Application Development
Strategies for management of electronic commerce allow students to learn to re-engineer established business processes to increase enterprise competitive advantage, provide better customer service, reduce operating costs, and achieve a better return on investment. Students will learn to evaluate, use, and deploy state-of-the-art tools and techniques needed to develop a reliable e-commerce offering on the Web. The course will cover state-of-the-art programming and development tools. This class will provide students with hands-on exposure needed to design and build a fully functional e-commerce Web site.
Prerequisite(s): [(ITMD 463)]
(2-2-3)

ITMD 465
Rich Internet Applications
Students learn to create interactive rich internet applications using web development frameworks, applications, and techniques that primarily operate on the client-side. These applications often exhibit the same characteristics as desktop applications and are typically delivered through a standards-based web browser via a browser plug-in or independently via sandboxes or virtual machines. Current software frameworks used to download, update, verify, and execute these applications are addressed as well as writing applications for deployment in these frameworks.
Prerequisite(s): [(ITMD 461)]
(2-2-3)

ITMD 466
Service-Oriented Architecture
This course covers IT enterprise systems employing web services technologies in SOA and ESB architectural patterns. The student considers SOA which defines and provisions IT infrastructure and allows for a loosely-coupled data exchange over disparate applications participating in business processes. The simplification of integration and flexible reuse of business components within SOA is greatly furthered by ESB. Lab exercises using contemporary tool-kits are utilized to reinforce platform-agnostic course topics.
Prerequisite(s): [(ITMD 411 and ITMD 461)]
(2-2-3)

ITMD 467
Web Systems Integration
In this project-based course, student teams will build an enterprise-grade website and web infrastructure integrating server-side applications, databases, and client-side rich internet applications as a solution to a defined business problem.
Prerequisite(s): [(ITMD 462 and ITMD 465)]
(2-2-3)

ITMD 469
Topics in Application Development
This course will cover a particular topic in application development, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMD 469/569 credit may be applied to a degree.
(Credit: Variable)

Information Technology and Management: Management

ITMM 464
Social Media Marketing
Class participants will explore the tactics, tools, and strategies of incorporating new media channels to successfully grow a business and/or to maximize the goals of other types of organizations.
(3-0-3)

ITMM 470
Fundamentals of Management for Technology Professionals
This course explores fundamentals of management for professionals in high-technology fields. It addresses the challenges of the following: managing technical professionals and technology assets; human resource management; budgeting and managerial accounting; management of services, infrastructure, outsourcing, and vendor relationships; technology governance and strategy; and resource planning.
(3-0-3) **(C)**

ITMM 471
Project Management for Information Technology & Management
Basic principles of project management are taught with a particular focus on project planning for information technology hardware, software and networking project implementation. Management of application development and major Web development projects will also be addressed.
(3-0-3) **(C)**

ITMM 481
Information Technology Entrepreneurship
This course prepares students to become leaders in information technology and to build ITM companies. Students design and develop a prototype ITM product and prepare a business plan and venture proposal presentation.
(3-0-3)

ITMM 482
Business Innovation
This course is designed to teach innovative thinking through theory, methods, and practice of innovation. The course incorporates Einstein's thinking, and Edison's method to establish the innovation process that can be applied in current business environment. Current economic conditions and global sourcing requires that innovation becomes a leading tool for developing a competitive edge. Innovation has been considered a competency of educated, design engineering, and a selected few employees that has become insufficient today. Corporations and organizations need innovation to develop customer-specific solutions in almost real time.
(3-0-3)

ITMM 485
Legal & Ethical Issues in Information Technology
Current legal issues in information technology are addressed including elements of contracting, payment systems and digital signatures, privacy concerns, intellectual property, business torts, and criminal liability including hacking, computer trespass and fraud. Examination of ethical issues including privacy, system abuse, and ethical practices in information technology equip students to make sound ethical choices and resolve legal and moral issues that arise in information technology.
(3-0-3) **(C)**

Information Technology and Management: Operations

ITMO 417
Shell Scripting for System Administration

Focuses on preparation of shell scripts to enhance and streamline system administration tasks in all contemporary server operating systems. Scripting will be taught in both native and portable environments. The course will address shell programming, regular expressions, common and system-specific shell utilities and built-in commands, user defined and shell variables, flow control structures, shell functions, and the creation and execution of shell scripts. Homework and hands-on exercises will provide practical experience in contemporary server environments. Same as ITMO 517.
Prerequisite(s): [(ITMO 456)]
(3-0-3)

ITMO 433
Enterprise Server Administration

Students learn to set up, maintain, and administer X86-based servers and associated networks using a contemporary industry-standard proprietary operating system. Topics include hardware requirements; software compatibility; system installation, configuration and options, and post-installation topics; administrative and technical practices required for system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention. Also addressed is configuration and administration of common network and server services such as DNS, DHCP, remote access, email, basic virtualization, web and web services, and more.
Prerequisite(s): [(ITM 301 and ITMO 440)]
(2-2-3)

ITMO 440
Introduction to Data Networks & the Internet

This course covers current and evolving data network technologies, protocols, network components, and the networks that use them, focusing on the Internet and related LANs. The state of worldwide networking and its evolution will be discussed. This course covers the Internet architecture, organization, and protocols including Ethernet, 802.11, routing, the TCP/UDP/IP suite, DNS, SNMP, DHCP, and more. Students will be presented with Internet-specific networking tools for searching, testing, debugging, and configuring networks and network-connected host computers. There will be opportunities for network configuration and hands-on use of tools.
(2-2-3)

ITMO 441
Network Administration & Operations

Students learn the details, use, and configuration of network applications. Currently protocols and application technologies considered include SNMP, SMTP, IMAP, POP, MIME, BOOTP, DHCP, SAMBA, NFS, AFS, X, HTTP, DNS, NetBIOS, and CIFS/SMB. Windows workgroups and domains: file and printer sharing, remote access, and Windows networking are addressed. A research paper in the above topic areas is required.
Prerequisite(s): [(ITMO 440) OR (ITMO 540 with min. grade of C)]
(2-2-3)

ITMO 444
Cloud Computing Technologies

Computing applications hosted on dynamically-scaled virtual resources available as services are considered. Collaborative and non-collaborative “cloud-resident” applications are analyzed with respect to cost, device/location independence, scalability, reliability, security, and sustainability. Commercial and local cloud architectures are examined. A group-based integration of course topics will result in a project employing various cloud computing technologies.
Prerequisite(s): [(ITMD 411 and ITMO 456)]
(2-2-3)

ITMO 450
Enterprise End-User System Administration

Students learn to set up, configure, and maintain end-user desktop and portable computers and devices in an enterprise environment using a contemporary proprietary operating system, including the actual installation of the operating system in a networked client-server environment. User account management, security, printing, disk configuration, and backup procedures are addressed with particular attention to coverage of networked applications. System installation, configuration, and administration issues as well as network file systems, network access, and compatibility with other operating systems are also addressed. Administration of central server resources associated with management and provisioning of end-user systems in workgroups, domains, or forests is also addressed.
Prerequisite(s): [(ITM 301)]
(2-2-3)

ITMO 453
Open Source Server Administration

Students learn to set up, configure, and administer an industry-standard open source server operating system including integration with client systems using a variety of operating systems in a mixed environment. Topics include hardware requirements; software compatibility; administrative and technical practices required for system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention. Also addressed are configuration and administration of common network and server services such as DNS, DHCP, firewall, proxy, remote access, file and printer sharing, email, web, and web services as well as support issues for open source software.
Prerequisite(s): [(ITMO 440 and ITMO 456)]
(2-2-3)

ITMO 454
Operating System Virtualization

This course will cover technologies allowing multiple instances of operating systems to be run on a single physical system. Concepts addressed will include hypervisors, virtual machines, paravirtualization and virtual appliances. Both server and desktop virtualization will be examined in detail, with brief coverage of storage virtualization and application virtualization. Business benefits, business cases and security implications of virtualization will be discussed. Extensive hands-on assignments and a group project will allow students to gain first-hand experience of this technology.
Prerequisite(s): [(ITM 301) OR (ITMO 456)]
(2-2-3)

ITMO 456
Introduction to Open Source Operating Systems
Students learn to set up and configure an industry-standard open source operating system including system installation and basic system administration; system architecture; package management; command-line commands; devices, filesystems, and the filesystem hierarchy standard. Also addressed are applications, shells, scripting and data management; user interfaces and desktops; administrative tasks; essential system services; networking fundamentals; and security, as well as support issues for open source software. Multiple distributions are covered with emphasis on the two leading major distribution forks.
(2-2-3)

Information Technology and Management: Security

ITMS 428
Database Security
Students will engage in an in-depth examination of topics in data security including security considerations in applications and systems development, encryption methods, cryptography law and security architecture and models.
Prerequisite(s): [(ITMD 421)]
(3-0-3)

ITMS 443
Vulnerability Analysis & Control
This course addresses hands-on ethical hacking, penetration testing, and detection of malicious probes and their prevention. It provides students with in-depth theoretical and practical knowledge of the vulnerabilities of networks of computers including the networks themselves, operating systems, and important applications. Integrated with the lectures are laboratories focusing on the use of open source and freeware tools; students will learn in a closed environment to probe, penetrate, and hack other networks.
(2-2-3)

ITMS 448
Cyber Security Technologies
Prepares students for a role as a network security analyst and administrator. Topics include viruses, worms, and other attack mechanisms, vulnerabilities, and countermeasures; network security protocols, encryption, identity and authentication, scanning, firewalls, security tools, and organizations addressing security. A component of this course is a self-contained team project that, if the student wishes, can be extended into a fully operational security system in a subsequent course.
Prerequisite(s): [(ITMO 440) OR (ITMO 540 with min. grade of C)]
(2-2-3) **(C)**

ITMS 458
Operating System Security
This course will address theoretical concepts of operating system security, security architectures of current operating systems, and details of security implementation using best practices to configure operating systems to industry security standards. Server configuration, system-level firewalls, file system security, logging, anti-virus and anti-spyware measures and other operating system security strategies will be examined.
Prerequisite(s): [(ITMO 456)]
(2-2-3)

ITMS 478
Cyber Security Management
In-depth examination of topics in the management of information technology security including access control systems and methodology, business continuity and disaster recovery planning, legal issues in information system security, ethics, computer operations security, physical security and security architecture & models using current standards and models
(3-0-3) **(C)**

ITMS 479
Topics in Information Security
This course will cover a particular topic in Information Security, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMS 479/579 credit may be applied to a degree.
(Credit: Variable)

Information Technology and Management: Theory and Technology

ITMT 430
System Integration
In this capstone course, students will identify, gather, analyze, and write requirements based on user needs and will then design, construct, integrate, and implement an information system as a solution to a business problem. Students will document integration requirements using business process models and will learn and apply key systems integration architecture, methodologies, and technologies using industry best practices. User needs and user centered design will be applied in the selection, creation, evaluation, and administration of the resulting system. The system design process will take into account professional, ethical, legal, security, and social issues and responsibilities and stress the local and global impact of computing on individuals, organizations, and society. Discussion will also cover the need to engage in continuing professional development.
Prerequisite(s): [(ITMD 411, ITMD 421, ITMD 434, ITMD 461, ITMM 471, ITMO 440, and ITMO 456)]
(2-2-3) **(E)**

ITMT 491
Undergraduate Research
Undergraduate research. Written consent of instructor is required.
(Credit: Variable)

ITMT 492
Embedded Systems & Reconfigurable Logic Design
This course covers reconfigurable intelligent devices programmed with modern high level languages focusing on design and integration to modern environments. The course will also cover the topic and deployment of wireless sensor networks and the use of rapid prototyping for commercial application. Students will discover hardware, software and firmware design trade-offs as well as best practices in current embedded systems development. A final project will integrate course topics into a system using an embeddable single-board microcontroller.
Prerequisite(s): [(ITM 311) OR (ITM 312)]
(3-0-3)

ITMT 495
Topics in Information Technology
This course will cover a particular topic varying from semester to semester in which there is particular student or staff interest.
(Credit: Variable)

Technology

TECH 497
Special Projects
Independent study and projects in applied technology that are multi/cross-disciplinary not tied to a specific department. (Credit: Variable)

INFORMATION TECHNOLOGY AND MANAGEMENT: GRADUATE COURSES

The following graduate courses are available to degree-seeking undergraduate students with approval of the course instructor and faculty advisor, and to co-terminal degree students; additional graduate courses may be available to co-terminal degree students. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

ITMD 511
Application Development Methodologies

ITMD 512
Structured and Systems Programming

ITMD 521
Client Server Technologies and Applications

ITMD 523
Advanced Topics in Data Management

ITMD 526
Data Warehousing

ITMD 527
Data Analytics

ITMD 529
Advanced Data Analytics

ITMD 532
UML Based Software Development

ITMD 535
Data Center Architecture

ITMD 556
Intelligent Device Projects

ITMM 572
Process Engineering for Information Technology Managers

ITMM 573
Building and Leading Effective Teams

ITMM 574
Information Technology Management Frameworks

ITMM 575
Networking and Telecommunications Mangement

ITMM 576
Data Center Management

ITMM 577
Case Studies in the Management of Information Technology

ITMM 582
Business Innovation

ITMM 584
Information Technology at C-Level

ITMM 586
Information Technology Auditing

ITMO 542
Wireless Technologies and Applications

ITMO 545
Telecommunications Technology

ITMO 546
Telecommunications Over Data Networks

ITMO 547
Telecommunications Over Data Networks: Projects & Advanced Methods

ITMO 557
Storage Technologies

ITMS 518
Coding Security

ITMS 538
Cyber Forensics

ITMS 539
Steganography

ITMS 549
Cyber Security Technologies: Projects and Advanced Methods

ITMS 555
Mobile Device Forensics

ITMS 588
Incident Response, Disaster Recovery and Business Continuity

ITMT 514
Enterprise Application Architecture

ITMT 531
Object Oriented System Analysis, Modeling and Design

ITMT 533
Operating System Design Implementation

ITMT 535
Data Center Architecture

ITMT 537
Instructional Technologies

ITMT 593
Embedded Systems

TECH 580
Topics in the Management of Technology

TECH 581
Consulting for Technical Professionals

TECH 597
Special Problems in Technology

Landscape Architecture

LA 443
Forests, Preserves, Parks, & Urbanscapes

The growing need for these public site types in America in the 1800s gave rise to the landscape architecture profession. More necessary now than ever, the planning and design approach to these sites is undergoing major change. In this course students will investigate the historical and contemporary environmental and cultural relationships of the American landscape. Themes include landscape use and ecological change, regional and national landscapes, the roles of the National Park Service, state and county park and forest systems, and municipal green spaces. Case studies and analyses of specific sites.
(3-0-3)

LA 497
Special Projects

Special projects. Open only to Architecture majors.
(Credit: Variable)

Lewis College of Human Sciences

LCHS 100
Introduction to the Professions

This course is designed for students who are undecided about their major. Students will learn about professions in the context of different industries including entry points for each industry and the career opportunities associated with different sectors. Students will be provided assessments of their abilities and interests to inform their thinking about career paths that represent a best fit.
(2-0-2) **(C)**

LCHS 285
Special Topics

Investigate a topic of current interest at an introductory level. Topic will be announced by instructor at scheduling time. Course may be taken multiple times.
(3-0-3)

Literature

LIT 306
Science Fiction

A treatment of select science fiction texts in terms of how they reflect shifting forms of work and social life in the 20th century. The course will focus on how these texts translate shifts in social patterns and popular entertainment.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 307
Graphic Novel

Comics, once a genre associated primarily with superheroes, have evolved since the 1970's to address weighty philosophical and existential issues in extended formats such as the graphic novel. This course will examine the graphic novels from major authors in the genre (e.g., Spiegelman, Eisner, and Moore) as well as "outside" artists. Also covered are the theoretical foundations of comics theory according to Will Eisner and Scott McCloud (among others). May not be taken for credit by students who have completed LIT 380 Graphic Novel.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 309
Short Fiction

A formal and thematic analysis of a diverse selection of works of short fiction. The selection will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 315
The Novel

Analysis of the novel as a literary form with attention to its place in ongoing cultural and political discourse.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 317
The Novel Today

An examination of major world fiction since World War II. Readings will be chosen from such writers as Graham Greene, Alexander Solzhenitsyn, Heinrich Boll, Saul Bellow, Robertson Davies, and Gabriel Marquez, Nadine Gordimer, Toni Morrison, and Salman Rushdie.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 326
World Literatures

Contemporary networks of global capital and information technologies provide the motivation for the reading strategies of this course. The course will examine literary texts from a variety of global contexts from the perspective of globalism and nationalism.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 328
Poetry

Study of poetry and imaginative prose, including an analysis of the theoretical, literary, and socio-cultural contexts of these works. The course may include creative writing by students.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 337
Shakespeare: Early Work

Study of Shakespeare's work before 1600, focusing on the histories, early comedies and tragedies. Close reading of the plays' language and form, and emphasis on the place of drama in early modern culture. Syllabus varies but is likely to include Taming of the Shrew, Much Ado About Nothing, Parts 1 and 2 of Henry IV, Henry V, Hamlet.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 338
Shakespeare: Late Work

Study of Shakespeare's work after 1600, focusing on the middle and late comedies and tragedies and the romances. Close reading of the plays' language and form, and emphasis on the place of drama in early modern culture. Syllabus varies but is likely to include Twelfth Night, Macbeth, Coriolanus, Othello, King Lear, The Winter's Tale and The Tempest. May be taken independently of LIT 337.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 339
Shakespeare on Stage & Screen
While reading is the first step in understanding Shakespeare's work, seeing his words brought to life in a film or stage production comes closest to experiencing the plays as Shakespeare intended 400 years ago: as a performance. For each play discussed, students will view and compare two film versions. Students will also go to a live production of one play. Also covered are a history of Shakespeare in film and an introduction to film analysis. May not be taken for credit by students who have taken LIT 380 Shakespeare on Stage and Screen.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 342
Theater in Chicago
Designed to introduce students to the variety of professional theater performances in and around Chicago. Main emphasis on seeing plays, ancient to contemporary; essays and oral reports; study of dramatic genres and theater history.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 343
Film Analysis
Examination of the style and language of film as shown in a number of feature films, with emphasis on the various ways individual directors use the cinema for personal and cultural ends.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 352
Gender & Sexuality in Literature
This course introduces students to literary texts in Western and other traditions that examine issues of gender and sexuality, exploring how both gender and sexuality are interactive concepts shaped by their interrelationships with other vectors of identity, and with the artistic forms in which they are represented. May not be taken for credit by students who have taken LIT 380 Gender and Sexuality in Literature.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 354
African American Literature
This course explores various issues represented within African American literature. Throughout the course the students will read texts that focus on relationships between race, class, gender and identity. Students will discuss and research topics associated with themes outlined by the instructor.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 366
Twentieth-Century American Literature
Study of such writers as Steineck, Frost, Eliot, Anderson, O'Neill, Hemingway, Cather, Wolfe, Faulkner, and contemporary writers such as Updike and Toni Morrison.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 380
Topics in Literature
An investigation into a topic of current or enduring interest in literature, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 411
Workshop in Creative Writing
A workshop demonstrating principles of composition in fiction, poetry, or drama, studied from a writer's vantage point. Works by modern authors are analyzed. Student manuscripts are discussed and evaluated.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

LIT 491
Independent Reading & Research
Consent of department. For advanced students.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(Credit: Variable) **(C)(H)**

Mathematics

Courses indicated by an asterisk (*) do not count toward any mathematics requirements in business, computer science, engineering, mathematics, or natural science degree programs.

MATH 100
Introduction to the Profession
Introduces the student to the scope of mathematics as a profession, develops a sense of mathematical curiosity and problem solving skills, identifies and reinforces the student's career choices, and provides a mechanism for regular academic advising. Provides integration with other first-year courses. Introduces applications of mathematics to areas such as engineering, physics, computer science, and finance. Emphasis is placed on the development of teamwork skills.
(3-0-3) **(C)**

MATH 119*
Geometry for Architects
Basic analytic geometry in two and three dimensions; trigonometry. Equations of lines, circles and conic sections; resolution of triangles; polar coordinates. Equations of planes, lines, quadratic surfaces. Applications.
(3-0-3) **(C)**

MATH 122*
Introduction to Calculus
Basic concepts of calculus of a single variable; limits, derivatives, integrals. Applications.
(3-0-3)

MATH 130*
Thinking Mathematically
This course allows students to discover, explore, and apply modern mathematical ideas. Emphasis is placed on using sound reasoning skills, visualizing mathematical concepts, and communicating mathematical ideas effectively. Classroom discussion and group work on challenging problems are central to the course. Topics from probability, statistics, logic, number theory, graph theory, combinatorics, chaos theory, the concept of infinity, and geometry may be included.
(3-0-3) **(C)**

MATH 148*
Calculus/Precalculus I
Review of algebra and analytic geometry. Functions, limits, derivatives. Trigonometry, trigonometric functions and their derivatives. Chain rule, implicit and inverse functions, and inverse trigonometric functions.
(4-0-4)

MATH 149
Calculus/Precalculus II
Applications of derivatives; related rates, maxima and minima, monotonicity, concavity, graphing, optimization. Antiderivatives, first order differential equations. Definite integral and applications. Implicit and inverse functions, and inverse trigonometric functions.
Prerequisite(s): [(MATH 148 with min. grade of C)]
(4-1-5) **(C)**

MATH 151
Calculus I
Analytic geometry. Functions and their graphs. Limits and continuity. Derivatives of algebraic and trigonometric functions. Applications of the derivative. Introduction to integrals and their applications.
Prerequisite(s): [(IIT Mathematics Placement: 151) OR (MATH 145 with min. grade of C) OR (MATH 148 with min. grade of C)]
(4-1-5) **(C)**

MATH 152
Calculus II
Transcendental functions and their calculus. Integration techniques. Applications of the integral. Indeterminate forms and improper integrals. Polar coordinates. Numerical series and power series expansions.
Prerequisite(s): [(MATH 149 with min. grade of C) OR (MATH 151 with min. grade of C)]
(4-1-5) **(C)**

MATH 230
Introduction to Discrete Math
Sets, statements, and elementary symbolic logic; relations and digraphs; functions and sequences; mathematical induction; basic counting techniques and recurrence. Credit will not be granted for both CS 330 and MATH 230. Course does not satisfy graduation requirements for Computer Information Systems or Computer Science majors.
(3-0-3) **(C)**

MATH 251
Multivariate & Vector Calculus
Analytic geometry in three-dimensional space. Partial derivatives. Multiple integrals. Vector analysis. Applications.
Prerequisite(s): [(MATH 152)]
(4-0-4)

MATH 252
Introduction to Differential Equations
Linear differential equations of order one. Linear differential equations of higher order. Series solutions of linear DE. Laplace transforms and their use in solving linear DE. Introduction to matrices. Systems of linear differential equations.
Prerequisite(s): [(MATH 152)]
(4-0-4)

MATH 300
Perspectives in Analysis
The course is focused on selected topics related to fundamental concepts and methods of classic analysis and their applications with emphasis on various problem-solving strategies, visualization, mathematical modeling, and interrelation of different areas of mathematics.
Prerequisite(s): [(MATH 251 and MATH 252)]
(3-0-3)

MATH 332
Elementary Linear Algebra
Systems of linear equations; matrix algebra, inverses, determinants, eigenvalues, and eigenvectors, diagonalization; vector spaces, basis, dimension, rank and nullity; inner product spaces, orthonormal bases; quadratic forms.
Prerequisite(s): [(MATH 251*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MATH 333
Matrix Algebra & Complex Variables
Vectors and matrices; matrix operations, transpose, rank, inverse; determinants; solution of linear systems; eigenvalues and eigenvectors. The complex plane; analytic functions; contour integrals; Laurent series expansions; singularities and residues. Course does not satisfy graduation requirements for Applied Mathematics majors.
Prerequisite(s): [(MATH 251)]
(3-0-3)

MATH 350
Introduction to Computational Mathematics
Study and design of mathematical models for the numerical solution of scientific problems. This includes numerical methods for the solution on linear and nonlinear systems, basic data fitting problems, and ordinary differential equations. Robustness, accuracy, and speed of convergence of algorithms will be investigated including the basics of computer arithmetic and round-off errors. Same as MMAE 350.
Prerequisite(s): [(CS 104) OR (CS 105) OR (CS 115)] AND [(MATH 251)] AND [(MATH 252)]
(3-0-3) **(C)**

MATH 374
Probability & Statistics for Electrical & Computer Engineers
This course focuses on the introductory treatment of probability theory including: axioms of probability, discrete and continuous random variables, random vectors, marginal, joint, conditional and cumulative probability distributions, moment generating functions, expectations, and correlations. Also covered are sums of random variables, central limit theorem, sample means, and parameter estimation. Furthermore, random processes and random signals are covered. Examples and applications are drawn from problems of importance to electrical and computer engineers. Credit only granted for one of MATH 374, MATH 474, and MATH 475.
Prerequisite(s): [(MATH 251)]
(3-0-3)

MATH 400
Real Analysis
Real numbers, continuous functions; differentiation and Riemann integration. Functions defined by series.
Prerequisite(s): [(MATH 251)]
(3-0-3)

MATH 402
Complex Analysis
Analytic functions, conformal mapping, contour integration, series expansions, singularities and residues, and applications. Intended as a first course in the subject for students in the physical sciences and engineering.
Prerequisite(s): [(MATH 251)]
(3-0-3)

MATH 405
Introduction to Iteration & Chaos
Functional iteration and orbits, periodic points and Sharkovsky's cycle theorem, chaos and dynamical systems of dimensions one and two. Julia sets and fractals, physical implications.
Prerequisite(s): [(MATH 251, MATH 252, and MATH 332) OR (MATH 251, MATH 252, and MATH 333)]
(3-0-3) **(C)**

MATH 410
Number Theory
Divisibility, congruencies, distribution of prime numbers, functions of number theory, diophantine equations, applications to encryption methods.
Prerequisite(s): [(MATH 230)]
(3-0-3)

MATH 420
Geometry
The course is focused on selected topics related to fundamental concepts and methods of Euclidean geometry in two and three dimensions and their applications with emphasis on various problem-solving strategies, geometric proof, visualization, and interrelation of different areas of mathematics.
Prerequisite: Permission of instructor.
(3-0-3)

MATH 425
Statistical Methods
Concepts and methods of gathering, describing and analyzing data including basic statistical reasoning, basic probability, sampling, hypothesis testing, confidence intervals, correlation, regression, forecasting, and nonparametric statistics. No knowledge of calculus is assumed. This course is useful for students in education or the social sciences. This course does not count for graduation in any mathematics programs. Credit not given for both MATH 425 and MATH 476. Course does not satisfy graduation requirements for Applied Mathematics majors.
(3-0-3)

MATH 426
Statistical Tools for Engineers
Descriptive statistics and graphs, probability distributions, random sampling, independence, significance tests, design of experiments, regression, time-series analysis, statistical process control, introduction to multivariate analysis. Same as CHE 426. Credit not given for both Math 426 and CHE 426 Course does not satisfy graduation requirements for Applied Mathematics majors. Requires sophomore standing.
(3-0-3)

MATH 430
Applied Algebra
Relations; modular arithmetic; group theory: symmetry, permutation, cyclic, and abelian groups; group structure: subgroups, cosets, homomorphisms, classifications theorems; rings and fields. Applications to crystallography, cryptography, and check-digit schemes.
Prerequisite(s): [(MATH 230) OR (MATH 332)]
(3-0-3) **(C)**

MATH 431
Applied Algebra II
Ring homomorphisms; factorization and reducibility in polynomial rings; integral domains; vector spaces; fields and their extensions. As time permits, application to one or more of the following: Frieze and crystallographic groups, Caley digraphs, and coding theory.
Prerequisite(s): [(MATH 430)]
(3-0-3)

MATH 435
Linear Optimization
Introduction to both theoretical and algorithmic aspects of linear optimization: geometry of linear programs, simplex method, anticycling, duality theory and dual simplex method, sensitivity analysis, large scale optimization via Dantzig-Wolfe decomposition and Benders decomposition, interior point methods, network flow problems, integer programming. Credit may not be granted for both MATH 435 and MATH 535.
Prerequisite(s): [(MATH 332)]
(3-0-3)

MATH 453
Combinatorics
Permutations and combinations; pigeonhole principle; inclusion-exclusion principle; recurrence relations and generating functions; enumeration under group action.
Prerequisite(s): [(MATH 230)]
(3-0-3)

MATH 454
Graph Theory & Applications
Graph theory is the study of systems of points with some of the pairs of points joined by lines. Sample topics include: paths, cycles and trees; adjacency and connectivity; directed graphs; Hamiltonian and Eulerian graphs and digraphs; intersection graphs. Applications to the sciences (computer, life, physical, social) and engineering will be introduced throughout the course. Credit will not be granted for both MATH 454 and MATH 553
Prerequisite(s): [(MATH 230 and MATH 251) OR (MATH 230 and MATH 252)]
(3-0-3) **(C)**

MATH 461
Fourier Series & Boundary-Value Problems
Fourier series and integrals. The Laplace, heat, and wave equations: Solutions by separation of variables. D'Alembert's solution of the wave equation. Boundary-value problems.
Prerequisite(s): [(MATH 251 and MATH 252)]
(3-0-3)

MATH 474
Probability & Statistics
Elementary probability theory including discrete and continuous distributions, sampling, estimation, confidence intervals, hypothesis testing, and linear regression. Credit not granted for both MATH 474 and MATH 475. Course does not satisfy graduation requirements for Applied Mathematics majors.
Prerequisite(s): [(MATH 251)]
(3-0-3)

MATH 475
Probability
Elementary probability theory; combinatorics; random variables; discrete and continuous distributions; joint distributions and moments; transformations and convolution; basic theorems; simulation. Credit not granted for both MATH 474 and MATH 475.
Prerequisite(s): [(MATH 251)]
(3-0-3)

MATH 476
Statistics
Estimation theory; hypothesis tests; confidence intervals; goodness-of-fit tests; correlation and linear regression; analysis of variance; nonparametric methods.
Prerequisite(s): [(MATH 475)]
(3-0-3) **(C)**

MATH 477
Numerical Linear Algebra
Fundamentals of matrix theory; least squares problems; computer arithmetic; conditioning and stability; direct and iterative methods for linear systems; eigenvalue problems. Credit may not be granted for both MATH 477 and MATH 577.
Prerequisite(s): [(MATH 350)]
(3-0-3)

MATH 478
Numerical Methods for Differential Equations
Polynomial interpolation; numerical integration; numerical solution of initial value problems for ordinary differential equations by single and multi-step methods, Runge-Kutta, Predictor-Corrector; numerical solution of boundary value problems for ordinary differential equations by shooting method, finite differences and spectral methods. Credit may not be granted for both MATH 478 and MATH 578.
Prerequisite(s): [(MATH 350)]
(3-0-3)

MATH 481
Introduction to Stochastic Processes
This is an introductory, undergraduate course in stochastic processes. Its purpose is to introduce students to a range of stochastic processes which are used as modeling tools in diverse fields of applications, especially in risk management applications for finance and insurance. The course covers basic classes of stochastic processes: Markov chains and martingales in discrete time; Brownian motion; and Poisson process. It also presents some aspects of stochastic calculus.
Prerequisite(s): [(MATH 332 and MATH 475) OR (MATH 333 and MATH 475)]
(3-0-3)

MATH 483
Design & Analysis of Experiments
Review of elementary probability and statistics; analysis of variance for design of experiments; estimation of parameters; confidence intervals for various linear combinations of the parameters; selection of sample sizes; various plots of residuals; block designs; Latin squares; one, two, and 2^k factorial designs; nested and cross factor designs; regression; nonparametric techniques.
Prerequisite(s): [(MATH 476)]
(3-0-3)

MATH 484
Regression & Forecasting
Simple linear regression; multiple linear regression; least squares estimates of parameters; hypothesis testing and confidence intervals in linear regression models; testing of models, data analysis, and appropriateness of models; linear time series models; moving average, autoregressive and/or ARIMA models; estimation, data analysis, and forecasting with time series models; forecasting errors and confidence intervals. Credit may not be granted for both MATH 484 and MATH 564.
Prerequisite(s): [(MATH 474) OR (MATH 476)]
(3-0-3) **(C)**

MATH 485
Introduction to Mathematical Finance
This is an introductory course in mathematical finance. Technical difficulty of the subject is kept at a minimum while the major ideas and concepts underlying modern mathematical finance and financial engineering are explained and illustrated. The course covers the binomial model for stock prices and touches on continuous time models and the Black-Scholes formula.
Prerequisite(s): [(MATH 475)]
(3-0-3)

MATH 486
Mathematical Modeling I
The course provides a systematic approach to modeling and analysis of physical processes. For specific applications, relevant differential equations are derived from basic principles – for example, from conservation laws and constitutive equations. Dimensional analysis and scaling are introduced to prepare a model for analysis. Analytic solution techniques, such as integral transforms and similarity variable techniques, or approximate methods, such as asymptotic and perturbation methods, are presented and applied to the models. A broad range of applications from areas such as physics, engineering, biology, and chemistry are studied. Credit may not be granted for both MATH 486 and MATH 522.
Prerequisite(s): [(MATH 461)]
(3-0-3) **(C)**

MATH 487
Mathematical Modeling II
The formulation of mathematical models, solution of mathematical equations, interpretation of results. Selected topics from queuing theory and financial derivatives.
Prerequisite(s): [(MATH 252)]
(3-0-3) **(C)**

MATH 488
Ordinary Differential Equations & Dynamical Systems
Boundary-value problems and Sturm-Liouville theory; linear system theory via eigenvalues and eigenvectors; Floquet theory; nonlinear systems: critical points, linearization, stability concepts, index theory, phase portrait analysis, limit cycles, and stable and unstable manifolds; bifurcation; and chaotic dynamics.
Prerequisite(s): [(MATH 251 and MATH 252)]
(3-0-3)

MATH 489
Partial Differential Equations
First-order equations, characteristics. Classification of second-order equations. Laplace's equation; potential theory. Green's function, maximum principles. The wave equation: characteristics, general solution. The heat equation: use of integral transforms.
Prerequisite(s): [(MATH 461)]
(3-0-3)

MATH 491
Reading & Research
Independent reading and research.
(Credit: Variable) **(C)**

MATH 497
Special Problems
Special problems.
(Credit: Variable) **(C)**

Military Science

MILS 101
Foundation of Officership
Issues and competencies that are central to a commissioned officer's responsibilities. Establish framework for understanding officership, leadership, and Army values followed and "life skills" such as physical fitness and time management.
(1-2-1) **(C)**

MILS 102
Basic Leadership
Establishes foundation of basic leadership fundamentals such as problem solving, communications, briefings and effective writing, goal setting techniques for improving listening and speaking skills, and an introduction to counseling.
(1-2-1) **(C)**

MILS 107
American Military History
Study of American military history through examination of evolvement of the Army and warfare.
(3-2-3)

MILS 147
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 148
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 199
Military Topics
Approval of the department. Research and study of selected topics. A practical laboratory is required. May be repeated if topics vary. Students may register in more than one section per term.
(3-0-3)

MILS 201
Individual Leadership Studies
Students identify successful leadership characteristics through observation of others and self and through experiential learning exercises. Students record observed traits (good and bad) in a dimensional leadership journal and discuss observations in small group settings.
(2-2-2)

MILS 202
Leadership & Teamwork
Study examines how to build successful teams, various methods for influencing action, effective communication in setting and achieving goals, the importance of timing the decision, creativity in the problem solving process, and obtaining team buy-in through immediate feedback.
(2-2-2)

MILS 247
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 248
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 301
Leadership & Problem Solving
Students conduct self-assessment of leadership style, develop personal fitness regimen, and learn to plan and conduct individual/ small unit tactical training while testing reason and problem-solving techniques. Students receive direct feedback on leadership abilities.
(3-2-3) **(C)**

MILS 302
Leadership & Ethics
Examines the role communications, values, and ethics play in effective leadership. Topics include ethical decision-making, consideration of others, spirituality in the military, and survey Army leadership doctrine. Emphasis on improving oral and written communication abilities.
Prerequisite(s): [(MILS 301)]
(3-2-3) **(C)**

MILS 347
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 348
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 350
Military Civil & Public Affairs
This course is an expansion of Military Presence in towns, villages, and cities where it would be necessary for a military government to assume responsibilities for the administration of the government functions. An added feature of the course would be the development of positive relationships with civilians and government officials. The preparation of news and information releases and related operations.
(0-0-3)

MILS 394
Advanced Military Topics
Approval of the department. Study of advanced topics in military science. A practical laboratory is required. May be repeated if topics vary. Students may register in more than one section per term.
(3-0-3)

MILS 399
Advanced Independent Research
Approval of the department. Intensive research and study of selected topics. A practical laboratory is required. May be repeated to maximum of 6 hours if topics vary. Students may register in more than one section per term.
(0-0-3)

MILS 401
Leadership & Management
Develops student proficiency in planning and executing complex operations, functioning as a member of a staff, and mentoring subordinates. Students explore training management, methods of effective staff collaboration, and developmental counseling techniques.
Prerequisite(s): [(MILS 301 and MILS 302)]
(3-2-3) **(C)**

MILS 402
Officership
Study includes case study analysis of military law and practical exercises on establishing an ethical command climate. Students must complete a semester long Senior Leadership Project that requires them to plan, organize, collaborate, analyze, and demonstrate their leadership skills.
Prerequisite(s): [(MILS 301, MILS 302, and MILS 401)]
(3-2-3) **(C)**

MILS 447
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 448
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 499
Advanced Independent Research
Intensive research and study of selected topics. May be repeated for a maximum of six credit hours. A practical laboratory is required for Army ROTC cadets.
(Credit: Variable)

Mechanical, Materials, and Aerospace Engineering

MMAE 100
Introduction to the Profession
Introduces the student to the scope of the engineering profession and its role in society, develops a sense of professionalism in the student, confirms and reinforces the student's career choices, and provides a mechanism for regular academic advising. Provides integration with other first-year courses. Applications of mathematics to engineering. Emphasis is placed on the development of professional communications and teamwork skills.
(2-1-3) **(C)**

MMAE 200
Introduction to Mechanics
Equilibrium concepts. Free body diagrams. Statics of particles and rigid bodies. Distributed forces, centroids, center of gravity, and moments of inertia. Friction. Internal loads in bars, shafts, cables, and beams.
Prerequisite(s): [(MATH 152* and PHYS 123)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 202
Mechanics of Solids
Stress and strain relations, mechanical properties. Axially loaded members. Torsion of circular shafts. Plane stress and strain, Mohr's circle, stress transformation. Elementary bending theory, normal and shear stresses in beams, beam deflection. Combined loading.
Prerequisite(s): [(MMAE 200)]
(3-0-3)

MMAE 232
Design for Innovation
Design and development of mechanical systems. The design process, isometric sketching, engineering drawings, CAD, sustainable design, whole-system design and lifecycle thinking, design for product lifetime, lightweighting, technical writing, bio-inspired design process, bio-inspired design for locomotion, mechanism and linkage design, actuators, triggers, engineering and ethics, and engineering and law. Team-based design and build projects focusing on sustainable design techniques, bio-inspired locomotion, and mechatronics.
Prerequisite(s): [(CS 104 and MMAE 200*)] An asterisk (*) designates a course which may be taken concurrently.
(1-3-3) **(C)**

MMAE 302
Advanced Mechanics of Solids
Analysis of stress and strain. Torsional and bending structural elements. Energy methods and Castigliano's theorems. Curved beams and springs. Thick-walled cylinders and spinning disks. Pressure vessels. Contact stresses. Stability of columns. Stress concentration and stress intensity factors. Theories of failure, yield, and fracture. Fatigue.
Prerequisite(s): [(MATH 251, MATH 252, and MMAE 202)]
(3-0-3)

MMAE 304
Mechanics of Aerostructures
Loads on aircraft, and flight envelope. Stress, strain and constitutive relations. Torsion of open, closed and multi-cell tubes. Energy methods. Castigliano's theorems. Structural instability.
Prerequisite(s): [(MATH 251, MATH 252, and MMAE 202)]
(3-0-3)

MMAE 305
Dynamics
Kinematics of particles. Kinetics of particles. Newton's laws of motion, energy; momentum. Systems of particles. Kinematics of rigid bodies. Plane motion of rigid bodies: forces and accelerations, energy, momentum.
Prerequisite(s): [(CAE 286) OR (MMAE 200)] AND [(MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 311
Compressible Flow
Regimes of compressible perfect-gas flow. Steady, quasi one-dimensional flow in passages. Effects of heat addition and friction in ducts. Design of nozzles, diffusers and wind tunnels. Simple waves and shocks in unsteady duct flow. Steady two-dimensional supersonic flow including oblique shocks and Prandtl-Meyer expansions.
Prerequisite(s): [(MMAE 313 and MMAE 320)]
(3-0-3)

MMAE 312
Aerodynamics of Aerospace Vehicles
Analysis of aerodynamic lift and drag forces on bodies. Potential flow calculation of lift on two-dimensional bodies; numerical solutions; source and vortex panels. Boundary layers and drag calculations. Aerodynamic characteristics of airfoils; the finite wing.
Prerequisite(s): [(MMAE 311*, MMAE 313, and MMAE 320)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 313
Fluid Mechanics
Basic properties of fluids in motion. Langrangian and Eulerian viewpoints, materials derivative, streamlines, etc. Continuity, energy, and linear and angular momentum equations in integral and differential forms. Integration of equations for one-dimensional forms and application to problems. Incompressible viscous flow; Navier-Stokes equations, parallel flow, pipe flow, and the Moody diagram. Introduction to laminar and turbulent boundary layers and free surface flows.
Prerequisite(s): [(MATH 252*)] AND [(MMAE 200)] AND [(MMAE 320*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 315
Aerospace Laboratory I
Basic skills for engineering research are taught, which include: analog electronic circuit analysis, fundamentals of digital data acquisition, measurements of pressure, temperature, flow rate, heat transfer, and static forces and moments; statistical data analysis.
Prerequisite(s): [(MMAE 313 and PHYS 221 and MMAE 311*)] An asterisk (*) designates a course which may be taken concurrently.
(2-3-4) **(C)**

MMAE 319
Mechanical Laboratory I
Basic skills for engineering research are taught, which include: analog electronic circuit analysis; fundamentals of digital data acquisition; measurements of pressure, temperature, flow rate, heat transfer, and static forces and moments; and statistical date analysis.
Prerequisite(s): [(MMAE 313 and PHYS 221)]
(2-3-4) **(C)**

MMAE 320
Thermodynamics
Introduction to thermodynamics including properties of matter; First Law of Thermodynamics and its use in analyzing open and closed systems; limitations of the Second Law of Thermodynamics; entropy.
Prerequisite(s): [(MATH 251)]
(3-0-3)

MMAE 321
Applied Thermodynamics
Analysis of thermodynamic systems including energy analysis; analysis and design of power and refrigeration cycles; gas mixtures and chemically reacting systems; chemical equilibrium; combustion and fuel cells.
Prerequisite(s): [(MMAE 313* and MMAE 320)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 323
Heat & Mass Transfer
Basic laws of transport phenomena, including: steady-state heat conduction; multi-dimensional and transient conduction; forced internal and external convection; natural convection; heat exchanger design and analysis; fundamental concepts of radiation; shape factors and network analysis; diffusive and convective mass transfer; phase change, condensation and boiling.
Prerequisite(s): [(MMAE 313 and MMAE 320)]
(3-0-3)

MMAE 332
Design of Machine Elements
Students will gain an understanding of the basic elements used in machine design. These include the characteristics of gears, bearings, shafts, keys, couplings, fasteners, springs, electric motors, brakes and clutches, and flexible elements. Students will also learn mechanism types, linkage analysis, and kinematic synthesis.
Prerequisite(s): [(MMAE 232*)] AND [(MMAE 302) OR (MMAE 304)] AND [(MS 201)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 350
Computational Mechanics
Explores the use of numerical methods to solve engineering problems in solid mechanics, fluid mechanics and heat transfer. Topics include matrix algebra, nonlinear equations of one variable, systems of linear algebraic equations, nonlinear equations of several variables, classification of partial differential equations in engineering, the finite difference method, and the finite element method. Same a MATH 350.
Prerequisite(s): [(CS 104-201, MATH 251, MATH 252*, and MMAE 202*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 361
Fundamentals of Crystalline Solids
Imperfections in metals and ceramics. Dislocations and plastic deformation. The thermodynamic and kinetic principles of binary phase diagrams. Diffusion. Solidification.
Prerequisite(s): [(MMAE 371 and MS 201)]
(3-0-3)

MMAE 362
Physics of Solids
Introduction of crystallography, crystal structure, crystal systems, symmetry, stereographic representation. Crystal structures in materials. X-ray diffraction; character of X-rays and their interaction with crystals; diffraction methods. Structure of the atom and the behavior of electrons in solids. Band theory of solids. Electrical, thermal and magnetic behavior. Theory of phase stability in alloys. Equivalent to PHYS 437.
Prerequisite(s): [(MS 201)]
(3-0-3) **(C)**

MMAE 365
Structure & Properties of Materials I
Crystal structures and structure determination. Crystal defects, intrinsic and extrinsic properties, diffusion, kinetics of transformations, evolution and classification of microstructures.
Prerequisite(s): [(MMAE 320* and MS 201)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 370
Materials Laboratory I
Introduction to materials characterization techniques including specimen preparation, metallography, optical and scanning electron microscopy, temperature measurement, data acquisition analysis and presentation.
Prerequisite(s): [(MMAE 365*) OR (MMAE 371*)] An asterisk (*) designates a course which may be taken concurrently.
(1-6-3) **(C)**

MMAE 372
Aerospace Materials Lab
Mechanical behavior and microstructural characterization of aerospace materials including advanced metal alloys, polymers, ceramics, and composites. Introduction to mechanical testing techniques for assessing the properties and performance of aerospace materials. Evaluation of structural performance in terms of materials selection, processing, service conditions, and design.
Prerequisite(s): [(MMAE 202 and MS 201)]
(3-3-3) **(C)**

MMAE 373
Instrumentation & Measurements Laboratory
Basic skills for engineering research are taught, which include: analog electronic circuit analysis, fundamentals of digital data acquisition and statistical data analysis. Laboratory testing methods including solid mechanics: tension, torsion, hardness, impact, toughness, fatigue and creep. Design of experiments.
Prerequisite(s): [(PHYS 221)]
(2-3-4) **(C)**

MMAE 406
Mechanical Vibrations
Study of free, forced and damped vibrations of single degree of freedom mechanical systems: resonance, critical damping, and vibration isolation. Two degree of freedom systems: natural frequencies, normal modes, resonances and vibration absorbers. Introduction to vibrations of multiple degree of freedom.
Prerequisite(s): [(MMAE 305 and MMAE 350)]
(3-0-3) **(C)**

MMAE 407
Biomechanics: Solids
Properties of mathematical models for bone, soft tissues, tendons, ligaments, cartilage, and muscles. Human body structure, posture movement, and locomotion. Spine mechanics and joint mechanics. Mechanics of occlusion and mastication. Exoprosthetics and endoprosthetics. Implants and biomechanical compatibility.
Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MMAE 430*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(C)**

MMAE 410
Aircraft Flight Mechanics
Airplane performance: takeoff, rate of climb, time to climb, ceilings, range and endurance, operating limitations, descent and landing. Helicopters and V/STOL aircraft. Airplane static stability and control: longitudinal stability, directional stability, and roll stability. Airplane equations of motion: kinematics and dynamics of airplanes, and stability derivatives. Dynamic response: longitudinal modes of motion, lateral modes of motion. Introduction to aircraft control.
Prerequisite(s): [(MMAE 312 and MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 411
Spacecraft Dynamics
Orbital mechanics: two-body problem, Kepler's equation, classical orbital elements, and introduction to orbit perturbations. Spacecraft mission analysis: orbital maneuvers and station keeping, earth orbiting, lunar, and interplanetary missions, introduction to orbit determination. Spacecraft attitude dynamics: three-dimensional kinematics and dynamics of spacecraft, rotating reference frames and orientation angles, and spacecraft equations of motion. Spacecraft attitude stability and control: dual-spin platforms, momentum wheels, control-moment gyros, gravity gradient stabilization, introduction to spacecraft attitude determination and control.
Prerequisite(s): [(MATH 252, MMAE 200, MMAE 305, and MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 412
Spacecraft Design I
Launch vehicle design including a system engineering, payload mission definition, propulsion and staging, structural design, trajectory analysis and guidance, launch window considerations, navigation and attitude determination, booster re-entry, range safety, and reliability. Semester-long project is focused on the integration of multiple systems into a coherent launch vehicle design to achieve specific mission requirements.
Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MMAE 411*)] AND [(MMAE 452)] An asterisk (*) designates a course which may be taken concurrently.
(2-1-3) **(C)**

MMAE 413
Spacecraft Design II
Spacecraft systems design including real world mission analysis and orbit design, launch vehicle requirements, attitude determination and control, propulsion, structural design, power systems thermal management, and telecommunications. Semester-long project is focused on the integration of multiple systems into a coherent spacecraft design to achieve specific mission requirements.
Prerequisite(s): [(MMAE 411 and MMAE 412)]
(2-1-3)

MMAE 414
Aircraft Design I
Aircraft design including aerodynamic, structural, and power plant characteristics to achieve performance goals. Focus on applications ranging from commercial to military and from manpowered to high-speed to long-duration aircraft. Semester project is a collaborative effort in which small design groups complete the preliminary design cycle of an aircraft to achieve specific design requirements.
Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MMAE 312)] AND [(MMAE 410*)] AND [(MMAE 452)] An asterisk (*) designates a course which may be taken concurrently.
(2-1-3) **(C)**

MMAE 415
Aerospace Laboratory II
Advanced skills for engineering research are taught, which include experiments with digital electronic circuit analysis, dynamic data acquisition techniques, fundamentals of fluid power system design, GPS and inertial guidance systems, air-breathing propulsion, and fly-by-wire control.
Prerequisite(s): [(MMAE 315) OR (MMAE 319)] AND [(MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(2-3-4) **(C)**

MMAE 416
Aircraft Design II
Team project that includes conceptual design, detail design, prototyping, and testing (or simulation) of an aircraft model or aircraft subsystem to meet performance specifications.
Prerequisite(s): [(MMAE 410 and MMAE 414)]
(3-3-3)

MMAE 417
Advanced Aerodynamics
Unsteady aerodynamics, nonlinear flight regimes at high angle of attack, missile aerodynamics, hypersonic flight, and other topics relevant to the aerospace industry.
Prerequisite(s): [(MMAE 410*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 418
Fluid Power for Aerospace Applications
Basic principles and concepts needed for the design and troubleshooting of fluid power systems. An emphasis is placed on flight control and simulation of hydraulic systems and is extended to mobile and industrial applications.
Prerequisite(s): [(MMAE 313 and MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(2-3-3)

MMAE 419
Mechanical Laboratory II
Laboratory testing methods including solid mechanics: tension, torsion, hardness, impact, toughness, fatigue and creep; heat and mass transfer: conduction, fins, convection, radiation, diffusion; vibrations and control. Design of experiments.
Prerequisite(s): [(MMAE 302*) OR (MMAE 304*)] AND [(MMAE 315) OR (MMAE 319)] AND [(MMAE 323)] AND [(MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)**

MMAE 425
Direct Energy Conversion
A study of various methods available for direct conversion of thermal energy into electrical energy. Introduction to the principles of operation of magneto-hydrodynamic generators, thermoelectric devices, thermionic converters, fuel cells and solar cells.
Prerequisite(s): [(MMAE 321 and PHYS 224)]
(3-0-3)

MMAE 426
Nuclear, Fossil-Fuel, & Sustainable Energy Systems
Principles, technology, and hardware used for conversion of nuclear, fossil-fuel, and sustainable energy into electric power will be discussed. Thermodynamic analysis – Rankine cycle. Design and key components of fossil-fuel power plants. Nuclear fuel, reactions, materials. Pressurized water reactors (PWR). Boiling water reactors (BWR). Canadian heavy water (CANDU) power plants. Heat transfer from the nuclear fuel elements. Introduction to two phase flow: flow regimes; models. Critical heat flux. Environmental effects of coal and nuclear power. Design of solar collectors. Direct conversion of solar energy into electricity. Wind power. Geothermal energy. Energy conservation and sustainable buildings. Enrichment of nuclear fuel. Nuclear weapons and effects of the explosions.
Prerequisite(s): [(CHE 302) OR (MMAE 323)]
(3-0-3)

MMAE 432
Design of Mechanical Systems
Small-group design projects drawn from industry. Requires senior standing.
Prerequisite(s): [(MMAE 304) OR (MMAE 332*)] An asterisk (*) designates a course which may be taken concurrently.
(1-3-3) **(C)**

MMAE 433
Design of Thermal Systems
Application of principles of fluid mechanics, heat transfer, and thermodynamics to design of components of engineering systems. Examples are drawn from power generation, environmental control, air and ground transportation, and industrial processes, as well as other industries. Groups of students work on projects for integration of these components and design of thermal systems.
Prerequisite(s): [(MMAE 321)] AND [(MMAE 323)]
(3-0-3) **(C)**

MMAE 434
Design for Mechanical Reliability
Reliability and hazard functions; statics and dynamic reliability models for series, parallel and complex systems; reliability allocation. Probabilistic design; stress and strength distributions; safety factors; loading random variables; geometric tolerances, linear and nonlinear dimensional combinations; stress as random variable; material properties as random variables; failure theories; significant stress-strength models; reliability confidence intervals.
Prerequisite(s): [(MMAE 332)]
(3-0-3)

MMAE 435
Design for Safety in Machines
A critical study of the interface between law and safety engineering, which embraces not only statutory law, such as OSHA and the Consumer Products Safety Act, but also case law arising from product liability suits. Detailed analysis of actual industrial and consumer accidents from the investigative stages through their litigation. Formulation of general safety design techniques for mechanical engineering systems and the development of courtroom communication skills for expert witnesses. Requires senior standing.
(3-0-3)

MMAE 440
Introduction to Robotics
Classification of robots; kinematics and inverse kinematics of manipulators; trajectory planning; robot dynamics and equations of motion; position control.
Prerequisite(s): [(MMAE 305)] AND [(MMAE 315) OR (MMAE 319)]
(3-0-3)

MMAE 443
Systems Analysis & Control
Mathematical modeling of dynamic systems; linearization. Laplace transform; transfer functions; transient and steady-state response. Feedback control of single-input, single-output systems. Routh stability criterion. Root-locus method for control system design. Frequency-response methods; Bode plots; Nyquist stability criterion.
Prerequisite(s): [(MATH 252)] AND [(MMAE 305)]
(3-0-3)

MMAE 444
Design for Manufacture
The materials/design/manufacturing interface in the production of industrial and consumer goods. Material and process selection; process capabilities; modern trends in manufacturing. Life cycle engineering; competitive aspects of manufacturing; quality, cost, and environmental considerations.
Prerequisite(s): [(MMAE 485)]
(3-0-3)

MMAE 445
Computer-Aided Design
Principles of geometric modeling, finite element analysis and design optimization. Curve, surface, and solid modeling. Mesh generation, Galerkin method, and Isoparametric elements. Optimum design concepts. Numerical methods for constrained and unconstrained optimization. Applications of CAD/CAE software for mechanical design problems.
Prerequisite(s): [(MMAE 304) OR (MMAE 332)] AND [(MMAE 350)]
(3-0-3)

MMAE 450
Computational Mechanics II
Explores the use of numerical methods to solve engineering problems in continuum mechanics, fluid mechanics, and heat transfer. Topics include partial differential equations and differential and integral eigenvalue problems. As tools for the solution of such equations, we discuss methods of linear algebra, finite difference and finite volume methods, spectral methods, and finite element methods. The course contains an introduction to the use of a commercial finite element package for the solution of complex partial differential equations.
Prerequisite(s): [(MATH 350) OR (MMAE 350)]
(3-0-3)

MMAE 451
Finite Element Methods in Engineering
Principles of minimum potential energy of structures–stiffness matrices, stress matrices and assembly process of global matrices. The finite element method for two-dimensional problems: interpolation functions, area coordinates, isoperimetric elements, and problems of stress concentration. General finite element codes: data generation and checks, ill-conditioned problems, and node numbering.
Prerequisite(s): [(MATH 252, MMAE 202, and MMAE 350)]
(3-0-3)

MMAE 452
Aerospace Propulsion
Analysis and performance of various jet and rocket propulsive devices. Foundations of propulsion theory. Design and analysis of inlets, compressors, combustion chambers, and other elements of propulsive devices. Emphasis is placed on mobile power plants for aerospace applications.
Prerequisite(s): [(MMAE 311)]
(3-0-3)

MMAE 453
Advanced Automotive Powertrains
This course provides insight into the various methods of propulsion available for automobiles. Students will receive the tools and practical understanding required to analyze a variety of vehicle powertrain architectures and predict the energy consumptions and vehicle performance of the current automotive powertrains. This course will provide students with an understanding of the working principles of internal combustion engines, hybrid powertrains, and electric vehicles; the ability to predict the energy requirements of these powertrains; experience in analyzing system and component efficiency based on vehicle test data; and a comprehensive view of the current challenges in the automotive transportation sector. Students will apply the analytical tools presented in the course to examine topics such as vehicle loads and losses, emissions control, vehicle efficiency, and the impact of vehicle hybridization and electrification.
Prerequisite(s): [(MMAE 321)]
(3-0-3)

MMAE 455
Cardiovascular Fluid Mechanics
Anatomy of the cardiovascular system. Scaling principles. Lumped parameter, one-dimensional linear and nonlinear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system. Steady and pulsatile flow in rigid and elastic tubes. Form and function of blood, blood vessels, and the heart from an engineering perspective. Sensing, feedback, and control of the circulation. Possible project using custom software to run blood flow simulations. Same as BME 455.
Prerequisite(s): [(BME 301) OR (MMAE 313)]
(3-0-3)

MMAE 461
Failure Analysis
This course provides comprehensive coverage of both the "how" and "why" of metal and ceramic failures and gives students the intellectual tools and practical understanding needed to analyze failures from a structural point of view. Its proven methods of examination and analysis enable students to reach correct, fact-based conclusions on the causes of metal failures, present and defend these conclusions before highly critical bodies, and suggest design improvements that may prevent future failures. Analytical methods presented in the course include stress analysis, fracture mechanics, fatigue analysis, corrosion science, and nondestructive testing. Numerous case studies illustrate the application of basic principles of metallurgy and failure analysis to a wide variety of real-world situations.
Prerequisite(s): [(MS 201)]
(3-0-3)

MMAE 463
Structure & Properties of Materials II
Continuation of MMAE 365. Solidification structures, diffusional and diffusionless transformations. Structure-property relationships in commercial materials.
Prerequisite(s): [(MMAE 365)]
(3-0-3)

MMAE 464
Physical Metallurgy
Principles of microstructure evolution with emphasis on phase transformations in metals and alloys. Processing-microstructure-property relationships. Fundamentals of alloy design for commercial applications.
Prerequisite(s): [(MMAE 361) OR (MMAE 365)]
(3-0-3)

MMAE 465
Electrical, Magnetic, & Optical Properties of Materials
Electronic structure of solids, semiconductor devices and their fabrication. Ferroelectric and piezoelectric materials. Magnetic properties, magnetocrystalline anisotropy, magnetic materials and devices. Optical properties and their applications, generation and use of polarized light. Same as PHYS 465.
Prerequisite(s): [(MMAE 365) OR (PHYS 348)]
(3-0-3) **(C)**

MMAE 466
Microstructural Characterization of Materials
Advanced optical microscopy. Scanning and transmission electron microscopes. X-ray microanalysis. Surface characterization. Quantitative microscopy.
Prerequisite(s): [(MMAE 370)]
(2-3-3) **(C)**

MMAE 468
Introduction to Ceramic Materials
The structure and structure/properties relationships of ceramic materials. Topics include: crystal structure types; crystal defects; structure of class; phase equilibria and how these affect applications for mechanical properties; electrical properties; and magnetic properties. Sintering and ceramic reactions are related to microstructure and resultant properties.
Prerequisite(s): [(MS 201)]
(3-0-3)

MMAE 470
Introduction to Polymer Science
An introduction to the basic principles that govern the synthesis, processing and properties of polymeric materials. Topics include classifications, synthesis methods, physical and chemical behavior, characterization methods, processing technologies and applications. Credit will only be granted for CHE 470, CHEM 470, MMAE 470.
Prerequisite(s): [(CHEM 124, MATH 251, and PHYS 221)]
(3-0-3) **(C)**

MMAE 472
Advanced Aerospace Materials
Principles of materials and process selection for minimum weight design in aerospace applications. Advanced structural materials for aircraft fuselage and propulsion applications. Materials for space vehicles and satellites. Environmental degradation in aerospace materials.
Prerequisite(s): [(MMAE 372)]
(3-0-3)

MMAE 473
Corrosion: Materials Reliability & Protective Measures
This course covers the basics of corrosion science (fundamentals and mechanisms) and corrosion engineering (protection and control). The various forms of corrosion (uniform, pitting, crevice, stress corrosion cracking, etc.) are illustrated along with practical protective measures (coatings, inhibitors, electrochemical protection, materials upgrade, etc.). The course highlights the concepts of alloys design to minimize corrosion, the properties of steels, stainless steels, and high-performance alloys along with case studies of corrosion failures and lessons learned.
Prerequisite(s): [(MMAE 365)]
(2-0-2)

MMAE 476
Materials Laboratory II
Team design projects focused on the processing and/or characterization of metallic, non-metallic, and composite materials. Students will work on a capstone design problem with realistic constraints, perform experimental investigations to establish relationships between materials structures, processing routes and properties, and utilize statistical or computational methods for data analysis.
Prerequisite(s): [(MMAE 370)]
(1-6-3)

MMAE 482
Composites
This course focuses on metal, ceramic and carbon matrix composites. Types of composite. Synthesis of precursors. Fabrication of composites. Design of composites. Mechanical properties and environmental effects. Applications.
Prerequisite(s): [(MS 201)]
(3-0-3)

MMAE 484
Materials & Process Selection
Decision analysis. Demand, materials and processing profiles. Design criteria. Selection schemes. Value and performance oriented selection. Case studies.
(3-0-3) **(C)**

MMAE 485
Manufacturing Processes
Principles of material forming and removal processes and equipment. Force and power requirements, surface integrity, final properties and dimensional accuracy as influenced by material properties and process variables. Design for manufacturing. Factors influencing choice of manufacturing process.
Prerequisite(s): [(MMAE 332) OR (MMAE 372)]
(3-0-3)

MMAE 490
Crystallography & Crystal Defect
Geometrical crystallography - formal definitions of lattices, systems, point groups, etc. Mathematical methods of crystallographic analysis. Diffraction techniques: X-ray, electron and neutron diffraction. Crystal defects and their influence on crystal growth and crystal properties.
(3-0-3)

MMAE 491
Undergraduate Research
Student undertakes an independent research project under the guidance of an MMAE faculty member. Requires the approval of the MMAE Department Undergraduate Studies Committee.
(Credit: Variable)

MMAE 494
Undergraduate Design Project
Student undertakes an independent design project under the guidance of an MMAE faculty member. Requires the approval of the MMAE Department Undergraduate Studies Committee.
(Credit: Variable)

MMAE 497
Undergraduate Special Topics
Special individual design project, study, or report as defined by a faculty member of the department. Requires junior or senior standing and written consent of both academic advisor and course instructor.
(Credit: Variable)

Materials Science

MS 201
Materials Science
The scientific principles determining the structure of metallic, polymeric, ceramic, semiconductor and composite materials; electronic structure, atomic bonding, atomic structure, microstructure and macrostructure. The basic principles of structure-property relationships in the context of chemical, mechanical and physical properties of materials.
Prerequisite(s): [(CHEM 122) OR (CHEM 124)]
(3-0-3)

Mathematics and Science Education

MSED 200
Analysis of Classrooms
This is an introductory course providing students background in learning theory, motivation theory, classroom management, aspects of effective teaching, critical classroom variables, and the school as a system. This course includes a two-hour weekly seminar along with a practicum experience of five hours per week in an area school.
(2-5-3) **(C)**

MSED 250
Middle & Secondary Curriculum/Foundations
This course focuses on history/sociology of education, rationales, and goals of current reform efforts, curriculum design, development, and curriculum analysis. This course is designed to develop the participant's understanding of mathematics and science curricula in middle and secondary schools. Studies will include the roles of goals, standards, and learning theories in the development and selection of instructional materials, assessments, and technology. The course includes consideration of issues of equity and student diversity on middle and secondary school curricula. The course will involve readings, reflections, curriculum development, and evaluation projects.
(3-0-3) **(C)**

MSED 300
Instructional Methods/Strategies I
Discussion/laboratory oriented course that focuses on instructional planning, implementation considerations of various teaching methods, and development of instructional activities. Students are also provided with opportunities to practice instructional skills in peer teaching lessons.
Prerequisite(s): [(MSED 200 and MSED 250) OR (MSED 500 and MSED 554) OR (MSED 500 and MSED 555)]
(3-0-3) **(C)**

MSED 320
Inquiry & Problem Solving in Mathematics & Science
This course provides students with opportunities for reflection on aspects of inquiry and problem solving and nature of science and mathematics. It provides background for student development of instructional materials focusing on inquiry/problem solving, nature of science/mathematics, and how to modify and differentiate instructional materials to include the participation of all students. Must have received a passing score on the ISBE Basic Skills Exam.
Prerequisite(s): [(MSED 200 and MSED 250) OR (MSED 500 and MSED 554) OR (MSED 500 and MSED 555)]
(3-0-3) **(C)**

MSED 350
Advanced Methods for Inclusive Instruction & Practicum
This course will help students develop an understanding of the roles community resources and informal settings can play in math/science achievement and the ability to create instructional materials that capitalize on the use of these resources to better design instructional materials and experiences to meet the diverse needs of their students. Students spend approximately five hours per week in an informal education venue (e.g., museum, aquarium, zoo) along with a weekly two-hour, on-campus course per week. Students will reflect on how their students can learn in informal settings, teaching to public student audiences and designing curricular materials. Assessments will include the development of a curriculum unit that includes formal and informal lessons.
Prerequisite(s): [(MSED 200, MSED 250, and MSED 300) OR (MSED 300, MSED 500, and MSED 554) OR (MSED 300, MSED 500, and MSED 555)]
(2-5-3) **(C)**

MSED 400
Instructional Methods/Strategies II
Follow-up course to Instructional Methods/Strategies I with a strong focus in various advanced instructional models such as inductive, deductive, problem solving, and inquiry role development as well as cooperative learning and assessment. The course will emphasize the development, implementation, and assessment of differentiated instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for all aspects of intellectual, social, and emotional development of all students regardless of cultural, social, and ethnic background. Students will have several opportunities to practice instructional models in peer teaching lessons.
Prerequisite(s): [(MSED 300)]
(3-0-3) **(C)**

MSED 450
Professional Internship
Capstone experience in which students assume continuous teaching responsibilities in at least three classes in an area school. Students will spend a full semester in the area school under the supervision of a classroom teacher and university supervisor. Students must have received a passing score of the ISBE Content Exam and faculty approval.
Prerequisite(s): [(MSED 300)] AND [(MSED 320) OR (MSED 538)] AND [(MSED 350) OR (MSED 540)] AND [(MSED 400)]
(0-40-6) **(C)**

MSED 480
Adolescent Psychology
This course is designed to develop the participants' understanding of adolescent psychology. The main foci throughout the course are the unique aspects of adolescents and how those aspects influence behavior, learning, and social interactions, especially with regard to middle schools. Studies will include educational psychology theories and models, motivation and learning, developmental changes during adolescence, cognitive abilities, human ecology, diversity, and cultures. Additionally, participants will examine historical and philosophical perspectives of adolescent psychology and synthesize how these perspectives have influenced teaching, learning, and cultures in middle schools. The course will involve weekly readings and reflections, classroom experiences, short assignments, tests/quizzes, research projects, and formal class presentations. Mandatory for students seeking middle school optional endorsements.
(3-0-3)

MSED 497
Special Projects
Special projects.
(Credit: Variable)

Naval Science

Naval Science courses are open to non-ROTC students with departmental approval.

NS 101
Introduction to Naval Science
A general introduction to the USN and USMC that emphasizes organizational structure, warfare components, and assigned roles/missions of USN/USMC, covers all aspects of Naval Science from its relative position within DoD to the specific warfare communities/career paths, and includes basic elements of leadership and Navy Core Values. The course will provide students with initial exposure to many elements of Naval culture and provides conceptual framework/working vocabulary for students to use on summer cruise.
Corequisite(s): (NS 499)
(2-0-2)

NS 102
Naval Ships Systems I (Engineering)
Students learn detailed ship design, hydrodynamic forces, stability, propulsion, electrical theory and distribution, hydraulic theory and ship control, and damage control. The course includes basic concepts of theory/design of steam, gas turbine, diesel, and nuclear propulsion. Case studies on leadership/ethical issues in the engineering arena are also covered. Not required for Nurse and Marine Corps options.)
Corequisite(s): (NS 499)
(3-0-3)

NS 201
Naval Ships Systems II (Weapons)
The course outlines the theory and employment of weapons systems. Students explore the processes of detection, evaluation, threat analysis, weapon selection, delivery, guidance, and explosives. Fire control systems and major weapon types are discussed, including capabilities and limitations. The physical aspects of radar and underwater sound are described. Facets of command, control, communications, computers, and intelligence are explored as a means of weapons systems integration. The tactical and strategic significance of command and control warfare and information warfare is discussed. This course is supplemented with review/analysis of case studies involving the moral and ethical responsibilities of leaders in the employment of weapons. Not required for Nurse and Marine Corps options.
Corequisite(s): (NS 499)
(3-0-3)

NS 202
Seapower & Maritime Affairs
A study of the U. S. Navy and the influence of sea power upon history that incorporates both a historical and political science process to explore the major events, attitudes, personalities, and circumstances that have done the following: imbued the U. S. Navy with its proud history and rich tradition; deals with issues of national imperatives in peacetime, as well as war, varying maritime philosophies that were interpreted into Naval strategies/doctrines, budgetary concerns which shaped force realities, and the pursuit of American diplomatic objectives; and concludes with a discussion of the Navy's strategic and structural changes at the end of the Cold War and its new focus, mission, and strategy in the post September 11, 2001, world. For Nurse Corps only; course may be taken in sophomore year.
Corequisite(s): (NS 499)
(3-0-3) **(C)**

NS 301
Navigation
In-depth study of the theory, principles, procedures, and application of plotting, piloting, and electronic navigation as well as an introduction to maneuvering boards. Students learn piloting techniques, the use of charts, the use of visual and electronic aids, and the theory of operation of both magnetic and gyrocompasses. Students develop practical skills in plotting and electronic navigation. Other topics include tides, currents, effects of wind/weather, voyage planning, and an application and introduction to the international/inland rules of navigation. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts listed above. Not required for Nurse and Marice Corps options.
Corequisite(s): (NS 499)
(3-0-3)

NS 302
Naval Operations & Seamanship
A continued study of relative motion, formation tactics, and ship employment. Introductions to naval operations and operations analysis, ship behavior and characteristics in maneuvering, applied aspects of ship handling, afloat communications, naval command and control, naval warfare areas, and joint warfare are also included. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts listed above. Not required for Nurse and Marine Corps options.
Corequisite(s): (NS 499)
(3-0-3)

NS 310
Evolution of Warfare
Students trace the development of warfare to the present day. This course is designed to cover the causes of continuity and change in the means and methods of warfare. It addresses the influence of political, economic, and societal factors on the conduct of war with significant attention focused on the role of technological innovation in changing the battlefield. Students will explore the contribution of preeminent military theorists and battlefield commanders to our modern understanding of the art and science of war. Required for Marine option and MECEP students; optional for Navy students.
Corequisite(s): (NS 499)
(3-0-3) **(C)**

NS 401
Leadership & Management
The course introduces the student to many of the fundamental concepts of leading Sailors and Marines which shall be expanded upon during the continuum of leadership development throughout NROTC, and develops the elements of leadership vital to the effectiveness of Navy/Marine Corps officers by reviewing the theories and parameters of leadership and management within and outside of the Naval service and progressing through values development, interpersonal skills, management skills, and application theory. Practical applications are explored through the use of experiential exercises, readings, case studies, and laboratory discussions.
Corequisite(s): (NS 499)
(3-0-3) **(C)**

NS 402
Naval Leadership & Ethics
The course completes the final preparations of ensigns and second lieutenants for service in the Fleet and Marine Corps. The course integrates an intellectual exploration of Western moral traditions and ethical philosophy with a variety of topics such as the following: military leadership, core values, and professional ethics; the UCMJ and Navy regulations; and discussions relating to the roles of enlisted members, junior and senior officers, command relationships, and the conduct of warfare. The course provides midshipmen with a foundation of moral traditions combined with a discussion of actual current and historical events in the United States Navy and Marine Corps to prepare them for the role and responsibilities of leadership in the Naval Science of the 21st century.
Corequisite(s): (NS 499)
(3-0-3) **(C)(E)**

NS 405
Leadership & Management Seminar
A six-hour seminar augmenting Theory of Organization and Management (BUS 301). This seminar addresses leadership, management, and other organizational behavior issues facing junior officers, to include strategic and tactical planning, time-management, communication, counseling, team-building, and decision-making in a stressful environment. Required for Naval ROTC students. Normally taken concurrently with BUS 301 and in place of NS 401.
Corequisite(s): (MGT 351)
(1-0-0)

NS 410
Amphibious Warfare
Students learn the fundamental terms, concepts, and theories of general warfare and amphibious warfare. These terms, concepts, and theories shall be applied through a historical analysis of amphibious operations, identifying the evolution of amphibious doctrine, tactics, and technology. Focuses on the evolution of the U. S. Marine Corps into a specialized amphibious force with particular attention devoted to the structure and capabilities of the present day U. S. Marine Corps as a forward deployed and rapid deployment force and the development of expeditionary maneuver warfare concepts.
Corequisite(s): (NS 499)
(3-0-3) **(C)**

NS 497
Special Topics
This course provides midshipmen with an opportunity to work under the supervision of an officer/instructor on projects related to professional development. Department permission required.
(Credit: Variable)

NS 499
Naval Science Laboratory
Topics deal with general Navy/Marine Corps mission and policies, force protection, operational security, watch standing, physical fitness, nutrition, stress management, and other professional development subjects.
(0-2-0)

Philosophy

PHIL 301
Ancient Philosophy
A study of major works by Plato, Aristotle, and other important ancient philosophers.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 302
Origins of Modern Philosophy
The study of major 17th and 18th century philosophers, such as Descartes, Hobbes, Spinoza, Locke, Leibniz, Berkeley, Hume, and Kant.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 305
Twentieth Century Philosophy
A study of recent philosophical trends (or movements), including logical positivism, existentialism, ordinary language philosophy, etc.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 311
Great Philosophers
An in-depth study of a single outstanding philosopher, chosen by the instructor. The focus of the course will be announced when the course is scheduled.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 326
Philosophy of Language
An analysis of the concept of language in both the works of philosophers and the works of linguists. The course looks into theories of linguistic meaning, sentence structure, speech acts, and the assumptions underlying research in modern linguistics.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 328
Comparative Philosophy
This course draws upon two or more widely different traditions in considering one or more topics of philosophical interest. Usually, the course will include both Western and non-Western sources. The course may be organized around a given philosophical issue or may compare and contrast two or more thinkers from the relevant traditions.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 332
Political Philosophy
Examination of different conceptions of legitimate political authority; includes discussion of ideas of social justice, natural rights, sovereignty.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 333
Social Philosophy
A systematic examination of contemporary Social issues such as abortion, euthanasia, war, environmental destruction, poverty, terrorism, and sexual morality.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 336
Metaphysics
Metaphysics.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 341
Philosophy of Science
Through an analysis of the concepts of explanation, theory, hypothesis, experiment, and observation, this course seeks an understanding of how the growth of scientific knowledge is possible.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 342
Philosophy of Mind
An examination of the conception of "mind" as opposed to body implications for psychology, artificial intelligence, and neuroscience.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 343
Philosophy of Social Inquiry
An examination of the methods and theories of the social sciences, especially sociology and anthropology, and their relationships to the natural sciences.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 350
Science & Method
A history of interaction between science and philosophy showing how changing conceptions of metaphysics and scientific method have influenced the development of Renaissance astronomy, nineteenth century atomic theory, ether theories, theories of geological and biological change, etc.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 351
Science & Values
This course will consider questions such as: What role should values play in scientific inquiry? Should scientists consider only epistemic or cognitive values, or should they also take into account social and cultural values? Could science be objective and make progress if it is shaped by social and cultural values?
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 360
Ethics
A study of the fundamental issues of moral philosophy.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 362
Philosophy of Law
An analysis of the concept of law and how it differs from custom, religion, and morality. The course looks into issues of judicial reasoning, the assumptions that underlie the criminal justice system and the imposition of liability, and legal ethics.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 363
Aesthetics
The philosophy of the fine arts, including an analysis of the concepts of beauty, representation, expression and the purpose of art.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 370
Engineering Ethics
A study of the problems of moral and social responsibility for the engineering profession, including such topics as safety, confidentiality and government regulation.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 371
Ethics in Architecture
A study of the moral problems architects must resolve in the practice of their profession, including problems of confidentiality, candor, esthetics, and economy arising from the special responsibilities of architects to and public, client, employer, and colleagues.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 373
Business Ethics
Ethical issues relating to individual and corporate responsibility, self and governmental regulation, investment, advertising, urban problems, the environment, preferential hiring.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 374
Ethics in Computer Science
Moral problems that confront professionals in computer-related fields, including questions raised by the concept of intellectual property and its relationship to computer software, professional codes of ethics for computer use, responsibility for harm resulting from the misuse of computers.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 380
Topics in Philosophy
An investigation into a topic of current interest in philosophy; which will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(3-0-3) **(C)(H)**

PHIL 491
Independent Study
Supervised individual research for advanced students.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106) OR (HUM 200-299)]
(Credit: Variable) **(C)(H)**

Physics

PHYS 100
Intro to the Profession
Introduction to the physical sciences, scientific method, computing tools, and interrelations of physical sciences with chemistry, biology and other professions.
(2-0-2) **(C)**

PHYS 120
Astronomy
A descriptive survey of observational astronomy, the solar system, stellar evolution, pulsars, black holes, galaxies, quasars, the origin and fate of the universe.
(3-0-3)

PHYS 123
General Physics I: Mechanics
Vectors and motion in one, two and three dimensions. Newton's Laws. Particle dynamics, work and energy. Conservation laws and collisions. Rotational kinematics and dynamics, angular momentum and equilibrium of rigid bodies. Gravitation. Oscillations.
Prerequisite(s): [(MATH 149*) OR (MATH 151*)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)**

PHYS 200
Introduction to Energy, Waves, Materials, & Forces
This course will address the basic physical principles and concepts associated with energy, power, heat, light, sound, circuits, materials, fluids, and forces. Although quantitative at times, the course will stress conceptual understanding and practical applications.
(4-0-4) **(N)**

PHYS 211
Basic Physics I
Intended to give students in liberal arts, business, and psychology an understanding of the basic principles of physics and an appreciation of how the results of physics influence contemporary society. This course does not satisfy graduation in any engineering or physical science program.
Prerequisite(s): [(MATH 122) OR (MATH 148) OR (MATH 151)]
(3-0-3)

PHYS 212
Basic Physics II
Intended to give students in the liberal arts, business, and psychology an understanding of the basic principles of physics and an appreciation of how the results of physics influence contemporary society. This course does not count for graduation in any engineering or physical science program.
Prerequisite(s): [(MATH 122) OR (MATH 148) OR (MATH 151)]
(3-0-3)

PHYS 221
General Physics II: Electricity & Magnetism
Waves charge, electric field, Gauss' Law and potential. Capacitance, resistance, simple a/c and d/c circuits. Magnetic fields, Ampere's Law, Faraday's Law, induction, and Maxwell's equations. Traveling waves, electromagnetic waves, and light.
Prerequisite(s): [(MATH 149) OR (MATH 151)] AND [(MATH 152*)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)**

PHYS 223
General Physics III
Sound, fluid mechanics and elasticity. Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Reflection, refraction, interference and diffraction. Special relativity. Quantization of light, charge and energy.
Prerequisite(s): [(PHYS 221)]
(3-3-4)

PHYS 224
General Physics III for Engineers
Sound and fluid mechanics. Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Reflection, refraction, interference and diffraction. Special relativity. Light and quantum physics, structure of the hydrogen atom. Atomic physics, electrical conduction in solids, nuclear physics, particle physics and cosmology.
Prerequisite(s): [(MATH 152, PHYS 123, and PHYS 221)]
(3-0-3)

PHYS 240
Computational Science
This course provides an overview of introductory general physics in a computer laboratory setting. Euler-Newton method for solving differential equations, the trapezoidal rule for numerical quadrature and simple applications of random number generators. Computational projects include the study of periodic and chaotic motion, the motion of falling bodies and projectiles with air resistance, conservation of energy in mechanical and electrical systems, satellite motion, using random numbers to simulate radioactivity, the Monte Carlo method, and classical physical models for the hydrogen molecule and the helium atom.
Prerequisite(s): [(PHYS 221)]
(2-3-3) **(C)**

PHYS 300
Instrumentation Laboratory
Basic electronic skills for scientific research. Electrical measurements, basic circuit analysis, diode and transistor circuits. Transistor and integrated amplifiers, filters, and power circuits. Basics of digital circuits, including Boolean algebra and design of logic circuits.
Prerequisite(s): [(PHYS 221)]
(2-4-4) **(C)**

PHYS 304
Thermodynamics & Statistical Physics
Statistical basis of thermodynamics, including kinetic theory, fundamentals of statistical mechanics, fluctuations and noise, transport phenomena and the Boltzmann equation. Thermodynamic functions and their applications, first and second laws of thermodynamics.
Prerequisite(s): [(PHYS 223) OR (PHYS 224)]
(3-0-3)

PHYS 308
Classical Mechanics I
Newton's Laws, one-dimensional motion, vector methods, kinematics, dynamics, conservation laws, and the Kepler problem. Collisions, systems of particles, and rigid-body motion. Approximation techniques, Lagrangian and Hamiltonian formulations of classical mechanics, small oscillations.
Prerequisite(s): [(MATH 252)] AND [(PHYS 223) OR (PHYS 224)]
(3-0-3)

PHYS 309
Classical Mechanics II
Newton's Laws, one dimensional motion, vector methods, kinematics, dynamics, conservation laws, and the Kepler problem. Collisions, systems of particles, and rigid-body motion. Approximation technique, Lagrangian and Hamiltonian formulations of classical mechanics, small oscillations.
Prerequisite(s): [(MATH 252)] AND [(PHYS 223) OR (PHYS 224)]
(3-0-3)

PHYS 348
Modern Physics for Scientists & Engineers
An introduction to modern physics with the emphasis on the basic concepts that can be treated with elementary mathematics. Subjects covered include Bohr atom, elementary wave mechanics and an introduction to quantum mechanics, atom and molecular spectra, nuclear, and particle physics.
Prerequisite(s): [(PHYS 223)]
(3-0-3)

PHYS 403
Relativity
Introduction to the special and general theories of relativity. Lorentz covariance. Minkowski space. Maxwell's equations. Relativistic mechanics. General coordinate covariance, differential geometry, Riemann tensor, the gravitational field equations. Schwarzschild solution, astronomical and experimental tests, relativistic cosmological models.
Prerequisite(s): [(MATH 251 and PHYS 308)]
(3-0-3)

PHYS 404
Subatomic Physics
Historical introduction; general survey of nuclear and elementary particle physics; symmetries and conservation laws; leptons, quarks, and vector bosons; unified electromagnetic and weak interactions; the parton model and quantum chromodynamics.
Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 405
Fundamentals of Quantum Theory I
A review of modern physics including topics such as blackbody radiation, the photoelectric effect, the Compton effect, the Bohr model of the hydrogen atom, the correspondence principle, and the DeBroglie hypothesis. Topics in one-dimensional quantum mechanics such as the particle in an infinite potential well, reflection and transmission from potential wells, barriers, and steps, the finite potential well and the quantum harmonic oscillator. General topics such as raising and lowering operators, Hermitian operators, commutator brackets and the Heisenberg Uncertainty Principle are also covered. Many particle systems and the Pauli Exclusion Principle are discussed. Three-dimensional quantum mechanical systems, orbital angular momentum, the hydrogen atom.
Prerequisite(s): [(MATH 252, PHYS 308*, and PHYS 348)]
An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

PHYS 406
Fundamentals of Quantum Theory II
Zeeman and Stark Effects. Addition of spin and orbital angular momenta, the matrix representation of quantum mechanical operators, the physics of spin precession and nuclear magnetic resonance. Time independent and time dependent perturbation theory, Fermi's Golden Rule and the physics of radiation emitted in the course of atomic transitions. Indistinguishable particles in quantum mechanics, the helium atom. Scattering theory, using partial wave analysis and the Born approximation.
Prerequisite(s): [(PHYS 405)]
(3-0-3)

PHYS 409
Energy & Environment
This course aims to deal with topics like energy demands and energy resources, environmental problems of energy production, nuclear power, renewable energy sources (e.g. hydro-electric, wave and wind power, biomass, solar energy). After providing an in-depth understanding of the sources of energy and its efficient use, the course will teach how to reduce negative environmental impacts from energy production, conversion, and distribution. Since energy is arguably the most critical environmental and social challenge facing the globe today, the course will conclude with a brief discussion on socio-economic consequences and public policy issues of energy use.
Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 410
Molecular Biophysics
The course covers thermodynamic properties of biological molecules, irreversible and open systems, information theory, biophysical measurements, the structure and properties of proteins, enzyme action, the structure and properties of nucleic acids, genetics at the molecular level, and molecular aspects of important biological systems.
Prerequisite(s): [(CHEM 343) OR (PHYS 304)]
(3-0-3)

PHYS 411
Astrophysics
Celestial mechanics and planetary motion; stellar structure and evolution; energy generation in stars; theory of white dwarfs, pulsars (neutron stars), and black holes; quasars; cosmology, background microwave radiation, and the big bang model.
Prerequisite(s): [(PHYS 223) OR (PHYS 224)]
(3-0-3)

PHYS 412
Modern Optics & Lasers
Geometrical and physical optics. Interference, diffraction, and polarization. Coherence and holography. Light emission and absorption. Principles of laser action, characterization of lasers, and laser applications.
Prerequisite(s): [(CS 105 and PHYS 348)]
(3-0-3)

PHYS 413
Electromagnetism I
Differentiation and integration of vector fields, and electrostatics and magnetostatics. Calculation of capacitance, resistance, and inductance in various geometries.
Prerequisite(s): [(MATH 252 and PHYS 308)]
(3-0-3)

PHYS 414
Electromagnetism II
Propagation and generation of electromagnetic radiation. Antennas and waveguides. Maxwell's equations. Electromagnetic properties of materials. Classical electrodynamics; special relativity.
Prerequisite(s): [(PHYS 413)]
(3-0-3)

PHYS 415
Solid State Electronics
Energy bands and carrier transport in semi-conductors and metals. Physical principles of p-n junction devices, bipolar junction transistors, FETS, Gunn diodes, IMPATT devices, light-emitting diodes, semiconductor lasers.
Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 418
Introduction to Lasers
Nature of light. Coherence and holography. Light emission and absorption. Principles of laser action. Characteristics of gas lasers, organic dye lasers, solid state lasers. Laser applications.
Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 420
Bio-Nanotechnology
In this multidisciplinary course, we will examine the basic science behind nanotechnology and how it has infused itself into areas of nanofabrication, biomaterials, and molecular medicine. This course will cover materials considered basic building blocks of nanodevices such as organic molecules, carbon nanotubes, and quantum dots. Top-down and bottom-up assembly processes such as thin film patterrning through advanced lithography methods, self-assembly of molecular structures, and biological systems will be discussed. Students will also learn how bionanotechnology applies to modern medicine, including diagnostics and imaging and nanoscale, as well as targeted, nanotherapy and finally nanosurgery.
Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 425
High Energy Astrophysics
High-energy astrophysics covers interactions in the most extreme physical conditions across the cosmos. Included in this course are the physics of black holes, neutron stars, large scale jets, accretion, shocks, and particle acceleration. Emission mechanisms resulting from relativistic particle acceleration are covered including synchrotron radiation and Bremsstrahlung and Compton processes. Recent observations of X-ray to TeV gamma-ray energies have contributed significantly to understanding these phenomena and will be highlighted.
Prerequisite(s): [(MATH 251, MATH 252, and PHYS 348)]
(3-0-3)

PHYS 427
Advanced Physics Laboratory I
Experiments related to our present understanding of the physical world. Emphasis is on quantum phenomena in atomic, molecular, and condensed matter physics, along with the techniques of measurement and data analysis. The second semester stresses project-oriented experiments on modern topics including spectroscopy, condensed matter physics, and nuclear physics.
Prerequisite(s): [(PHYS 348)]
(3-2-3) **(C)**

PHYS 428
Advanced Physics Laboratory II
Experiments related to our present understanding of the physical world. Emphasis is on quantum phenomena in atomic, molecular, and condensed matter physics, along with the techniques of measurement and data analysis. The second semester stresses project-oriented experiments on modern topics including spectroscopy, condensed matter physics and nuclear physics.
Prerequisite(s): [(PHYS 348)]
(2-3-3) **(C)**

PHYS 431
Nanoscience
An introduction to the study of phenomena at the nanoscale including their physics, chemistry, biology, and materials science; synthesis and fabrication of nanomaterials and nanostructures; methods of characterization; nanoscale properties including quantum effects.
Prerequisite(s): [(CHEM 344) OR (PHYS 224) OR (PHYS 348)]
(3-0-3)

PHYS 437
Solid State Physics
Crystal structure and binding, lattice vibrations, phonons, free electron model, band theory of electrons. Electrical, thermal, optical, and magnetic properties of solids. Superconductivity.
Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 440
Computational Physics
Root finding using the Newton-Raphson method; interpolation using Cubic Splines and Least Square Fitting; solving ordinary differential equations using Runge-Kutta and partial differential equations using Finite Difference and Finite Element techniques; numerical quadrature using Simpson's Rule, Gaussian Quadrature and the Monte Carlo method; and spectral analysis using Fast Fourier Transforms. These techniques are applied to a wide range of physics problems such as finding the energy levels of a finite quantum well using a root finding technique, solving the Schrodinger equation using the Runge-Kutta-Fehlberg method, using random numbers to simulate stochastic processes such as a random walk, using the Fast Fourier Transform method to perform a spectral analysis on non-linear chaotic systems such as the Duffing oscillator, and using auto-correlation functions to simulate sonar or radar ranging problems.
Prerequisite(s): [(PHYS 240, PHYS 308, PHYS 348, and PHYS 405)]
(2-3-3) **(C)**

PHYS 444
Physics for High School Teachers
Physics for high school teachers.
(1-0-1)

PHYS 445
Physics for High School Teachers
Physics for high school teachers.
(3-0-3)

PHYS 465
Electrical, Magnetic, & Optical Properties
Electronic structure of solids, semiconductor devices, and their fabrication. Ferroelectric and piezoelectric materials. Magnetic properties, magnetocrystalline anisotropy, magnetic materials and devices. Optical properties and their applications, generation, and use of polarized light. Same as MMAE 465.
(3-0-3)

PHYS 485
Physics Colloquium
Lectures by prominent scientists. This course exposes students to current and active research in physics both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to our academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.
Prerequisite(s): [(PHYS 223) OR (PHYS 224)]
(1-0-1)

PHYS 491
Undergraduate Research
Recommendation of advisor and approval of the department chair. Student participation in undergraduate research, usually during the junior or senior year.
(Credit: Variable) **(C)**

PHYS 497
Special Topics in Physics
Special topics in physics.
(Credit: Variable) **(C)**

PHYS 498
Research Honors Thesis Preparation
Background and research following a summer research honors project, preparing to write a research honors thesis in Physics 499. Student will organize a review committee to direct and review the research.
(Credit: Variable)

PHYS 499
Research Honors Thesis
Background and laboratory research and thesis writing following a summer research project and thesis preparation. The student will meet regularly with his or her committee during thesis preparation and will write and defend thesis.
(Credit: Variable)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

PHYS 501
Methods of Theoretical Physics I

PHYS 502
Methods of Theoretical Physics II

PHYS 505
Electromagnetic Theory

PHYS 507
Electrodynamics

PHYS 508
Analytical Dynamics

PHYS 509
Quantum Theory I

PHYS 510
Quantum Theory II

PHYS 515
Statistical Mechanics

PHYS 521
Quantum Electronics

PHYS 537
Solid State Physics I

PHYS 538
Solid State Physics II

PHYS 553
Quantum Field Theory

PHYS 561
Radiation Biophysics

PHYS 570
Introduction to Synchrotron Radiation

PHYS 571
Radiation Physics

PHYS 572
Introduction to Health Physics

PHYS 573
Standards, Statutes and Regulations

PHYS 575
Case Studies in Health Physics

PHYS 576
Radiation Dosimetry

PHYS 577
Operational Health Physics

Political Science

PS 200
American Government
Surveys American politics and government. Informal political institutions, such as parties and interest groups, are analyzed and related to formal governmental institutions, such as the presidency and the Congress. Emphasis is placed on how the American political culture shapes these institutions and how public policies are produced.
(3-0-3) **(C)(S)**

PS 202
Introduction to Political Science
Introduces students to modern political science covering American politics, comparative political science, and research methods.
(3-0-3) **(C)(S)**

PS 214
State & Local Government
Investigates the relationships among federal, state/provincial, metropolitan/regional, and local units of government, examining theories of federalism, constitutional foundations, judicial interpretations, administrative actions, and current trends and debates. The United States and other federal systems serve as case countries. The course also explores how federalism is being shaped by such factors as globalization, environmental challenges, tribal sovereignty, and terrorism.
(3-0-3) **(C)(S)**

PS 230
International Relations
Examines relations among countries from the perspective of both the international system and the nation-state. Emphasis is placed on the transformation in the international system caused by weapons, production, and communication technologies. Special attention is given to the international policies of the United States toward various regions and its role in international organizations.
(3-0-3) **(C)(S)**

PS 232
Introduction to Comparative Politics
Introduces students to the most common theories and approaches in contemporary comparative political analysis. Students then employ the tools of comparison developed in an examination of the causes and consequences of political instability and conflict and transitions to stable democracy.
(3-0-3) **(C)(S)**

PS 242
American Foreign Policy
Explores how American foreign policy is made and why it matters both in the context of domestic politics and for the international system as a whole. Students will identify U. S. foreign policy goals and critique foreign policy implementation.
(3-0-3) **(C)(S)**

PS 285
Special Topics in Political Science
Investigates a topic of current interest at the introductory level. Topic will be announced by instructor at scheduling time. There are no prerequisites for this course. Course may be taken multiple times provided the topic is different each time.
(3-0-3) **(C)(S)**

PS 306
Politics & Public Policy
Analyzes public policy processes with a primary focus on the United States and a secondary focus on cross-country comparisons involving the U. S. The overarching concern is the effectiveness of government intervention given our market-based system. The student will become familiar with models and determinants of policy making. Beyond theories of policy making, the course also surveys a number of timely policy issues. In this way, a balance is reached between theory and application. There will be an underlying focus on the American political economy and public policy making, but students do not need an extensive background in either economics or policy making.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 312
Analysis & Evaluation of Public Policy
Explores techniques of policy analysis and program evaluation having practical application in such fields as transportation, education, housing, criminal justice, and environmental quality. The course includes the research and analytical methods most frequently applied in governmental decision making.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(S)**

PS 313
Comparative Public Policy
Considers why policies on issues like social welfare, health care, education, immigration, and others differ from country to country, looking for answers in such factors as political culture, level of economic development and equality, institutional frameworks and actors, social organization, or some mix of those explanations.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 315
Urban Politics
Examines city and metropolitan politics and government. The course emphasizes how economic and demographic changes influence local politics, how local politics work, and how state and national policies influence local politics.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 317
Chicago Politics
Studies Chicago's politics and government from both historical and contemporary perspectives. Emphasis is placed on changes that have significantly shaped the direction of Chicago's politics. Special attention is devoted to social class, ethnicity, race, and ideology as factors that have influenced the Democratic political machine and its opponents.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 319
Comparative Health Systems
Surveys and compares health care systems in a range of developed and developing countries. The course examines why countries facing similar health problems have sometimes developed different policy responses, what has been the nature of those policies, and how effective or ineffective they have been. Health insurance, payment methods, the role of providers, the relationship between medicine and culture, and recent reforms and innovations in health care policy are among the issues discussed.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(S)**

PS 323
Problems of Multi-Ethnic, Multi-Religious States
Focuses on the political challenges arising in multiethnic, multi-language, and multi-religious societies in which there has been substantial conflict or balkanization. Developed and developing countries receive attention.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(S)**

PS 329
Politics of Global Warming
Reviews politics and policies relating to global warming using a multi-disciplinary approach. Students look at its anthropogenic causes, impacts on human society, potential mitigation strategies, and policy responses. The course also examines the different issue areas connected to global warming: the environment; public safety; national security; economics; and national prestige.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(S)**

PS 332
Politics of Science & Technology
Explores the complex interrelationships among science, technology, and politics, with emphasis on the political issues created by contemporary scientific advances. The course gives roughly equal attention to the politics of scientific discovery; the development of organizations providing scientific advice to government; the impact of industrialized science and advanced technology on the economy and society; and the growing debate over the social implications of science and technology and how they can be predicted, measured, and controlled.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 338
Energy & Environmental Policy
Traces the economic and political implications of dependence on fossil fuels and the attempt to develop alternate energy sources and promote conservation. Assessed are the environmental effects of resource consumption and the effort to control these effects through increased efficiency and regulation of pollution. The course explores such problems as nuclear waste, acid rain, global warming, and deforestation, and examines national and international attempts at economic, political, and technological solutions.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 351
Public Administration
Examines the nature of administrative organization, decision-making in organization, and organizational structures and processes: division of work, authority, communications, and planning. The course considers the role of the government executive and analyzes the relationship between fiscal procedures and personnel management in organizations.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 354
Urban Policy
Explores major dilemmas facing cities today, including changing economic and tax bases, fiscal stresses, marginalized populations, new forms of consumption, and adaptation to structural change. Responses of politicians to pressures to develop new policies and leverage the productive capacity of the city and the impact of citizen preferences are analyzed. Same as SOC 354.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 360
Global Political Economy
Examines the economic, socio-political, and cultural aspects of globalization within the context of both contemporary discussions about the phenomenon and wider debates in the field of political economy. The course also covers aspects of international development, both economic and political.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 372
Government & Politics in Africa
Surveys contemporary African politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 373
Politics of East Asia
Surveys contemporary East Asian politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 374
Politics of Europe
Surveys contemporary European politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(S)**

PS 375
Politics of Latin America
Surveys contemporary Latin American politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(S)**

PS 376
Politics of Global Migration
Explores the economic, political, and humanitarian forces that are driving the complex phenomenon of contemporary global migration. The course examines the causes, lived experiences, and consequences of migration, working to acquire a sound understanding of its social, political, legal, and cultural dimensions.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(S)**

PS 385
Topics in Political Science
Investigates a topic of current interest in Political Science, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 388
International Law & Organizations
This course examines structures of global governance using analytical lenses developed by both political scientist and international legal scholars to understand the depth and scope of international law. We will explore the relationships between power, rules, and norms as well as the relative impact of hard versus soft law and more or less legalized institutional structures. These themes will guide us through a comparative survey of international and legal frameworks attached to the US, the International Criminal Court, and the World Trade Organization and those created by regional economic institutions such as the EU and NAFTA.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

PS 408
Methods of Policy Analysis
Introduces students to the field of policy analysis and acquaints them with basic methods of policy analysis and urban planning. Emphasis is on these methods and problem solving rather than on politics or the political process. Topics include decision theory, benefit/cost analysis, problem simulation, population projection, and problem definition and formulation. This seminar serves as the required capstone course for the Policy Analysis/Technology specialization.
Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) **(C)(S)**

PS 480
Introduction to Survey Methodology
This course will introduce advanced undergraduate students to the set of principles of survey research design that are the basis of standard practices in the social sciences. The course will discuss how to formulate research questions and develop hypotheses suitable for testing. Same as SOC 480.
Prerequisite(s): [(BUS 221) OR (PS 209) OR (PSYC 203) OR (SOC 209)]
(3-0-3) **(C)(S)**

PS 490
Senior Seminar
This is the capstone course for political science majors. It is intended to bring together a number of concepts, methodological approaches, and research skills while exploring a particular topic of current significance within the discipline. Open only to Political Science majors.
Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) **(C)(S)**

PS 491
Undergraduate Research in Political Science
Working with a member of the political science faculty, students will choose a topic, conduct research, and complete an original, independent research project.
Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) **(C)**

PS 497
Directed Readings in Political Science
Consists of independent reading and analysis, centered on particular problems and supervised by a member of the Political Science faculty. (Credit: Variable; maximum 3 credit hours)
Prerequisite(s): [(PS 190-299 and PS 300-399)]
(Credit: Variable) **(C)(S)**

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

PS 506
Politics and Public Policy

Psychology

PSYC 100
Introduction to the Profession I
Topics include problem formulation and career opportunities, spreadsheets and relevant computer applications, as well as data search tools.
(2-0-2) **(C)**

PSYC 101
Introduction to Profession II
Topics include problem formulation and career opportunities, spreadsheets and relevant computer applications, as well as data search tools.
(2-0-2) **(C)**

PSYC 203
Undergraduate Statistics for the Behavioral Sciences
The objectives of this course are to develop skills in using statistical data analysis commonly used in the behavioral sciences (e.g. descriptive statistics, ANOVA, regression, correlation, and meta-analysis). At the end of the course students should be able to comprehend statistical research findings, run basic statistical analysis, as well as make inferences from the results.
(3-0-3)

PSYC 204
Research Methods in Behavioral Science
Introduction to experimental, survey, and field study methodology, including: ethics; research design; collection, preparation, analysis of data; and writing research reports.
Prerequisite(s): [(PSYC 203)] AND [(PSYC 221) OR (PSYC 222)]
(2-2-3) **(C)(N)**

PSYC 221
Human Behavior, Growth & Learning
This is one of two courses intended to introduce basic topics in psychology; they can be taken either independently or in sequence. The survey includes overviews of clinical psychology, social psychology and personality. Experimental design and ethical issues will also be addressed.
(3-0-3) **(C)(S)**

PSYC 222
Brain, Mind, & Behavior
This one of two courses intended to introduce basic topics in psychology; they can be taken either independently or in sequence. The survey includes overviews of cognition, intelligence, neuroscience, aging and development, as well as controversies in experimental design and ethics.
(3-0-3) **(C)(S)**

PSYC 238
Professional Skills
Didactic and applied approach to professional skill development in the areas of oral communication, conflict management and interpersonal dimensions of the work setting.
(3-0-3)

PSYC 301
Industrial Psychology
Survey of practical applications of psychology to problems of business and industry: work attitudes and behavior; employee selection; morale; safety; turnover; absenteeism; and training.
(3-0-3) **(C)(S)**

PSYC 303
Abnormal Psychology
Overview of various cognitive, emotional, and behavioral disorders, focusing on diagnostic criteria, causal factors, and treatment, and emphasizing scientific, research-oriented perspectives.
Prerequisite(s): [(PS 190-298) OR (PSYC 190-299) OR (SOC 190-299)]
(3-0-3) **(C)(S)**

PSYC 310
Social Psychology
Description and analysis of behavior and experience as determined by social conditions. Includes social issues, human relations, prejudice, and leadership.
(3-0-3) **(S)**

PSYC 312
Human Motivation & Emotion
This course will provide a broad overview of major theories of human motivation, both historical and contemporary. After learning about these theories, students will explore how researchers have applied these principles in health care, sports, management, education, and virtual/gaming environments.
Prerequisite(s): [(PSYC 221) OR (PSYC 222)]
(3-0-3) **(C)**

PSYC 320
Applied Correlation & Regression
This course will provide students with the knowledge and skills needed to apply correlation and regression analysis to the study of human behavior. Emphasis will be placed on practical issues associated with these statistical techniques and significant attention will be paid to running analyses and reporting results.
Prerequisite(s): [(PSYC 203)]
(3-0-3)

PSYC 330
Health Psychology
Health psychology applies psychological principles to health promotion and the prevention and treatment of illness. The goal of this course is to provide a thorough understanding of the key concepts and theories important to health psychologists and the skills to think analytically and critically about health issues. The course will cover a broad range of topics including stress, coping, and behaviors that promote health and prevent illness. The course will also cover specific health problems such as HIV/AIDS, cardiovascular disease, diabetes, cancer, eating disorders, and substance abuse and critically examine the underlying biological, psychological, and social factors influencing the onset, course, and outcomes of these diseases.
Prerequisite(s): [(PSYC 221) OR (PSYC 222)]
(3-0-3) **(C)**

PSYC 380
Topics in Psychology
An investigation into a topic of current interest in psychology. The specific topic will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(PSYC 221) OR (PSYC 222)]
(3-0-3) **(S)**

PSYC 406
History & Systems of Psychology
Historical development of influential psychological systems: structuralism, functionalism, behaviorism, psychoanalysis, and Gestalt psychology. Requires 12 hours of psychology. Open only to Psychology majors.
Prerequisite(s): [(PSYC 203) OR (PSYC 204) OR (PSYC 409)] AND [(PSYC 221, PSYC 222, and PSYC 301) OR (PSYC 221, PSYC 222, and PSYC 303) OR (PSYC 221, PSYC 301, and PSYC 303) OR (PSYC 222, PSYC 301, and PSYC 303)]
(3-0-3) **(S)**

PSYC 409
Psychological Testing
Survey of current group tests, emphasizing basic concepts, e.g., validity and reliability, as well as practical applications and measurement techniques.
Prerequisite(s): [(PSYC 203, PSYC 221, and PSYC 222)]
(3-0-3)

PSYC 410
Introduction to Rehabilitation & Mental Health Counseling
Historical, philosophical, ethical, and legal bases of rehabilitation and mental health counseling. Includes a study of professional roles, functions, and responsibilities as well as service delivery systems and practices such as vocational, independent living, and public and private rehabilitation and mental health counseling.
Prerequisite(s): [(PSYC 221)]
(3-0-3) **(C)(S)**

PSYC 411
Medical Aspects of Disabling Conditions
Survey of human organ systems, medical terminology, unique characteristics of disabling conditions, including severe disabilities. Vocational consequences, environmental impact and implications for the rehabilitation process. One of a two course sequence.
Prerequisite(s): [(PSYC 221) OR (PSYC 222)]
(3-0-3) **(N)**

PSYC 412
Multicultural & Psychosocial Issues in Rehabilitation & Mental Health Counseling
Review of diversity issues in rehabilitation and mental health counseling including culture, disability, gender, aging, socio-economic status, and spirituality and religion. Includes theories of multicultural counseling and the counselor's role in the promotion of self-awareness and social justice; a study of individual and family adaptation and coping processes following disability; psychological and sociological consequences of disability; attitudes toward persons with disabilities; and the impact of social and environmental barriers.
Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) **(C)(S)**

PSYC 414
Neural & Biological Bases of Behavior
An introduction to the biological bases of behavior with an emphasis on neuroanatomy and neurophysiology of sensory and central nervous systems.
Prerequisite(s): [(PSYC 222)]
(3-0-3) **(N)**

PSYC 423
Learning Theory
Seminar course examining major areas of research in learning theory, starting with the behaviorists and gestalt psychologists, and working up to modern examinations of memory, metacognition, evolutionary psychology and social modeling.
Prerequisite(s): [(PSYC 222)]
(3-0-3) **(C)(S)**

PSYC 426
Cognitive Processes
This is a seminar course examining major areas of research in cognitive psychology, including attention, perception, memory, language, problem solving and creativity. Focus within these areas will vary depending on student interest, but throughout the semester we will be drawing connections between the study of the human mind and real-world applications in multiple fields.
Prerequisite(s): [(PSYC 222)]
(3-0-3) **(S)**

PSYC 431
Measurement of Attitudes
Survey of methods used in attitude scale construction. Development and use of such scales. Multidimensional scaling.
Prerequisite(s): [(PSYC 203)]
(3-0-3)

PSYC 435
Early Development
Processes and theories of mental, social, emotional and physical development of infants, children and adolescents. Requires 9 hours of psychology.
Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) **(S)**

PSYC 436
Adult Development
Explores processes and changes in cognitive, social, physical and emotional functioning across adult life. Requires 9 hours of psychology.
Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) **(S)**

PSYC 449
Practicum in Rehabilitation Services
Seminar and supervised fieldwork experience in a rehabilitation setting with disabled individuals. Emphasizes service delivery, interviewing techniques, and caseload management.
Prerequisite(s): [(PSYC 410, PSYC 411, PSYC 412*, and SOC 480)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

PSYC 452
Personality Theory
Survey of personality theories and their application to everyday life.
Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) **(S)**

PSYC 455
Development & Evaluation of Training in Organizations
The goal of this course is to provide the learner with a systems perspective to training in organizations. Through readings, discussions, in class exercises and project work students will learn to identify organizational issues that can be solved using a training intervention and develop appropriate training. The focus of the course will primarily be on knowledge application. Students will learn about the various steps involved in designing a training program including needs assessment, influence of learner characteristics, transfer of training and training evaluation. Through project work students will gain skills in implementing these steps.
Prerequisite(s): [(PSYC 221) OR (PSYC 301)]
(3-0-3) **(S)**

PSYC 456
Engineering Psychology
Theory of human physical and psychological abilities as they relate to design of transportation, housing, workplace, defense and recreational systems. Topics include theories relating to psychophysiology, anthropometry, communications, man-machine interactions, training, maintainability, safety, and engineering evaluation.
Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) **(S)**

PSYC 481
Groups & Leadership at Work
The course will review a system's model of groups and will discuss developmental stages of groups as they relate to communication behaviors. It will also review various approaches to leadership including individual, contingency, and relationship. The course engages students in various activities to help them become aware of themselves as team members and team leaders.
Prerequisite(s): [(PSYC 221 and PSYC 301)]
(3-0-3) **(S)**

PSYC 482
Undergraduate Research Seminar I
An introduction to applied research in psychology. Includes a didactic review of basic and current issues in psychological research as well as an experiential component. Students actively participate in ongoing faculty research programs and are exposed to all areas of research.
Prerequisite(s): [(PSYC 204, PSYC 221, and PSYC 222)]
(1-2-3)

PSYC 483
Undergraduate Research Seminar II
An introduction to applied research in psychology. Includes a didactic review of basic and current issues in psychological research as well as an experiential component. Students actively participate in ongoing faculty research programs and are exposed to all areas of research.
Prerequisite(s): [(PSYC 204, PSYC 221, and PSYC 222)]
(1-2-3)

PSYC 485
Senior Capstone Project I
The Psychology Capstone Project is an independent study that consists of a formal project and may include a research component, a literature review component as well as a data analysis component or may include an internship or fellowship experience as discussed by you and your project advisor. The project should incorporate and expand upon the depth of knowledge gained from previous years of study and include predetermined deliverables which may include a final thesis or poster. The project should focus on an area of psychology that is of interest to you as a means to expand your knowledge on the subject and to solidify your future goals. Requires senior standing.
(3-0-3)

PSYC 486
Senior Capstone Project II
Continuation of the Psychology Capstone Project. This is an independent study that consists of a formal project and may include a research component, a literature review component as well as a data analysis component or may include an internship or fellowship experience as discussed by you and your project advisor. The project should incorporate and expand upon the depth of knowledge gained from previous years of study and include predetermined deliverables which may include a final thesis or poster. The project should focus on an area of psychology that is of interest to you as a means to expand your knowledge on the subject and to solidify your future goals. Requires senior standing.
(3-0-3)

PSYC 487
Integrative Psychology Seminar I
A synthesis of issues and areas in psychology. Requires 21 credit hours in psychology. Requires junior standing.
Prerequisite(s): [(PSYC 203)]
(3-0-3)

PSYC 488
Integrative Psychology Seminar II
Seminar integrating seminal and cutting edge psychological writings both empirical and conceptual to address key issues in contemporary psychology. Requires 24 credits in psychology. Requires junior standing.
(3-0-3)

PSYC 489
Undergraduate Psychology Seminar
Reports and discussion of current problems and issues in psychology.
Prerequisite(s): [(PSYC 204, PSYC 221, and PSYC 222)]
(3-0-3) **(S)**

PSYC 497
Special Problems
Independent study involving compilation and analysis of data bearing on a significant problem. Requires junior standing.
(Credit: Variable)

GRADUATE COURSES
Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

PSYC 501
Biological Bases of Behavior

PSYC 502
Social Bases of Behavior

PSYC 503
Learning, Cognition, and Motivation

PSYC 504
Individual and Cultural Differences

PSYC 513
Assessment in Rehabilitation and Mental Health Counseling

PSYC 523
Introduction to Theories of Psychotherapy

PSYC 529
Personnel Selection and Evaluation

PSYC 545
Graduate Statistics I

PSYC 556
Organizational Psychology

PSYC 557
Pre-Practicum in Rehabilitation and Mental Health Counseling

PSYC 561
Applied Counseling Techniques: Group Counseling

PSYC 562
Job Placement

PSYC 563
Human Growth and Career Development

PSYC 583
Rehabilitation Engineering Technology I: Survey of Interdisciplinary Application of RET

PSYC 590
Psychiatric Rehabilitation

Sociology

SOC 200
Introduction to Sociology
Introduces students to the structure and operation of society. The course analyzes individual behavior and emphasizes social problems.
(3-0-3) **(C)(S)**

SOC 203
Engaging Sociology
A more visual and performative, communication-intensive alternative to SOC 200. Students read and take short quizzes on chapters from a standard text and prepare weekly assignments that apply the associated concepts and insights. Assignments vary, from reviewing scholarly articles and identifying and exploring sociological databases to taking photographs to bringing in music and film clips illustrating political and social cartoons and designing and/or identifying spaces, devices, and clothing that illustrate the topics at hand.
(3-0-3) **(C)(S)**

SOC 208
Social Psychology & Society
Explores different aspects of everyday judgments and their sometimes undesirable social consequences, especially the Fundamental Attribution Error. Other topics include various types of group influences on individual judgment and behavior, as well as persuasion, “brainwashing,” helping behavior, and prejudice. Formerly called SOC 308.
(3-0-3) **(C)(S)**

SOC 211
Introduction to the Sociology of Space
This introductory sociology course deals with people's general experience of space and how space and spatial arrangements affect people, social interaction, and the sense of community. It is designed to develop knowledge and understanding as well as analytical and perceptive skills. Our experiences of the spatial dimension of reality will be examined from various perspectives: emotional; cognitive; functional; symbolic; and cross-cultural. Our study objects range from everyday experiences to questions of community and city planning. Basic sociological concepts and research methods will be introduced and related to the topics covered. This course is required for SOC 311 (Social Use of Space).
(3-0-3) **(C)(S)**

SOC 212
Contemporary Social Problems
Investigates various "social problems" and how they came to be defined as problematic. The course covers such general sociological concepts and theoretical perspectives as symbolic interactionism, conflict theory, structural functionalism, and constructionism. Students also examine the role of state advocates and the media in defining social problems. Case studies illustrate how different theoretical perspectives lead to different "solutions" and policy recommendations.
(3-0-3) **(C)(S)**

SOC 221
Social Inequality
Evaluates the patterns and dimensions of social, economic, and political inequality in American society and how these compare with other societies, who gets ahead and why, the relationship of social class to other features of society, some consequences of social stratification, and outlooks for the future of inequality in developed countries like the United States. Formerly known as SOC 321. Same as PS 221.
(3-0-3) **(C)(S)**

SOC 285
Introductory Special Topics in Sociology
Investigates a topic of current interest at an introductory level. Topic will be announced by instructor at scheduling time. There are no prerequisites for this course. Course may be taken multiple times, provided the topic is different each time.
(3-0-3) **(C)(S)**

SOC 301
The Social Dimension of Science
Examines how social and psychological factors influence the reasoning and behavior of scientists. By contrasting traditional views of science with actual scientific practice, the course aims to understand such phenomena as "hype," resistance to scientific discovery, controversy, vicious competition, error, self-deception, and fraud.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 302
Science & Belief
Explores the relationship between science and belief by comparing Western science with other belief systems, science with religion, and science with pseudo-science. The course also examines cultural and ideological influences on scientific knowledge and public faith in science.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 303
Science in Society
Examines the role of the institution of science, scientific knowledge, and scientists in society. The course focuses on areas where science significantly influences and is influenced by political, economic, and cultural institutions and contexts.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 305
Social Communication
Studies the variety of subtle ways, verbal and nonverbal, in which humans communicate in personal, professional, and public life, and how to identify and solve problems and misunderstandings that typically arise. Topics include the social nature of humans, interpersonal communication, interaction within and between groups, teamwork, leadership, and intercultural communication.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 311
Social Use of Space
Gives students basic insights into people's experience of space and the effect of spatial arrangements on people's behavior. The course explores the differences in conceptions between planners and users and the need to take the user into account in spatial design.
Prerequisite(s): [(SOC 211)]
(3-0-3) **(S)**

SOC 340
Social Organization & Control
Surveys theories explaining the organization and structure of complex societies. The problem of social control, or the capacity of a society to regulate itself formally and informally according to its desired principles, is viewed as a central problem of social organization. Same as PS 340.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 348
Deviant Behavior & Conformity
Analyzes the definition, development, and control of deviant behavior in relation to social processes. Societal reaction to and the amount, distribution, and behavioral systems of various forms of deviance (drug addiction, suicide, crime, alcoholism, illegitimacy, etc.) are examined.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 351
Sociology of Work
Begins with a brief comparison of the nature, role, and meaning of work across time and space. The course continues with a survey of some of today's most important topics in the study of work, primarily looking at the United States and other developed countries.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 362
Technology & Social Change
Examines the social implications of selected emerging and cutting-edge technologies with an emphasis on recent developments and events. The course investigates the consequences of those technologies for society using both short-term and long-term perspectives and including moral, ethical, socioeconomic, and educational considerations. Same as PS 362.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 385
Topics in Sociology
Investigates a topic of current interest in Sociology which will be announced by the instructor when the course is scheduled.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SOC 425
Privacy
This course explores current conceptualizations of and behaviors about privacy. It is a reading-intensive, film-based, senior-level seminar on the design and engineering of privacy, the case law and policy aspects of privacy, professions deeply engaged in issues of privacy, the commercial business of privacy, and the cultural and cross-cultural cognitive, personal, and interpersonal behaviors of privacy.
Prerequisite(s): [(SOC 190-299 and SOC 300-399)]
(3-0-3) **(C)(S)**

SOC 490
Senior Seminar
This is the capstone course for sociology majors. It is intended to bring together a number of concepts, methodological approaches, and research skills while exploring a particular topic of current significance within the discipline. Open only to Sociology and Social Sciences. Requires senior standing.
(3-0-3) **(S)**

SOC 491
Undergraduate Research in Sociology
Working with a member of the sociology faculty, students will choose a topic, conduct research, and complete an original, independent research project.
Prerequisite(s): [(SOC 190-299 and SOC 300-399)]
(Credit: Variable) **(C)**

SOC 497
Directed Readings
Consists of independent reading or analysis, centered on particular problems and supervised by a member of the Sociology faculty. Credit: Variable; maximum 3 credit hours.
Prerequisite(s): [(SOC 190-299 and SOC 300-399)]
(Credit: Variable) **(C)(S)**

SOC 498
Exercises in Behavioral Observation
Provides students with an opportunity to acquire better field-work skills by providing a forum for discussing and practicing the craft. This is a seminar in advanced ethnographic methods. Permission of instructor is required.
(3-0-3) **(C)(S)**

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

SOC 598
Exercises in Behavioral Observation

Social Sciences

SSCI 100
Introduction to the Profession
The course introduces students to social science professions, career possibilities, and the range of skill sets utilized by professionals in the field.
(3-0-3) **(C)(S)**

SSCI 204
States, Markets, & Society
This course examines theoretical explanations for the relationship between governments, society, and the global economy. It considers structural industrial shifts and the impact of technology on production, economic competitiveness and social welfare. Themes include labor value, bureaucratic theory, class conflicts and in the internationalization of capital.
(3-0-3) **(C)(S)**

SSCI 209
Social Science Research Methods
Introduces students to explanation in the social sciences and both qualitative and the quantitative research methods. Topics covered include the formulation of research questions, measurement, data collection, survey research, significance tests, experimental and quasi-experimental design, sampling, and various techniques of qualitative research.
(3-0-3) **(C)(S)**

SSCI 210
Social & Political Thought
Examines central social and political theories and their ideas concerning the relationship between individual and society, social harmony and conflict, social equality, and the state.
(3-0-3) **(C)(S)**

SSCI 220
Global Chicago
Through readings, lectures, and field trips to local neighborhoods, this course will look at the ways that Chicago has become a global city and what that means for local government, businesses, educators, and the non-profit sector. The course explores how Chicago has become a node in the global economy and a gateway to immigrants from all over the world.
(3-0-3) **(C)(S)**

SSCI 285
Special Topics
Investigates a topic of current interest at the introductory level. Course may be taken multiple times provided the topic is different each time.
(3-0-3) **(C)(S)**

SSCI 354
Urban Policy
Explores major dilemmas facing cities today including changing economic and tax bases, fiscal stresses, immigration, marginalized populations, new forms of consumption, and adaptation to structural change. Responses of politicians to pressures to develop new policies and leverage the productive capacity of the city and the impact of citizen preferences are analyzed.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SSCI 355
Regional Economic Development
This course focuses on methods of analyzing why regions differ economically, how they interrelate, and why and how they react to changes in economic policies and conditions. Students will learn about models and metrics of regional structure and growth.
(3-0-3) **(C)(S)**

SSCI 359
Humans, Ecology, & Environment
Examines the relationship between humans and nature, including reasons for some well-known ecological catastrophes in human history. The course traces changing attitudes to the environment and explores various measures that have been offered to solve problems, for instance, the Green Revolution, sustainable development, renewable energy, "clean" technologies, and the potential social and ecological consequences of these solutions.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SSCI 378
The Triple Helix
This course explores government-led research and development (R&D) collaboration across government research institutes, private firms, and universities. This "triple helix" model originated in the 1980s in Japan under the technocratic model, was quickly taken up by Germany, the UK, and the US, and is responsible for the success of innovations ranging from the integrated circuit to household hydrogen production. But, why does it work, and is it always an ideal policy choice? In other words, should private firms be left alone to innovate or should they be coupled with the public sector?
(3-0-3) **(C)(S)**

SSCI 380
Technology for Development
This course will explore meaningful ways to use advanced technologies to support development from a social sciences perspective. We will begin by reviewing the history and politics of development over the last century. During this phase, we will examine some of the assumptions inherent in the concept of development, and evaluate the extent to which development has or has not been successful in achieving its mission up to the present day. We will then explore the economic and social contexts in which development work takes place and current applications of advanced technology for sustainable development. We will also explore a variety of advanced technologies and their potential for new applications in the context of global development. Because of the nature of the subject, this course will be broad and interdisciplinary; it will cover the basics of technology, economics, history, anthropology and politics/policy. This course requires an interest in understanding and evaluating information and communication technologies and how they are and could be employed around the world.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SSCI 385
Special Topics
Investigates an interdisciplinary topic of current interest in the social sciences. Course may be taken multiple times provided the topic is different each time.
Prerequisite(s): [(HUM 200-299)]
(3-0-3) **(C)(S)**

SSCI 387
Fieldwork Methods
This course is designed to provide students with the opportunity to work on a real-world project that is or will be taking place "in the field."
(3-0-3) **(S)**

SSCI 422
Complex Organizations
Introduces students to the significant theoretical frameworks that have emerged over time to describe and explain public and non-profit organizations as well as organizational actors and actions. The seminar includes consideration of relations between organization and its environment, the importance of inter-organizational networks, and the role of power in organizational life.
Prerequisite(s): [(Social Science Course 300-399)]
(3-0-3) **(C)(S)**

SSCI 480
Introduction to Survey Methodology
This course will introduce advanced undergraduate students to the set of principles of survey research design that are the basis of standard practices in the social sciences. The course will discuss how to formulate research questions and develop hypotheses suitable for testing.
Prerequisite(s): [(Social Science Course 300-399)]
(3-0-3) **(C)(S)**

SSCI 486
Planning, Fundraising, & Program Evaluation
The purpose of this course is to provide students with an introduction to applied research methodologies which are commonly used by public and non-profit managers to assess the effectiveness of service delivery. We will explore the theoretical underpinnings and practical application of the range activities involved in planning, implementing, and evaluating programs.
Prerequisite(s): [(PS 300-399) OR (SOC 300-399) OR (SSCI 300-399)]
(3-0-3) **(C)(S)**

SSCI 493
Public Service Internship
This course is designed to give students the opportunity to combine classroom theory with practical application through job-related experiences. Students will complete a 30-hour internship with an approved industry, government, or non-profit organization with a work focus which relates to their academic training and career objectives. Instructor permission is required.
(0-0-3)

GRADUATE COURSES
Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the ***IIT Bulletin: Graduate Programs.***

SSCI 580
Introduction to Survey Methodology

SSCI 586
Planning, Fundraising, and Program Evaluation

Technology
TECH 497
Special Projects
Independent study and projects in applied technology that are multi/cross-disciplinary not tied to a specific department.
(Credit: Variable)

Academic Policies and Procedures

Academic Policies and Procedures

Academic Loads

The average full-time academic load during the fall or spring semester is 15 credit hours. The minimum registration required for full-time status for those semesters is 12 credit hours. Full-time degree-seeking students who wish to enroll for more than 18 credit hours or part-time degree-seeking students who wish to enroll in 9 to 11 credit hours must obtain permission from their academic dean.

Students who wish to enroll in more than two courses during the summer term must obtain permission from their academic dean.

Non-degree students requesting a course overload (more than eight credit hours) must obtain permission from the Office of Undergraduate Academic Affairs.

Academic Program Audit

An academic audit provides a summary of a student's academic status to date and lists the courses to be completed in order to receive a degree. Students can request an official academic audit from the Office of Undergraduate Academic Affairs after they have earned a minimum of 60 semester hours, 90 semester hours for architecture students. Students may request an official academic audit through the Academic Affairs channel in the IIT Portal.

Students may also review academic progress towards their degree through the DegreeWorks channel in the IIT portal.

Academic Progress, Probation, and Academic Suspension/Dismissal

All students who are degree candidates are expected to maintain satisfactory academic progress. This includes earning satisfactory grade point averages (GPA) and maintaining a satisfactory rate of progress toward the completion of their degree programs.

Students who do not earn at least a 2.00 cumulative GPA, a 1.85 current GPA, or a 2.00 major GPA are placed on academic probation.

Degree-seeking students are required to maintain a satisfactory rate of progress.

- Full-time students must earn a minimum of 12 credit hours per semester applicable to their degrees.
- Part-time students must maintain a satisfactory rate of progress which will enable them to graduate within 12 academic years after achieving degree-seeking status.

Students who do not maintain a satisfactory rate of progress in a given semester may be placed on probation based on the recommendation from the student's academic advisor, department associate chair, and academic dean. Probation may affect financial aid. See Student Eligibility Requirements to Receive Federal and State Financial Assistance on page 12.

Students on probation are not permitted to:

- Register for more than 15 credit hours per semester unless they receive approval from the associate dean of their college.
- Hold an elected or appointed office in any student organization. Probation does not affect membership in a student organization.
- Participate in the Cooperative Education Program unless approved by the vice provost for Undergraduate Academic Affairs.

Academic probation may affect a student's eligibility to participate in varsity athletic sports.

Students who are on academic probation for two consecutive semesters are candidates for academic suspension from IIT.

The progress of non-degree students also is reviewed and any student who does not maintain good academic standing is subject to being placed on probation or academic suspension.

A student placed on academic suspension by the University may petition the Academic Standing Committee to review the suspension. The student must present substantial academic or other relevant new evidence not available at the time of suspension in support of the petition for reinstatement. The chair of the Academic Standing Committee will determine whether the new documentation warrants a further review of the case.

Advising

Each undergraduate student is assigned a faculty academic advisor who is available to discuss opportunities and career plans in the student's chosen field and to plan and approve coursework to meet departmental and university requirements. Students are urged to consult their advisors when questions arise.

Department advisors, the director of undergraduate advising, and advisors in Office of Undergraduate Academic Affairs are also available to answer questions and interpret policies regarding university requirements and academic procedures.

Change of Major or Declaration of Additional Majors

Students considering either a change of major or concurrently pursuing a second undergraduate degree or major should consult the departmental associate chair regarding program requirements and career opportunities in the new degree program.

Students may also review requirements for the new degree program by performing a "What If" audit using DegreeWorks. Students may access the DegreeWorks channel through the IIT portal.

An advisor in the Office of Undergraduate Academic Affairs can also assist a student in the selection of a suitable major. A student who wishes to change or declare a major or concurrently pursue an additional undergraduate degree program must obtain these forms from the Office of Undergraduate Academic Affairs or at **www.iit.edu/ugaa**. Approval from the intended major department is required.

Change of Status

Students who wish to change a classification and/or registration status must complete the applicable procedures listed below no later than two weeks prior to registration.

- Students changing from full-time degree-seeking status to part-time degree-seeking status must notify the Office of Financial Aid if they are receiving financial aid. International students with student visas must be registered as full-time students and are not permitted to change to part-time status.
- Students changing from part-time degree-seeking status to full-time degree-seeking status must inform their department and obtain the necessary advisor's approval for a full-time course load. Also, students in this category who wish to apply for financial aid must notify the Office of Financial Aid regarding their change of status.
- Students changing from non-degree status to full-time or part-time degree-seeking status must contact the Office of Undergraduate Academic Affairs. Students must have completed at least one semester of relevant coursework at IIT and must be in academic good standing in order to be eligible for changing their status.
- Students changing from graduate status to undergraduate full-time or part-time status must submit an application for admission to the Office of Undergraduate Admission.

Code of Academic Honesty

IIT expects students to maintain high standards of academic integrity. Students preparing for the practice of a profession are expected to conform to a code of integrity and ethical standards commensurate with the high expectations society places on practitioners of a learned profession. No student may seek to gain an unfair advantage over another. The Code of Academic Honesty is explained in the IIT Student Handbook and all students are expected to know and adhere to this code.

Credit by Examination

Credit may be earned through the following examination procedures. Total credit from proficiency examinations and the College Level Examination Program may not exceed 18 semester hours. There is no limit for Advanced Placement (AP) credit.

College Level Examination Program (CLEP)

For these examinations, which are administered by the College Entrance Examination Board, IIT will award credit under the following conditions:

- The CLEP examination and the score achieved meet the standards of the IIT department that offers courses in the area of the examination.
- The CLEP examination is taken before the student enters IIT.
- Students must observe all rules of the College Level Examination Program regarding the taking of CLEP examinations.

NOTE: Previous acceptance of the examination by another institution does not imply acceptance by IIT.

Proficiency Examinations

Any student who believes that, through self-study or outside experience, he or she has gained the substantive equivalent of the content of a specific course may ask for an examination. With the approval of the chair of the department offering the course and the Office of Undergraduate Academic Affairs, a proficiency examination will be administered. This is a graded exam and the letter grade will be entered on the permanent record. Proficiency examinations are not allowed for courses in which the student has previously enrolled and must be completed before a student's final 45 semester hours of enrollment at IIT. The Credit by Examination Form may be obtained in the Office of the Registrar and a per-credit-hour fee is charged for each examination.

Dean's List

Every semester the names of all undergraduate students who have completed at least 12 graded hours with a semester GPA of 3.50 or better appear on the Dean's List.

Grade Appeal

The assignment of letter grades (see grade legend) is at the discretion of the course instructor, and except for unusual circumstances, the assigned course grade is final.

Undergraduate students who want to appeal a letter grade assigned in a course should first confer directly with the course instructor. If the student and instructor cannot come to an agreement, the student should contact the chair of the instructor's department. If necessary, the student can appeal to the dean of the instructor's college.

Grades

Grade	Grade Description	Instructor Assigned	Performance Evaluated	Attempted Hours	Earned hours	Quality Points	Quality Hours	GPA Hours	FinAid Hours
A	excellent	✓	✓	✓	✓	4.00	✓	✓	✓
B	above average	✓	✓	✓	✓	3.00	✓	✓	✓
C	average	✓	✓	✓	✓	2.00	✓	✓	✓
D	below average	✓	✓	✓	✓	1.00	✓	✓	✓
E	fail	✓	✓	✓		0.00	✓	✓	✓
I	incomplete	✓		✓		0.00			✓
R	research	✓		✓		0.00			✓
NA	non-attendance	✓		✓		0.00			✓
S	satisfactory	✓	✓	✓	✓	0.00			✓
U	unsatisfactory	✓	✓	✓		0.00			✓
P	pass	✓	✓	✓	✓	0.00			
F	fail	✓	✓	✓		0.00			
AU	audit					0.00			
W	withdrawal(student initiated)			✓		0.00			✓
X	no grade submitted			✓		0.00			✓
NG	non-graded					0.00			

Grade Notes

AU Grade basis elected by student at point of registration. Permanent administrative grade automatically applied. An audit request must be submitted at the time of registration and courses may not be changed to or from audit after the registration period. There is no credit given for an audited course. Regular tuition rates apply.

D Used for undergraduate students only; not used to evaluate graduate level course work.

I The student must request this temporary grade from the instructor through the incomplete grade request process prior to the week of finals. The I grade is automatically posted when the Registrar's Office receives the approved request. A written agreement between the student and instructor must detail the remaining requirements for successful completion of the course. A grade of I will be assigned only in case of illness or for unusual or unforeseeable circumstances that were not encountered by other students in the class and that prevent the student from completing the course requirements by the end of the semester. Grades of I will automatically change to E on the published deadline of the subsequent term.

NA Apparent withdrawal as a result of the student never attending a registered section.

NG Grade for a course in which no evaluation is recorded. Permanent administrative grade automatically applied.

P/F Used for non-degree continuing education courses. All Continuing Education Unit (CEU) courses are graded on a pass/fail basis.

R Temporary grade indicating coursework is scheduled to extend beyond the end of term. The grade of R has same impact as an I grade until final letter grade is submitted. The grade of R does not expire or change to another grade.

S/U Graduate level courses only. Used for 591, 594, 600, 691, non-credit courses, and other courses approved by the Graduate Studies Committee. Not to be used for 597 variable topics courses.

W Permanent administrative grade automatically applied when student withdraws before deadline (60% of term). Grade of W does not affect GPA, and no credit hours are awarded for a grade of W.

X Temporary administrative grade automatically applied to blank grade rosters at grading deadline.

Grading Procedure

Online submission of final grades are due on the published deadline following final exams. Grades of X are posted for all missing (blank) grades at that time and are resolved through the grade change process. All grade changes are initiated by the instructor of record or authorized academic officer. Current temporary grades of I, R, and X can be changed by the instructor directly with the Office of the Registrar to a final letter grade of: A, B, C, D, E, or S/U, if the class has a pass/fail grading basis of satisfactory/unsatisfactory. Temporary grades of I or R cannot be changed to another temporary or a non-letter, administrative grade of: I, R, NA, AU, W, or X. Other grade changes may require an additional level of approval by an academic officer or appeals committee. Changes to final grades cannot be made once a degree has been posted for the career in which the course was taken, or in the case of a student's voluntary separation from the University.

Grade Point Average

The grade point average (GPA) is determined by dividing the total number of grade points earned by the total number of graded semester hours. Graded semester hours include courses graded A, B, C, D, and E. All courses taken at IIT apply to the cumulative GPA, including those that do not apply toward graduation.

Repeating Courses for a Grade Change

Undergraduate students may repeat a course for a change of grade. A request to repeat a course for a change of grade must be submitted through the DegreeWorks, channel in the IIT Portal, during registration. Both grades will be recorded on all transcripts issued. Only the second grade will be used to compute the GPA, even if the second grade is lower, except when the second grade is I, R, S, U, W, X, or AU. The course repeat policy is as follows:

- Both the grade and credit hours are removed if a course is repeated for a grade change.
- A course repeated for a grade change must be taken within one calendar year after initial enrollment in that course or the next time it is offered (whichever is longer).
- The same course may be repeated only once for a change of grade.
- No more than three courses may be repeated for a grade change in a student's career.
- Re-registration for courses in which a student received a passing grade requires the approval of the student's academic advisor and academic dean.
- If a course is no longer offered by the University, the provision to repeat the course for a grade change does not apply.

Graduate Course Enrollment Approval

All undergraduate students who wish to enroll in a graduate 500-level course must obtain approval from their faculty advisor. All undergraduate students who enroll in graduate courses are governed by the graduate grading system for those courses.

Graduation Requirements

Every student is responsible for fulfilling graduation requirements as specified in the IIT Bulletin in effect at the time of his or her admission to IIT. If those curriculum requirements change before the student completes a specified degree program, he or she may follow a curriculum in a subsequent IIT Bulletin with the approval of his or her academic unit head. When an earlier curriculum is no longer available, the individual degree program of a student who has been following this earlier curriculum will be modified by his or her academic unit head.

The student has the ultimate responsibility to fulfill degree requirements, to attain eligibility to enroll in particular courses, and to comply with all applicable academic rules governing his or her academic program.

NOTE: Students must file an Application for Graduation Form at the beginning of the semester in which they plan to graduate. Failure to do so may result in the postponement of the student's graduation. Please refer to the IIT Calendar on page 3 for specific deadlines.

Undergraduate students must complete:

- All required courses in their major program.
- Credit hour requirements as appropriate to their major (a minimum of 126 hours).
- Core Curriculum and special academic requirements as shown on page 25.
- Residence requirements as outlined on page 280.
- A minimum cumulative GPA of 2.00 and a minimum GPA of 2.00 in the student's major department courses. A student who completes all course requirements with an average below the minimum grade point requirements may, with permission of his or her department chair and academic dean, take additional courses to raise the GPA.
- Completion of all the above within a period of eight calendar years from the semester of initial admission for full-time students or 12 calendar years for part-time students after achieving degree-seeking status. A student may petition their major department and academic dean to have this period extended. If the petition is approved, this extension may involve additional compensating academic requirements.
- Payment of all financial obligations to the University.

All incomplete coursework must be submitted to the instructor prior to the date of graduation. A recorded grade of I (incomplete) in a course required for graduation will result in deferral of that student's graduation until the next semester. A new application for graduation must be submitted for that semester.

Graduation with Honors

A student must complete a minimum of 60 graded semester hours at IIT in order to receive the award of "summa cum laude", "magna cum laude", or "cum laude". A student who has a GPA of 3.90 and higher will graduate with "summa cum laude" honors; a student who has a GPA between 3.80-3.899 will graduate with "magna cum laude" honors; and a student who has a GPA between 3.50-3.799 will graduate with "cum laude" honors.

Leave of Absence

Undergraduate degree-seeking students who wish to withdraw from the University with the intention of returning to complete their degree program may apply for a Leave of Absence. All requests for a Leave of Absence begin with the One Stop. This designation cannot exceed one academic year; however, it may be extended if the proper documentation is submitted. The Leave of Absence form can be found on the Academic Affairs channel in the IIT Portal.

Students on a medical Leave of Absence may be required to contact the Student Health and Wellness Center and/or submit documentation from a health care professional relating to treatment prior to resuming their studies.

International students must comply with additional regulations when requesting a Leave of Absence. See **www.iit.edu/∼internat** for additional details.

The Leave of Absence policy is explained in more detail in the IIT Student Handbook.

Return from Leave

Students wishing to return from a Leave of Absence should contact the One Stop (onestop@iit.edu) to begin the process. The request for Return from Leave and all supporting documents must be submitted prior to the deadline specified on the IIT Calendar.

Students must submit official transcripts from all colleges and universities attended since last enrolled at IIT. In some cases, additional interviews may be required to process a Return from Leave.

International students must contact the International Center in addition to submitting a request to Return from Leave. See **www.iit.edu/∼internat**.

Registration

Registration and Class Attendance

Students are required to be registered for all classes in which they participate, attend, and/or submit coursework for evaluation. No credit will be granted for any course for which the student did not properly register before the last day to add a class for the semester. Students are required to be registered to make use of university facilities. Students who are in an exchange, study abroad, or cooperative education program also must be registered for their particular programs.

All students are expected to attend classes regularly. Excessive absences may be grounds for a failing grade. Non-attendance does not constitute an official withdrawal. When illness or emergency requires a student to miss more than two days of class, the student must notify the course instructor. It is also recommended that the student contact the dean of students and the director of undergraduate advising.

Priority Registration

Undergraduate students are allowed to register for an upcoming term based on their student classification (see page 281), which is determined by earned credit hours. In-progress credit hours are not used in determining registration priority. All graduate students, U5 (fifth-year) undergraduates, and U4 (fourth-year) undergraduates can register on the first day of registration. All U3 (third-year) undergraduates can register on the second day of registration. All U2 (second-year) undergraduates can register on the third day of registration. All U1 (first-year) undergraduates can register on the fourth day. Open registration begins on the fifth day for all other students.

Registration Holds and Controls

Students with unpaid balances, disciplinary sanctions, unmet immunization requirements, or other such conditions to warrant a registration hold are prevented from enrolling in classes until the condition is resolved and the hold is removed.

Registration controls including prerequisites, corequisites, maximum hours, level, and program restrictions may also exist to limit or prevent registration in specific circumstances. Students should consult their advisor, resolve all holds, and take note of any registration restrictions that pertain to their student status and course selection, prior to their appointed registration date for an upcoming term.

For more information, go to
www.iit.edu/registrar/registration_tools.

Residence Requirements

All undergraduate degree-seeking students must observe the following residence requirements:

- Once enrolled at IIT, a student is not permitted to enroll at another institution without obtaining permission. A student must submit an academic petition to the Office of Undergraduate Academic Affairs for approval prior to registration at another institution.
- A course failed at IIT must be repeated at IIT. No transfer credit will be awarded for any course equivalent to a course failed at IIT.
- The final 45 semester hours of work must be completed in residence at IIT. Any proficiency examinations or enrollment at another institution must be completed before this period.
- A student must complete a minimum of 45 semester hours at IIT in order to be eligible for a Bachelor's degree from IIT.

Second Bachelor's Degree

A student whose first degree is granted by IIT must complete a minimum of 15 additional credit hours at IIT. A student whose first degree was awarded by another institution must complete a minimum of 45 additional credit hours at IIT. All other graduation requirements apply for the second degree. The GPA required for "summa cum laude", "magna cum laude", and "cum laude" for the second degree includes all IIT coursework.

Student Academic Petitions

A student may request a review of decisions concerning academic status or regulations by submitting an academic petition to the Office of Undergraduate Academic Affairs. Students who wish to take a course at another institution during the summer must submit an academic petition to the Office of Undergraduate Academic Affairs prior to the registration at another institution to guarantee transfer of credit in accordance with university policies.

Student Classification

The following table describes classifications for undergraduate students currently in effect at the Illinois Institute of Technology. Classification is based on total earned hours in a student's undergraduate career.

Classification	*Earned Hours*
First-Year Undergraduate (U1)	0-29.9
Second-Year Undergraduate (U2)	30-59.9
Third-Year Undergraduate (U3)	60-89.9
Fourth-Year Undergraduate (U4)	90-130.9
Fifth-Year Undergraduate (U5+)	131+

Transcripts

Official transcripts are requested through the Office of the Registrar and are only released with the expressed consent and authorization of the student, in compliance with (FERPA) the Family Educational Rights and Privacy Act of 1974. The secured document is certified as of the printing date and is not valid if altered in any way or opened by someone other than the intended recipient.

Official transcripts are released only after the student has fulfilled all financial obligations to the University. Official transcripts issued directly to the student making the request are stamped "ISSUED TO STUDENT". A fee is charged for each transcript issued.

Unit of Credit

Academic credit is recorded in semester hours. Each semester hour represents one 50-minute period per week for a 16-week semester. IIT follows the standard Carnegie Unit, requiring 750 contact minutes of instruction per credit hour, regardless of the length of the term.

Withdrawal from the University

Undergraduate degree-seeking students who withdraw from all of their courses are in effect withdrawing from the University. Non-attendance does not imply withdrawal. All requests for Withdrawal begin with the One Stop which will provide assistance with the successful resolution of all outstanding obligations to the University. The Withdrawal Form can be found in the Academic Affairs channel in the IIT Portal.

International students must comply with additional regulations when withdrawing from the University. See **www.iit.edu/∼internat**.

Any undergraduate student who is not in attendance for a semester must apply for Reinstatement in the Office of Undergraduate Academic Affairs.

Reinstatement

Students who have withdrawn and now wish to return to IIT should contact the Office of Undergraduate Academic Affairs (**ugaa@iit.edu**) to begin the process. The request for Reinstatement must be submitted prior to the deadline specified on the IIT calendar.

Students must submit official transcripts from all colleges and universities attended since last enrolled at IIT. In some cases, additional interviews may be required for Reinstatement.

International students must contact the International Center in addition to submitting an application for Reinstatement. See **www.iit.edu/∼internat** for more information.

Campus Resources

Academic Resource Center

Website: www.iit.edu/arc

The Academic Resource Center (ARC) is a comprehensive center with a variety of services for students and faculty. The ARC's mission is to enrich the academic experience through a student-centered approach to learning. The ARC provides peer tutoring in Mathematics, Architecture, Engineering, and the sciences on a drop-in basis and by appointment.

Undergraduate and graduate peer tutors are available during the fall, spring, and summer semesters. In addition to peer tutoring, the ARC also offers exam reviews, workshops, supplemental instruction, group study space, and an OTS computer laboratory including PCs and Macs. The ARC also keeps some textbooks and iPads with academic apps, for your reference.

The ARC is located in the northwest corner of the Hermann Hall Building, Room 112. The ARC is open Monday through Thursday, 10:00 a.m. to 8:00 p.m., Friday, 10:00 a.m. to 3:00 p.m., and Sunday from 6:00 p.m. to 9:00 p.m. For more details, visit the ARC website: **www.iit.edu/arc** or call 312.567.5216.

Access, Card, and Parking Services

Website: www.iit.edu/acaps

The Access, Card, and Parking Services Office issues HawkCards and parking permits for the University. The HawkCard is the picture identification card for IIT students, staff, and faculty. Not only does it serve as an ID, it also grants access to buildings, parking lots, computer labs, Keating Athletic Center, the shuttle bus, library materials' check-out services, and TechCash balances. Permits to park in IIT lots are available for purchase on an annual, academic year, or monthly basis. Students should visit Access, Card, and Parking Services in Hermann Hall, Room 201, for more information, or visit **www.iit.edu/acaps**.

Athletics and Recreation

Website: www.illinoistechathletics.com

The Department of Athletics offers a comprehensive program of varsity sports, intramural competition, instruction, and formal recreation activities for both men and women.

Athletics

Illinois Tech is currently transitioning to NCAA Division III and is beginning year two of the provisional stage. The sports program field's competitive teams in 13 sports: men's and women's swimming and diving, cross country, track and field, basketball, and soccer, as well as men's baseball, women's lacrosse and womem's volleyball.

Illinois Tech is a member of the United Staes Collegiate Athletic Association (USCAA) as a full member for 2014-2015. The USCAA focuses specifically on smaller institutions of higher learning and will provide current Scarlet Hawk student-athletes the opportunity to compete for National Championships and student-athlete accolades as IIT transitions to NCAA DIII full status.

The eight USCAA sponsored sports that Illinois Tech has sports teams are baseball, men's basketball, men's cross-country, men's soccer, volleyball, women's basketball, women's soccer, and women's cross country.

IIT Women's Lacrosse will be a member in the Midwest Lacrosse Conference in 2014-15. IIT Men's and Women's Swimming competes in the Liberal Arts Conference in 2014-15. IIT Men's and Women's Swimming competes in the Liberal Arts Championships. Men's and Women's Track and Field compete in several presitgious invitational events.

Recreation

The Intramurals and Recreation program offers a variety of fun, recreational, social, and competitive activities for IIT students regardless of experience and ability. Traditional offerings include basketball, volleyball, flag football, dodgeball, soccer, and softball. Other sports include, racquetball, badminton, cricket, kickball, and ultimate frisbee. Fitness classes are also available for students including but not limited to yoga, Zumba, Salsa dancing, and Pilates. In addition, we offer open recreational play in basketball and volleyball along with open swimming in the Keating Sports Center pool. Moreover, IIT has the only disc golf course in Chicago proper, which gives students another recreational outlet and makes our university a popular destination for local area disc golf enthusiasts.

Campus Life

Website: www.iit.edu/campus_life

The Office of Campus Life provides campus programs and events designed to enhance the student educational experience outside of the classroom. Campus Life manages the campus Orientation Program, Freshman Year Experience (FYE) programming, and provides direct oversight to more than 100 student organizations, including the Student Government Association and Union Board. Other registered student organizations represent a variety of student interests in areas such as culture, recreation, academics, and the arts.

Career Management Center

Website: www.cmc.iit.edu

Located in Herman Hall, the Career Management Center (CMC) offers individual career advising and testing, résumé critiques, job search strategies, mock interviews, and labor market and salary data. The CMC also administers the Cooperative Education Program and the Internship Program, whereby qualified students gain experience in their field of study prior to graduation. Both programs are options for domestic and international students at the undergraduate or graduate level.

The CMC conducts a variety of professional development workshops on topics including résumé and cover letter writing, job search strategies, communications, and interviewing skills. The CMC also hosts biannual career fairs, employer spotlights, and on-campus interviews. Career related resources, workshop schedules, and a link to job postings may be accessed by students and alumni registered in JOBS4HAWKS (**www.cmc.iit.edu**). Individual sessions with a career counselor may be scheduled by appointment at 312.567.6800.

Cooperative Education Program

Website: www.cmc.iit.edu

Cooperative education is a learning approach that integrates university studies with professional work experience in industry, business, or government. Salaries among IIT co-op students are competitive and help defray educational expenses. The co-op experience improves employment opportunities upon graduation. Graduate students must meet co-op and internship eligibility requirements.

Part-time employment opportunities may be available for students both on and off campus. Positions may be career related co-ops or internships, part-time, or seasonal work. Co-ops, internships, and on-campus jobs are posted in the Career Management Center (CMC) NACElink database.

Students interested in and eligible for employment off campus in their field of study may get job search assistance from the CMC and must attend an Introduction to Cooperative Education and Internship Workshop conducted by the CMC. Workshop schedules are posted at **www.cmc.iit.edu**. Appointments for individual career counseling may be made by calling 312.567.6800.

International students (on F1 visa) are restricted to on-campus employment for their first academic year of study at any school in the United States. After completing one academic year in the country, students on an F1 visa may be eligible for opportunities off campus (only if related to their field of study) through the Cooperative Education Program or the Internship Program.

Policies for graduate students:

- Graduate students enrolled in a summer coop or internship on a full-time basis are not eligible to register for a course during the summer semester.
- Graduate students enrolled in a fall or spring coop or internship on a full-time basis, for nine credits, and who are in good academic standing (cumulative GPA 3.0/4.0) may register for 3-6 credits of academic course enrollment, which is equivalent to 15 hours of registration.
- Graduate students who have earned academic probation, from the prior semester (cumulative GPA below 3.0/4.0) are not eligible to apply for a coop or internship, for the first time, until the cumulative GPA is raised to 3.0/4.0.
- Graduate students who have earned academic probation, during a semester in which enrollment in a coop or internship is concurrent with academic course registration, are not eligible for continued enrollment in a coop or internship without prior approval of the Associate Dean for Graduate Academic Affairs.
- Graduate students, who are completing a second degree at IIT, when the first degree was also earned at IIT, are eligible for a coop or internship, after one semester of full-time graduate enrollment, in a fall or spring semester.
- Graduate students, who are completing a second degree at IIT, when the first degree was earned at a different institution, are eligible for a coop or internship after two semesters of full-time graduate enrollment, in fall and spring semesters.

Part-Time Employment

Website: www.iit.edu/financial_aid/student_employment

Part-time employment opportunities may be available for students both on and off campus. Positions may be career related co-ops or internships, non-Federal Work Study jobs, part-time, or seasonal work. Co-ops, internships, and on campus jobs are posted in the Career Management Center (CMC) JOBS4HAWKS database. Federal Work Study positions and information can be found on the Financial Aid website **www.iit.edu/financial_aid/student_employment**. Graduate students should note that they are not eligible for some of these positions.

Students interested in and eligible for employment off campus in their field of study may get job search assistance from the CMC and must attend an Introduction to Cooperative Education and Internship Workshop conducted by the CMC. Workshop schedules are posted at **www.cmc.iit.edu**. Appointments for individual career counseling may be made by calling 312.567.6800.

International students (on F1 visa) are restricted to on-campus employment for their first academic year of study at any school in the United States. After completing one academic year in the country, students on an F1 visa may be eligible for opportunities off campus (only if related to their field of study) through the Cooperative Education Program or the Internship Program.

Communication Across the Curriculum Program

Website: www.iit.edu/cac

The Communication Across the Curriculum (CAC) Program helps students understand the role of writing and speaking in their academic and professional lives. Both on its website (**www.iit.edu/cac**) and through the IIT Writing Center (see page 299), located in Siegel Hall 232/233/234, the CAC provides assistance in communication skills for academic inquiry, professional research, and the workplace. The CAC also assists IIT instructors in developing materials relevant to written, oral, electronic, and interpersonal communication in discipline-specific courses – particularly Introduction to the Profession (ITP), communication-intensive courses (C-Courses), and Interprofessional Projects (IPROs). The CAC director also administers IIT's Basic Writing Proficiency requirement.

Commuter Student Services

IIT's commuter student organization, Commuter Students Association, informs commuter students about available student services and serves as a place where commuter students get to know one another and voice their concerns. The group also plans a variety of events and activities throughout the year. For more information on CSA's programming, students should consult the Office of Campus Life in the McCormick Tribune Campus Center.

Disability Resources

Website: www.iit.edu/cdr

Services for persons with disabilities are coordinated by the Center for Disability Resources. Persons with disabilities who are interested in applying for admission to any of IIT's education programs are invited to call the center or to email **disabilities@iit.edu** prior to their arrival on campus to discuss their individual needs. Enrolled students with disabilities are encouraged to contact the director of the Center for Disability Resources to register and request accomodations.

Fraternity and Sorority Life

Website: www.iit.edu/housing/greek_life

The Greek community at IIT is focused on giving students the chance to learn both inside and outside of the classroom. IIT's six fraternities and three sororities uphold their own missions through brotherhood and sisterhood activities. These groups also concentrate heavily on the values of their organizations by participating in regular philanthropic and community service events. Each fraternity and sorority has its own operating structure and allows students to develop valuable leadership and interpersonal skills. Academics and scholarship are an integral part of the Greek system, and the community works hard to uphold rigorous scholastic standards as a part of their daily functioning. Membership is open to both residential and commuter students.

Idea Shop

Website: ipro.iit.edu/ideashop

A catalyst for innovation, the Idea Shop is a 13,000-square-foot facility composed of a state-of-the-art 3D rapid prototyping lab, a Dell laptop lab, an iPad library, an iMac lab for mobile app development and video editing, collaborative teaming areas, formal classrooms, and flexible open spaces. The Idea Shop is home to IIT's Interprofessional Projects Program (IPRO), entrepreneurship initiatives, and the Exelon Summer Insitute, an accelerated program for incoming first-year students. The Idea Shop is located in the University Technology Park at IIT, a newly remodeled incubator space for researchers and companies requiring robust infrastructure. The Idea Shop helps to build the competency and professional perspectives of IIT students at all levels. It is an inviting place for returning alumni, students, and prospective students to interact and participate in workshops. The Idea Shop also serves the Chicago-area entrepreneurial community and facilitates the process by transforming student and faculty generated ideas into actual businesses, products, and patents.

IIT Online

IIT was one of the first universities in the Chicago area to offer microwave delivery of live courses to area companies. As early as 1977, IIT was delivering course lectures to remote students and over the years, IITV - as IIT Online was then known - delivered countless hours of courses and programming to as many as 72 corporate and non-corporate locations. IIT Online continues that strong tradition - video lecture capture is a distinctive hallmark of an IIT Online course.

IIT Online delivers over 9000 course lectures per year from interactive video conferences to on-demand internet access. That represents over 400 hundred courses from almost every academic department. IIT Online supports students and faculty in these courses with:

- Student Services - staff coordinate room scheduling, exams, proctors, exam and homework return, as well as troubleshoot technical issues like video playback, etc.
- Production - student technical directors are used for every class session of every course to record faculty instruction and ensure a quality recording;
- Faculty Support - staff assist faculty with Blackboard and instructional design services.

Most online programs are designed for graduate students and courses follow the same 16-week semester academic calendar as the University. Courses have the same faculty and follow the same syllabus. If the course uses exams, exams follow the same schedule. Exams are typically administered at local testing centers for students in the United States.

Prospective students who wish to take courses online at Illinois Institute of Technology must first be admitted to a degree, certificate, or professional development program. Individuals are welcome to apply to take courses in a non-degree capacity, but please note that non-degree status does not confer automatic admission into a degree-granting program and limits to the number of overall credits that can be taken.

Students taking IIT Online courses are IIT students and are subject to all of the same policies and procedures as on-campus students in face-to-face courses.

International Center

Website: www.iit.edu/∼internat

The purpose of the International Center is to promote international education and cultural exchange by (1) supporting international students, faculty, staff, and students studying abroad, (2) assisting in the compliance of immigration and other related regulations, (3) providing study abroad advising for students interested in studying in another country, and (4) providing services and resources to the IIT community. These services include: individual and group orientations to the University and community; assistance with document preparation for employment and other related non-immigrant benefits; workshops for faculty, staff, and students on issues affecting international students and scholars; cross-cultural activities and programs that promote intercultural perspectives and address adjustment issues; study abroad advising for students interested in studying in another country.

All international students, scholars, and faculty are required to report to the International Center immediately upon arrival.

Interprofessional Projects

Website: www.ipro.iit.edu

The Interprofessional Projects (IPRO) Program coordinates the IPRO course, a general education requirement for all undergraduates and a possible elective for graduate students. The IPRO course organizes students in semester-long multidisciplinary project team sections based on contemporary problem-solving challenges that are proposed by students, faculty members, and sponsoring organizations that reflect the diversity of the workplace: corporations, entrepreneurial ventures, non-profit organizations, and government agencies. The IPRO teams are self-directed, offering terrific opportunities for developing leadership potential and collaborating on interesting technical, business, and social challenges with faculty and sponsor mentors. Entrepreneurial IPRO (EnPRO) teams address the added challenge of developing a technological entrepreneurship opportunity analysis that can lead to a business plan for a new venture concept. IPRO teams may include five to 15 students from all academic levels (sophomore through graduate school), and across IIT's professional programs (applied technology, architecture, business, design, engineering, law, political science, technical communication, psychology, and the sciences). Integrating these perspectives within a project team stimulates student and faculty interaction across the boundaries of individual disciplines and experiences. Learn more and review the current or future course listings by visiting **http://ipro.iit.edu** or the IPRO Program Office at 3424 South State Street, Central Building, 4th Floor.

Leadership Academy

Website: leadershipacademy.iit.edu

The Leadership Academy is an integral component of IIT's interprofessional approach to undergraduate education. Its objectives are to create and implement an effective leadership development curriculum for IIT undergraduate students, to identify and support students with exceptional leadership potential, and to evaluate leadership development outcomes at individual and program levels. Currently, the academy offers scholarships and mentors to the scholarship recipients. It also offers the Sophomore Leadership Retreat, a series of engaging leadership development seminars, which any IIT full-time undergraduate student can attend and earn points toward a certificate in leadership studies.

Libraries

Website: library.iit.edu

IIT's libraries include Paul V. Galvin Library; the Center for the Study of Ethics in the Professions (Main Campus); the Graham Resource Center (Main Campus); the Louis W. Biegler Library (Rice Campus); the Chicago-Kent College of law Library at the downtown campus; the Institute for Food Safety and Health Library (Moffett Campus); and the IIT Archives (Main Campus).

Paul V. Galvin Library

Website: library.iit.edu

As the University's central library, Paul V. Galvin Library combines digital access with traditional library services. The library's physical holdings include more than one million volumes and library spaces accommodate both individual and collaborative learning. Computers, scanners, copiers, and printers are available for patrons. Virtual services are provided 24 hours per day with access to dozens of online databases indexing millions of journal articles, approximately 62,000 full text e-journals, more than one million e-books, and I-Share, a statewide resource sharing system of more than 80 academic libraries. Galvin Library also provides web-based delivery of a variety of materials including documents requested via interlibrary loan. The library's instruction program serves the IIT community by teaching skills needed to locate, retrieve, and evaluate information. Library instructors teach at all levels from introductory to advanced and they can cover a broad range of information and retrieval techniques. Subject specialists can specifically tailor instruction sessions for coursework or programs.

Graham Resource Center

Website: library.iit.edu/grc

Housed in Crown Hall, the Graham Resource Center (GRC) is IIT's architecture library, serving students and faculty of the College of Architecture (COA), and a branch of Paul V. Galvin Library. The GRC supports the educational and curricular goals of the COA by acquiring, preserving, and serving materials in various media to COA students, faculty, and staff; providing reference and research assistance to patrons about architecture, landscape architecture, and city planning, and offering bibliographic instruction to all GRC and architecture researchers and users.

The collections of the Graham Resource Center includes more than 15,000 books, 40 journal titles, and many electronic resources to meet research and reference needs. The GRC also holds special collections focused on Mies van der Rohe and Chicago architecture, as well as a circulating collection of iconic chairs.

Phone number: 312.567.3256

Center for the Study of Ethics in the Professions

Website: ethics.iit.edu

The Center, located in Hermann Hall, contains a variety of materials dealing with topics in practical and professional ethics, such as autonomy, confidentiality, conflict of interest, and self-regulation. The library provides bibliographic assistance to students and researchers and assists visiting scholars and practitioners.

Phone number: 312.567.6913

Chicago-Kent College of Law Library

Website: www.kentlaw.iit.edu/library

The law library at the downtown campus serves Chicago-Kent College of Law and other IIT programs taught at the downtown facility. The law library is one of the largest in the country, with more than 500,000 volumes of legal materials covering federal, state, local, and international jurisdictions. The law library is a depository for U.S. Federal, United Nations, and European Union materials. The law librarians provide research and instructional assistance to faculty and students of the downtown campus, as well as tours and instruction to others who use the law library. Special collections include the Library of International Relations, the Law School Archives, and the Law School's growing institutional repository.

Phone number: 312.906.5600

Institute for Food Safety and Health Library

Website: library.iit.edu/ifsh

Located on IIT's Moffett Campus in Bedford Park, the Branch Library at the Institute for Food Safety and Health (IFSH) supports both the academic curriculum for IIT's Department of Food Science and Nutrition, and the food safety and technology research being conducted at IFSH. A depository library for the FAO (Food and Agriculture Organization of the United Nations), the library provides digital access to all of the Galvin Library's databases, as well as services such as interlibrary loan, web-based document delivery, and library instruction.

One Stop

Website: onestop.iit.edu

The One Stop has been established to provide services to students with maximum efficiency and a minimum of confusion. This office, representing the Offices of the Registrar, Financial Aid, Academic Affairs, and Student Accounting will be the starting point for all IIT students (prospective, new, and continuing) seeking administrative and academic assistance.

At the One Stop, you can get assistance, ask questions, and be pointed in the right direction for registration, change of major, student petitions, enrollment verification, transcripts, and more. You can get personal assistance with financial account information, paying tuition and fees, housing bills, and parking tickets, as well as obtaining information about financial aid. For more details, see **onestop.iit.edu** or call 312.567.3810.

Registrar

Website: www.iit.edu/registrar

The Office of the Registrar serves as the official data steward of institutional academic information and student records to support the needs of students, faculty, staff, and alumni at Illinois Institute of Technology. The office maintains accurate, timely, and secure information to support and enforce academic policy, registration, grading, enrollment and degree certification, course information, the production of diplomas and official transcripts, and other related university functions.

Research Institutes

IIT Research Institute (IITRI)

Website: www.iitri.org

IITRI is IIT's not-for-profit contract research affiliate. With a focus on biomedical research, IITRI's staff of approximately 100 scientists and technicians conducts programs for both government and commercial sponsors. Specific areas of expertise include preclinical toxicology; carcinogenesis and cancer prevention; inhalation technology; molecular biology; analytical chemistry; and biodefense. David McCormick, IITRI Senior Vice President and Director, can be reached at 312.567.4972.

The Institute for Food Safety and Health (IFSH)

Website: www.iit.edu/ifsh

IFSH is a world class research institute that produces knowledge-based outcomes in the areas of food safety, food defense, and nutrition for stakeholders in government, industry, and academia. IFSH builds on and expands the vital work of the National Center for Food Safety and Technology (NCFST), a unique research consortium of IIT, the U.S. Food and Drug Administration (FDA), and the food industry. For more than 25 years, the center has provided a collaborative environment where scientists from industry, academia, and government pool their scientific expertise and institutional perspectives to ensure the production of safe, wholesome foods. IFSH has four operating centers that support the institute: the National Center for Food Safety and Technology (NCFST), Center for Nutrition Research (CNR), Center for Processing Innovation (CPI), and Center for Specialty Programs (CSP).

Within the FDA staff, Richard McDonald is Director, Division of Food Processing Science and Technology. Within the IIT Staff, Robert Brackett, IIT Vice President and IFSH Director, can be reached at 708.563.1577 or rbrackett@iit.edu. Jason Wan, IFSH Associate Director, can be reached at 708.563.8287 or jwan1@iit.edu.

Pritzker Institute of Biomedical Science and Engineering

Website: www.iit.edu/pritzker_institute/

The Pritzker Institute is an umbrella organization that enhances the biomedical science and engineering research activities on the IIT campus. The Medical Imaging Research Center (MIRC), the Center for Integrative Neuroscience and Neuroengineering Research (CINNR), and the Engineering Center for Diabetes Research and Education (ECDRE), the Center for the Study of Condensed Soft Matter (μCoSM), and the Biophysics Collaborative Access Team (BioCAT) are some of the centers and activities that operate under the Institute. Each of the centers has a director and is described in more detail elsewhere in this document. The Pritzker Institute develops and coordinates relationships and programs with traditional science and engineering departments within IIT, as well as outside institutions, especially, Argonne National Laboratory, Rush Presbyterian Medical Center, and the University of Chicago. Vincent Turitto, Director, can be reached at 312.567.6927.

Wanger Institute for Sustainable Energy Research (WISER)

Website: www.iit.edu/wiser

WISER's mission is to continue to improve the quality of life and positively impact society while preserving our natural resources and the environment for future generations. Fulfillment of this mission will reduce our dependence on fossil fuels and, at the same time, provide sufficient and affordable sources of clean energy and water.

WISER cultivates close collaboration among numerous programs at IIT with a focus on development of energy-related interdisciplinary educational and research initiatives and proposals. Current WISER activities involve more than 60 faculty members from throughout IIT, spanning engineering, design, architecture, business, psychology, the sciences, and law. WISER plans to further enhance research and educational partnerships with the City of Chicago, State of Illinois, industry, national laboratories, and other universities. The goal of the institute is to play a leading role in identifying future research directions for shaping national and international energy policy and sustainability initiatives. Hamid Arastoopour, Director, can be reached at 312.567.3038 or at arastoopour@iit.edu or contact Peg Murphy, Assistant Director, at 312.567.6881 or murphym@iit.edu.

Research Centers

Center for Accelerator and Particle Physics (CAPP)

Website: www.capp.iit.edu

CAPP provides a locus for interdisciplinary activities at IIT aimed at the continued development of research in elementary particle physics, at developing new particle accelerator technologies, and at education and outreach to educational institutions and to the wider business, philanthropic, and general public sectors. It serves as a base to coordinate the activities of a group of IIT faculty, graduate students, and staff from various departments currently involved in a number of research programs, and will promote substantial increases in such involvement through a close working relationship with other universities in the region and with Fermilab and Argonne National Laboratory (ANL). Daniel Kaplan, Director, can be reached at 312.567.3389 or kaplan@iit.edu.

Center for Complex Systems and Dynamics (CCSD)

Website: www.ccsd.iit.edu

CCSD provides an interdisciplinary collaborative environment for fundamental and applied research for understanding and mathematically describing complex systems; developing mathematical and computational techniques for simulating, analyzing, and modifying their behavior; and applying these methods to various complex systems of national interest. Current research areas include nonlinear and stochastic phenomena in complex systems, multiagent systems, complex networks and adaptive systems, natural and industrial ecologies, dynamics of multiphase systems, fluid turbulence, molecular level modeling of physical systems, brain electrophysiology and computational neuroscience, and transportation systems. Fouad Teymour, Director, can be reached at 312.567.8947 or teymour@iit.edu.

Center for Diabetes Research and Policy (CDRP)

Website: www.iitdiabetes.org

CDRP is a multi-disciplinary center that includes scholars from engineering, scientific, social scientific, and legal fields who focus on various aspects of diabetes research, prevention, diagnosis, and treatment. The Center unites IIT entities that undertake scientific research, make policy assessments and recommendations, and provide legal advice for individuals with diabetes-related conditions who are participating in research, seeking access to care, or have been discriminated against because they have or are likely to develop diabetes. It also undertakes research into understanding the disease's mechanisms, designing new treatments, and discovering methods of monitoring and treating the complications of the disease. CDRP collaborates with community and professional groups to increase education, awareness, and prevention. Sarah Blenner, Director, can be reached at 312.906.5393 or sblenner@kentlaw.iit.edu.

Center for Electrochemical Science and Engineering

Website: engineering.iit.edu/chbe/research/research-centers

The Center conducts basic and applied research primarily in fuel cells and batteries, while preparing students for a career in advanced energy technology. Jai Prakash, Director, can be reached at 312.567.3639.

Center of Excellence in Polymer Science and Engineering

Website: engineering.iit.edu/chbe/research/research-centers

The Center is an interdisciplinary research and education center established in 1990 through a grant from the Amoco Foundation and is devoted to the advancement of polymer science and engineering. Research is conducted on synthesis, rheology, characterization, and processing of polymers. Education programs include concentrations for B.S., MAS (non-thesis), M.S., and Ph.D. degrees. Dave Venerus, Director, can be reached at 312.567.5177 or venerus@iit.edu.

Center for Integrative Neuroscience and Neuroengineering Research (CINNR)

Website: www.cinnresearch.org

CINNR's mission is to foster research in systems and behavioral neuroscience at the University of Chicago and neural engineering at Illinois Institute of Technology. Work in the Center proceeds from basic science and clinical efforts and emphasizes interdisciplinary approaches to understanding the nervous system. Nicholas Hatsopoulos, Co-Director, can be reached at 773.702.5594 or nicho@uchicago.edu. David Mogul, Co-Director, can be reached at 312.567.3873 or mogul@iit.edu.

Center for the Molecular Study of Condensed Soft Matter (μCoSM)

Website: www.iit.edu/ucosm/

μCoSM is a multi-disciplinary center dedicated to the research of soft matter, both biological and synthetic. The Center has substantial expertise in cell membranes, collagen, ECM, peptide mimetics, entangled polymers, networks, and the cytoskeleton. Particular emphasis is paid to establishing molecular structure/property/function relationships. The Center houses faculty from Biology, Engineering, and Physics, and is a member of the Pritzker Institute of Biomedical Science and Engineering. Research relies equally on experimental, computational, and theoretical components, including neutron diffraction, x-ray diffraction and scattering, atomic force microscopy, Forced Rayliegh Scattering, micro- and bulk rheology, molecular dynamics simulations, and stochastic and statistical mechanical modeling. Jay Schieber, Director, can be reached at 312.567.3046 or schieber@iit.edu.

The Center for Nutrition Research (CNR)

Website: www.iit.edu/ifsh/research_centers/ncnr/

CNR supports the work of the Clinical Nutrition Research Center (CNRC) which conducts human nutrition and clinical research to determine the health benefits of foods and food components in a variety of study areas, including nutrient properties and bioavailability, obesity and satiety, diabetes and cardiovascular disease risk reduction, and infant and child nutrition. The unit also manages projects related to IFSH's Health Promoting Foods research arm. Britt Burton-Freeman, Director, can be reached at 708.563.8276 or bburton@iit.edu.

The Center for Processing Innovation (CPI)

Website: www.iit.edu/ifsh/research_centers/ncpi/

CPI provides expanded process control and process validation capabilities for applied research through IFSH's GMP processing area, kitchen and pilot plant, BSL-2 processing innovation laboratory, fresh produce processing line, and the newly commissioned BSL-3 laboratory and biocontainment pilot plant. The unit also administers education and training services and other targeted commercial projects. Alvin Lee, Director, can be reached at 708.563.8277 or alec@iit.edu.

The Center for Specialty Programs (CSP)

Website: www.iit.edu/ifsh/research_centers/css/

CSP administers key specialized programs, including customized laboratory proficiency testing services for all stakeholders. The Center also manages and coordinates research projects that require select agent registrations. Robin Kalinowski, Director, can be reached at 708.563.8822 or kalinowski@iit.edu.

Center for Strategic Competitiveness (CSC)

Website: stuart.iit.edu/research

CSC develops global partnerships to enhance innovation and creativity and is the foundation for IIT Stuart's strategically competitive curriculum. The Center's mission is to develop Strategic Competitiveness into an approach to business that will enhance the ability of individuals, organizations, and governmental units to respond proactively and innovatively to global market challenges in the next economy.

Center for the Study of Ethics in the Professions (CSEP)

Website: ethics.iit.edu

CSEP was established in 1976 to promote research and teaching on practical ethical issues in the professions. Within IIT, CSEP pursues this mission by integrating ethics into IIT programs and courses and collaborating with faculty in teaching and research. The first ethics center to focus on the professions, CSEP continues to be one of the nation's leading ethics centers and is internationally recognized for its work on ethics in science, engineering, and related areas of business. CSEP is committed to multidisciplinary and multi-institutional research, to projects that combine empirical investigation with conceptual analysis, and projects that introduce and propagate innovations in teaching. Past projects have focused on such topics as intellectual property, decision-making involving engineers and managers, and ethics and societal implications of nanotechnology. There is a continuing emphasis on projects that integrate ethics education into technical courses, for example the development of methods of "micro-insertion" and Ethics Across the Curriculum. CSEP's initiatives to integrate ethics in the IPROs offer models for raising ethics awareness and providing experience of ethics problem solving for students in all IIT's disciplines and professional programs. Elizabeth Hildt, Director, can be reached at 312.567.3017.

Center for Synchrotron Radiation Research and Instrumentation

Website: www.csrri.iit.edu

The Center promotes application of the tools and techniques of synchrotron radiation to science and engineering research with a particular focus on developing and operating experimental beam line facilities to serve the needs of various collaborative access teams at the Advanced Photon Source at Argonne National Laboratory. Carlo Segre, Director, can be reached at 312.567.3498.

Center for Work Zone Safety and Mobility (CWZSM)

Website: www.cwzsm.iit.edu

CWZSM works towards providing long-term solutions to transportation work-zone safety and mobility problems by building a consortium of major work-zone stakeholders including transportation agencies, contractors, trucking industry, and the insurance industry. By working together through the consortium, the stakeholders can combine their resources and knowledge and work towards preventing the 50,000 work-zone injuries and hundreds of fatalities that occur every year. The initiatives of the Center focus on (1) developing work-zone safety audit guidelines by addressing the concerns and interests of all stakeholders, (2) discovering/developing/transferring new technologies and measures for improving work-zone safety and minimizing negative impacts on private industries and the national economy, and (3) providing work-zone safety training and education to the transportation community and the public. Zongzhi Li, Director, can be reached at 312.567.3556 or lizz@iit.edu.

Electric Power and Power Electronics Center (EPPEC)

Website: www.power.iit.edu

IIT has long maintained high quality education and research programs in electric power and energy systems. The mission of EPPEC is to make significant educational, research, and practical contributions to the fields of electric power, power electronics, electric machines, motor drives, and vehicular power systems. The tasks of the Center include the sponsorship of technical studies which will enhance the role of university faculty, manufacturers, vendors, and consumers in power engineering research and education. The Center works with centers and departments across IIT, other institutions, government agencies, and industry to sponsor research projects, short courses, conferences, and seminars. Mahesh Krishnamurthy, Interim Director, can be reached at 312.567.7232 or kmahesh@ece.iit.edu.

Engineering Center for Diabetes Research and Education (ECDRE)

Website: www.iit.edu/ecdre/

ECDRE's objective is to use engineering and science-based techniques to develop treatment modalities for diabetes and its many complications. ECDRE is the first engineering center in the U.S. to focus on diabetes treatment. IIT faculty members, in collaboration with investigators and clinicians at the University of Chicago, University of Illinois at Chicago, and Argonne National Laboratory, are working on a variety of diabetes-related research projects, including the development of artificial pancreas systems. ECDRE is a component of the Pritzker Institute of Biomedical Science and Engineering which is developing a biomedical research thrust on the campus of IIT. Ali Cinar, Director, can be reached at 312.567.3042 or cinar@iit.edu.

Fluid Dynamics Research Center

Website: fdrc.iit.edu

The Center consists of six faculty engaged in experimental, computational, and analytical studies of fluid flow and its control. The Center has numerous research-quality experimental facilities including high and low Mach number wind tunnels, jet facilities, water channels, anechoic room, and an axial flow compressor. Extensive computational resources are available for numerical flow simulations. Areas of focus include active flow control for aerospace applications, aeroacoustics, contaminant dispersion predictions, and vortex-surface interactions. David R. Williams, Director, can be reached at 312.567.3192.

High Performance Computing Center (HPCC)

HPCC is based on the successful collaboration among IIT faculty and the Office of Technology Services. The HPCC serves a critical computing need among IIT researchers–the availability of high performance computing resources. In particular, the HPCC charter has three main goals: (1) to provide expertise on the integration of new computing equipment into IIT's HPC pool, (2) to attract external funding for HPC infrastructure, and (3) to promote HPC at IIT. The HPCC oversees the university's central research computing resources–the 32 processor gigawulf Linux cluster. Alex Flueck, Director, can be reached at 312.567.3625 or flueck@iit.edu.

Illinois Institute of Technology Architecture Chicago Research Center (IITAC-Research Center)

The keynote of the IITAC-Research Center is "Rethinking Metropolis," the architecture of the multiple, competing entities defining urban life in the new millennium. Urban migrations and the proliferation of information technologies have rendered obsolete the logistical premises and architectural values of the traditional city. We can no longer view architecture as a singular enterprise of making buildings and it is time for a radical critique of our approaches. The task of rethinking our habitats and landscapes in a fundamental way entails a multi-faceted and interdisciplinary approach. It will draw upon the cultural, social, economic, and biological sciences, but it will also demand a particular talent and sensitivity to be cultivated in the architect who is ethically charged with environmental interventions. Richard Neutra some years ago opened a book with the somber note that "Nature has too long been outraged by design of nose rings, corsets, and foul-aired subways." Today this observation has become ever more relevant because the problems associated with the metropolis have grown even more acute. We have choices to make as a profession. And if the 21st century is to succeed in improving living conditions for the world's populations, it will be because we have adopted the tools at our disposal and energetically stepped forth with a dynamic vision. The purpose of the IITAC-Research Center is to promote and promulgate invention–to proffer a new vision. Harry Francis Mallgrave, Director, can be reached at 312.567.3269 or mallgrave@iit.edu.

International Center for Sensor Science and Engineering (ICSSE)

Website: www.icsse.iit.edu

ICSSE coordinates education and research activities in sensor science and engineering. The Center addresses significant national and international needs for research and development in sensor science. Current research activities include: biosensors, electrochemical sensors, nanosensors, physical sensors, computations for optimum sensor applications, pattern recognition and artificial intelligence in sensor systems, artificial chemical sensor arrays like electronic noses and tongues, prosthetic sensing like eyes, ears and noses, sensor modeling and design, the shared sensor technology user facility for extreme sensor evaluation, and sensors for chiral molecules. Sensor applications include medicine, environment, human health and safety, industrial and automotive, homeland security, and the NASA space station. Rong Wang, Director, can be reached at 312.567.3121 or wangr@iit.edu.

Medical Imaging Research Center (MIRC)

Website: www.iit.edu/mirc/

MIRC at the Pritzker Institute of Biomedical Science and Engineering promotes, coordinates, and fosters research and educational activities at IIT in medical imaging and related fields. Educational programs include B.S. and Ph.D. programs in Biomedical Engineering and a professional Master's degree in Electrical and Computer Engineering. Current projects include: mapping the human brain, new x-ray imgaging techniques, computer-aided diagnosis, and imaging the heart. Miles Wernick, Director, can be reached at 312.567.8818 or wernick@iit.edu.

National Center for Food Safety and Technology (NCFST)

Website: www.iit.edu/ifsh/research_centers/ncfst/

NCFST, IFSH's cornerstone principal operating center, continues to operate under its long-time cooperative agreement between IIT and FDA, focusing on design and performance of a variety of collaborative and cooperative research projects across several focus areas including microbiology, chemical constituents, allergens, food processing, packaging, methods validation, and nutrition. Robert Brackett, IIT Vice President and IFSH Director, can be reached at 708.563.1577 or rbrackett@iit.edu.

Robert W. Galvin Center for Electricity Innovation

Website: www.iitmicrogrid.net

The mission of the Center is to pursue groundbreaking work in the generation, transmission, distribution, management, and consumption of electricity. The Galvin Center brings together faculty, students, researchers, industry, government, innovators, and entrepreneurs to collaborate to improve the reliability, security, and efficiency of the electric grid and overcome obstacles to the national adoption and implementation of the smart grid. Mohammad Shahidehpour, Director, can be reached at 312.567.5737 or ms@iit.edu.

Thermal Processing Technology Center (TPTC)

Through TPTC, faculty and students undertake research to support the needs of the materials processing and manufacturing industries. The Center performs high quality basic and applied research in thermal processing technology of interest to the primary metals and manufacturing industry. In addition, the Center provides training and education to enhance the human resources available to industry. Multi-disciplinary research teams are used to provide innovative cross-cutting technological solutions to industrial materials processing problems. Philip Nash, Director, can be reached at 312.567.3056.

Wireless Network and Communications Research Center (WiNCom)

Founded in 2006, WiNCom is an initiative of the Computer Science and Electrical and Computer Engineering departments. Motivated by the continuing explosion in the use of the radio frequency spectrum and the desire to increase RF spectrum utilization and efficiency, WiNCom fuses the creative talents of faculty and students from across IIT. WiNCom's signature achievement is the 2007 establishment and ongoing operation of the IIT Spectrum Observatory which is creating a continuous record of RF spectrum utilization in Chicago. Research programs include RF spectrum measurements, RF measurement data storage and analysis techniques, cognitive radio, communication system modeling, RF coexistence, and RF interference modeling and mitigation. Application areas are licensed and unlicensed spectrum, public safety, smart grid, and spectrum sharing. The Center has generated numerous technology transfers and spinoffs including a commercial RF spectrum observatory network. Center researchers have ongoing engagements with the FCC and other government entities including the U.S. Commerce Department Spectrum Management Advisory Committee. Cynthia Hood, Director, can be reached at 312.567.3918. Dennis Roberson, Co-Director, can be reached at 312.567.3032.

Residence and Greek Life

Website: www.iit.edu/housing

More than half of IIT's full-time undergraduates live on campus. Residence and Greek Life offers a wide range of accommodations, programs, and services designed to enhance campus life. Residence and Greek Life maintains residence halls and apartments designed to meet the different needs of IIT students, faculty, and staff. Within these buildings, the staff members coordinate academic and social programming, assist students with personal and academic concerns, supervise resident advisors and community desk assistants, and advise the Residence Hall Association. Please contact Residence and Greek Life for further information about these options.

Service, Education, and Outreach Centers

Center for Research and Service

Website: www.iit.edu/~psyccrs/

The Center offers professional consulting services through the College of Psychology at IIT. The Center supports its clients through research-based solutions that improve individual, team, and organizational performance. Graduate and undergraduate students have opportunities to work on projects in their field of study. George M. Langlois, Director, can be reached at 312.567.6471

Center for Sustainable Enterprise

Website: stuart.iit.edu/news/tags/center-sustainable-enterprise

The Center can bring the many disciplines resident at IIT together in a collaborative relationship with business corporations, other academic institutions, government agencies, and members of the NGO community to identify, develop, communicate, and help implement practical and equitable business strategies that advance the ecological sustainability of the Greater Chicago Area, while fostering our current and future economic viability. M. Krishna Erramilli, Director, can be reached at 312.906.6543 or krish@stuart.iit.edu.

Energy/Environment/Economics (E^3)

E^3 is an academic program of research and coursework for students in engineering. The research program encompasses areas of specialization that relate to energy, sustainable development, industrial ecology, and environmental design. Hamid Arastoopour, WISER Director, can be reached at 312.567.3038 or arastoopour@iit.edu.

Grainger Power Electronics and Motor Drives Labs (GPEMDL)

GPEMDL focuses on studies related to electric power generation transmission, distribution, operation, and controls. GPEMDL houses several graduate and undergraduate laboratories. Annual research support of more than $250,000 is provided by federal and private agencies. Mahesh Krishnamurthy, Director, can be reached at 312.567.7232 or kmahesh@ece.iit.edu

Institute for Science, Law and Technology

Website: www.kentlaw.iit.edu/islat

The Institute provides a forum to produce and disseminate knowledge on the social and legal implications of emerging technologies. As part of its mission, the Institute sponsors long-term, multi-disciplinary research, public conferences, judicial training, symposia for journalists, and other programs. Public programming, research, and student educational opportunities in the Institute focus on biotechnology, genetics, nanotechnology, diabetes policy, environmental science, social networks, and intellectual property. In addition, Institute staff and faculty draft laws and regulations and develop other programs that guide public policy decisions. Lori Andrews, Director, can be reached at 312.906.5359 or landrews@kentlaw.iit.edu.

Invention Center

The Center helps students and faculty develop a studio approach to engineering. The Center's philosophy is project-oriented, creativity-driven, and encompasses all the stages of invention including idea generation and development, prototype development and proof-of-concept, the patent process, and commercialization. Francisco Ruiz, Director, can be reached at 312.567.3212.

Office of Intellectual Property and Technology Transfer

Website: www.iit.edu/research/services/ttip/

The Office of Intellectual Property and Technology Transfer supports all IIT efforts to develop and protect intellectual property. The office manages the process of identifying, evaluating, protecting, marketing, and licensing all IIT inventions and copyrightable material. Robert Anderson, Director, can be reached at 312.567.3462.

Spiritual Life and Service Learning

Website: www.iit.edu/spiritual_life

The Office of Spiritual Life and Service Learning serves students of all faith traditions as well as secular humanists and atheists. Together with student religious organizations and other university offices, the office sponsors activities for faith development, worship, socializing, and service. The office sponsors interfaith learning opportunities on campus and provides information about religious resources both on and off campus. The director is also available to discuss personal or spiritual issues.

Home to IIT's Service Learning programs, the office sponsors and supports regular community service activities, advises the Service Learning theme community, and connects interested students with volunteer opportunities both on and off campus.

The Office of Spiritual Life is located in MTCC 213. The director can be contacted at 312.567.3160, **spiritual.life@iit.edu**, or **service@iit.edu**.

Student Affairs
Website: www.iit.edu/student_affairs

The Office of Student Affairs oversees many areas of student life and serves as the primary advocate and ombudsperson for students. The office also manages the student conduct process. Students, faculty, and staff are encouraged to contact the office for help or referrals.

Activities outside the classroom and laboratory complement and enhance IIT's central educational mission. IIT encourages all students to participate in athletics, student organizations, and professional societies. Students are also encouraged to take advantage of the cultural, educational, and recreational resources on campus, as well as in the Chicago area. For additional information on activities, organizations, and services, consult the IIT Student Handbook.

Student Center for Diversity and Inclusion
Website: www.iit.edu/scdi

The purpose of the Center is to provide programs, research, advocacy, and advise on issues, policies, and practices that affect the universities commitment to diversity and inclusion. The Center is dedicated and committed to continually evolve through the review of best practices. In support of that commitment, the work of the Center is organized around a concept of diversity that is practical and includes multiple social and cultural identities, such as race, gender, sexual orientation, class, group affiliation, ability, national origin, and religion.

Support & Services

- Educational and Cultural Programs
- Personal and Professional Development
- Student Networking Events
- Cultural Events Calendar
- Diversity and Inclusion Library Guides

National Observances

- Hispanic Heritage Month
- LGBTQ Pride Month
- Native American Heritage Month
- African American History Month
- Asian American History Month
- Women's History Month
- Martin Luther King Birthday

Signature Programs

- Sharing Table
- Mixing It Up at a Lunch Day
- "My Dream Is" Martin Luther King Jr. Celebration
- IIT Globe Trekker Reading Program
- Welcome to Campus Dinner
- Graduation: Parent Tea
- Chicago Great Migration Series

Student Health and Wellness Center
Website: www.iit.edu/shwc

The Student Health and Wellness Center (SHWC) provides quality and cost-sensitive healthcare tailored to the needs of our students. The goal of SHWC is to provide campus health and wellness resources that enable students to successfully achieve their academic goals and promote lifelong wellness. The SHWC provides primary care, specialty care, urgent care, diagnostic services, psychotherapy and mental health support, health promotion, and wellness programs.

SHWC provides diagnosis and treatment of common illnesses and injuries with the ability to dispense medication and/or provide appropriate prescriptions. Immunizations, allergy injections, gynecological care, sexual health screening, and walk-in urgent care are also provided. A small fee may incur for labs, diagnostic tests, immunizations, and medication given on site.

The SHWC provides administrative oversight of the Aetna Health Insurance Plan offered to currently enrolled students. Health insurance is not a required to use the SHWC.

Counseling services include psychotherapy, referral, and medication management. Treatment length varies depending on individual needs, and can last up to 16 individual counseling sessions per student while group therapy imposes no session limits. Counselors are experienced to address many issues students may face including, but not limited to, loneliness, relationship concerns, family issues, self-esteem, depression, anxiety, concentration difficulties, sleeping difficulties, eating disorders, addiction, sexual concerns, anger management, cultural adjustment, and other personal issues.

The SHWC team of culturally sensitive professionals provides comprehensive clinical services and outreach programs to IIT students. In addition, SHWC is a resource for consultation to faculty, staff, and parents. The office is located in the IIT Tower, 3rd Floor. To schedule an appointment call 312.567.7550.

Technology Services

Website: www.iit.edu/ots

The Office of Technology Services (OTS) supports IIT's primary technology systems, including administrative systems, myIIT, Banner, and the network and telephone infrastructures. OTS maintains approximately 600 computers in its classrooms, labs, and public terminals throughout the Main, Downtown, Rice, and Moffett campuses, including an online virtual computer lab. To ensure that students have access to equipment that supports their academic goals, the computers in the classrooms and labs are refreshed on a three-year cycle. The classroom and lab instructional software is reviewed every semester by the IIT Software Committee and updated after thorough testing for compatibility with existing hardware and software.

OTS also supports remote printing from personal laptops/desktops and mobile devices to printing release stations located in various computer labs and public areas. Additional information about these services is available on the IIT Print channel and the OTS portal website, accessible through the myIIT Training and Support tab.

OTS manages the myIIT web portal **my.iit.edu**, which provides personalized access to email, Google Apps, online course registration, Blackboard, OTS Support, student financial information, student life, weblinks, tools, and other content. All IIT students receive an email address integrated into each student's Google Apps for Education account, which is accessed via the myIIT portal. Google Apps for Education also includes collaboration tools such as Google Docs, Sites, Groups, and more. Supplemental class materials are available through Blackboard, IIT's course management system, where instructors post lectures, notes and other course information. IIT distance learning content and video lectures are also accessed through Blackboard.

The OTS Support Desk is the central point of contact for technology support at IIT. Support Desk staff provide technical troubleshooting, account management, and configuration assistance for all IIT students, faculty and staff. OTS Support is available through myIIT and includes a knowledge database **(support.iit.edu)** with how-to information for common technical issues and questions. A request for technical support may be submitted by opening a ticket through the OTS Support feature in myIIT, sending a request via email (**supportdesk@iit.edu**), or by calling the Support Desk at 312.567.3375.

IIT provides traffic-shaped Internet access through its wired and wireless networks. Most campus buildings have wired Internet access and secured wireless Internet access is available campus-wide. Visit the OTS website to view IIT's current WiFi zones. Instructions for connecting to the Internet through the IIT network, including how to configure and register personal computers and mobile devices, are also available on the OTS website.

Visit the OTS website: **www.iit.edu/ots** and the portal website on the *Training and Support* tab in myIIT for the most up-to-date information and useful details about IIT's technology.

Undergraduate Academic Affairs

Website: www.iit.edu/ugaa

The Office of Undergraduate Academic Affairs (UGAA) provides a variety of academic support services for all undergraduate students from the time of admission to graduation. These services include academic advising; evaluation of transfer credits from both United States and international schools; academic program audits; student petitions; course repeats for a change of grade; change of major; monitoring of academic progress; certification of student's eligibility for degree conferral; granting an official leave of absence; and official withdrawal from the University. In addition, this office reinstates former undergraduate students to the University and maintains the official academic files for all undergraduate students. Degree Works, the online degree audit system is monitored and maintained by the Office of Undergraduate Academic Affairs.

Writing Center

Website: humansciences.iit.edu/humanities/writing-center

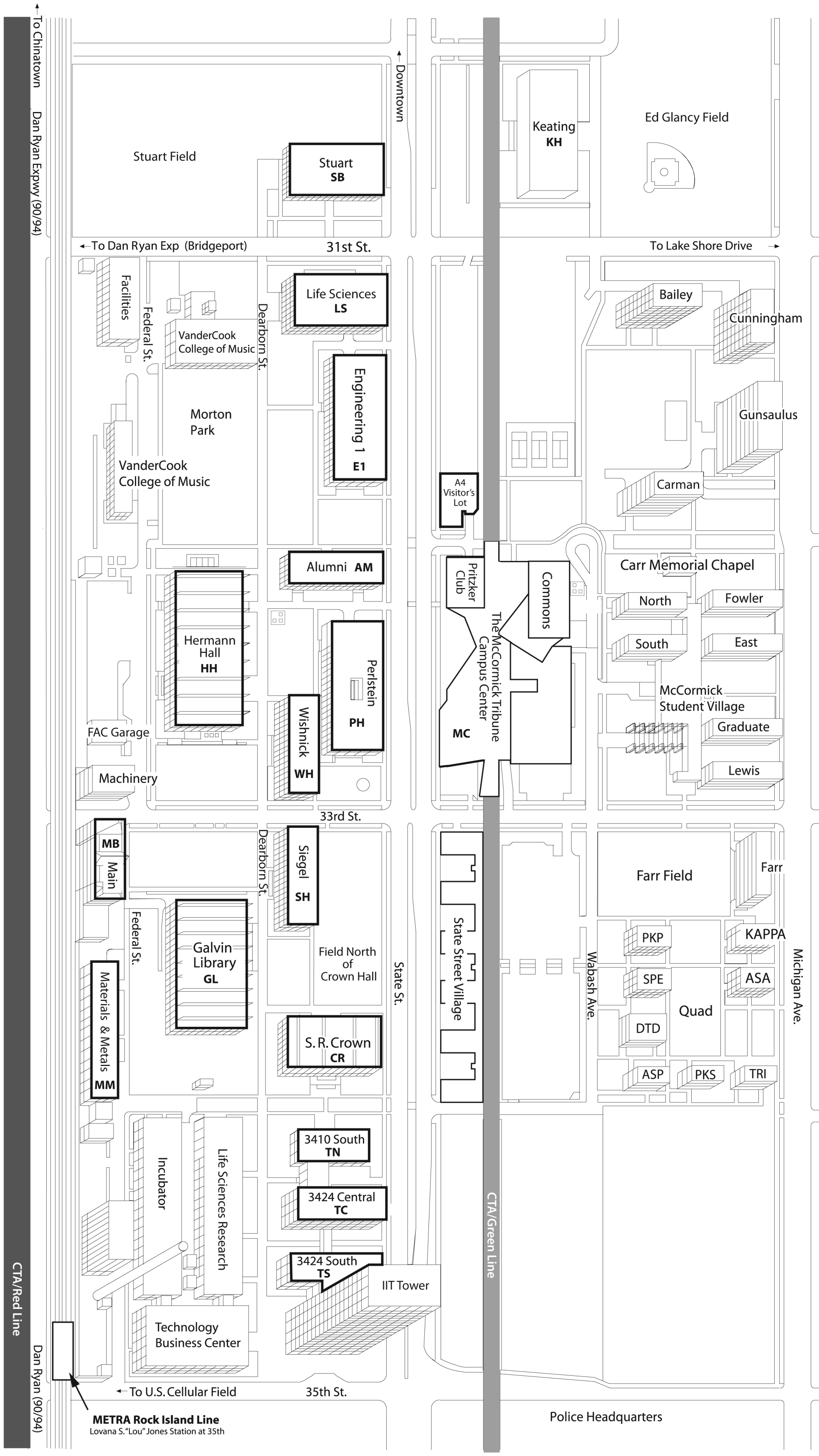
IIT students can seek assistance with written and oral assignments at the IIT Writing Center, located in Siegel Hall 232/233/234. Tutors are available to assist students enrolled in writing-intensive courses (Introduction to the Profession, C-courses, and IPROs). Tutors specializing in English as a Second Language are also available to assist students whose primary language is not English. Appointments can be made in advance on the sign-up sheets on Siegel 232/233/234 doors. Walk-in appointments are also possible when tutors are not working with other students. Tutoring is free of charge, and both undergraduate and graduate students are welcome.

Key University Websites

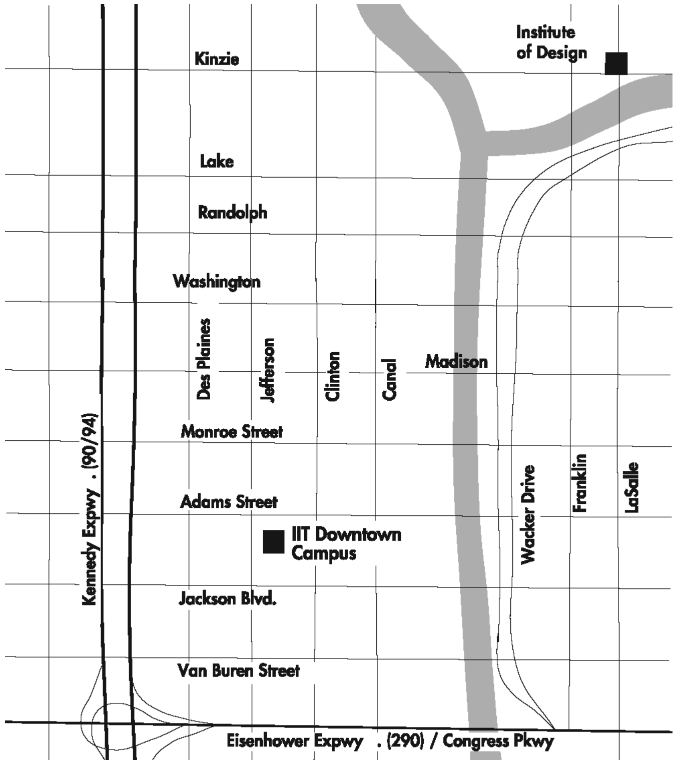
Please consult the websites listed below for the most current information:

Academic Calendar	www.iit.edu/registrar/important_dates/academic_calendar
Board of Trustees	web.iit.edu/president/board-trustees
Office of the President Senior Administration	web.iit.edu/president/senior-administration-and-contacts
Office of the Provost Administrative Offices	web.iit.edu/provost/administrative-offices
Office of the Provost Academic Offices	web.iit.edu/provost/academics
Office of the Institutional Information	www.iit.edu/oiir
Colleges	
Armour College of Engineering	engineering.iit.edu/people/faculty
Biomedical	engineering.iit.edu/bme/people/faculty
Chemical & Biological	engineering.iit.edu/chbe/people/faculty
Civil, Architectural & Environmental	engineering.iit.edu/caee/people/faculty
Electrical & Computer	engineering.iit.edu/ece/people/faculty
Mechanical, Materials & Aerospace	engineering.iit.edu/mmae/people/faculty
Chicago Kent College of Law	www.kentlaw.iit.edu/faculty
College of Architecture	arch.iit.edu/people/faculty
College of Science	science.iit.edu/people/faculty
Applied Mathematics	science.iit.edu/applied-mathematics/people/faculty
Biology	science.iit.edu/biology/people/faculty
Chemistry	science.iit.edu/chemistry/people/faculty
Computer Science	science.iit.edu/computer-science/people/faculty
Mathematics & Science Education	science.iit.edu/mathematics-science-education/people/faculty
Physics	science.iit.edu/physics/people/faculty
Stuart School of Business	stuart.iit.edu/faculty
Lewis College of Human Sciences	humansciences.iit.edu/faculty
Humanities	humansciences.iit.edu/humanities/faculty
Psychology	humansciences.iit.edu/psychology/faculty
Social Sciences	humansciences.iit.edu/social-sciences/faculty
School of Applied Technology	appliedtech.iit.edu/people
INTM	appliedtech.iit.edu/industrial-technology-and-management/about/people/faculty
ITM	appliedtech.iit.edu/information-technology-and-management/about/people/faculty
Institute of Design	www.id.iit.edu/community/faculty/
ROTC	
Air Force Aerospace Studies (AFROTC)	afrotc.iit.edu
Military Science - Army	www.iit.edu/departments/army/people.php
Naval Science (NROTC)	www.iit.edu/nrotc/a_staff.htm

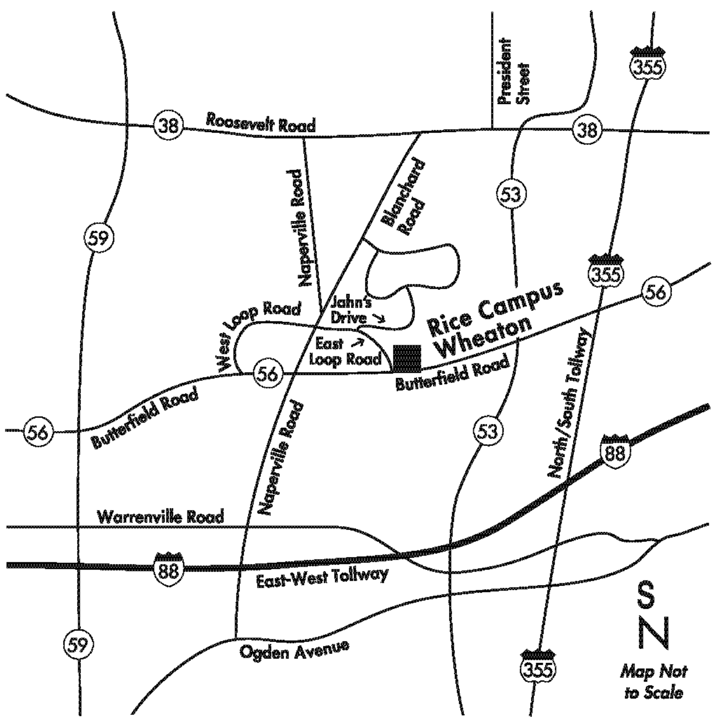
Main Campus


To Chinatown
Dan Ryan Expwy (90/94)
Downtown
Stuart Field
Stuart SB
Keating KH
Ed Glancy Field
To Dan Ryan Exp (Bridgeport)
31st St.
To Lake Shore Drive
Facilities
Federal St.
VanderCook College of Music
Dearborn St.
Life Sciences LS
Bailey
Cunningham
IIT Apartments
Morton Park
Engineering 1 E1
Gunsaulus
VanderCook College of Music
A4 Visitor's Lot
Carman
Carr Memorial Chapel
Alumni AM
Pritzker Club
Commons
North
Fowler
Hermann Hall HH
The McCormick Tribune Campus Center
South
East
Perlstein PH
McCormick Student Village
Wishnick WH
MC
Graduate
FAC Garage
Machinery
Lewis
33rd St.
MB
Main
Siegel SH
Farr Field
Farr
Galvin Library GL
Federal St.
Field North of Crown Hall
State St.
State Street Village
Wabash Ave.
PKP
KAPPA
Materials & Metals MM
SPE
ASA
Michigan Ave.
Quad
DTD
S. R. Crown CR
ASP
PKS
TRI
3410 South TN
Incubator
Life Sciences Research
3424 Central TC
CTA/Green Line
3424 South TS
IIT Tower
CTA/Red Line
Technology Business Center
Dan Ryan (90/94)
To U.S. Cellular Field
35th St.
Police Headquarters
METRA Rock Island Line
Lovana S."Lou" Jones Station at 35th

Downtown Campus and Institute of Design



Rice Campus



Getting to Main Campus

Airports
IIT and Chicago are served by O'Hare International Airport and Midway International Airport. Public and private transportation is available from the airports to downtown Chicago and IIT campuses.

Train
Metra Rail Rock Island District line to 35th Street/Lou Jones/Bronzeville station.
Other commuter railroad lines to Union and Northwestern train stations (both off Canal Street), then public transportation, taxi, or IIT shuttle bus from the Downtown Campus at 565 West Adams Street to Main Campus.

Bus
To Greyhound or Continental Trailways terminal, then taxi or public transportation to IIT.

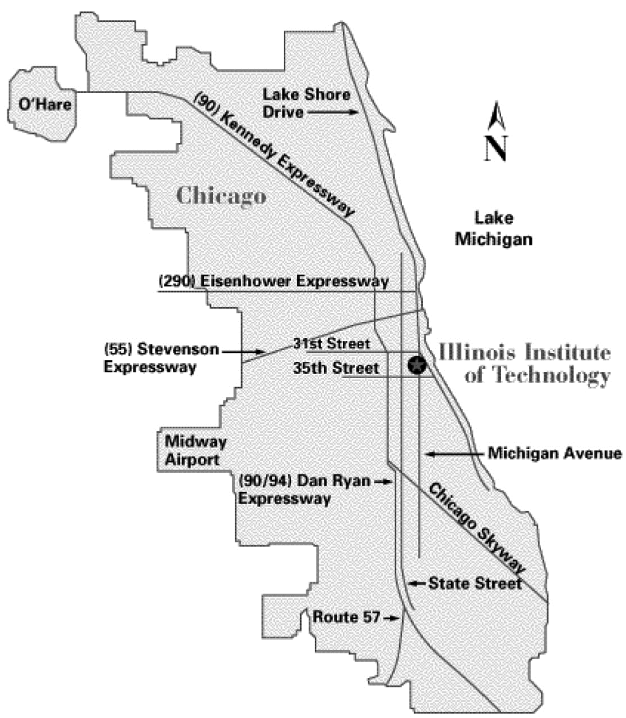
Public Transportation
1. CTA Red Line (Howard-Dan Ryan) to 35th Street Station.
2. CTA Green Line (Lake-Englewood-Jackson Park) to 35-Bronzeville-IIT station.
3. CTA bus lines with stops on State Street (#29) or Michigan Avenue (#35).

Automobile
From North: Dan Ryan Expressway east to 31st Street exit, continue south to 33rd Street, turn left (east). Metered parking is located along Federal Street north and south of 33rd Street, and in the Visitor's Parking Lot (Lot A4) at 32nd Street and State Street, on the east side of State Street.

From South: Dan Ryan Expressway west to 35th Street exit, continue north to 33rd Street, turn right (east). Metered parking is located along Federal Street north and south of 33rd Street, and in the Visitor's Parking Lot (Lot A4) located at 32nd Street and State Street, on the east side of State Street.

From Lake Shore Drive: Exit at 31st Street, go inland (west) to State Street, turn left (south). Metered parking is available in the Visitor's Parking Lot (Lot A4) located at 32nd Street and State Street, on the east side of State Street.

Parking
Pay station parking is available to all visitors and is located in designated lots on State Street between 31st and 35th street. Special event parking may be available in other parking lots on campus. Please contact the Access, Card, and Parking Services Office for more details on parking, or visit the parking web page for current parking locations at **www.parking.iit.edu**. Please call the parking administrator at 312.567.8968 if you need assistance in finding parking.



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ILLINOIS INSTITUTE OF TECHNOLOGY

Main Campus
33rd and State Street
Chicago, Illinois 60616

Downtown Campus
565 West Adams Street
Chicago, Illinois 60661

Institute of Design
350 North LaSalle Street
Chicago, Illinois 60610

Rice Campus
201 East Loop Road
Wheaton, Illinois 60189

Moffett Campus
6502 South Archer Road
Bedford Park, Illinois 60501

www.iit.edu