ILLINOIS INSTITUTE OF TECHNOLOGY

Transforming Lives.Inventing the Future. ***www.iit.edu***

Bulletin: Undergraduate Programs 2006–2008

Undergraduate Degree Programs

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

College of Architecture

Architecture

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

Center for Professional Development

Industrial Technology and Management
Information Technology and Management

Institute of Psychology

Psychology

College of Science and Letters

Applied Mathematics
Biochemistry*
Biology
Chemistry
Computer Information Systems
Computer Science
Humanities
Internet Communication
Journalism of Technology, Science and Business
Molecular Biochemistry and Biophysics
Physics
Political Science
Professional and Technical Communication

Stuart School of Business

Business Administration
Business Administration and Applied Sciences

IIT offers graduate degree programs in areas of Architecture, Business, Design, Engineering, Financial Markets, Law, Mathematics and Science Education, Psychology, Public Administration, the Sciences, and Technical Communication. See the current *IIT Bulletin: Graduate Programs* for a detailed listing of gradute programs or visit the web-site www.grad.iit.edu. For descriptions of law programs and courses, see the *Chicago-Kent College of Law Bulletin.*

IIT offers Reserve Officer Training Corps (ROTC) programs designed to develop officers for the armed forces in the Air Force, Army, Marines and Navy.

IIT offers programs leading to secondary education certification in science and mathematics.

*To begin Fall 2007 pending approval of IIT faculty and Board of Trustees

Telephone Directory

Maps for the Downtown, Main and Rice campuses are on page 257. When calling from a campus phone, use last five digits only.

Administrative and Service

Academic Resource Center 312.567.5216
Access Card and Parking Services 312.567.8968
Admission, Undergraduate (full-time) 312.567.3025
Admission, Undergraduate (part-time) 312.567.3300
Alumni Relations 312.567.5040
Athletics & Recreation 312.567.3296
Bookstore - Barnes & Noble 312.567.3120
Bursar's Office 312.567.3785
Campus Ministry 312.567.3160
Career Development Center 312.567.6800
Communications & Marketing 312.567.3104
Computing & Network Services 312.567.5963
Counseling Services 312.808.7132
Disability Resources 312.567.5744
Educational Services 312.567.3300
Financial Aid 312.567.7219
Graduate Admission 312.567.3020
Graduate College 312.567.3024
Greek Life 312.567.5133
Health Services 312.808.7100
Hermann Union Building 312.567.3075
Housing Office 312.567.5075
IIT Online Technical Services 312.567.3457
International Center 312.567.3680
Galvin Library (Main Campus) 312.567.3355
McCormick Tribune Campus Center 312.567.3700
Moffett Campus 708.563.1576
Multicultural Programs 312.567.5250
Public Safety 312.808.6300
Residence Life Office 312.808.6400
Daniel F. and Ada L. Rice Campus 630.682.6000
Student Activities 312.567.3720
Student Affairs 312.567.3081
Student Records and Registration 312.567.3784
Student Service Center 312.567.3100
Women Outreach and Resource Center 312.567.5250

Colleges and Academic Units

College of Architecture 312.567.3230
Armour College 312.567.3009
- Biomedical Engineering 312.567.5100
- Chemical & Environmental Engineering 312.567.3040
- Civil & Architectural Engineering 312.567.3540
- Electrical & Computer Engineering 312.567.3400
- Mechanical, Materials & Aerospace Engineering 312.567.3175

Center for Professional Development 630.682.6008
- Information Technology & Management 630.682.6008
- Industrial Technology & Management 312.567.3650

Institute of Design 312.595.4900
Institute of Psychology 312.567.3500
College of Science & Letters 312.567.3800
- Applied Mathematics 312.567.8980
- Biological, Chemical & Physical Sciences 312.567.3480
- Computer Science 312.567.5150
- Lewis Department of Humanities 312.567.3465
- Mathematics & Science Education 312.567.3661
- Social Sciences 312.567.5128
  - MPA (M.S. Public Administration) 312.906.5198

Chicago-Kent College of Law 312.906.5000
Stuart School of Business 312.906.6500
- Center for Financial Markets 312.906.6500
- Institute of Business and Interprofessional Studies 312.569.3996

Air Force — Aerospace Studies 312.567.3525
Army — Military Science 312.808.7141
Navy — Naval Science 312.567.3530

Foreword for the IIT Undergraduate 2006–2008 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 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 entered IIT in the academic years 2006–2008. 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 adviser from the student's major department is the best source for current curriculum information. The Office of Educational Services can refer students to the appropriate administrative office for current policies and procedures. Many policies in this bulletin are also found within **www.enrollment.iit.edu.**

Undergraduate Bulletin Committee

Carole Orze - Chair
Melisa Lopez
Rebecca Nicholes
Gerald F. Saletta
R. Stephen Sennott
Susan S. Sitton
John W. Snapper
Greg Welter
John S. Kallend - Accreditation Review

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 affirmative action officer, 224 Perlstein Hall, Illinois Institute of Technology.
For descriptions of graduate programs and courses, see the ***IIT Bulletin: Graduate Programs***. For descriptions of law programs and courses, see the ***Chicago-Kent College of Law Bulletin***.

This bulletin supercedes the 2004-2007 IIT Undergraduate Bulletin.

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

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Calendar

IIT Academic Calendar for Fall

	Fall 2006	Fall 2007	Fall 2008	Fall 2009
Last day for reinstatement	Aug 8	Aug 7	Aug 5	Aug 4
Registration & orientation period	Aug 21-23	Aug 20-22	Aug 18-20	Aug 17-19
Classes begin	Aug 24	Aug 23	Aug 21	Aug 20
Last day to Register, Add, Change	Sept 1	Aug 31	Aug 29	Aug 28
Labor Day holiday	Sept 4	Sept 3	Sept 1	Sept 7
Last day to submit appl. for grad.	Sept 8	Sept 7	Sept 5	Sept 4
Last day to remove "I" grades	Oct 6	Oct 5	Oct 3	Oct 2
Fall Break	Oct 19-21	Oct 18-20	Oct 16-18	Oct 15-17
Last day for official withdrawal	Nov 3	Nov 2	Oct 31	Oct 30
Advising period	Nov 6-17	Nov 5-16	Nov 3-14	Nov 9-20
Registration begins	Nov 13	Nov 12	Nov 10	Nov 16
Thanksgiving Day holiday	Nov 23-25	Nov 22-24	Nov 27-29	Nov 26-28
Classes end	Dec 9	Dec 8	Dec 6	Dec 5
Final exam period	Dec 11-16	Dec 10-15	Dec 8-13	Dec 7-12
Commencement*	Dec 17	Dec 16	Dec 14	Dec 13

IIT Academic Calendar for Spring

	Spring 2007	Spring 2008	Spring 2009	Spring 2010
Last day for reinstatement	Dec 11, 2006	Dec 17, 2007	Dec 15, 2008	Dec 14,2009
Registration & orientation period	Jan 8-11	Jan 14-17	Jan 12-15	Jan 11-14
MLK, Jr. holiday	Jan 15	Jan 21	Jan 19	Jan 18
Classes begin	Jan 16	Jan 22	Jan 20	Jan 19
Last day to Register, Add, Change	Jan 23	Jan 29	Jan 27	Jan 26
Last day to submit appl. for grad.	Jan 26	Feb 1	Jan 30	Jan 29
Last day to remove "I" grades	Feb 23	Feb 29	Feb 27	Feb 26
Spring vacation	Mar 12-17	Mar 17-22	Mar 16-21	Mar 15-20
Last day for official withdrawal	Mar 30	Apr 4	Apr 3	Apr 2
Advising period	Apr 9-20	Apr 14-25	Apr 13-24	Apr 12-23
Registration begins	Apr 16	Apr 21	Apr 20	Apr 19
Classes end	May 5	May 10	May 9	May 8
Final exam period	May 7-12	May 12-17	May 11-16	May 10-15
Commencement*	May 13	May 18	May 17	May 16

IIT Academic Calendar for Summer

	Summer 2007	Summer 2008	Summer 2009	Summer 2010
Last day for reinstatement	May 15	May 14	May 13	May 19
Registration & orientation period	May 30-31	May 28-29	May 27-28	June 2-3
Classes begin	June 4	June 2	June 1	June 7
Last day to Register, Add, Change	June 5	June 3	June 2	June 8
Last day to submit appl. for grad.	June 8	June 6	June 5	June 11
Independence Day holiday	July 4	July 4-5	July 3-4	July 3-5
Last day for official withdrawal	July 13	July 11	July 10	July 16
End of eight-week session	July 28	July 26	July 25	July 31

* tentative dates

Objective of Education at IIT

IIT's mission is to educate people from all backgrounds for meaningful roles in a changing technological world and to advance knowledge through research and education.

The Colleges of Illinois Institute of Technology

College of Architecture

Donna V. Robertson, FAIA
Dean
S. R. Crown Hall
3360 S. State St.
Chicago, IL 60616
312.567.3230
www.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 tutelage of a faculty of practicing architects; the study of architectural theory; interdisciplinary learning; digital technologies; sustainability; design/build; and international study.

Armour College of Engineering

Hamid Arastoopour
Dean
Engineering 1 Building
Room 220
10 W. 32nd Street
Chicago, IL 60616
312.567.3009
www.iit.edu/~armour

Armour College is named for IIT's predecessor, Armour Institute of Technology, which was established in 1892 on the site of the present IIT Main Campus.

The following departments comprise Armour College: Biomedical Engineering; Chemical and Environmental Engineering; Civil and Architectural Engineering; Electrical and Computer Engineering; and Mechanical, Materials and Aerospace Engineering.

Chicago-Kent College of Law

Harold J. Krent
Dean
Downtown Campus
565 W. Adams St.
Chicago, IL 60661
312.906.5000
www.kentlaw.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 and Master of Laws, and participates in joint-degree programs with the Stuart School of Business, and the Graduate Program in Public Administration.

Institute of Design

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

Since its founding as the New Bauhause in 1937, the IIT Institute of Design (www.id.iit.edu) has grown into the largest full-time graduate-only design program in the U.S., with over 125 students from around the world. The school offers professional Master of Design degrees in communication design, design planning, design research, or product design; a dual Master of Design/MBA degree program with the IIT Stuart School of Business; and the Master of Design Methods, a nine-month executive program in design methods for innovation. The Institute of Design created the country's first Ph.D. design program in 1991, helping pioneer the development of an international community of basic research in design methods.

Center for Professional Development

C. Robert Carlson
Director
Daniel F. and Ada L. Rice Campus
201 East Loop Road
Wheaton, IL 60187
630.682.6000
www.cpd.iit.edu

The Center for Professional Development (CPD) offers technology-oriented training and education for working professionals. Courses are taught by IIT professors and industry professionals with significant working, teaching and research experience in their fields. The CPD offers education and training in a wide variety of formats including degree, non-degree, certificate, credit and non-credit programs; corporate training; short courses; and seminars ranging from a few hours to several days in length. Completion of all CPD non-credit courses will result in the assignment of Continuing Education Units (CEU) fully accredited by the International Association for Continuing Education and Training (IACET).

The Center for Professional Development offers undergraduate degree programs in Information Technology and Management and Industrial Technology and Management as well as graduate programs in Information Technology and Management and Industrial Technology and Operations.

Institute of Psychology

M. Ellen Mitchell
Director
252 Life Sciences Building
3101 S. Dearborn St.
Chicago, IL 60616
312.567.3500
www.iit.edu/~psych

Established in 1995, the Institute of Psychology was created from the Department of Psychology, previously housed within IIT's Lewis College of Liberal Arts. It is noted for its applied graduate programs in clinical, industrial/organizational and rehabilitation psychology. It offers an undergraduate program that is focused on psychology as a science linked to the professions.

College of Science and Letters

F.R. McMorris
Dean
125 Engineering 1 Building
10 W. 32nd St.
Chicago, IL 60616
312.567.3800
www.iit.edu/~csl

The following departments are in the College of Science and Letters: Applied Mathematics; Biological, Chemical and Physical Sciences; Computer Science; Lewis Department of Humanities; Mathematics and Science Education; and Social Sciences.

Stuart School of Business

Harvey Kahalas
Dean
Downtown Campus
565 W. Adams St.
Chicago, IL 60661
312.906.6500
www.stuart.iit.edu

The Stuart School of Business was established in 1969 with a gift from IIT alumnus and Chicago financier Harold Leonard Stuart. The School places an emphasis on the relation between business and technology and cross-disciplinary education. In addition to its undergraduate programs, Stuart offers AACSB-accredited graduate programs that include markets and marketing communication, and a JD/MBA and an MS Design/MBA. The School houses the Institute of Business and Interprofessional Studies, the Center for Financial Markets, the Center for Sustainable Enterprise and the Center for Management of Medical Technology.

Graduate College

Ali Cinar
Dean
301 Main Building
3300 S. Federal St.
Chicago, IL 60616
312.567.3024
www.grad.iit.edu

The Graduate College coordinates the programs of advanced study offered by the academic units of the university. The college consists of the following offices: Office of the Dean/Vice Provost for Research; Office of Sponsored Research and Programs; Office of Research Compliance and Proposal Development; Office of Technology Transfer and Intellectual Property; Graduate Academic Affairs; IIT Online Client and Student Support Services; Outreach; Director of the Rice Campus; Center for Professional Development; and the Office of Editorial Assistance (Thesis Examiner). The dean chairs the Graduate Studies Committee and the Research Council, sets minimum standards for graduate students, represents the university in national forums for graduate education, and serves as an advocate for promoting graduate education across the university.

Accreditation

IIT is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools. Commission URL:
www.ncahigherlearning commission.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.

IIT History and Campuses

IIT's traditions span more than a century of innovation and educational leadership. IIT came into being in 1940 with the merger of Armour Institute of Technology (founded in 1892) and Lewis Institute (founded in 1896).

Today, the university has several campuses and offers degree programs through the College of Architecture, Armour College of Engineering, Institute of Business and Interprofessional Studies, Chicago-Kent College of Law, Institute of Design, Center for Professional Development, Institute of Psychology, College of Science and Letters, and Stuart School of Business.

The 120-acre Main Campus is located three miles south of the central business district in Chicago, and is internationally known for its architecture. The Master Plan of the campus and many of its 50 buildings were developed by Ludwig Mies van der Rohe, one of the century's most influential architects.

IIT's Downtown Campus, at 565 W. Adams St. in the West Loop business district, houses the Chicago-Kent College of Law, Stuart School of Business, and the Master of Public Administration program. A shuttle-bus provides transportation between the Main and Downtown campuses.

The Institute of Design, 350 N. LaSalle St., is in an outstanding downtown location and state-of-the-art facility.

The Daniel F. and Ada L. Rice Campus, at 201 E. Loop Road in Wheaton, Ill., is IIT's west-suburban location. Graduate and upper-division undergraduate courses and degree programs are available at the Rice Campus via evening and Saturday classes and via courses broadcast live through IIT Online.

The Center for Professional Development offers degree programs in information technology and management and in manufacturing technology and management, non-credit short courses, and information technology training programs.

IIT Online delivers courses via the Internet and links classroom studios on campus with remote TV receiving sites. IIT Online's talk-back feature permits students in receiving classrooms to participate in class discussions. IIT has more than 50 receiving sites throughout the Chicago area.

Moffett Campus, in southwest-suburban Summit-Argo, houses the National Center for Food Safety and Technology (NCFST), a multidisciplinary food safety research facility, which is funded by the U.S. Food and Drug Administration and the food industry. Established with a gift from CPC International, Inc., the campus has enabled the university to develop academic programs in food safety and technology. Courses leading to master's degrees and certificate programs in food safety and technology and in food process engineering are offered at this facility.

A Snapshot of the IIT Community

Enrollment (Fall 2005)

Undergraduate	2,216 students
Graduate	3,112 students
Law	1,144 students
Total	6,472 students

Student Demographics

Male	69%
Female	31%
Minority (includes African American, Asian American, Hispanic American, and Native American)	19%
International	31%
Countries of Origin	105
Student/Faculty Ratio	11:1

Degrees Awarded 2004–2005

Bachelor	370
Master and Professional Master	944
Law	325
Ph.D.	62
Total	1,701

Admission, Financial Aid and Expenses

Undergraduate Admission

Classification of Students

Undergraduate admission to IIT is processed in two offices, based on a student's classification. Students should be aware of the correct office for application materials.

The Office of Undergraduate Admission is responsible for admission decisions for all first-year (freshmen and transfer), full-time, degree-seeking undergraduates except ITM and INTM majors. To be full-time, a student must register for 12 or more credit hours each semester.

All full-time, degree-seeking freshmen or transfer students should contact:

Office of Undergraduate Admission
10 W. 33rd St.
Perlstein Hall 101
Chicago, IL 60616
Telephone: 312.567.3025
Outside Chicago: 1.800.448.2329
Fax: 312.567.6939
E-mail: admission@iit.edu
Online application: **www.iit.edu/~apply**

All part-time degree and non-degree students, special-status students, summer school students, re-admit applicants, and full-time ITM and INTM majors should contact:

Office of Educational Services
3300 S. Federal St.
Main Building 101
Chicago, IL 60616
Telephone: 312.567.3300
Fax: 312.567.3302
E-mail: edsvcs@iit.edu
Web site: **www.iit.edu/~edserve**
Online application: **edserve.iit.edu**

Application as a Freshman

IIT admits freshmen students on a rolling basis beginning in September, with most admission decisions having been made by mid-March. Students will be admitted after March if there are spaces available.

Some honors programs and some scholarships have January deadlines. Students need to adhere to those deadlines stated in the admission or scholarship applications. Students have until May 1 (National Candidates' Reply Date) to accept IIT's offer of admission. Students admitted after May 1 will have two weeks from the receipt of their admission and/or financial aid award letters to respond to IIT's offer. To accept IIT's offer of admission, a student must return the Enrollment Confirmation Form, which is sent to every admitted student, and a non-refundable matriculation deposit by the above dates. The deposit will be applied to the cost of attendance.

Obtaining Freshman Application

Freshman applicants must submit a completed application, application fee or fee waiver, transcripts of all high schools attended, transcripts from all colleges attended (when applicable), standardized test scores, (ACT or SAT I) and a letter of recommendation. International students should request the International Student Application. The freshman application may be obtained by contacting the Office of Undergraduate Admission or online at **www.iit.edu/~apply.**

Standardized Test Scores for Freshman Applicants

All students are required to submit scores from either the College Entrance Examination Board's Scholastic Aptitude Test (SAT1/Reasoning) or the American College Test (ACT). The tests may be taken at any time, but preferably by the December testing date in the high school senior year. Applicants for admission to the spring semester must have taken the SAT1/Reasoning or ACT by the preceding November. IIT recommends SAT2 tests in math and science, but does not require them for admission or scholarship applications.

High School Requirements for Freshman Applicants

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.

	Required	Recommended
English	4 years	
Mathematics	4 years *	Calculus
Laboratory Science	2 years **	3 years

* Material should include depth in algebra, geometry, trigonometry, analytic geometry and pre-calculus skills.

** Material should include chemistry and physics.

Transfer of College-Level Credit for Freshman Applicants

Advanced Placement Examinations

IIT will award credit for CEEB Advanced Placement Examinations. Credit will vary by test score. A complete list of acceptable AP scores and IIT course equivalents may be found in the "Frequently Asked Questions" section on the Undergraduate Admission website: **www.iit.edu/~apply.**

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 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 the Office of Undergraduate Admission.

General Certificate of Education Examination - Advanced Level

College credit will be awarded for GCE A-level examinations with a grade of A, B, C, D, and E. A maximum of 10 hours of credit can be awarded for each A-level examination. No credit will be granted for advanced subsidiary level examinations.

College Coursework

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. 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.

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.

a) All new first year and transfer students who have neither advanced placement credit nor transfer credit for MATH 151 - Calculus I are required to take the mathematics placement test.

b) All new first year and transfer students who have neither advanced placement credit nor transfer credit for COM 101 - University Writing 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 during their first year of attendance.

c) 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.

Full-Time Transfer Admission for Domestic Students

Application as a Transfer Student

The Office of Undergraduate Admission is responsible for admission decisions for full-time transfer students except ITM and MTM majors. Full-time status requires that students enroll in a minimum of 12 credit hours each semester. Transfer students may apply for the fall or spring term in all majors except architecture, which is a fall-entry program only. IIT admits transfer students on a rolling basis. The deadline to apply for the fall term (beginning late August) is July 1; for the spring term (beginning mid-January), the deadline is November 1. Earlier deadlines apply to international students and are listed online at **www.iit.edu/~apply.**

Obtaining an Application

The transfer application may be obtained by contacting the Office of Undergraduate Admission or by downloading the online application from: **www.iit.edu/~apply.**

Students must submit the IIT Transfer Application, application fee or fee waiver, transcripts from all colleges and universities attended, a personal statement, and a letter of recommendation to the IIT Office of Undergraduate Admission.

Requirements for Transfer

Transfer applicants must be in good academic standing at their previous colleges to be considered for admission to IIT. Admission is based upon a cumulative GPA and individual grades in all classes that apply to the major selected. A minimum cumulative GPA of 3.0 is expected 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 less than 30 hours of transferable graded college coursework must submit high school transcripts and SAT1/Reasoning or ACT scores as part of their application.

Transfer Credit

Official credit evaluations are completed only after a student is admitted to IIT.

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, test scores and agency recommendations for CLEP (see page 219), Dantes, and military experience. IIT, however, does not grant credit for vocational courses or life/work experience. In addition, technology courses will not be accepted in any engineering program.

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. (See page 222)

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. In certain instances, the academic department must approve transfer credit if a long period of time has elapsed since the course was completed.

Transfer articulation agreements that list course equivalents are available for most two-year Chicago-area colleges from the Office of Educational Services and online at **www.iit.edu/~edserve/guidelines.html**.

Acceptance of Transfer Admission

To accept IIT's offer of admission, a student must return the ***Enrollment Confirmation Form*** and a non-refundable $200 matriculation deposit. The deposit is credited to the student's account and will go toward the cost of attendance. The ***Enrollment Confirmation Form*** is sent to every admitted student.

International Student Admission

Students who are neither citizens nor permanent residents of the United States submit the International Undergraduate Application for Full-time Admission, which may be obtained from the Office of Admission.

Though the required admission documents can vary depending upon individual circumstances, all international applicants must submit a completed application for admission, a certified copy in English translation of all upper secondary school grades or marks, SAT or ACT scores, TOEFL scores and an affidavit of financial support.

Prospective applicants should read carefully the description of requirements included with the printed application for admission or on the IIT website that provides the online application.

Immunization Requirement for New Students

In accordance with Illinois law, all students born on or after January 1, 1957, and enrolling at IIT for the first time after July 1, 1989, must supply health-provider documentation of vaccination for diphtheria, tetanus, measles, rubella, and mumps. Transfer student are considered first time enrolled students. Those students enrolling for the first time during a summer session may be permitted to enroll in the subsequent fall term before providing proof of immunization. Students who wish to enroll only in one class per semester or via IIT Online at corporate sites may files a written request for an exemption. Exemption from one or more of the specific requirements may also be granted based on documented medical or religious reasons. A student who does not provide acceptable documentation of immunization will be prevented from registering for classes in the next semester. Questions regarding the immunization policy should be directed to IIT's Counseling and Health Service Office at 312.808.7100.

Part-Time Admission

Office of Educational Services
3300 S. Federal St.
101 Main Building
Chicago, IL 60616
Telephone: 312.567.3300
Fax: 312.567.3302
E-mail: edsvcs@iit.edu
Online application: **edserve.iit.edu**

Part-Time Students

Students who wish to enroll in less than 12 credit hours per semester are classified as part-time students. All undergraduate programs, except architecture, can be completed on a part-time basis, with both day and evening courses being offered. The majority of courses in the following degree programs can be completed through evening classes:

- Chemical Engineering
- Information Technology and Management
- Industrial Technology and Management

The graduation requirements for full- and part-time students are identical.

Application as a Degree-Seeking Part-Time Student

Part-time students must meet the same admission requirements as full-time students. Students with previous college work will be evaluated by the same criteria used for full-time undergraduate transfer admission. (See page 12.) Students who have less than 30 hours of transferable college coursework may be required to submit high school transcripts and standardized test scores.

Students who have not attended college must meet the high school requirements listed on page 11 and must submit high school transcripts and standardized test scores.

Prospective students must submit the completed application, application fee, and official transcripts of all coursework to the Office of Educational Services.

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; or
- 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 follow the same application procedures as part-time degree-seeking students.

Campus Locations for Part-Time Students

Part-time 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, which is IIT's distance education unit delivering courses via Internet and IITV (a live interactive system linking classrooms with remote TV receiving sites), is another option for the part-time student. For additional information, visit **www.iit-online.iit.edu**.

Summer School Admission

Students who attend another college or university and who 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 Office of Educational Services:

- a Summer School Application;
- a $30 application fee; and
- a transcript and/or a letter of good standing that indicates completion of the prerequisites for the requested courses 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.

Reinstatement of Undergraduate Students

Former IIT students who wish to re-enter IIT as full-time or part-time undergraduate students must contact the Office of Educational Services for an ***Application for Undergraduate Reinstatement***. No fee is required. The application and all supporting documents must be submitted before the deadline specified on the IIT Calendar on page 3. Students must submit official transcripts from all college and universities attended since last enrolled at IIT.

International students with a student visa requesting reinstatement must contact the International Center in addition to submitting the application for reinstatement.

Financial Aid

Comprehensive Financial 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 and scholarship funds. Most federal and state funds are based on demonstrated financial need, with the exception of merit scholarships. Institutional funds include need-based grants and loans, as well as merit scholarships based on academic, athletic and service achievements. IIT uses the formula established by the U.S. Congress to determine financial need for assistance. IIT offers limited academic scholarship assistance to international students.

Determining Financial Need for Assistance

Financial need is the difference between a student's total annual cost of attending IIT and the amount the student and the student's family is expected to contribute toward that cost of education. The total cost of attendance at IIT includes tuition and mandatory fees, room and board, books and supplies, transportation, and personal expenses. The amount that the student and family is expected to contribute is called the expected family contribution (EFC). The U.S. Congress has established the formula used to calculate the EFC. 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.

Student Eligibility Requirements to Receive Financial Assistance

Students must be U.S. citizens or eligible non-citizens and be enrolled in a degree-seeking program for at least half-time (six credit hours or more per semester) and demonstrate reasonable academic progress toward graduation.

Application Process

All students applying for financial assistance need to complete the Free Application for Federal Student Aid (FAFSA). This application is available after December 1 and should be filed by the student as soon as possible after January 1 of the academic year in which the student is attending college. (The IIT Title IV School Code is **001691**.) The priority date for financial aid consideration at IIT is April 15. All financial assistance is awarded on an annual basis. Students should be aware that a FAFSA must be filed each academic year. The amount of financial aid that a student receives each year depends on demonstrated financial need and the availability of funds. Students applying for financial aid will be required to submit tax information upon request.

Freshman Students

The Free Application for Federal Student Aid (FAFSA) for freshmen entering IIT is available from high schools, IIT's Office of Undergraduate Admission, Office of Financial Aid, or online at **www.fafsa.ed.gov**.

The priority date for financial aid consideration is April 15; therefore, new students should ***not*** wait for a final admission decision before filing the FAFSA. International students do not submit a FAFSA.

Transfer Students

All new transfer students will file either a renewal or an original FAFSA. The priority date for financial aid consideration is April 15; therefore, new transfer students should ***not*** wait for a final admission decision before filing the FAFSA.

Continuing Students

All continuing students must submit either a renewal or original FAFSA to the U.S. Department of Education by April 15, which is the priority date for financial aid consideration. FAFSAs are available online at **www.fafsa.ed.gov**.

Federal Financial Aid Programs

Federal Pell Grant

A 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. All students who file the FAFSA receive a Student Aid Report (SAR). If a student does not qualify for a Pell Grant, he or she may still be eligible for other forms of financial aid. Students can designate IIT as a SAR recipient by using the code **001691** in Section H of the FAFSA.

Federal Supplemental Educational Opportunity Grant (FSEOG)

An FSEOG is a federal grant that does not have to be repaid. This grant is for undergraduate students who demonstrate exceptional financial need. Students apply for the FSEOG by filing the FAFSA. IIT strongly encourages all students who wish to be considered for SEOG to submit the FAFSA to the Department of Education by the April 15th deadline. These awards are limited and awarded on a first-come, first-served basis.

Federal Perkins Loan

A Federal Perkins Loan is a low-interest (5 percent) federal loan for both undergraduate and graduate students with exceptional financial need. IIT is the lender, and the loan is made with government funds. There is no interest charged while the student is attending school. When a student leaves school or drops below half-time attendance, there is a nine-month interest-free grace period before the student begins repayment. All repayments are made to IIT on a quarterly basis. Students apply for a Perkins Loan by filing the FAFSA. Students who wish to be considered for the Federal Perkins program are strongly encouraged to submit the FAFSA to the Department of Education by the April 15th deadline. These awards are limited and awarded on a first-come, first-served basis.

Federal Work Study Program (FWSP)

The FWSP provides salaries for jobs for undergraduate and graduate students with demonstrated financial need. Students awarded FWSP funds can earn money to help pay education expenses. Students can work either on- or off-campus. Off-campus jobs will be with private, non-profit organizations or public agencies that encourage 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 should not work more than 20 hours per week during the academic year and may not work during their scheduled class times. Students apply for FWS by filing the FAFSA. On-campus jobs are advertised at www.cdc.iit.edu. Off-campus jobs are also advertised by the Career Development Center. This office also assists students in finding summer employment and permanent jobs after graduation.

Federal Family Education Loan Program (FFELP)

The FFELP loan program includes the Stafford subsidized and unsubsidized loan programs for undergraduate and graduate students, as well as the Parent Loan for Undergraduate Students (PLUS) Program. The Stafford Loan Program provides low-interest loans to assist students with paying educational costs. The interest rate set for new borowers after July 1, 2006 will be a 6.8 percent fixed rate. Students with a previous loan will continue to have a variable interest rate. The interest rate will change annually on July 1, with a mazimum of 8.25 percent. These loans must be repaid over a period of time after a student leaves school. The funds for these loans come from banks, credit unions or other participating lenders.

Federal Stafford Loans (Subsidized and Unsubsidized)

The Subsidized Stafford Loan is awarded based on demonstrated financial need, and students do not pay interest on the principal while they are in school. The Unsubsidized Stafford Loan is ***not*** awarded based on demonstrated financial need; however, interest ***is*** charged from the time that the loan funds are disbursed to the student. Students have the option of paying the interest or having the interest added onto the principal. Fees of up to 3 percent are charged on each loan, and these fees are deducted before a student receives the loan funds.

Federal PLUS Loans

PLUS loans enable parents with a good credit history to borrow money to help pay educational expenses for their dependent undergraduate student. The interest rate is set on July 1 and is fixed. The rate as of July 1, 2006 is 8.5 percent. Students apply for all FFELP loans by filing the FAFSA.

Illinois Student Assistance Commission (ISAC) Financial Aid Programs

Monetary Award Program (MAP)

This program is for undergraduate Illinois residents and provides state grants that do 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 toward tuition and mandatory fees. A student can receive the MAP grant for up to a maximum of 135 credit hours. Students apply for the MAP grant by filing the FAFSA. To receive the maximum grant amount, students must be enrolled in 15 credit hours.

Merit Recognition Scholarship (MRS)

The MRS program provides a one-time $1,000 state grant to qualified Illinois high school students who rank in the top 5 percent of their class at the end of the seventh semester in high school. Demonstrated financial need is not a factor in determining MRS recipients. The top 5 percent of seniors from all Illinois high schools are automatically considered for the MRS program. Once ISAC selects all eligible recipients, an MRS application is sent to the student. The student completes the application and submits it to the IIT Office of Financial Aid.

Silas Purnell Illinois Incentive for Access Grant (IIA)

The IIA Program provides a one-time state grant of up to $500 for freshmen who have an expected family contribution (EFC) of zero, which is determined by filing the FAFSA. A student must be enrolled at least half-time in an Illinois institution, be an Illinois resident, and have not yet received a bachelor's degree.

IIT Financial Aid Programs

Most IIT students receive some form of financial assistance. All students who submit a FAFSA are considered for all federal, state and institutional financial aid for which they qualify. IIT grants and most loans are awarded on the basis of demonstrated financial need. In addition, each year a number of talented students receive IIT scholarships that are based on merit. All IIT scholarships may be adjusted upon a student receiving federal and/or state grant funding.

The Office of Admission initially awards IIT scholarships, and the Office of Financial Aid administers renewals of the awards. Generally these scholarships are renewable for four years and only apply to undergraduate students who maintain full-time status in undergraduate degree programs. Full-time status is defined as enrollment in 12 or more credit hours of course work at IIT each semester. All IIT scholarships require satisfactory academic progress as defined in the ***Undergraduate Bulletin.*** However, most IIT scholarships have additional academic requirements.

The academic records of students who do not meet the requirements of their IIT scholarships are reviewed by the Scholarship Policy and Review Committee after the posting of spring term grades. This committee, appointed by the Director of Financial Aid and comprised of both faculty and financial aid staff, can renew, reduce, or discontinue the scholarships of such students.

Transfer-Student Scholarships

Merit scholarships are awarded to transfer students who have strong college records. Awards are renewable based on grade point average at IIT and reasonable academic progress. All admitted students are reviewed for eligibility.

Athletic Scholarships

As a National Association of Intercollegiate Athletics (NAIA) member, IIT awards athletic scholarships based solely on athletic ability, regardless of need. In compliance with NAIA rules, athletic scholarships are officially made by financial aid officers, upon recommendation of the athletic director. Students with demonstrated financial need will be reviewed for federal, state and other IIT financial aid for which they are eligible. This scholarship may be adjusted upon a student receiving federal and state funding.

IIT Loans

Loans are available to undergraduate students regardless of need. These loans will be listed on a student's financial aid award notification letter.

IIT Employment Program

Employment for students who are not awarded Federal Work Study (FWS) is available on and off campus in the greater Chicago area. On-campus jobs are advertised at w**ww.cdc.iit.edu.** Off-campus jobs are also advertised by the Career Development Center. This office also assists students in finding summer employment and permanent jobs after graduation.

ROTC Programs

IIT offers scholarship supplements to admitted students who have been awarded U.S. Air Force, Army or Naval ROTC scholarships. The scholarship supplements are described at w**ww.iit.edu/undergrad/rotc.html.**

Veterans' Educational Benefits

Veterans enrolling at IIT for the first time should obtain V.A. application forms from the Office of the Registrar, 104 Main Building, 3300 S. Federal St., Chicago, IL 60616 (telephone: 312.567.6742 or e-mail: student.services@iit.edu.) Subsequent applications will be processed by the university's Veterans Affairs representative upon notification of intentions to re-enroll.

Continued Eligibility for Financial Assistance

All students receiving federal and/or state financial aid funds must demonstrate reasonable academic progress toward graduation from IIT. Reasonable academic progress includes both a satisfactory cumulative and major grade point average and sufficient credit hours earned each semester toward the completion of a degree program. IIT has established a Reasonable Academic Progress Policy in compliance with federal and state regulations. Failure to comply with IIT's Reasonable Academic Progress Policy will lead to the student's losing eligibility for financial assistance.

Additional Information

All financial aid awards and scholarships for freshmen, transfer, continuing undergraduate, and all graduate students (excluding law, business and MPA students) are processed by the IIT Office of Financial Aid. Students should submit all information regarding financial assistance to: Office of Financial Aid, 3300 S. Federal St., Chicago, IL 60616 (telephone 312.567.7219). The office is open from 8:30 a.m. to 5 p.m., Monday through Friday.

Expenses

All University mandatory and non-mandatory charges are published regularly in official University publications including electronic mail and web site postings. **For a complete listing of current tuition, fees, and other charges go to www.enrollment.iit.edu, then select Tuition and Fees.** The University regrets that continually rising costs do not permit it to guarantee that published charges will not change. Students and parents should anticipate periodic increases in the future.

Admission Application Fee

All applications for undergraduate admission from U.S. citizens (freshmen and transfer students) or international students must be accompanied by a non-refundable fee. Please contact the appropriate program Office of Admission for applicable fee.

Undergraduate Tuition

Undergraduates registered for 12 credit hours or more are considered full-time and will be charged at the full-time tuition rate. Part-time undergraduates registered for fewer than 12 credit hours will be charged at the per credit hour part-time tuition rate.

Enrollment Deposit

Each student admitted as a full-time degree-seeking undergraduate student is required to make a non-refundable enrollment deposit which is credited toward the student's cost of attendance and holds a place in class for the initial semester of enrollment.

Orientation Fee

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

Other Fees and Charges

A student may incur other fees and charges that are both mandatory and non-mandatory. **For a complete current listing of all charges and fees go to www. enrollment.iit.edu, then select Tuition and Fees.**

Book and Supplies

Books and supplies are available at the University bookstores. Costs for books and supplies can differ significantly depending upon the field of study. Most undergraduate students can expect to spend at least $1,000 per year for books and supplies (exclusive of drafting equipment, computers, and similar one time purchases). Students in the College of Architecture may spend less on books but substantially more on supplies.

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

Payment of all term charges to the University are due on the first day of classes of each term. For those unable to complete payment by that deadline there are several payment plan options available that incur additional plan fees. The latest information and costs and payment plan enrollment forms are at **www.enrollment.iit.edu,** then select **Student Accounts.** Failure to adhere to any payment plan schedule of payments will result in late fees in addition to any plan administrative fee. Payment may be made by cash, check, money order, or credit card. Credit card payments may be made at w**ww.enrollment.iit.edu,** select I**IT Web for Students,** select S**tudent & Credit Card Payment.** Payment may also be made in person at the IIT Cashier's Office in the Main Building, Main Campus or at the Bursar's Office at the Downtown Campus. For the current mailing address and contact information regarding any questions about bills and payments contact the Bursar's Office at **bursar@iit.edu;** or go to w**ww.enrollment.iit.edu,** then select S**tudent Accounts**

University Refund 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 a refund or credit for unused tuition upon written request to the Office of Educational Services. Payments for other charges incurred may be the responsibility of the student at the determination of the University. Students should consult **www.enrollment.iit.edu** for the approved University refund schedule.

Outstanding Debts

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 current according to established University policies and payment due dates. Students with outstanding University debts may be suspended from current term classes. Students whose accounts are not current will not be allowed to register or attend classes for any subsequent term. No diploma, certificates of attendance, letters of completion, or transcripts of academic records will be issued until all financial obligations have been met.

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 families must live in the residence halls or in fraternity or sorority houses. Exceptions to this policy may be granted by the director of housing. Housing for first-year students is guaranteed through June 1. Residence hall contracts are made for the full academic year, from the beginning of orientation in August until commencement in May. The charges for room and board for 2006–07 range from $8,050 to $15,256 for an academic year. When a student applies for housing accommodations, an itemized list of available housing facilities and rates will be furnished.

Meals

Students living in residence halls contract for a variety of meal plans. Meal plans and meals on a cash basis are available to non-residents.

Housing Deposit Fee

An initial $300 nonrefundable payment, which applies in full to charges for room and board, must be submitted to the director of housing by June 1 for fall semester applicants or by December 1 for spring semester applicants. One-half of the room and board charge for the academic year is payable each semester.

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 are 356 living units in four high-rise apartment buildings on campus. These units range from efficiency to three-bedroom apartments and are not air conditioned. Leases are available to married students and single full-time graduate students if space is available. Rentals for unfurnished apartments, including all utilities except telephone, range from approximately $627 to $1,393 per month. Applications for campus housing should be submitted to the director of housing well in advance. A $50 non-refundable application fee is required when applying for an apartment.

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 and liberal arts. This section lists the general education requirements of the university. Specific degree requirements are described in the departmental listings. Minors are listed on pages 136-138.

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 general education courses in science, mathematics, computer science, humanities and social science. These courses provide the foundation for nearly all of IIT's major programs. Because general education courses apply to all majors, most students may wait as late as the sophomore year to declare their respective majors and still graduate on time.

General Education Requirements

The general education program is designed to ensure that all IIT graduates have a basic understanding of certain essential areas of knowledge. *The general education program sets minimal requirements.* Most degree programs require additional courses in these areas. These additional course requirements may be found in the departmental listings. General education requirements will not be waived. Substitutions may be considered upon written request to the Office of Educational Services. Approval will be granted only to individual students, 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 therefore 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 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. This requirement applies to all students enrolling for an undergraduate degree.

2. Students must complete a minimum of 42 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:

   15 hours in major courses.
   15 hours in non-major courses.

   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 seek help from the IIT Writing Center when referred by course instructors or academic advisers. Please refer to the section on the Writing Center on page 230.

B. Mathematics: 5 credit hours

The five credit hours must be of MATH 119 or above. BUS 221 and PSYC 203 also satisfy this requirement.

C. Computer Science: 2 credit hours

All students must take CS 105, 115, 116, 201, or ARCH 125 or a computer science course at the 200-level or above.

D. Humanities and Social or Behavioral Sciences: 21 credit hours, subject to minimum requirements in each area as specified below:

1. Humanities: a minimum of nine credit hours. Courses that satisfy this requirement are marked with an (**H**) in this bulletin. The courses must be distributed as follows:

   (a) Humanities 100-level course.

   (b) At least two courses marked with an (**H**) at the 300-level or above. Students may use foreign language courses at the 200-level to fulfill 300-level requirements.

2. Social or Behavioral Sciences: a minimum of nine credit hours. Courses that satisfy this requirement are marked with an (**S**) in this bulletin. The courses must be distributed as follows:

   (a) At least two courses on the 300-level or above.

   (b) Courses from at least two different fields.

   (c) At least six credits in a single field.

E. Natural Science or Engineering: 11 credit hours

This component may be satisfied by courses in engineering, biology, chemistry and physics, or by courses in architecture and psychology marked with an (**N**). These courses must be distributed as follows:

1. Two sequential natural science or engineering courses in a single field. (CHEM 124 with MS 201 satisfies this requirement.)

2. At least one natural science or engineering course in a second area.

F. Introduction to the Profession: 2 credit hours

All students must complete these courses in their first year. Students entering with 30 hours or more of transfer credit may have this requirement waived with departmental approval. If waived, the total credit hours required for the degree must still be satisfied.

G. Interprofessional Projects (IPRO): 6 credit hours

Students will participate in at least two Interprofessional Project experiences. These projects develop communication, project management, 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 are 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

Department Web site: www.math.iit.edu

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 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.

Students with an applied mathematics background are prepared for courses in the insurance industry, electronics and computer manufacturing businesses, logistic companies, pharmaceutical firms, etc. The program 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 credit hours) in an area outside of applied mathematics. A minor in computer science or one of the engineering disciplines prepares the student to enter the job market in business or government.

Faculty

Chair
Fred J. Hickernell
Room 208b E1
Ext. 78983

Associate Chair
Director of Undergraduate Studies
Gregory Fasshauer
Room 208a E1
Ext. 73149

Professors
Bernstein (jointly with Chemical Engineering), Duan (Director, Laboratory for Stochastics and Dynamics), Edelstein, Erber (jointly with Physics), Frank, Hickernell, McMorris (Dean, College of Science and Letters), Nair (jointly with Mechanical and Aerospace Engineering), Reingold (jointly with Computer Science)

Associate Professors
Abarji, Adler, Bielecki, Fasshauer, Li, Lubin, Rempfer (jointly with Mechanical and Aerospace Engineering), Wendland

Assistant Professor
Ellis, Kaul, Pelsmajer

Distinguished Research Professor
Fang

Research Associate Professor
Heller

Senior Lecturers
Maslanka, Miranda, Sitton

Faculty Emeriti
Byrne, Darsow, DeCicco, Deliyannis, Pearson, Sklar, Stueben

Applied Mathematics

Bachelor of Science in Applied Mathematics

Required Courses	Credit Hours
Applied Mathematics Requirements MATH 100, 151, 152, 230, 251, 252, 332, 350, 400, 402, 461, 475	41
Applied Mathematics Electives *	18
Humanities and Social Science Requirements See general education requirements on page 25	21
Minor Subject Requirement 5 related courses from departments other than Applied Mathematics	15
Interprofessional Projects	6
Computer Science Requirements (CS 115 and 116) or (CS 105 and 201)	4
Science Requirement PHYS 123	4
Science Electives	10
Free Electives	9
Total Credit Hours	**128**

* Applied mathematics electives are to be chosen after consultation with an academic adviser. Student goals, interests and course availability should be determining factors in this selection process.

It is worth noting that the set of electives MATH 405, 410, 430, 454 and 486 are fundamental to the study of Discrete Methods. The courses MATH 477, 478, 486, 487, 488 and 489 focus on elementary topics in the field of computational mathematics. Issues in stochastic analysis are studied in MATH 453, 477, 476, 482, 483, 486, and topics essential in area of applied analysis are examined in MATH 405, 478, 486, 487, 488 and 489.

Applied Mathematics Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 100 Introduction to the Profession	2	0	2
MATH 151 Calculus I	4	1	5
CS 115 Object-Oriented Programming I	2	1	2
Humanities Elective	3	0	3
Humanities or Social Science Elective	3	0	3
Science Elective	3	0	3
Totals	**17**	**2**	**18**

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152 Calculus II	4	1	5
MATH 230 Introduction to Discrete Mathematics	3	0	3
CS 116 Object-Oriented Programming II	2	1	2
PHYS 123 General Physics I	3	3	4
Humanities or Social Science Elective	3	0	3
Totals	**15**	**5**	**17**

Semester 3			
MATH 251 Multivariate and Vector Calculus	4	0	4
MATH 332 Matrices	3	0	3
Science Elective	3	3	4
Minor Subject	3	0	3
Free Elective	3	0	3
Totals	**16**	**3**	**17**

Semester 4			
MATH 252 Introduction to Differential Equations	4	0	4
MATH 350 Introduction to Computational Mathematics	3	0	3
Science Elective	3	0	3
Minor Subject	3	0	3
Humanities or Social Science Elective	3	0	3
Totals	**16**	**0**	**16**

Semester 5			
MATH 400 Real Analysis	3	0	3
MATH 475 Probability	3	0	3
Applied Mathematics Elective	3	0	3
Minor Subject	3	0	3
Humanities or Social Science Elective	3	0	3
Totals	**15**	**0**	**15**

Semester 6			
MATH 402 Complex Analysis	3	0	3
MATH 461 Fourier Series and Boundary-Value Problems	3	0	3
Applied Mathematics Elective	3	0	3
Minor Subject	3	0	3
IPRO 497	1	6	3
Totals	**13**	**6**	**15**

Semester 7			
Applied Mathematics Elective	3	0	3
Applied Mathematics Elective	3	0	3
Humanities or Social Science Elective	3	0	3
Minor Subject	3	0	3
Free Elective	3	0	3
Totals	**15**	**0**	**15**

Semester 8			
Applied Mathematics Elective	3	0	3
Applied Mathematics Elective	3	0	3
IPRO 497	1	6	3
Humanities or Social Science Elective	3	0	3
Free Elective	3	0	3
Totals	**13**	**6**	**15**

Total Credit Hours **128**

College of Architecture

Department Web site: www.arch.iit.edu

Now, in the new century, architecture must fill an ever more demanding role in asserting human values in a rapidly changing, technology-driven and increasingly complex global society. The integration of new construction, along with the conservation of the old, brings together current issues of urban housing, commercial development, infrastructure and transportation, along with critical concerns for energy and a sustainable environment. The resulting cultural values of community development must be adaptable to both domestic and international contexts, and thoughtful to the consequences of what we build.

Drawing strength from its Mies van der Rohe heritage, its key position in the legacy of Modernism, its location in Chicago, and its connections to progressive practitioners and emerging global practices, the College of Architecture offers the professional, five-year Bachelor of Architecture (B.Arch.) degree. Accredited by the National Architectural Accrediting Board (NAAB), this well-established degree program prepares architects to use communication and analytical skills to provide inventive solutions to a broad range of design problems.

The objectives of the B.Arch. program prepare architects to respond to an increasingly complex global condition, within cities and beyond. Informed by humanist ideals, our graduates combine technical expertise and environmental awareness to design and execute individual buildings as well as sensitively planned landscapes at any scale, in any material. Consisting of tenured faculty and practicing architects, our teachers are committed to training and educating a diverse student body for a broad range of professional career opportunities in architecture and the construction industry. Integrating advanced digital technology and design studio training, our program prepares our graduates to:

- Design functional, compelling buildings to meet the needs of a complex, changing world.
- Work collaboratively with allied professionals (engineering, landscape architecture, construction management, etc.) to produce quality built environments.
- Enter the profession equipped with an integrated knowledge of complex construction technologies, craftsmanship, materials, and an inspired sense of design excellence.
- Articulate in two-dimensional and three-dimensional visual form a contemporary vision for architectural excellence responsive to the 21st century's cultural, economic, regulatory, environmental, ethical, and material contingencies that condition the built world.
- Take leadership roles throughout their lives to support design excellence, develop technical expertise, advance professional practice, practice ethical integrity, and promote respect for the architect in contemporary society.
- Consider all aspects of the built environment to insure a sustainable and planned integration of architecture with the natural environment and its resources. .

To understand architecture in its global context, IIT students are encouraged to travel outside the United States to study modern and historic buildings. Students may enroll in the European Study Program, a Paris-based studio defined by travel, drawing and projects derived from contemporary urban landscapes. Recent advanced studios have been situated for one month in Asia and South America.

The College's roots are firmly embedded in Chicago's architectural history. Creative pioneers like Sullivan, Jenney, Root, Burnham and Wright produced a body of work that established the principles of modern architecture. These architects were inspired by exciting new engineering possibilities, yet they never wavered from the unifying belief in a rich cultural expression of architecture for their time. They also believed in education and, in 1895, combined a course of study in drawing and construction at the Art Institute of Chicago, with the support courses of history, mathematics and engineering from the then Armour Institute of Technology. The catalog for this new program was called the Chicago School of Architecture.

Out of these beginnings, the College's faculty and students continue to engage with complexities that inform architectural education and future practice. Located in one of the world's greatest cities for the study of architecture, the most outstanding architectural and engineering resources of Chicago provide both faculty and reinforcement of the educational mission. Moreover, S.R. Crown Hall, designed by Mies van der Rohe, is the ultimate space to study architecture. Set within the Mies-designed campus, it has become recognized as one of the most significant buildings of the 20th century.

Current curricular emphases are in digital applications (including Building Information Management), advanced technologies, design and theory, Landscape Architecture and its relationship to Architecture, development and Design/Build, Sustainability and Planning, and History/Theory/Criticism. A dynamic campus center by Rem Koolhaas and residence hall by Helmut Jahn have energized the historic campus landscape. To meet expanded studio and faculty requirements, the College has adapted important Mies buildings for additional teaching and design/build projects.

With a demonstrated legacy of excellence, IIT Architecture seeks to become a force for designing built environments of high quality through the incorporation of planing, technology, materials, space and formal generation. The responsible integration of these attributes is promoted to accentuate the historical, social, cultural, and environmental imperatives requisite to better society.

Architecture

Faculty

Dean
Donna V. Robertson, FAIA
S. R. Crown Hall
Ext. 73230

Associate Dean and Director of Graduate Programs
Peter Beltemacchi
S.R. Crown Hall
Ext. 73261

Assistant Dean for Undergraduate Academic Affairs
R. Stephen Sennott
S. R. Crown Hall
Ext. 78835

Assistant Dean for Graduate Academic Affairs
Nicole X. Osborne
S.R. Crown Hall
Ext. 75858

Professors
Elnimeiri, Land

Associate Professors
Beltemacchi, Hovey, Krawczyk, Mallgrave, Robertson, Schipporeit, Sharpe, Takeuchi

Assistant Professors
Brock, Conger-Austin, Denison, Durbrow, Flury, Gentry, Kearns, Kultermann, Riley, Ronan, Wetzel

Studio Professors
Horn, R. Jones, Karidis, Krueck

Studio Associate Professors
Brown, Felsen, Nagle, Pettigrew, Roesch, Stutzki

Instructor
Braucher, Davis, Gould, Kim, McLeish

Distinguished Research Professor
Sobel

Morgenstern Visiting Critic
Murcutt (2004)
deVries (2005)
Chipperfield (2006)

Adjunct Professors
Brubaker, Clark, Hamill, Hartray, Karlovitz, Moreno, Peterson, Ryan, Thomas, Uhlir, Wimer

Adjunct Associate Professors
Desalvo, Gang, Geiger, Glynn, Goldsmith, Grzeslo, Kriegshauser, Miller, Nelson, Palmer, Paradiso Sennott, Schendel

Adjunct Assistant Professors
Beck, Brewer, Lozano, Danley, Emmick, Fleener, Greenberg, Hall, Issa, Johnson, K. Jones, Kibler, Kintigh, Klaeschen, Kohnke, Kowalczyk, Krone, Pack, Peluso, Pierraci, Schachman, Shell, Shojaie

Visiting Assistant Professor
Ellingsen, Flohr, Kober, Koreman, Wood

Research Associate
Moddrell, Parente, Tamai

Faculty Emeriti
Danforth, Hannaford, Thomas, Utsunomiya

Professional Degrees

The undergraduate professional degree program at IIT has always been a comprehensive five-year fully accredited Bachelor of Architecture (B.Arch) degree. The educational format is based on providing the fundamental body of knowledge required by the profession within a fully coordinated three-year core studio sequence. Each of the three years is team taught to horizontally integrate all courses within each year and vertically sequence learning experiences from year to year. This professional background within the three-year core becomes the preparation for the last two years of elective design studios focused on topic areas such as 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, environmental and international context of their profession. Faculty are encouraged to broaden the upper-level studios to become 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 higher education.

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 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

Master's degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the preprofessional degre is not, by itself, recognized as an accredited degree.

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, 109, 110, 113, 114, 125, 201, 202, 226, 305, 306, 403, 404, 413, 417, 418, 419, 420, 423	84
Building Science/Structural Requirements ARCH 230, 334, 335	9
Art and Architectural History Requirements AAH 119, 120 ARCH 321	9
Architectural History Elective	3
City and Regional Planning Requirements CRP 201, 465	6
Mathematics Requirements MATH 119, 122	6
Physics Requirement PHYS 200	4
Humanities and Social Science Requirements See general education requirements on page 25	21
Interprofessional Projects (2)	6
Architecture Electives (7)	21
Total Credit Hours	**169**

Architecture Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
ARCH 113	Architecture Studio I	0	12	6
ARCH 100	Introduction to Architecture	2	1	3
ARCH 109	Freehand Drawing I	0	4	2
MATH 119	Geometry for Architects	3	0	3
Humanities 100-level Elective		3	0	3
Totals		**8**	**17**	**17**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
ARCH 114	Architecture Studio II	0	12	6
ARCH 110	Freehand Drawing II	0	4	2
MATH 122	Introduction to Mathematics II	3	0	3
ARCH 125	Introduction to Architectural Computing	1	2	3
Humanities or Social Science Elective		3	0	3
Totals		**7**	**18**	**17**

Semester 3				
ARCH 201	Architecture Studio III	0	10	5
AAH 119	History of World Architecture I	3	0	3
ARCH 226	CAD in Practice	2	2	3
PHYS 200	Basic Physics for Architects	4	0	4
Totals		**9**	**12**	**15**

Semester 4				
ARCH 202	Architecture Studio IV	0	12	6
ARCH 230	Architecture and Structure	3	0	3
AAH 120	History of World Architecture II	3	0	3
CRP 201	The Dwelling	3	0	3
Social Science Elective		3	0	3
Totals		**12**	**12**	**18**

Semester 5				
ARCH 305	Architecture Studio V	0	12	6
ARCH 403	Mechanical and Electrical Building Systems for Architects I	3	0	3
ARCH 423	Architectural Programming	3	0	3
ARCH 334	Frame Structural System and Steel	3	0	3
ARCH 321	History of Modern Thought	3	0	3
Totals		**12**	**12**	**18**

Semester 6				
ARCH 306	Architecture Studio VI	0	12	6
ARCH 404	Mechanical and Electrical Building Systems for Architects II	3	0	3
ARCH 335	Reinforced Concrete and Continuous Structure	3	0	3
CRP 465	The Ecological Basis of Planning	3	0	3
Architecture Elective		3	0	3
Totals		**12**	**12**	**18**

Semester 7				
ARCH 417	Architecture Studio VII	0	12	6
History of Architecture Elective		3	0	3
Social Science Elective		3	0	3
Architecture Elective		3	0	3
Architecture Elective		3	0	3
Totals		**12**	**12**	**18**

Semester 8				
ARCH 418	Architecture Studio VIII	0	12	6
IPRO Elective		1	6	3
Humanities Elective		3	0	3
Architecture Elective		3	0	3
Totals		**7**	**18**	**15**

Semester 9				
ARCH 419	Architecture Studio IX	0	12	6
IPRO Elective		1	6	3
Social Science Elective		3	0	3
Architecture Elective		3	0	3
Architecture Elective		3	0	3
Totals		**10**	**18**	**18**

Semester 10				
ARCH 420	Architecture Studio X	0	12	6
ARCH 413	Architectural Practice	3	0	3
Humanities Elective		3	0	3
Architecture Elective		3	0	3
Totals		**9**	**12**	**15**

Total Credit Hours **169**

Optional Programs

Architecture students are encouraged to select electives that provide a sequence of 15 credit hours of learning experiences related to a specific interest that will reinforce the curriculum.

Such topical fields of study should be chosen early in the student's program in consultation with their academic adviser.

Bachelor of Architecture/Master of Business Administration Double-Degree Option

Qualified students may earn both the Bachelor of Architecture and Master of Business Administration (M.B.A.) degrees in six, rather than the normal seven, years. Students who are completing their eighth semester, or an equivalent of 124 credit hours, in architecture at IIT may apply for entry into the joint program. They should take preparatory courses for the M.B.A. prior to entry and the Graduate Management Admission Test (GMAT) during the eighth semester. Students who anticipate entering into the program should seek advising in the Stuart School of Business and the College of Architecture early in their studies at IIT.

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

Qualified students regularly 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, CAE 303, CAE 304, CAE 307, CAE 310, CAE 431, and CAE 432 in place of MATH 119, MATH 122, CAE 287, CAE 351, CAE 352 and as technical electives. Students who anticipate entry into the combined program and who intend to specialize in construction engineering and management must successfully complete the following courses as part of the technical electives in their undergraduate programs in architecture: CAE 323, CAE 431, CAE 432 and CAE 457.

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.

Minors and Concentrations

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 adviser or a dean, and in consultation with the Office of Educational Services, a select number of courses from other departments may serve as an architecture elective. These have included CRP courses, ID courses in architectural photography, or selected CAE courses related to construction management or civil and architectural engineering. Within the College of Architecture, students may concentrate their required architecture elective courses to design a specialized area of study such as advanced CAD presentation, architectural history, or city planning. Students should consult with their respective adviser early in their program of study.

Biological, Chemical and Physical Sciences

Department Web site: www.iit.edu/~bcps

In an ever more technological world, a substantive understanding of the sciences is a requirement for many professions, including careers in science, education, 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, Chemical and Physical Sciences offers traditional Bachelor of Science (B.S.) degrees in each area of biology, chemistry and physics, as well as interdisciplinary B.S. degrees in Biochemistry (beginning in 2007 pending approval) and Molecular Biochemistry and Biophysics (M.B.B.). All five 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's Chicago-Kent College of Law, the Stuart School of Business Financial Markets Program, and the Department of Mathematics and Science Education.

Details of the five 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 110-111), and in the Special Programs section (pages 139-145).

Biological, Chemical and Physical Sciences

Faculty

Chair
John F. Zasadzinski
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Ext. 75874

Biology Faculty

Associate Chair
Ben Stark
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Ext. 73488

Professors
Cork, Irving, McCormick, Mehta, Stark

Adjunct Professor
Rubenstein

Associate Professor
Howard

Assistant Professors
Menhart, Orgel, Xiang, C. Zhang, W. Zhang, Y. Zhang

Senior Lecturer
Spink

Research Professors
Cummings, Kilbane, Palumbo, Webster

Faculty Emeriti
Bretz, Danforth, Erwin, Grecz, Jasper, Koblick, Roth, Roush, Webster

Chemistry Faculty

Associate Chair
Rong Wang
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Ext. 73121

Professors
P.Y. Johnson, Khan, Lykos, Mandal, Schug

Adjunct Professor
Cwik

Associate Professor
Wang

Assistant Professor
Bishnoi, Chong

Chemistry Faculty (cont.)

Senior Lecturer
El-Maazawi, Nguyen

Visiting Assistant Professor
Finney

Research Professors
Buttner, Stetter

Faculty Emeriti
Eisenberg, Fanta, Filler

Physics Faculty

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Pritzker Professor of Science
Lederman

Professors
Bunker, Erber*, P.W. Johnson, Kallend**, Kaplan, Morrison, Rubin, Scott, Segre, Zasadzinski

Associate Professors
Coffey, Longworth, White

Assistant Professors
Spentzouris, Terry, Torun

Research Professor
Johnstone

Research Associate Professors
Barrea, Roberts

Research Assistant Professor
Khelashvili

Senior Lecturer
Friedman, Glodowski

Faculty Emeriti
Burnstein, Hauser, Malhiot, Spector, Zwicker

* Jointly with Department of Applied Mathematics
** Jointly with Department of Mechanical, Materials and Aerospace Engineering

Biochemistry*

***Slated to begin Fall 2007 pending approval of IIT faculty and Board of Trustees**

The BCPS department is introducing a new degree program in Biochemistry 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, 495	23
Chemistry Requirements CHEM 124, 125, 237, 239, 240, 247, 343, 344 (or PHYS 223), 485	24/28
Biochemistry Requirements BIOL/CHEM 401, 402, and BIOL 404	9
Technical Electives (5)	14/16
Physics Requirements PHYS 123, 221, 223 (or CHEM 344)	8/12
Mathematics Requirements MATH 151, 152, 251, and BME 433	17
Interprofessional Projects	6
Computer Science Requirement CS 105	2
Humanities and Social Science Requirements See general education requirements on page 25	21
Total Credit Hours	**128-130**

Biochemistry Curriculum*

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
BIOL 100	Introduction to the Profession	2	0	2
BIOL 107	General Biology Lectures	3	0	3
BIOL 109	General Biology Laboratory	0	3	1
CHEM 124	Principles of Chemistry I	3	3	4
MATH 151	Calculus I	4	1	5
Totals		**12**	**7**	**15**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
BIOL 115	Human Biology Lectures	3	0	3
BIOL 117	Experimental Biology Laboratory	0	3	1
CHEM 125	Principles of Chemistry II	3	3	4
MATH 152	Calculus II	4	1	5
Humanities	100-level Course	3	0	3
Totals		**13**	**7**	**16**

Semester 3				
BIOL 214	Genetics	3	0	3
CHEM 237	Organic Chemistry I	3	4	4
PHYS 123	General Physics I	3	3	4
MATH 251	Multivariable and Vector Calculus	4	0	4
CS 105	Introduction to Computer Programming	2	1	2
Totals		**15**	**8**	**17**

Semester 4				
BIOL 210	Microbiology Lectures	3	0	3
CHEM 239	Organic Chemistry II	3	0	3
CHEM 240	Organic Chemistry Laboratory	1	4	2
PHYS 221	General Physics II	3	3	4
Humanities or Social Science Elective		3	0	3
Totals		**13**	**7**	**15**

Semester 5				
BIOL/CHEM 401	Biochemistry Lectures I	3	0	3
PHYS 223	General Physics III**			
	OR			
	Technical Elective	3	0/3	3/4
CHEM 247	Analytical Chemistry	2	4	3
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**4/7**	**15/16**

Semester 6				
BIOL/CHEM 402	Biochemistry Lectures II	3	0	3
BIOL 404	Biochemistry Laboratory	0	6	3
BME 433	Biostatistics	3	0	3
Technical Elective		3	0	3
Humanities or Social Science Elective		3	0	3
IPRO 497	Interprofessional Project I	1	6	3
Totals		**13**	**12**	**18**

Semester 7				
BIOL 445	Cell Biology Lectures	3	0	3
BIOL 446	Cell Biology Laboratory	0	6	3
BIOL 495	Biology Colloquium	1	0	1
CHEM 343	Physical Chemistry I	3	0	3
Technical Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**13**	**6**	**16**

Semester 8				
CHEM 344	Physical Chemistry II**			
	OR			
	Technical Elective	3	0/4	3/4
CHEM 485	Chemistry Colloquium	1	0	1
IPRO 497	Interprofessional Project II	1	6	3
Technical Elective		3	0	3
Technical Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**17**	**6/10**	**16/17**

Minimum Total Credit Hours **128**

* Slated to begin Fall 2007 pending approval of IIT faculty and Board of Trustees

** Student must complete either PHYS 223 or CHEM 344.

Biological, Chemical and Physical Sciences

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, 320, 403, 404, 430, 445, 446, 495	40
Biology Electives	12
Interprofessional Projects	6
Mathematics Requirements MATH 151, 152	10
Chemistry Requirements CHEM 124, 125, 237, 239, 247	18
Physics Requirements PHYS 123, 221, 223	12
Computer Science Requirement CS 105	2
Humanities and Social Science Requirements See general education requirements on page 25	21
Free Electives	6
Total Credit Hours	**127**

Biology Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
BIOL 107	General Biology Lectures	3	0	3
BIOL 109	General Biology Laboratory	1	2	2
CHEM 124	Principles of Chemistry I	3	3	4
BIOL 100	Introduction to the Profession	2	0	2
MATH 151	Calculus I	4	1	5
Totals		**13**	**6**	**16**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
BIOL 115	Human Biology Lectures	3	0	3
BIOL 117	Experimental Biology Laboratory	1	2	2
CHEM 125	Principles of Chemistry II	3	3	4
Humanities	100-level Course	3	0	3
MATH 152	Calculus II	4	1	5
Totals		**14**	**6**	**17**

Semester 3				
BIOL 214	Genetics	3	0	3
CHEM 237	Organic Chemistry I	3	4	4
PHYS 123	General Physics I	3	3	4
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**15**	**7**	**17**

Semester 4				
BIOL 210	Microbiology Lectures	3	0	3
BIOL 225	Microbiology Laboratory	0	4	2
CHEM 239	Organic Chemistry II	3	0	3
PHYS 221	General Physics II	3	3	4
Humanities or Social Science Elective		3	0	3
Totals		**12**	**7**	**15**

Semester 5				
BIOL 430	Animal Physiology	3	0	3
CHEM 247	Analytical Chemistry	2	4	3
PHYS 223	General Physics III	3	3	4
CS 105	Introduction to Computer Programming	2	1	2
Humanities or Social Science Elective		3	0	3
Totals		**13**	**8**	**15**

Semester 6				
BIOL 403	Biochemistry Lectures	4	0	4
BIOL 404	Biochemistry Laboratory	0	6	3
IPRO 497	Interprofessional Project I	1	6	3
Humanities or Social Science Elective		3	0	3
Free Elective		3	0	3
Totals		**11**	**12**	**16**

Semester 7				
Biology Elective		3	0	3
Biology Elective		3	0	3
BIOL 320	Literature in Biology	2	0	2
BIOL 445	Cell Biology Lectures	3	0	3
BIOL 446	Cell Biology Laboratory	0	6	3
BIOL 495	Biology Colloquium	1	0	1
Totals		**12**	**6**	**15**

Semester 8				
Biology Elective		3	0	3
Biology Elective		3	0	3
Free Elective		3	0	3
BIOL 495	Biology Colloquium	1	0	1
IPRO 497	Interprofessional Project II	1	6	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**6**	**16**

Total Credit Hours **127**

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. Our requirement for participation in an original research project also provides the necessary experience 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 43 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's 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 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, focused on career interests. An integral part of this stage is a research project under the supervision of a member of the chemistry faculty, culminating in a senior thesis. Students may receive certification of their Bachelor of Science in Chemistry degree 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 inter-disciplinary 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

There may be slight variations in the science requirements based on the optional degree being pursued. These variations are footnoted below.

Required Courses	Credit Hours
Chemistry Requirements CHEM 100, 124, 125, 237, 239, 240, 247, 321, 334, 335, 343, 344, 415, 416*, 450*, 451, 485*, 487*	53
Technical Electives**	15
Biology Requirements BIOL 403	4
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Computer Science Requirement CS 105	2
Humanities and Social Science Requirements See general education requirements on page 25	21
Interprofessional Projects	6
Total Credit Hours	**127**

* CHEM 416, 450, 485 and 487 are not required for students pursuing the Bachelor of Science in Chemistry with emphasis in Chemical Education.

** One of the technical electives must be BIOL 107 or BIOL 115. This course must be taken before the student enrolls in BIOL 403.

Chemistry Curriculum

Semester 1		Lab. Lect.	Cr. Hrs.	Hrs.
CHEM 100	Introduction to the Profession	2	0	2
CHEM 124	Principles of Chemistry I	3	3	4
CS 105	Introduction to Computer Programming I	2	1	2
MATH 151	Calculus I	4	1	5
Humanities or Social Science Elective		3	0	3
Totals		**14**	**5**	**16**

Semester 2		Lab. Lect.	Cr. Hrs.	Hrs.
CHEM 125	Principles of Chemistry II	3	3	4
MATH 152	Calculus II	4	1	5
PHYS 123	General Physics I	3	3	4
Humanities or Social Science Elective		3	0	3
Totals		**13**	**7**	**16**

Semester 3				
CHEM 237	Organic Chemistry I	3	4	4
CHEM 247	Analytical Chemistry	2	4	3
MATH 251	Multivariate and Vector Calculus	4	0	4
PHYS 221	General Physics II	3	3	4
Humanities or Social Science Elective		3	0	3
Totals		**15**	**11**	**18**

Semester 4				
CHEM 239	Organic Chemistry II	3	0	3
CHEM 240	Organic Chemistry Laboratory	1	4	2
MATH 252	Introduction to Differential Equations	4	0	4
Technical Elective**		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**4**	**15**

Semester 5				
CHEM 343	Physical Chemistry I	3	0	3
CHEM 321	Instrumental Analysis	2	6	4
IPRO 497	Interprofessional Project I	1	6	3
Technical Elective**		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**12**	**12**	**16**

Semester 6				
CHEM 344	Physical Chemistry II	3	3	4
CHEM 334	Spectroscopic Methods	2	0	2
CHEM 335	Spectroscopic and Separation Techniques	0	6	2
BIOL 403	Biochemistry Lectures	4	0	4
Humanities or Social Science Elective		3	0	3
Totals		**12**	**9**	**15**

Semester 7				
CHEM 415	Inorganic Chemistry	3	0	3
CHEM 450	Introduction to Research*	0	8	3
CHEM 451	Modern Techniques in Chemical Literature	2	0	2
Technical Elective**		3	0	3
Technical Elective**		3	0	3
Totals		**11**	**8**	**14**

Semester 8				
CHEM 487	Senior Thesis in Chemistry*	0	12	4
IPRO 497	Interprofessional Project II	1	6	3
CHEM 485	Chemistry Colloquim*	1	0	1
CHEM 416	Advanced Laboratory*	3	0	3
Technical Elective**		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**11**	**18**	**17**

Total Credit Hours **127**

* CHEM 416, 450, 485 and 487 are not required for students pursuing the Bachelor of Science in Chemistry with emphasis in Chemical Education.

** One of the technical electives must be BIOL 107 or BIOL 115. This course must be taken before the student enrolls in BIOL 403.

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/~chemistry.**

1. 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.

BIOL 210	Microbiology Lectures
BIOL 225	Microbiology Laboratory
BIOL 214	Genetics and Genetics Technology
BIOL 404	Biochemistry Laboratory
BIOL 445	Cell Biology
BIOL 446	Cell Biology Laboratory

2. Bachelor of Science in Chemistry with emphasis in Pharmaceutical Chemistry *

Program Advisors: 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 lesson 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.

CHEM 455	Advanced Organic Chemistry
CHEM 531	Tactics of Organic Synthesis
CHEM 539	Introduction to Pharmaceutical Chemistry
BIOL 404	Biochemistry Laboratory
CHEM 497	Special Problems

3. 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.

CHEM 455	Advanced Organic Chemistry
CHEM 435	Introduction to Polymers
CHEM 535	Advanced Polymer Chemistry
CHEM 537	Polymer Chemistry Laboratory
CHEM 542	Polymer Characterization and Analysis

4. 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.

MS 201	Materials Sciences
MMAE 486	Principles of Ceramics
PHYS 437	Solid State Physics
CHEM 435	Introduction to Polymers

Select one course from the following list

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

5. Bachelor of Science in Chemistry with emphasis in Chemical Physics

Program Advisors: R. Wang/P. Lykos

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.

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

Select one course from the following list

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

6. Bachelor of Science in Chemistry with emphasis in Chemical Education

Program Advisor: M. El-Maazawi/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, page 110 and **www.iit.edu/departments/msed/**).

MSED 200	Analysis of Classrooms- Practicum and Seminar
MSED 250	Curriculum/Foundations
MSED 300	Instructional Methods/Strategies I
MSED 320	Inquiry/IPRO Seminar
MSED 350	Informal Education Practicum and Seminar
MSED 400	Instructional Methods/Strategies II
MSED 450	Professional Internship

* Students interested in pursuing the pharmaceutical chemistry or polymer chemistry degree option must submit a formal letter of intent to a program adviser 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.

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, 320, 403, 404, 430, 445, 446, 495	40
Chemistry Requirements CHEM 124, 125, 237, 239, 247 (or PHYS 300), 343, 344 (or PHYS 348)	24/25
Physics Requirements PHYS 123, 221, 223, 410	15
Interprofessional Projects	6
Mathematics Requirements MATH 151, 152, 251, 252 (or PHYS 240), 474	20/21
Computer Science Requirement CS 105	2
Humanities and Social Science Requirements See general education requirements on page 25	21
Total Credit Hours	**128–130**

Molecular Biochemistry and Biophysics Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
CHEM 124	Principles of Chemistry I	3	3	4
BIOL 107	General Biology Lectures	3	0	3
BIOL 109	General Biology Laboratory	1	2	2
BIOL 100	Introduction to the Profession	2	0	2
MATH 151	Calculus I	4	1	5
Totals		**13**	**6**	**16**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
CHEM 125	Principles of Chemistry II	3	3	4
BIOL 115	Human Biology Lectures	3	0	3
BIOL 117	Experimental Biology Laboratory	1	2	2
Humanities	100-level Course	3	0	3
MATH 152	Calculus II	4	1	5
Totals		**14**	**6**	**17**

Semester 3				
PHYS 123	General Physics I	3	3	4
CHEM 237	Organic Chemistry I	3	4	4
BIOL 214	Genetics	3	0	3
MATH 251	Multivariate and Vector Calculus	4	0	4
CS 105	Introduction to Computer Programming I	2	1	2
Totals		**15**	**8**	**17**

Semester 4				
PHYS 221	General Physics II	3	3	4
CHEM 239	Organic Chemistry II	3	0	3
BIOL 210	Microbiology Lectures	3	0	3
BIOL 225	Microbiology Laboratory	0	4	2
IPRO 497	Interprofessional Project I	1	6	3
Totals		**10**	**13**	**15**

Semester 5				
PHYS 223	General Physics III	3	3	4
BIOL 430	Animal Physiology	3	0	3
CHEM 247	Analytical Chemistry	2	3/4	3
	OR			
PHYS 300	Instrumentation Lab			
CHEM 343	Physical Chemistry I	3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**6/7**	**16**

Semester 6				
BIOL 403	Biochemistry Lectures	4	0	4
BIOL 404	Biochemistry Laboratory	0	6	3
PHYS 240	Computational Science	2/4	3/0	3/4
	OR			
MATH 252	Introduction to Differential Equations			
CHEM 344	Physical Chemistry II	3	4/0	4/3
	OR			
PHYS 348	Modern Physics			
Humanities or Social Science Elective		3	0	3
Totals		**12/14**	**6/13**	**16/18**

Semester 7				
BIOL 445	Cell Biology Lectures	3	0	3
BIOL 446	Cell Biology Laboratory	0	6	3
BIOL 495	Biology Colloquium	1	0	1
PHYS 410	Molecular Biophysics	3	0	3
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**13**	**6**	**16**

Semester 8				
IPRO 497	Interprofessional Project II	1	6	3
BIOL 320	Biological Literature	2	0	2
MATH 474	Probability and Statistics	3	0	3
BIOL 495	Biology Colloquium	1	0	1
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**13**	**6**	**15**

Total Credit Hours **128–130**

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 and research. Graduates are prepared for immediate entry into positions in industrial and government research laboratories, and for graduate study in 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, and computer science as well.

A student completing a BS program in Physics 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.

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, 428, 440, 485	55
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 Science Requirements See general education requirements on page 25	21
Physics Electives	12
Total Credit Hours	**128**

Physics Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
PHYS 123	General Physics I	3	3	4
CHEM 124	Principles of Chemistry I	3	3	4
PHYS 100	Introduction to the Profession	2	0	2
MATH 151	Calculus I	4	1	5
Humanities 100-level Course		3	0	3
Totals		**15**	**7**	**18**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
PHYS 221	General Physics II	3	3	4
CHEM 125	Principles of Chemistry II	3	3	4
MATH 152	Calculus II	4	1	5
Humanities or Social Science Elective		3	0	3
Totals		**13**	**7**	**16**

Semester 3				
PHYS 223	General Physics III	3	3	4
CS 105	Introduction to Computer Programming I	2	1	2
MATH 251	Multivariate and Vector Calculus	4	0	4
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**15**	**4**	**16**

Semester 4				
PHYS 348	Modern Physics	3	0	3
PHYS 240	Computational Science	2	3	3
MATH 252	Introduction to Differential Equations	4	0	4
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**15**	**3**	**16**

Semester 5				
PHYS 308	Classical Mechanics I	3	0	3
PHYS 300	Instrumentation Lab	2	3	3
IPRO 497	Interprofessional Project I	1	6	3
Mathematics elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**12**	**9**	**15**

Semester 6				
PHYS 309	Classical Mechanics II	3	0	3
PHYS 304	Kinetic Theory and Thermodyanmics	3	0	3
PHYS 427	Advanced Physics Laboratory I	2	3	3
Physics Elective†		3	0	3
Physics Elective†		3	0	3
Totals		**14**	**3**	**15**

Semester 7				
PHYS 405	Quantum Theory I	3	0	3
PHYS 428	Advanced Physics Laboratory II*	2	3	3
PHYS 413	Electricity and Magnetism I	3	0	3
PHYS 485	Physics Colloquium	1	0	1
IPRO 497	Interprofessional Project II	1	6	3
Physics Elective†		3	0	3
Totals		**13**	**9**	**16**

Semester 8				
PHYS 406	Quantum Theory II	3	0	3
PHYS 440	Computational Physics	2	3	3
PHYS 414	Electricity and Magnetism II	3	0	3
PHYS 485	Physics Colloquium	1	0	1
Mathematics Elective		3	0	3
Physics Elective†		3	0	3
Totals		**15**	**3**	**16**

Total Credit Hours **128**

*PHYS 428 may be substituted by a semester of research with permission of the department.

† Any advanced undergraduate or graduate physics course selected in consultation with the academic adviser.

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.

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 Pre-calculus, 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 advisers who constitute the Premedical Advisory Committee, see: **http://www.iit.edu/~premed/.** Post-Baccalaureate premedical students will be assigned an adviser 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.

Biological, Chemical and Physical Sciences

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 grade point average 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 grade point average 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 admissions office 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	10
Mathematics Requirements MATH 151, PSYC 203	8
Physics Requirements PHYS 123, 221	8

* Students who complete all of these courses (or their equivalents) with a GPA of 3.000 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		Lect.	Lab. Hrs.	Cr. Hrs.
CHEM 124	Principles of Chemistry I	3	3	4
PHYS 123	General Physics I	3	3	4
MATH 151	Calculus I	4	1	5
Clinical Volunteer Service		0	0	0
Totals		**10**	**7**	**13**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
CHEM 125	Principles of Chemistry II	3	3	4
PHYS 221	General Physics II	3	3	4
PSYC 203	Undergraduate Statistics for the Behavioral Sciences	3	0	3
Clinical Volunteer Service		0	0	0
Totals		**9**	**6**	**11**

Semester 3				
CHEM 237	Organic Chemistry I	3	3	4
BIOL 107	General Biology Lectures	3	0	3
BIOL 109	General Biology Laboratory	0	4	2
Research Volunteer Service		0	0	0
Totals		**6**	**7**	**9**

Semester 4				
CHEM 239	Organic Chemistry II	3	0	3
CHEM 240	Organic Chemistry Laboratory	1	4	2
BIOL 115	Human Biology	3	0	3
BIOL 117	Experimental Biology	0	4	2
Research Volunteer Service		0	0	0
Totals		**7**	**8**	**10**

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 320-Biological Literature; BIOL 403-Biochemistry Lectures; BIOL 430-Animal Physiology; BIOL 445-Cell Biology. Full-time employment in health care or in medical research is strongly encouraged during this year.

Other Bachelor's Degree Programs in Biological, Chemical and Physical 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 142.

Honors Law Program

Students in any of the BCPS programs are eligible for this program (see page141). For students in biology, chemistry and physics, this is a seven-year program, which can be accelerated under special conditions approved by the student's adviser.

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 3.0 and obtains a satisfactory score on the GMAT. Students enrolled in any of the BCPS programs are eligible for this program.

Biomedical Engineering

Department Web site: www.iit.edu/~bme

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 which are integrated with the chemical, physical and biological sciences, 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 B.S. in Biomedical Engineering.

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

- An ability to apply knowledge of mathematics, science, and engineering to the solution of biomedical engineering problems
- An ability to design and conduct experiments, as well as to analyze and interpret data
- An ability to design a biomedical engineering 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 based upon analytical and critical thinking skills
- 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 relevant to biomedical engineering
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- An understanding of biology and physiology, and the capability to apply advanced mathematics, science, and engineering to solve the problems at the interface of engineering and biology
- The ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and non-living materials and systems.

Our educational objectives describe the qualities and performance of our alumni:

- They possess the ability to employ up-to-date technical and hands-on skills in biomedical engineering through analysis, synthesis, and design such that they are successful in industry, graduate or professional graduate programs.
- They possess the quantitative, analytic and critical thinking skills to solve complex biomedical engineering problems
- They possess the ability to work effectively in teams
- They possess excellent written and oral communication skills necessary to interact with health care professionals, engineers and scientists.
- They possess the sense of responsibility and ethics of a professional engineer

Biomedical Engineering

Faculty

Chair
Vincent Turitto
Room 116 Engineering 1
Ext. 76927

Undergraduate Program Director
Mark Anastasio
Room 118 Engineering 1
Ext. 73926

Professor
Turitto

Associate Professors
Anastasio, Mogul, Troyk

Assistant Professors
Arfanakis, Brey, Derwent, Hall, Kamper

Research Professor
Opara

Senior Lecturers
Fagette, Papavasiliou

Faculty Emeritus
Arzbaecher

Areas of Specialization (Tracks)

The biomedical program has three areas of specialization (or tracks): cell and tissue engineering, medical imaging, and neural engineering. These areas while distinct in their concept are not entirely separate, as a core exposure to the physical, chemical, biological and engineering sciences is common to all and there is potential for considerable crossover among the areas at the upper division level. This is indicated by the track course options.

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 materials to place in the human body has been practiced for over 100 years, but it remains as 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 mechanically strong enough 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.

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 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.

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.

Medical School Admission

For information regarding admission to medical schools see page 142 or go to **www.premed.iit.edu.**

Biomedical Engineering

Bachelor of Science in Biomedical Engineering

Required Courses	Credit Hours
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 124, 125	8
Biology Requirements BIOL 107, 109, 115, 117	10
Humanities and Social Science Requirements See general education requirements on page 25	21
Electrical and Computer Engineering Requirements ECE 211	3
IPRO Requirements	6
Common Biomedical Engineering Requirements BME 100, 315, 320, 330, 405, 419, 420, 433, 450, 490	21

Required Courses	Credit Hours
Track Requirements for Biomedical Engineering	
Cell and Tissue Engineering CS 105, MMAE 200, MS 201, CHEM 237, 239, CHE 202, BME 301, 308, 435, 482, Two (2) BME Electives (6 credit hours)	36
Neural Engineering CS 115, ECE 212, 213, 214, 218, BME 309, 443, 445, 438, MATH 333 or CHEM 237, Technical Elective or CHEM 239, Three (3) BME Electives (9 credit hours)	37/38
Medical Imaging CS 201, ECE 213, 437, 475, 481 BME 309, 438, 443, 445, PHYS 224 or CHEM 237, MATH 333 or CHEM 239, One (1) BME Elective (3 credit hours)	35/36
Cell and Tissue Engineering - Total Credit Hours	**131**
Neural Engineering - Total Credit Hours	**132/133**
Medical Imaging - Total Credit Hours	**132/133**

Biomedical Engineering Curriculum
Cell and Tissue Track

Semester 1		Lect. Hrs.	Lab. Hrs.	Cr. Hrs.
BIOL 107	General Biology Lectures	3	0	3
CHEM 124	Principles of Chemistry (w/lab)	3	3	4
MATH 151	Calculus I	4	1	5
BIOL 109	General Biology Laboratory	1	2	2
BME 100	Introduction to the Profession	3	0	3
Totals		**14**	**6**	**17**

Semester 2		Lect. Hrs.	Lab. Hrs.	Cr. Hrs.
BIOL 115	Human Biology	3	0	3
CHEM 125	Principles of Chemistry (w/lab)	3	3	4
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Totals		**13**	**7**	**16**

Semester 3				
Humanities or Social Science Elective		3	0	3
MATH 252	Introduction to Differential Equations	4	0	4
MMAE 200	Introduction to Mechanics*	3	0	3
ECE 211	Circuit Analysis I	3	0	3
CS 105	Introduction to Computer Programming I	2	1	2
Totals		**15**	**1**	**15**

Semester 4				
Humanities or Social Science Elective		3	0	3
MATH 251	Multivariate and Vector Calculus	4	0	4
MS 201	Materials Science*	3	0	3
BIOL 117	Experimental Biology	1	2	2
PHYS 221	Electromagnetism and Optics	3	3	4
Totals		**14**	**5**	**16**

Semester 5				
Humanities or Social Science Elective		3	0	3
BME Elective*		3	0	3
CHEM 237	Organic Chemistry I*	3	4	4
BME 330	Analysis of Biosignals and Systems	3	0	3
CHE 202	Material and Energy Balances	2	2	3
BME 315	Instrumentation Laboratory	1	3	2
Totals		**15**	**9**	**18**

Semester 6				
Humanities or Social Science Elective		3	0	3
BME 308	Reaction Kinetics	3	0	3
CHEM 239	Organic Chemistry II*	3	0	3
IPRO I	Interprofessional Project I	1	6	3
BME 301	BioFluid Mechanics	3	0	3
BME 320	Fluids Laboratory	0	3	1
Totals		**13**	**9**	**16**

Semester 7				
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
BME 482	Mass Transport for Biomedical Engineers	3	0	3
BME 435	Thermodynamics of Living Systems	3	0	3
BME 450	Animal Physiology	3	0	3
BME 405	Physiology Laboratory	0	3	1
BME 419	Introduction to Design	1	0	1
Totals		**15**	**3**	**17**

Semester 8				
Humanities or Social Science Elective		3	0	3
BME Elective**		3	0	3
BME 420	Design Concepts in Biomedical Engineering	3	0	3
IPRO II	Interprofessional Project II	1	6	3
BME 490	Senior Seminar	1	0	1
BME 433	Biostatistics	3	0	3
Totals		**14**	**6**	**16**

Total Credit Hours **131**

* Students pursuing premed may take Chem 237 and 239 in the sophomore year and MMAE 200 and MS 201 in the junior year without any prerequisite problems.

**BME elective must be an engineering course in BME, ECE, CHE, or MMAE

Biomedical Engineering Curriculum
Neural Engineering Track

Semester 1		Lect. Hrs.	Lab. Hrs.	Cr. Hrs.
BIOL 107	General Biology Lectures	3	0	3
CHEM 124	Principles of Chemistry (w/lab)	3	3	4
MATH 151	Calculus I	4	1	5
BIOL 109	General Biology Laboratory	1	2	2
BME 100	Introduction to the Profession	3	0	3
Totals		**14**	**6**	**17**

Semester 2		Lect. Hrs.	Lab. Hrs.	Cr. Hrs.
BIOL 115	Human Biology	3	0	3
CHEM 125	Principles of Chemistry (w/lab)	3	3	4
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Totals		**13**	**7**	**16**

Semester 3				
Humanities or Social Science Elective		3	0	3
MATH 252	Differential Equations	4	0	4
ECE 211	Circuit Analysis I	3	0	3
ECE 212	Analog and Digital Laboratory	0	3	1
ECE 218	Digital Systems	3	0	3
CS 115	Object-Oriented Programming I	2	1	2
Totals		**15**	**4**	**16**

Semester 4				
Humanities or Social Science Elective		3	0	3
BIOL 117	Experimental Biology	1	2	2
MATH 251	Multivariate and Vector Calculus	4	0	4
ECE 213	Circuit Analysis II	3	0	3
ECE 214	Analog and Digital Laboratory II	0	3	1
PHYS 221	Electromagnetism and Optics	3	3	4
Totals		**14**	**8**	**17**

Semester 5				
Humanities or Social Science Elective		3	0	3
BME 309	Biomedical Imaging and Sensing	3	0	3
BME 330	Analysis of Biosignals and Systems	3	0	3
BME 315	Instrumentation Laboratory	1	3	2
MATH 333	Matrix Algebra and Complex Variables			
	OR	3	0/4	3/4
CHEM 237	Organic Chemistry I			
BME Elective*		3	0	3
Totals		**13**	**3/7**	**17/18**

Semester 6				
Humanities or Social Science Elective		3	0	3
CHEM 239	Organic Chemistry II			
	OR	3	0	3
	Technical Elective			
IPRO I	Interprofessional Project I	1	6	3
BME 443	Biomedical Instrumentation and Electronics	3	0	3
BME 445	Quantitative Neural Function	3	0	3
BME 320	Fluids Laboratory	0	3	1
Totals		**13**	**9**	**16**

Semester 7				
Humanities or Social Science Elective		3	0	3
BME Elective*		3	0	3
BME Elective*		3	0	3
BME 450	Animal Physiology	3	0	3
BME 405	Physiology Laboratory	0	3	1
BME 419	Introduction to Design	1	0	1
IPRO II	Interprofessional Project II	1	6	3
Totals		**14**	**9**	**17**

Semester 8				
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
BME 420	Design Concepts in Biomedical Engineering	3	0	3
BME 438	NeuroImaging	3	0	3
BME 490	Senior Seminar	1	0	1
BME 433	Biostatistics	3	0	3
Totals		**16**	**0**	**16**

Total Credit Hours **132-133**

* BME elective must be an engineering course in BME, ECE, CHE, or MMAE

Biomedical Engineering Curriculum
Medical Imaging Track

Semester 1		Lect. Hrs.	Lab. Hrs.	Cr. Hrs.
BIOL 107	General Biology Lectures	3	0	3
CHEM 124	Principles of Chemistry (w/lab)	3	3	4
MATH 151	Calculus I	4	1	5
BIOL 109	General Biology Laboratory	1	2	2
BME 100	Introduction to the Profession	3	0	3
Totals		**14**	**6**	**17**

Semester 2		Lect. Hrs.	Lab. Hrs.	Cr. Hrs.
BIOL 115	Human Biology	3	0	3
CHEM 125	Principles of Chemistry (w/lab)	3	3	4
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Totals		**13**	**7**	**16**

Semester 3				
Humanities or Social Science Elective		3	0	3
MATH 252	Differential Equations	4	0	4
ECE 211	Circuit Analysis I	3	0	3
CS 201	Accelerated Introduction to Computer Science	3	2	4
PHYS 221	Electromagnetism and Optics	3	3	4
Totals		**16**	**5**	**18**

Semester 4				
Humanities or Social Science Elective		3	0	3
MATH 251	Multivariate and Vector Calculus	4	0	4
BIOL 117	Experimental Biology	1	2	2
ECE 213	Circuit Analysis II	3	0	3
PHYS 224	Thermal and Modern Physics **OR**	3	0/4	3/4
Chem 237	Organic Chemistry I			
Totals		**14**	**2/6**	**15/16**

Semester 5				
Humanities or Social Science Elective		3	0	3
BME Elective*		3	0	3
BME 309	Biomedical Imaging and Sensing	3	0	3
BME 315	Instrumentation Laboratory	1	3	2
BME 330	Analysis of Biosignals and Systems	3	0	3
MATH 333	Matrix Algebra and Complex Variable **OR**	3	0	3
CHEM 239	Organic Chemistry II			
Totals		**16**	**3**	**17**

Semester 6				
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
BME 320	Fluids Laboratory	0	3	1
BME 433	Biostatistics	3	0	3
BME 445	Quantitative Neural Function	3	0	3
IPRO I	Interprofessional Project I	1	6	3
Totals		**13**	**9**	**16**

Semester 7				
Humanities or Social Science Elective		3	0	3
BME 450	Animal Physiology	3	0	3
BME 405	Physiology Laboratory	0	3	1
BME 419	Introduction to Design	1	0	1
ECE 437	Digital Signal Processing	3	0	3
ECE 475	Random Phenomena in EE	3	0	3
IPRO II	Interprofessional Project II	1	6	3
Totals		**14**	**9**	**17**

Semester 8				
Humanities or Social Science Elective		3	0	3
BME 438	NeuroImaging	3	0	3
BME 420	Design Concepts in Biomedical Engineering	3	0	3
BME 443	Biomedical Instrumentation and Electronics	3	0	3
BME 490	Senior Seminar	1	0	1
ECE 481	Image Processing	3	0	3
Totals		**16**	**0**	**16**

Total Credit Hours **132-133**

* BME elective must be an engineering course in BME, ECE, CHE, or MMAE

Stuart School of Business

Department Web site: www.iit.edu/~usb

The Undergraduate Program in Business was re-established in 2003. Through its programs in leadership, interprofessional projects, entrepreneurship and business, the program helps prepare a new generation of men and women qualified to lead the companies and organizations of tomorrow in the face of a rapidly evolving global economy and technology base. The School delivers an innovative "techno-business" educational experience that results in unique value propositions for our students, faculty and partners.

The Stuart School of Business offers two undergraduate business degrees:

- Bachelor of Science in Business Administration
- Bachelor of Science in Business Administration and Applied Science

These are distinctive programs designed to educate students to deal with the problems of an increasingly complex business environment where an understanding of emerging technology is central to the practice of business administration.

The objectives of both of these programs are to provide future business managers and leaders with:

- A solid technological foundation for the new and emerging business environment
- A fundamental grounding in traditional skills of business such as accounting, economics, finance, marketing, management, and social skills
- An understanding of the interdisciplinary nature of management in today's complex businesses.

The Interprofessional Projects (IPRO) Program

The Interprofessional Projects Program provides all undergraduate students with the opportunity to work on multidisciplinary project teams to solve real world problems. These projects develop communication, teamwork, and leadership skills, as well as an awareness of economic marketing, ethical and social issues. See the General Education requirements on page 25.

The Ed Kaplan Entrepreneurial Studies Program

The Ed Kaplan Entrepreneurial Studies Program offers programs designed to help students develop an understanding of the role of entrepreneurship in our society and the characteristics of entrepreneurial businesses, as well as an introduction to the basic business skills that are needed to be successful in an entrepreneurial environment.

The Leadership Academy

The Leadership Academy identifies and supports students with exceptional leadership potential and provides a leadership development curriculum for all undergraduates.

Stuart School of Business

Faculty

Dean of the Stuart School of Business
Harvey Kahalas

Associate Dean and Director of Undergraduate Programs
Thomas C. Anderson
Room 4A5 IGT Central
Ext. 73983

Director of Interprofessional Projects
Thomas Jacobuis

Director of Ed Kaplan Entrepreneurial Studies Program
Jay Fisher

Director of the Leadership Academy
Bruce Fisher

Professors
Bilson, Geisler, Goldhar, Hassan, Kahalas, Knowles, Ong, Tourk

Associate Professors
Bariff, Kelly, Khalili, Liao, Prabhaker, Wickramasinghe

Assistant Professors
Durango-Cohen

Clinical Professors
Twombly

Clinical Associate Professor
T. Anderson, Hamilton

Clinical Assistant Professors
Jabbari

Industry Professor
Gorham

Industry Associate Professors
Johnson, Nassos, Pistrui

Adjunct Faculty
Anderson, Barstein, Hojnar, Johnson, Krauss, Moltz, Stoner, Quinones

Research Professors
Roberson, Thomopoulos

Senior Lecturers
Black, Braband, Bredine, Ferguson, Mueller

Lecturers
Van Vilet, Wojcik

Instructors
Chaudoin, Phillips

Faculty Emeriti
Calero, Chung, Cohen, Davis, Smith

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. Business fundamentals include accounting, economics, statistics, finance, business law, marketing, management, entrepreneurship, and leadership. Students also take a business concentration that allows them to develop a depth of knowledge in a business area. Currently available concentrations are in Entrepreneurship, Finance, Marketing, International Business, and Human Resources. Individualized concentrations 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, 402, 423, 480, ECON 151, 152	48
Business Electives At least 19 hours in a designated business concentration. Courses are selected individually with the student's adviser. Concentrations include: Entrepreneurship, Finance, Marketing, Human Resources Management, and International Business. The International Business concentration requires a semester abroad.	19
Mathematics Requirements MATH 120, 121	6
Science Requirements	13
Humanities and Social Science Requirements See general education requirements on page 25	21
Computer Science Requirement CS 105	2
Interprofessional Projects One of which must be an entrepreneurial IPRO	6
Free Electives	5
Technical Electives	6
Total Credit Hours	**126**

Business Administration Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
BUS 100	Introduction to the Profession	1	2	2
ECON 151	Economics of the Firm	3	0	3
MATH 120	Business Mathematics I	3	0	3
CS 105	Introduction to Computer Programming I	2	1	2
CHEM 124	Principles of Chemistry I	3	3	4
Totals		**12**	**6**	**14**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
BUS 221	Statistics for Managerial Decision Making	3	0	3
ECON 152	National & Global Enonomics	3	0	3
MATH 121	Business Mathematics II	3	0	3
PHYS 211	Basic Physics I	3	0	3
Humanities Elective		3	0	3
Social Science Elective		3	0	3
Totals		**18**	**0**	**18**

Semester 3				
BUS 211	Financial Accounting	3	0	3
BUS 301	Theory of Organization and Management	3	0	3
BIOL 107	General Biology Lectures	3	0	3
PHYS 212	Basic Physics II	3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 4				
BUS 212	Managerial Accounting	3	0	3
BUS 305	Operations Management	3	0	3
BUS 341	Business Law	3	0	3
BUS 351	Finiancial Management	3	0	3
Social Science Elective		3	0	3
Humanities Elective		3	0	3
Totals		**18**	**0**	**18**

Semester 5				
BUS 311	Strategic Cost Management	3	0	3
BUS 321	Management Science	3	0	3
BUS 361	Introduction to Entrepreneurship	3	0	3
BUS 371	Introduction to Marketing	3	0	3
Social Science Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 6				
Business Elective*		2	0	2
Business Elective*		2	0	2
Business Elective*		3	0	3
IPRO/EnPRO		1	6	3
Free Elective		3	0	3
Humanities Elective		3	0	3
Totals		**14**	**6**	**16**

Semester 7				
Business Elective*		3	0	3
Business Elective*		3	0	3
BUS 423	Management Information Systems	3	0	3
IPRO/EnPRO		1	6	3
Technical Elective		3	0	3
Totals		**13**	**6**	**15**

Semester 8				
BUS 402	Leadership Seminar	0	3	1
BUS 480	Business Strategy	3	0	3
Business Elective*		3	0	3
Business Elective*		3	0	3
Technical Elective		3	0	3
Free Elective		2	0	2
Totals		**14**	**3**	**15**

Minimum Credit Hours **126**

* At least 13 semester hours in a designated concentration.

Stuart School of Business

Bachelor of Science in Business Administration and Applied Science

The Bachelor of Science in Business Administration and Applied Science provides a solid foundation in business fundamentals along with an excellent technology foundation which includes a minimum of 51 hours of mathematics, science and engineering courses. Business fundamentals include accounting, economics, statistics, finance, business law, marketing, management, entrepreneurship, and leadership. The technology curricula includes core mathematics and sciences and a concentration in a technology discipline that will help prepare students to work in a technology based industry. Concentrations include life sciences, chemistry, design, information technology, construction management material science, mechanical engineering, and environmental management.

Bachelor of Science in Business Administration and Applied Science

Required Courses	Credit Hours
Business Requirements BUS 100, 211, 212, 221, 301, 305, 311, 321, 341, 351, 361, 371, 402, 423, 480, ECON 151, 152	48
Business Electives	6
Mathematics Requirements MATH 151, 152	10
Science Requirements CHEM 124, PHYS 123, 221, BIOL 107	15
Humanities and Social Science Requirement See general education requirements on page 26	21
Computer Science Requirement CS 115	2
Interprofessional Projects One of which must be an entrepreneurial IPRO	6
Technical Concentration Technical courses chosen individually with the student's adviser to provide a concentration in a specific technology or technologies related to a specific industry. Concentrations include: Chemistry, Life Sciences, Information Technology, Design, Environmental Management, Construction Management, Material Science, and Mechanical Engineering.	23
Total Credit Hours	**131**

Business Administration and Applied Science Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
BUS 100	Introduction to the Profession	1	2	2
ECON 151	Economics of the Firm	3	0	3
MATH 151	Calculus I	4	1	5
CS 115	Object-Oriented Programming I	2	1	2
CHEM 124	Principles of Chemistry I	3	3	4
Totals		**13**	**7**	**16**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
BUS 221	Statistics for Managerial Decision Making	3	0	3
ECON 152	National & Global Enonomics	3	0	3
MATH 152	Calculus II	4	1	5
PHYS 123	General Physics I	3	3	4
Humanities Elective		3	0	3
Totals		**16**	**4**	**18**

Semester 3				
BUS 211	Financial Accounting	3	0	3
BUS 301	Theory of Organization and Management	3	0	3
BIOL 107	General Biology	3	0	3
PHYS 221	General Physics II	3	3	4
Social Science Elective		3	0	3
Totals		**15**	**3**	**16**

Semester 4				
BUS 212	Managerial Accounting	3	0	3
BUS 305	Operations Management	3	0	3
BUS 341	Business Law	3	0	3
BUS 351	Financial Management	3	0	3
Technical Elective		3	0	3
Humanities Elective		3	0	3
Totals		**18**	**0**	**18**

Semester 5				
BUS 311	Strategic Cost Management	3	0	3
BUS 321	Management Science	3	0	3
BUS 361	Introduction to Entrepreneurship	3	0	3
BUS 371	Introduction to Marketing	3	0	3
Technical Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 6				
Business Elective		3	0	3
Technical Elective		3	0	3
Technical Elective		3	0	3
Humanities Elective		3	0	3
IPRO/EnPRO		1	6	3
Social Sciences Elective		3	0	3
Totals		**16**	**6**	**18**

Semester 7				
BUS 423	Management Information Systems	3	0	3
Business Elective		3	0	3
Technical Elective		3	0	3
Technical Elective		3	0	3
IPRO/EnPro		1	6	3
Totals		**13**	**6**	**15**

Semester 8				
BUS 402	Leadership Seminar	0	3	1
BUS 480	Business Strategy	3	0	3
Technical Elective		2	0	2
Technical Elective		3	0	3
Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**3**	**15**

Total Credit Hours **131**

Chemical and Environmental Engineering

Department Web site: www.chee.iit.edu

The Department offers leading edge research and education programs in Chemical Engineering, Biological Engineering, and Environmental Engineering. These programs are aimed to prepare engineers for the technological challenges of the 21st century, by providing the 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, to 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. Specific chemical and biological engineering outcomes are detailed at http://www.chee.iit.edu/undergrad/objectives.htm.

A B.S. degree is offered in Chemical Engineering. M.S., Professional Master's, and Ph.D. degree programs are offered in chemical and environmental engineering. A Professional Master's degree is offered in biological engineering. M.S. and Professional Master's degree programs are also offered in food processing engineering as well as a combination of chemical engineering/computer science degree, and an internet-based Master of Gas Engineering. The Department also offers a B.S./M.D. program in engineering and Medicine (see page 142) and a combined undergraduate/graduate law program (see page 141).

Faculty

Chair
Fouad A. Teymour
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Associate Chair for Undergraduate Affairs
Javad Abbasian
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Professors
Arastoopour (Max McGraw Professor and Dean of Armour College of Engineering), Bernstein, Cinar (Dean of the Graduate College and Associate Vice Provost for Research), Gidaspow (Distinguished University Professor), Linden (Max McGraw Professor and Director of Energy and Power Center), Moschandreas, Myerson (Provost and Senior Vice President), Noll, Parulekar, Prakash (Director of Center of Excellence for Electrochemical Science and Engineering), Schieber (Director of Center of Excellence in Polymer Science and Engineering), Teymour (Johnson Polymer Professor and Chair), Venerus (Associate Chair for Graduate Affairs), Wasan (Motorola Professor and Vice President for International Affairs)

Associate Professors
Abbasian (Gas Technology Institute Associate Professor and Associate Chair for Undergraduate Affairs), Anderson (Director, Rice Campus Program), Chmielewski, Pagilla, Pérez-Luna

Assistant Professors
Gidalevitz, Ramani

Lecturer
Aderangi (Director of Undergraduate Laboratory)

Research Professors
Al-Hallaj (Coordinator of the Renewable Energy Program), Hatziavramidis (Director of the Particle Technology and Crystallization Center), Ivanov, Nagy, Nikolov, Plomp, Sandi, Selman

Adjunct Professors
Caracotsios, Knowlton, Lindahl,

Faculty Emeritus
Swanson

Special Program Note for the Chemical Engineering Program

The Interprofessional Project Experience

Students in the chemical engineering program must be enrolled in six credits of Interprofessional Projects according to the following format:

- CHE/IPRO 296 Introduction to IPROs (1 credit)
- IPRO 497 Interprofessional Project (3 credits)
- CHE/IPRO 496 Design IPRO (2 credits)

IPRO 497 provides the opportunity to enroll in an IPRO offered by any academic unit. CHE/IPRO 296 and CHE/IPRO 496 create a package to accomplish interdisciplinary teamwork for process design. CHE/IPRO 496 students attend one lecture weekly on process design and a weekly two-hour meeting with the expanded IPRO group and their project adviser. The expanded IPRO group consists of the CHE/IPRO 496 students, CHE/IPRO 296 students and students from other academic units who have registered for the relevant IPRO 497 sections (3 credit hours). CHE/IPRO 296 students provide support to the specific design activity through literature survey, data generation and use of design software as appropriate. CHE/IPRO 496 students are responsible for developing and designing the process. IPRO 497 students enrich the project by extending the work into their areas of specialization.

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 and Process Design IPRO) 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 equally 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.

Chemical and Environmental Engineering

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

These programs are described on pages 68-69.

Students may also choose a minor program from the list on pages 136-138.

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
Major Courses	
Chemical Engineering Requirements CHE 100, 101, 202, 301, 302, 311, 317, 351, 406, 418, 423, 433, 435, 439, 451, 494	43
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 125, 237, 239, 343, 344*	18
Computer Science Requirement CS 105	2
Electrical and Computer Engineering Requirement ECE 211 or 218	3
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Technical Electives	12
Interprofessional Projects CHE/IPRO 296, CHE/IPRO 496, IPRO 497	6
Total Credit Hours	**131**

*Students have the option of replacing CHEM 344 with BIOL 403.

Chemical Engineering Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
CHE 100	Introduction to the Profession I	1	2	2
MATH 151	Calculus I	4	1	5
CHEM 125	Principles of Chemistry II*	3	3	4
CS 105	Introduction to Computer Programming I	2	1	2
Humanities Elective		3	0	3
Totals		**13**	**7**	**16**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
CHE 101	Introduction to the Profession II	1	2	2
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Social Science Elective		3	0	3
Totals		**11**	**6**	**14**

Semester 3				
CHE 202	Material and Energy Balances	3	0	3
MATH 252	Introduction to Differential Equations	4	0	4
CHEM 237	Organic Chemistry I	3	4	4
PHYS 221	Electromagnetism and Optics	3	3	4
Humanities Elective		3	0	3
Totals		**16**	**7**	**18**

Semester 4				
CHE/ IPRO 296	Introduction to IPRO†	0	2	1
CHE 301	Fluid Mechanics	3	0	3
MATH 251	Multivariate and Vector Calculus	4	0	4
CHEM 239	Organic Chemistry II	3	0	3
CHEM 343	Physical Chemistry I	3	0	3
Social Science Elective		3	0	3
Totals		**16**	**2**	**17**

Semester 5				
CHE 302	Heat and Mass Transfer Operations	3	0	3
CHE 311/412	Foundations of Biological Science for Engineering	3	0	3
CHE 351	Thermodynamics I	3	0	3
ECE 211	Circuit Analysis I			
	OR	3	0	3
ECE 218	Digital Systems			
Humanities Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 6				
CHE 317	Chemical and Biological Engineering Laboratory I	1	3	2
CHE 451	Thermodynamics II	2	0	2
CHE 433	Process Modeling and System Theory	3	0	3
CHEM 344	Physical Chemistry II			
	OR	3/4	4/0	4
BIOL 403	Biochemistry Lecture			
IPRO 497	Interprofessional Project	1	6	3
Technical Elective		3	0	3
Totals		**13/14**	**9/13**	**17**

Semester 7				
CHE 418	Chemical and Biological Engineering Laboratory II	1	3	2
CHE 423	Chemical Reaction Engineering	3	0	3
CHE 435	Process Control	3	0	3
CHE 494	Process Design	2	2	3
Technical Elective		3	0	3
Social Science Elective		3	0	3
Totals		**15**	**5**	**17**

Semester 8				
CHE 406	Transport Phenomena	3	0	3
CHE 439	Numerical and Data Analysis	3	0	3
CHE/ IPRO 496	Design IPRO†	1	2	2
Technical Elective		3	0	3
Technical Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**16**	**2**	**17**

Total Credit Hours **131**

* Initial placement in CHEM 125 requires consent of the BCPS department.

† Satisfies part of the General Education Requirement for Interprofessional Projects. Only CHE majors may register for CHE/IPRO 296 and CHE/IPRO 496.

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

Chemical and Environmental Engineering

Professional Specializations

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

1. **Energy/Environment/Economics (E^3)**
   Program adviser: 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 481	Flow Through Porous Media and Fundamentals of Reservoir Engineering
CHE 483	Synthetic Energy
CHE 489	Fluidization
CHE 491	Undergraduate Research
CHE 517	Gas Utilization Technologies and Economics
CHE 520	LNG Fundamentals and Technologies
CHE 522	Fundamentals of Combustion
CHE 541	Renewable Energy Technologies
CHE 565	Electrochemical Engineering
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

   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

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

2. **Environmental Engineering**
   Program adviser: D. Moschandreas

   Students must take two courses 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

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

3. **Polymer Science and Engineering**
   Program adviser: J. Schieber

   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 two courses from the following:

CHE 538	Polymerization Reaction Engineering
CHE 555	Polymer Processing
CHE 575	Polymer Rheology
CHE 581	Processing and Applications of Polymer Composite Materials
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

Professional Specializations continued

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

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

4. Bioengineering

Program advisers: S. Parulekar and V. Pérez-Luna

Bioengineering has two career specializations:

Biomedical Engineering

Students must take the following three courses:

BIOL 107	General Biology Lectures
BIOL 115	Human Biology
CHE 577	Bioprocess Engineering

One elective is chosen from the following:

BIOL 214	Genetics and Genetics Technology
	OR
BIOL 414	Genetics for Engineering Scientists
BIOL 403	Biochemistry Lectures
BIOL 430	Animal Physiology
BIOL 445	Cell Biology
CHE 491	Undergraduate Research

Biotechnology

Students must take the following course:

CHE 577	Bioprocess Engineering

Three electives are chosen from the following:

BIOL 107	General Biology Lectures
BIOL 214	Genetics and Genetic Technology
	OR
BIOL 414	Genetics for Engineering Scientists
BIOL 403	Biochemistry Lectures
BIOL 423	Microbial Genetics Laboratory
BIOL 445	Cell Biology
FPE 505	Food Microbiology

5. Process Design and Operation

Program adviser: D. Chmielewski

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

Two courses must be taken from the following:

CHE 426	Statistical Tools for Engineers
CHE 431	Artificial Intelligence Applications in Engineering
CHE 437	Discrete Time Systems and Computer Control
CHE 507	Computer-Aided Design
CHE 508	Process-Design Optimization
CHE 528	Analysis and Simulation of Chemical Processing
CHE 530	Advanced Process Control
CHE 532	Process Modeling
CHE 560	Statistical Quality and Process Control

Two courses must be selected from the following (only one may be an ENVE course):

CHE 402	Introduction to Microelectronics Fabrication Technology
CHE 430	Petrochemical Process Operations and Design
CHE 465	Electrochemical Energy Conversion
CHE 475	Food Engineering I
CHE 476	Food Engineering II
CHE 489	Fluidization
CHE 491	Undergraduate Research
CHE 571	Food Process Engineering
CHE 572	Advanced Food Process Engineering
ENVE 463	Introduction to Air Pollution Control
ENVE 476	Engineering Control of Industrial Hazards
ENVE 485	Pollution Prevention
ENVE 578	Physical and Chemical Processes for Industrial Gas Cleaning
ENVE 580	Hazardous Waste Engineering
FPE 521	Food Process Engineering
FPE 522	Advanced Food Process Engineering

Civil and Architectural Engineering

Civil Engineering

Department Web site: www.iit.edu/~ce

The objective of the civil engineering program is to produce graduates who are prepared to enter the civil engineering profession. Also, this program will prepare students to begin graduate studies in engineering. This 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 degree 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, concrete, 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.

The Department of Civil and Architectural Engineering provides introductory undergraduate education in these six subdisciplines of civil engineering and provides professional specializations in the areas of structural, geotechnical, transportation, civil-environmental, construction engineering and architectural engineering. The department also offers graduate degree programs and conducts research in the areas of structural engineering, geotechnical engineering, transportation engineering, and construction engineering and management. In addition, the department provides undergraduate service courses to the College of Architecture in the area of structural engineering and through minors in construction management and fire protection and safety engineering.

Students may choose a professional specialization as described on the following pages, or one of the following minors: Air Force Aerospace Studies, Military Science and Naval Science (see pages 136-138).

Architecture students who plan to pursue a master's degree in structural engineering should take CAE 303, 304, 307, 310, 315, 431 and 432. 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 and Architectural Engineering for information concerning this examination.

Faculty

Chair
Jamshid Mohammadi
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Associate Chair
John O'Leary
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Professors
Arditi, Mohammadi

Adjunct Professors
Carreira, Domel, Gill, Jahedi, Paintal, Pinjarkar

Associate Professors
Budiman, O'Leary, Shen, Shi

Adjunct Associate Professors
Fazio, Kurzydlo, Lemming, Popescu

Assistant Professors
Li, Megri, Muehleisen

Adjunct Assistant Professors
Frano, Nordmeyer

Senior Lecturer
De Santiago, Novak

Faculty Emerti
Chu, Dygdon, Guralnick, Khisty, Milbradt

Bachelor of Science in Civil Engineering

Required Courses	Credit Hours
Civil Engineering Requirements CAE 100, 101, 105, 221, 301, 302, 303, 304, 307, 310, 312, 315, 323, 419, 431, 432, 457, 470	54
CAE Electives	6
Technical Electives*	9
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 224	11
IPRO Capstone Design	3
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Engineering Course Requirements MMAE 201, 202, 305	9
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Total Credit Hours	**137**

* Of the total of three technical electives, one must be a junior-year IPRO.

Civil Engineering Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151	Calculus I	4	1	5
CHEM 124	Principles of Chemistry I	3	3	4
CAE 100	Introduction to the Profession I	2	2	3
CAE 105	Geodetic Science	2	3	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**9**	**18**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152	Calculus II	4	1	5
CS 105	Introduction to Computer Programming I	2	1	2
CAE 101	Introduction to the Profession II	1	4	3
PHYS 123	Mechanics	3	3	4
Humanities or Social Science Elective		3	0	3
Totals		**13**	**9**	**17**

Semester 3				
MATH 251	Calculus III	4	0	4
MMAE 201	Mechanics of Solids I	3	0	3
CAE 221	Engineering Geology	2	2	3
PHYS 221	Electromagnetism and Optics	3	3	4
Humanities or Social Science Elective		3	0	3
Totals		**15**	**5**	**17**

Semester 4				
MATH 252	Introduction to Differential Equations	4	0	4
MMAE 305	Dynamics	3	0	3
MMAE 202	Mechanics of Solids II	3	0	3
PHYS 224	Thermal and Modern Physics	3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**16**	**0**	**16**

Semester 5				
CAE 301	Hydraulics and Hydrology	2	3	3
CAE 303	Structural Design I	3	0	3
CAE 304	Structural Analysis I	2	3	3
CAE 312	Engineering Systems Analysis	3	0	3
CAE 315	Materials of Construction	2	3	3
CAE or Technical Elective*		3	0	3
Totals		**15**	**9**	**18**

Semester 6				
CAE 302	Fluid Mechanics and Hydraulics	3	0	3
CAE 307	Structural Design II	2	3	3
CAE 310	Structural Analysis II	2	3	3
CAE 323	Soil Mechanics	2	3	3
CAE or Technical Elective*		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**15**	**9**	**18**

Semester 7				
CAE 419	Transportation Engineering and Design	3	0	3
CAE 431	Steel Design	3	0	3
CAE 457	Geotechnical Foundation Design	3	0	3
CAE 470	Construction Methods and Cost Estimating	2	3	3
CAE or Technical Elective*		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**17**	**3**	**18**

Semester 8				
CAE 432	Concrete and Foundation Design	3	0	3
CAE or Technical Elective*		3	0	3
CAE or Technical Elective*		3	0	3
IPRO Capstone design course		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**15**	**0**	**15**

Total Credit Hours **137**

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

* At least two courses must be CAE 400-level courses and one of the remaining technical electives must be a junior year IPRO.

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 adviser and chair.

Structural Engineering: CAE 408, Bridge and Structural Design; CAE 420, Dynamics of Structures; CAE 430, Probability Concepts in Civil Engineering; CAE 435, Experimental Analysis of Structures; and CAE 442, Finite Elements Methods in Framed Structures.

Construction Engineering and Management: CAE 471, Construction Planning and Scheduling; CAE 472, Construction Site Operation; and CAE 473, Construction Project Administration.

Geotechnical Engineering: CAE 415, Pavement Design, Construction and Maintenance; CAE 442, Finite Element Methods in Framed Structures; and 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; and CAE 430, Probability Concepts in Civil Engineering.

Civil-Environmental Engineering: ENVE 401, Introduction to Water Resources Engineering; CAE 482, Hydraulic Design of Open Channel Systems; and an appropriate elective approved by the student's academic adviser.

Architectural Engineering

Department Web site: www.iit.edu/~ce

The objective of the architectural engineering program is to produce graduates who are prepared to enter the architectural engineering profession. Also, this program will prepare students to begin graduate studies in engineering. This 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; acoustic; 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.

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 and Architectural Engineering for information concerning this examination.

Bachelor of Science in Architectural Engineering

Required Courses	Credit Hours
Architectural Engineering Requirements CAE 100, 101, 105, 302, 303, 304, 307, 309, 312, 315, 323, 331, 334, 383, 461, 464, 468, 469, 470, 471	59
IPRO Capstone design course	3
Technical Electives*	12
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Engineering Course Requirements MMAE 201, MMAE 202	6
Humanities Requirement AAH 119	3
Humanities and Social Science Electives See general education requirements on page 25	18
Total Credit Hours	**136**

* Of the total of four technical electives, one must be a junior-year IPRO.

Architectural Engineering Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
CAE 100	Introduction to the Profession I	2	2	3
CAE 105	Geodetic Science	2	3	3
CHEM 124	Principles of Chemistry I	3	3	4
MATH 151	Calculus I	4	1	5
Humanities or Social Science Elective		3	0	3
Totals		**14**	**9**	**18**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
CAE 101	Introduction to the Profession II	1	4	3
CS 105	Introduction to Computer Programming I	2	1	2
PHYS 123	Mechanics	3	3	4
MATH 152	Calculus II	4	1	5
Humanities or Social Science Elective		3	0	3
Totals		**13**	**9**	**17**

Semester 3				
MMAE 201	Mechanics of Solids I	3	0	3
PHYS 221	Electromagnetism and Optics	3	3	4
MATH 251	Multivariate and Vector Calculus	4	0	4
AAH 119	History of World Architecture I	3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**16**	**3**	**17**

Semester 4				
MMAE 202	Mechanics of Solids II	3	0	3
PHYS 224	Thermal and Modern Physics	3	0	3
MATH 252	Introduction to Differential Equations	4	0	4
CAE 302	Fluid Mechanics and Hydraulics	3	0	3
CAE 309	Thermodynamics and Heat Transfer	4	0	4
Totals		**17**	**0**	**17**

Semester 5				
CAE 315	Material of Construction	2	3	3
CAE 312	Engineering Systems Analysis	3	0	3
CAE 303	Structural Design I	3	0	3
CAE 304	Structural Analysis I	2	3	3
CAE 331	Building Science	3	0	3
CAE 383	Electrical and Electronic Circuits	3	0	3
Totals		**16**	**6**	**18**

Semester 6				
CAE 307	Structural Design II	2	3	3
CAE 323	Soil Mechanics	2	3	3
CAE 334	Illumination and Acoustics	3	0	3
CAE 461	Plumbing and Fire Protection Design	3	0	3
Humanities or Social Science Elective		3	0	3
Technical Elective*		3	0	3
Totals		**16**	**6**	**18**

Semester 7				
CAE 470	Construction Methods and Cost Estimating	2	3	3
CAE 468	Architectural Design	2	1	2
CAE 464	HVAC Systems Design	3	0	3
Technical elective*		3	0	3
Technical elective*		3	0	3
Humanities and Social Science Elective		3	0	3
Totals		**16**	**4**	**17**

Semester 8				
CAE 471	Construction Planning and Scheduling	3	0	3
CAE 469	Architectural Studio	0	4	2
IPRO-Capstone design course		3	0	3
Technical elective*		3	0	3
Humanities and Social Science Elective		3	0	3
Totals		**12**	**4**	**14**

Total Credit Hours **136**

* Of the total of four technical electives, one must be a junior-year IPRO.

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. Three additional credit hours may be any 400 level CAE course taken with prior approval of the student's adviser and chair.

Building Mechanical and Energy: CAE 403, Sound and Vibration Control in Buildings; CAE 463, Building Enclosure Design; CAE 465, Building Energy Conservation Technologies.

Construction Engineering and Management: CAE 312, Engineering Systems Analysis; CAE 421, Risk Assessment Engineering; CAE 472, Construction Site Operation; CAE 473, Construction Project Administration.

Electrical and Illumination: CAE 465, Building Energy Conservation Technologies; CAE 466, Electrical and Communication Systems Design; CAE 467, Lighting Systems Design.

Fire Protection and Life Safety: CAE 422, Sprinklers, Standpipes, Fire Pumps, Special Suppression and Detection Systems; CAE 424, Introduction to Fire Dynamics; CAE 425, Fire Protection and Life Safety in Building Design.

Structural Engineering: CAE 310, Structural Analysis II; CAE 431, Steel and Timber Design; CAE 432, Concrete and Foundation Design; CAE 436, Design of Masonry and Timber Structures.

Engineering Graphics-Optional Programs

Department Web site: www.iit.edu/~ce

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 as used in engineering, science, business and technical work. The graphic language, 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 contact 312-567-3365.

Certificate in Engineering Graphics and CAD Curriculum

Recognizing the need for drafters and designers with a strong background in special areas of graphics, the Department of Civil and Architectural Engineering offers the following engineering graphics certificate programs.

These programs are 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.

EG 105	Engineering Graphics and Design (1-2-2)
EG 305	Advanced Engineering Graphics and Design (2-2-3)
EG 306	Engineering Descriptive Geometry (2-2-3)
EG 405	Mechanical Design Graphics (2-2-3)
EG 406	Technical and Pictorial Illustration (2-2-3)
EG 419	Computer Graphics in Engineering (2-2-3)

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 for advice on appropriate courses.

Engineering Management

Department Web site: www.iit.edu/~engmngt

This program is intended to offer an opportunity to students to obtain skills and competencies that are highly relevant to the rapidly growing face of business and industry — largely engendered by the accelerating development of new technologies and the emerging global economy.

The program objective is to prepare students to become leaders in the corporate world of the 21st century by emphasizing in fundamentals of science, engineering, management and business administration, and by concentrating on the development of critical thinking skills directed toward practical problem solving and informed decision making.

Students will obtain the ability to make decisions concerning technology selection and product process development in ways that combine technical, financial, marketing, human resources and strategic considerations. They will learn how to perform economic analyses for new products, technologies and processes and how 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.

The program has several possibilities for areas of concentration. These areas can be tailored for students who have interests in environmental, manufacturing, fire safety, construction management, transportation, materials and engineering foundations.

Bachelor of Science in Engineering Management

Required Courses	Credit Hours
Mathematics Requirements MATH 151, 152, 251, 474 or 475 (MATH 252 is a prerequisite for some concentrations and may be used as a technical elective)	17
Science Requirements CHEM 124 PHYS 123, 221, 224	15
Introduction to the Profession	2
Computer Science Requirement CS 105	2
Core Management Requirements BUS 210, 301, 305, 371 ECON 211, 423 COM 428	21
Engineering Concentration	24–28
Interprofessional Projects	6
Humanities and Social Science Electives See general education requirements on page 25	21
Technical Electives	9
Business Electives	6
Free Electives	0–4
Total Credit Hours	**127**

Engineering Management Concentrations

The concentrations presently available include:

Engineering Foundations — Credit Hours: 28

MS 201 Materials Science
CHE 202 Material and Energy Balances
MMAE 200 Introduction to Mechanics
MMAE 430 Engineering Measurements
MMAE 484 Materials and Process Selection
PHYS 300 Instrumentation Laboratory
CAE 312 Engineering Systems Analysis
CAE 473 Construction Project Administration
ENVE 485 Pollution Prevention

Manufacturing and Materials Engineering — Credit Hours: 24

MS 201 Materials Science
MMAE 201 Mechanics of Solids I
MMAE 202 Mechanics of Solids II
MMAE 371 Engineering Materials and Design
MMAE 445 CAD/CAM with Numerical Control
MMAE 485 Manufacturing Processes
Two of the following:
- MMAE 370 Materials Laboratory I
- MMAE 444 Design for Manufacture
- MMAE 468 Introduction to Ceramic Materials
- MMAE 480 Forging and Forming
- MMAE 483 Structure/Property Relationships in Polymers
- MMAE 484 Materials and Process Selection

Transportation Engineering — Credit Hours: 24

CAE 105 Geodetic Science
CAE 301 Hydraulics and Hydrology
CAE 312 Engineering Systems Analysis
CAE 323 Soil Mechanics
CAE 412 Traffic Engineering Studies and Design
CAE 416 Facility Design of Transportation Systems
CAE 417 Railroad Engineering and Design
CAE 419 Transportation Engineering and Design

Environmental Engineering — Credit Hours: 25

CHEM 125 Principles of Chemistry II
CHEM 247 Analytical Chemistry
CHEM 343 Physical Chemistry I
CHE 202 Material and Energy Balances
CHE 301 Fluid Mechanics and Heat-Transfer Operations
ENVE 404 Water and Wastewater Engineering
ENVE 463 Introduction to Air Pollution Control
ENVE 485 Pollution Prevention

Construction Engineering & Management — Credit Hours: 28

CAE 105 Geodetic Science
CAE 202 Materials and Strength of Materials
CAE 304 Structural Analysis I
CAE 312 Engineering Systems Analysis
CAE 315 Materials of Construction
CAE 470 Construction Methods and Cost Estimating
CAE 471 Construction Planning and Scheduling
CAE 472 Construction Site Operation
CAE 473 Construction Project Administration

Computer Science

Department Web site: www.cs.iit.edu

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 in Computer Science and Bachelor of Science with specialization 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.

In addition to these programs in computer science, the university offers a Bachelor of Science in Computer Engineering. This program focuses on both the digital electronics hardware used in computer systems and the software that controls this hardware, with an emphasis on the design and implementation of computer-controlled systems. This program is described in detail on page 88

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

- Analyze, design, implement, and test a software solution to "real world" problems.
- Write technical documents such as specifications, design, and users manuals in appropriate formats.
- Orally present deliverables related to Computer Science.
- Be prepared to enter a top-ranked graduate program in Computer Science.
- Have a strong theoretical as well as practical background in Computer Science.
- Have an appreciation of human behavior, culture, interaction, and organization through studies in the humanities and social sciences.
- Have a basic understanding of science and engineering and their linkages to key technologies.
- Have an enthusiasm for the educational process and for professional practices.
- Be able to work in interdisciplinary groups consisting of nontechnical and technical members.

All three 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 Bachelor of Science 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, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives—including computer graphics, artificial intelligence, database systems, computer architecture, and computer networks, 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 adviser to formulate a program that combines experiences across disciplines.

The B.S. with specialization 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).

Computer Science

Faculty

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Associate Chair
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Director of Undergraduate Programs
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Professors
Carlson, Frieder, Kapoor, Reingold, Sun

Associate Professors
Argamon, Grossman, Hood, Korel, Li, Wan

Assistant Professors
Agam, Calinescu, Lan, Ren, Yee

Research Faculty
Elrad, Leung, Roberson, H. Zhang

Clinical Assistant Professor
Goharian

Industry Associate Professor
Chlebus

Senior Lecturers
M. Bauer, Beckman, Sasaki, Soneru

Full-Time Instructors
Bistriceanu, Hanrath, Koutsogiannakis, Saelee, Winans

Faculty Emeriti
C. Bauer, I. Burnstein, Evens, Greene

Adjunct Faculty
Bader, Nogiec

Part-Time Instructors
Aldawud, Choi, Hield

Bachelor of Science in Computer Science

Required Courses	Credit Hours
Computer Science Requirements CS 100, 115, 116*, 330**, 331, 350, 351, 430, 440, 450, 485, 487	33
Computer Science Electives* **	15
Mathematics Requirements MATH 151, 152, 251, (332 or 333), (474 or 475)	20
Mathematics Elective Chosen from MATH 252, 410, 453, 454, 476, 482	3
Science Requirements PHYS 123, 221	8
Science Electives** **	6
Humanities/Social Science Electives See general education requirements on page 25	21
Writing/Speaking Elective COM 421 or COM 428	3
Interprofessional Projects	6
Free Electives	12
Total Credit 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. No courses from any other programs can be used as computer science electives.

**** 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 Computing Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) accredits this program.

Computer Science Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
CS 100	Introduction to the Profession	1	2	2
CS 115	Object-Oriented Programming I	2	1	2
MATH 151	Calculus I	4	1	5
Humanities 100-level Course		3	0	3
Social Science Elective		3	0	3
Totals		**13**	**4**	**15**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
CS 116	Object-Oriented Programming II	2	1	2
CS 330	Discrete Structures	3	0	3
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Humanities Elective		3	0	3
Totals		**15**	**5**	**17**

Semester 3				
CS 331	Data Structures and Algorithms	2	2	3
CS 350	Computer Organization and Assembly Language Programming	2	2	3
MATH 251	Multivariate and Vector Calculus	4	0	4
PHYS 221	Electromagnetism and Optics	3	3	4
Social Science Elective		3	0	3
Totals		**14**	**7**	**17**

Semester 4				
CS 351	System Programming	2	2	3
CS 430	Introduction to Algorithms	3	0	3
MATH 332	Matrices			
	OR			
MATH 333	Matrix Algebra and Complex Variables	3	0	3
Science Elective		3	0	3
Humanities Elective		3	0	3
Totals		**14**	**2**	**15**

Semester 5				
CS 440	Programming Languages and Translators	3	0	3
Computer Science Elective		3	0	3
MATH 474	Probability/Statistics			
	OR			
MATH 475	Probability	3	0	3
Social Science Elective		3	0	3
COM 421	Technical Communication			
	OR			
COM 428	Verbal and Visual Communication	3	0	3
Totals		**15**	**0**	**15**

Semester 6				
CS 450	Operating Systems	3	0	3
Computer Science Elective		3	0	3
Math Elective		3	0	3
IPRO 497	Interprofessional Project I	1	6	3
Free Elective		3	0	3
Totals		**13**	**6**	**15**

Semester 7				
CS 487	Software Engineering	3	0	3
Computer Science Elective		3	0	3
Science Elective		3	0	3
IPRO 497	Interprofessional Project II	1	6	3
Humanities or Social Science Elective		3	0	3
Free Elective		3	0	3
Totals		**16**	**6**	**18**

Semester 8				
CS 485	Computers in Society	3	0	3
Computer Science Elective		3	0	3
Computer Science Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Totals		**15**	**0**	**15**

Total Credit Hours **127**

Computer Science

Bachelor of Science with specialization in Computer Information Systems

Required Courses	Credit Hours
Computer Science Requirements	18
CS 100, 115, 116, 330 (or MATH 230), 331, 350, 351	
Computer Science Technical Electives*	15
Computer Science Electives	6
Mathematics Requirement	5
MATH 151	
Mathematics Elective	3
Science Requirements	
BIOL 107 or 115	3
CHEM 124	4
PHYS 123	4
Science Elective	3

Required Courses	Credit Hours
Humanities Requirement	3
Humanities 100-level course	
Humanities Electives	9
Psychology Requirements	
PSYC 221, 301	6
Social Science Requirement	
PS 200	3
Social Science Electives	6
Interprofessional Projects	6
Minor Courses	15
Free Electives	18
Total Credit Hours	**127**

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

Computer Information Systems Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
CS 100	Introduction to the Profession	1	2	2
CS 115	Object-Oriented Programming I	2	1	2
MATH 151	Calculus I	4	1	5
Humanities	100-level Course	3	0	3
PSYCH 221	Human Behavior Growth and Learning	3	0	3
Totals		**13**	**4**	**15**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
CS 116	Object-Oriented Programming II	2	1	2
Mathematics	Elective	3	0	3
BIOL 115	Human Biology OR			
BIOL 107	General Biology Lectures	3	0	3
Humanities	Elective	3	0	3
Social Science	Elective	3	0	3
Totals		**14**	**1**	**14**

Semester 3				
CS 330	Discrete Structures	3	0	3
CS 331	Data Structures and Algorithms	2	2	3
CHEM 124	Principles of Chemistry I	4	0	4
PS 200	American Government	3	0	3
Humanities	Elective	3	0	3
Totals		**15**	**2**	**16**

Semester 4				
CS 350	Computer Organization and Assembly Language Programming	2	2	3
Computer Science	Technical Elective*	3	0	3
PHYS 123	Mechanics	3	3	4
Minor Course		3	0	3
Computer Science	Elective	3	0	3
Totals		**14**	**5**	**16**

Semester 5				
CS 351	Systems Programming	2	2	3
Science	Elective	3	0	3
Minor Course		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Totals		**14**	**2**	**15**

Semester 6				
Computer Science	Technical Elective*	3	0	3
PSYCH 301	Industrial Psychology	3	0	3
Minor Course		3	0	3
IPRO 497	Interprofessional Project I	1	6	3
Humanities	Elective	3	0	3
Free Elective		3	0	3
Totals		**16**	**6**	**18**

Semester 7				
Computer Science	Technical Elective*	3	0	3
Computer Science	Technical Elective*	3	0	3
Minor Course		3	0	3
Social Science	Elective	3	0	3
Computer Science	Elective	3	0	3
Free Elective		3	0	3
Totals		**18**	**0**	**18**

Semester 8				
IPRO 497	Interprofessional Project II	1	6	3
Computer Science	Technical Elective*	3	0	3
Minor Course		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Totals		**13**	**6**	**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 or both 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 Educational Services. A minimum of 4 courses are required for a specialization.

Information Security: 4 courses required

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

Information and Knowledge Management Systems: 4 courses required

Students must take the following courses:

CS 425	Database Organization
CS 482	Information and Knowledge Management Systems

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

CS 422	Introduction to Data Mining
CS 429	Introduction to Information Retrieval Systems
CS 481	Intelligent Text Analysis for Knowledge Management

Electrical and Computer Engineering

Department Web site: www.ece.iit.edu

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.) in conjunction with the Department of Computer Science. Both degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The department also offers these minors (see pages 136-138):

- Air Force Aerospace Studies
- Applied Solid State Physics
- Energy/Environment/Economics (E^3)
- Management
- Military Science
- Naval Science
- Pre-Med 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 electives. The curriculum is described in detail on page 87.

Some students may wish to combine the full breadth of the B.S.E.E. curriculum with a concentration on computer systems.

For these students, the department offers a computer systems specialization of the B.S.E.E. Degree. The specialization includes the full B.S.E.E. curriculum and specific courses in computer science and electrical engineering.

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. This curriculum is described in detail on page 89.

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 curriculum is described in detail on page 91.

Faculty

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Professors
Emadi, LoCicero, Saniie, Shahidehpour, H. Stark, Wernick, Williamson, Wong

Research Professor
Brankov

Adjunct Professor
Briley, Ivanov, Kavicky, Nagel, Pinnello, Wiedman

Associate Professors
Atkin, Flueck, Saraniti, Ucci, Wang, Yang

Assistant Professors
Anjali, Cheng, Li, Oruklu, Velenis, Yetik, Zhou

Senior Lecturer
Borkar

Faculty Emeriti
Arzbaecher, Armington, Martin, Saletta, Weber

Electrical Engineering

Department Web site: www.ece.iit.edu

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, 212, 213, 214, 218 242, 307, 308, 311, 312, 319	36
Professional Electives	14
Mathematics Requirements MATH 151, 152, 251, 252, 333, and MATH 474	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 122	3
Computer Science Requirements CS 115, 116	4
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Engineering Course Requirement MMAE 200 or MMAE 320	3
Science Electives BIOL 107, BIOL 115, MS 201, or CHEM 126	3
Technical Electives	6
Interprofessional Projects	6
Total Credit Hours	**131**

Electrical Engineering Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151	Calculus I	4	1	5
CHEM 122	Principles of Chemistry I	3	0	3
CS 115	Object-Oriented Programming I	2	1	2
ECE 100	Introduction to the Profession I	2	3	3
Social Science Elective		3	0	3
Totals		**14**	**5**	**16**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Science Elective*		3	0	3
CS 116	Object-Oriented Programming II	2	1	2
Humanities 100-level Course		3	0	3
Totals		**15**	**5**	**17**

Semester 3				
MATH 252	Introduction to Differential Equations	4	0	4
PHYS 221	Electromagnetism and Optics	3	3	4
ECE 211	Circuit Analysis I	3	0	3
ECE 212	Analog and Digital Laboratory I	0	3	1
ECE 218	Digital Systems	3	0	3
Social Science Elective		3	0	3
Totals		**16**	**6**	**18**

Semester 4				
MATH 251	Multivariate and Vector Calculus	4	0	4
PHYS 224	Thermal and Modern Physics	3	0	3
ECE 213	Circuit Analysis II	3	0	3
ECE 214	Analog and Digital Laboratory II	0	3	1
ECE 242	Digital Computers and Computing	3	0	3
Totals		**13**	**3**	**14**

Semester 5				
MATH 333	Matrix Algebra and Complex Variables	3	0	3
IPRO I ***	Interprofessional Project I	1	6	3
ECE 307	Electrodynamics	4	0	4
ECE 311	Engineering Electronics	3	3	4
Humanities Elective		3	0	3
Totals		**14**	**9**	**17**

Semester 6				
ECE 308	Signals and Systems	3	0	3
Engineering Science Elective**		3	0	3
ECE 312	Electronic Circuits	3	3	4
ECE 319	Fundamentals of Power Engineering	3	3	4
Social Science Elective		3	0	3
Totals		**15**	**6**	**17**

Semester 7				
Professional ECE elective †		3	0	3
Professional ECE elective †		3	3	4
MATH 474	Probability and Statistics†††	3	0	3
IPRO II***	Interprofessional Project II	1	6	3
Humanities Elective		3	0	3
Totals		**13**	**9**	**16**

Semester 8				
Professional ECE elective †		3	0	3
Professional ECE elective †		3	3	4
Technical electives ††		6	0	6
Humanities or Social Science Elective		3	0	3
Totals		**15**	**3**	**16**

Total Credit Hours 131

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

* Science elective must be BIOL 107, BIOL 115, CHEM 126, or MS 201.

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

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

IPROs are subject to the approval of a student's academic adviser. At least one IPRO should have significant (at least 75 percent) technical content and be viewed as a technical IPRO with the same definition as a technical elective.

† 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 adviser 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 adviser approval.

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

††† ECE 475 may be substituted with adviser approval.

Computer Engineering

Department Web site: www.ece.iit.edu

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
Computer Engineering Requirements	
ECE 100, 211, 212, 213, 214, 218, 311, 441, 485	25
CS 115, 116, 330, 331, 350, 351, 450, 487	22
Mathematics Requirements	
MATH 151, 152, 251, 252, 474	24
Junior mathematics elective (MATH 333 or 471)	
Physics Requirements	11
PHYS 123, 221, 224	
Chemistry Requirement	3
CHEM 122	
Engineering Science Requirement	3
MMAE 200 or MMAE 320	
Humanities and Social Sciences Requirements	21
See general education requirements on page 25	
Junior Computer Engineering Elective	3/4
ECE 307, 308, 312 or 319	
Science Elective	3
BIOL 107, BIOL 115, MS 201, or CHEM 126	
Professional Electives	9/12
Interprofessional Projects	6
Total Credit Hours	**130/134**

Computer Engineering Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151	Calculus I	4	1	5
CHEM 122	Principles of Chemistry I	3	0	3
CS 115	Object-Oriented Programming I	2	1	2
ECE 100	Introduction to the Profession I	2	3	3
Social Science Elective		3	0	3
Totals		**14**	**5**	**16**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Science Elective*		3	0	3
CS 116	Object-Oriented Programming II	2	1	2
Humanities 100-level Course		3	0	3
Totals		**15**	**5**	**17**

Semester 3				
MATH 252	Introduction to Differential Equations	4	0	4
PHYS 221	Electromagnetism and Optics	3	3	4
ECE 211	Circuit Analysis I	3	0	3
ECE 212	Analog and Digital Laboratory I	0	3	1
ECE 218	Digital Systems	3	0	3
CS 331	Data Structures and Algorithms	2	2	3
Totals		**15**	**8**	**18**

Semester 4				
MATH 251	Multivariate and Vector Calculus	4	0	4
PHYS 224	Thermal and Modern Physics	3	0	3
ECE 213	Circuit Analysis II	3	0	3
ECE 214	Analog and Digital Laboratory II	0	3	1
CS 350	Computer Organization and Assembly Language Programming	2	2	3
CS 330	Discrete Structures	3	0	3
Totals		**15**	**5**	**17**

Semester 5				
Engineering Science Elective**		3	0	3
ECE 311	Engineering Electronics	3	3	4
CS 351	Systems Programming	2	2	3
Junior Mathematics Elective***		3	0	3
Humanities Elective		3	0	3
Totals		**14**	**5**	**16**

Semester 6				
Junior Computer Engineering Elective****		3	0/3	3/4
CS 450	Operating Systems I	3	0	3
MATH 474	Probability and Statistics†	3	0	3
IPRO I	Interprofessional Project I††	1	6	3
Social Science Elective		3	0	3
Totals		**13**	**6/9**	**15/16**

Semester 7				
ECE 441	Microcomputers	3	3	4
ECE 485	Computer Organization and Design*****	3	0	3
CS 487	Software Engineering I	3	0	3
Professional Elective†††		3/4	0/3	3/4
Humanities or Social Science Elective		3	0	3
Totals		**15/16**	**3/6**	**16/17**

Semester 8				
Professional Elective†††		3	0/3	3/4
Hardware-design Elective††††		3/4	0/3	3/4
IPRO II	Interprofessional Project II††	1	6	3
Humanities Elective		3	0	3
Social Science Elective		3	0	3
Totals		**13/14**	**6/12**	**15/17**

Total Credit Hours **130/134**

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

* Science elective must be BIOL 107, BIOL 115, CHEM 126, or MS 201.

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

*** Junior mathematics elective: Choose either MATH 333 or MATH 471.

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

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

† ECE 475 may be substituted with adviser approval.

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

††† Professional electives may be chosen from the 400-level ECE courses identified with a (**P**) in the course descriptions except ECE 448, and any 400-level computer science courses except CS 460, 461 and 485. A maximum of three credits of Undergraduate Research (ECE 491 or CS 491) or Special Problems (ECE 497 or CS 495) may be used as a professional elective with adviser approval.

†††† Hardware-design elective *must* be CS 471, ECE 429 or ECE 446.

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, 429 (or 446), 441, 485	47
Computer Engineering Requirements CS 115, 116, 330, 331, 351, 450, 487	19
Mathematics Requirements MATH 151, 152, 251, 252, 333, 474	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 122	3
Engineering Science Requirement MMAE 200 or MMAE 320	3
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Science Elective BIOL 107, BIOL 115, MS 201, or CHEM 126	3
Professional Electives	6/7
Technical Elective	3
Interprofessional Projects	6
Total Credit Hours	**146/147**

B.S.E.E./B.S.C.P.E. Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151	Calculus I	4	1	5
CHEM 122	Principles of Chemistry I	3	0	3
CS 115	Object-Oriented Programming I	2	1	2
ECE 100	Introduction to the Profession I	2	3	3
Social Science Elective		3	0	3
Totals		**14**	**5**	**16**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Science Elective*		3	0	3
CS 116	Object-Oriented Programming II	2	1	2
Humanities 100-level Course		3	0	3
Totals		**15**	**5**	**17**

Semester 3				
MATH 252	Introduction to Differential Equations	4	0	4
PHYS 221	Electromagnetism and Optics	3	3	4
ECE 211	Circuit Analysis I	3	0	3
ECE 212	Analog and Digital Laboratory I	0	3	1
ECE 218	Digital Systems	3	0	3
CS 331	Data Structures and Algorithms	2	2	3
Totals		**15**	**8**	**18**

Semester 4				
MATH 251	Multivariate and Vector Calculus	4	0	4
PHYS 224	Thermal and Modern Physics	3	0	3
ECE 213	Circuit Analysis II	3	0	3
ECE 214	Analog and Digital Laboratory II	0	3	1
ECE 242	Digital Computers and Computing	3	0	3
CS 330	Discrete Structures	3	0	3
Totals		**16**	**3**	**17**

Semester 5				
MATH 333	Matrix Algebra and Complex Variables	3	0	3
ECE 307	Electrodynamics	4	0	4
ECE 311	Engineering Electronics	3	3	4
IPRO I	Interprofessional Project I	1	6	3
CS 351	Systems Programming	2	2	3
Totals		**13**	**11**	**17**

Semester 6				
ECE 308	Signals & Systems	3	0	3
Engineering Science Elective**		3	0	3
ECE 312	Electronic Circuits	3	3	4
ECE 319	Fundamentals of Power Engineering	3	3	4
Social Science Elective		3	0	3
Totals		**15**	**6**	**17**

Semester 7				
ECE 441	Microcomputers	3	3	4
CS 450	Operating Systems	3	0	3
MATH 474	Probability & Statistics***	3	0	3
IPRO II	Interprofessional Project II	1	6	3
Humanities Elective		3	0	3
Totals		13	9	16

Semester 8				
ECE 429	Introduction to VLSI Design OR			
ECE 446	Advanced Logic Design	3	3	4
ECE 485	Computer Organization and Design****	3	0	3
CS 487	Software Engineering	3	0	3
Technical Elective††		3	0	3
Social Science Elective		3	0	3
Totals		**15**	**3**	**16**

Semester 9			
Professional Elective†	3	0/3	3/4
Professional Elective†	3	0	3
Humanities Elective	3	0	3
Humanities or Social Science Elective	3	0	3
Totals	**12**	**0/3**	**12/13**

Total Credit Hours **146/147**

* Science elective must be BIOL 107, BIOL 115, CHEM 126, or MS 201.

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

*** ECE 475 may be substituted with adviser approval.

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

† ECE 400-level course with (P) designation and except for ECE 448. A maximum of three credits of either ECE 491 or ECE 497.

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

Lewis Department of Humanities

Department Web site: www.iit.edu/departments/humanities

The Lewis Department of Humanities offers Bachelor of Science degrees in Journalism of Technology, Science & Business (JTSB), Humanities (HUM), Internet communication (iCOM), and Professional and Technical Communication (PTC). The JTSB degree is a science/mathematics/business-intensive program which also features a strong journalism/writing component. The HUM degree is a flexible liberal arts degree with an emphasis on the humanistic study of technology. The iCOM and PTC degrees provide students with both a liberal arts education in communication and culture and an applied professional education in a technical communication field. The department offers courses in art and architectural history, communication, English as a second language, history, languages and linguistics, literature, and philosophy.

The humanities department also offers academic minors in communication, English language and literature, history, linguistics literature, logic and philosophy of science, philosophy, professional and technical communication, and web communication. Minors in law and society, technology and human affairs, and urban studies are 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 technical and business 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, iCOM, JTSB, or PTC must meet with their faculty advisers during the pre-registration period. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements of the degree programs.

Faculty

Chair
Kathryn Riley
Room 218 Siegel Hall
Ext. 73566

Associate Chair, ESL Director and Associate Director of Technical Communication
Greg Pulliam
Room 213 Siegel Hall
Ext. 77968

Professors
Davis, Feinberg, Harrington, Ladenson, Riley, Schmaus

Associate Professors
Broadhead, Power, Snapper

Assistant Professors
Bauer, Mackiewicz, Tillmans

Senior Lecturers
Dabbert, Pulliam

Insructor
Batson

Faculty Emeriti
Applebaum, Irving, Zesmer

Director of Technical Communication
Glenn Broadhead
Room 200 Siegel Hall
Ext. 73469

Bachelor of Science in Humanities

www.iit.edu/departments/humanities

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 literature, linguistics, philosophy, history and communication. Students doing this in, for example, philosophy, 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.

Students accepted into the Honors Pre-Law Program substitute first year law courses for the minor and most free electives and take all other coursework in the first three years.

This degree has four components:

- General education (47 hours)
- Major field coursework (45 hours)
- Minor (15 hours)*
- Free electives (19 hours)*

Required Courses	Credit Hours
General Education Where unspecified, students should follow the bulletin guidelines.	47
Basic Writing Proficiency	
Mathematics Requirements	5
Computer Science Requirement	2
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Natural Science/ Engineering Requirements	11
Interprofessional Projects	6
Introduction to the Profession	2

Required Courses	Credit Hours
Major All major coursework is over and above general education humanities requirements, and must be chosen in consultation with the student's academic adviser. The major has five components:	
Communication Requirements Two upper-division courses	6
History Requirements Two upper-division courses	6
Philosophy/Ethics Requirements Two upper-division courses, at least one of which must be chosen from the following: PHIL 360, 365, 370, 373 or 374	6
Miscellaneous Humanities Requirements One of the following AAH courses: AAH 119, 120 or 301; two independent-study courses	9
Major (Technical) Electives Six additional upper-division humanities department courses	18
Minor Coursework	15/18
Free Electives Some may be needed for minor prerequisites, depending on the minor	19
Total Credit Hours	**126–129**

* 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.

Sample Curriculum for Honors Law Program Students

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151	Calculus I	4	2	5
BIOL 107	General Biology Lectures	3	0	3
BIOL 109	General Biology Laboratory	0	4	2
PS 101	Introduction to the Profession	2	0	2
Humanities 100-level Course		3	0	3
Totals		**12**	**6**	**15**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
BIOL 115	Human Biology	3	0	3
CS 105	Introduction to Computer Programming I	2	1	2
Communications Course		3	0	3
Major (technical) Elective		3	0	3
Social Science Elective		3	0	3
Humanities Elective		3	0	3
Totals		**17**	**1**	**17**

Semester 3				
PHYS 211	Basic Physics I	3	0	3
Philosophy Course		3	0	3
History Course		3	0	3
Social Science Elective		3	0	3
Humanities Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 4				
Major (technical) Elective		3	0	3
Philosophy/Ethics Course		3	0	3
Free Elective		3	0	3
Interprofessional Project		3	0	3
Social Science Elective		3	0	3
Major (technical) Elective		3	0	3
Totals		**18**	**0**	**18**

Semester 5				
Independent Study Course		3	0	3
Interprofessional Project		3	0	3
Art History Course		3	0	3
Social Science Elective		3	0	3
Major (technical) Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 6				
Communication Course		3	0	3
Major (technical) Elective		3	0	3
Free Elective		3	0	3
History Course		3	0	3
Major (technical) Elective		3	0	3
Independent Study Course		3	0	3
Totals		**18**	**0**	**18**

Three-year total credit hours **98**

Semester 7

Courses at IIT Chicago Kent College of Law.

Semester 8

Courses at IIT Chicago Kent College of Law.

Four-year total credit hours **126**

The Bachelor of Science Degrees in iCOM and PTC

Both B.S. degree programs help students develop their writing skills, sensitivity to the social and cultural aspects of communication, fluency with the latest computer technologies, and strategies for information design. Students in both programs will therefore take a number of courses in IIT's computer classrooms with state-of-the-art hardware and software. The required ethics component focuses on moral issues in communication, business, engineering or computer science. Finally, elective coursework in science, technology and society (STS) gives students awareness of the power of language and image to shape thoughts, values and actions in a variety of public, private and professional contexts.

Bachelor of Science in Internet Communication (iCOM)

Web site: www.iit.edu/~techcomm

Internet Communication brings together coursework in technical writing, communication, Web design, ethics, science and technology in society, along with a minor in computer networking, to train Internet professionals.

iCOM graduates can become Web designers and web masters, network administrators, technical writers and editors, and computer journalists.

Required Courses	Credit Hours
Communication Requirements COM 421 (or 423), 424, 425, 428, 430, 431, 432	21
iCOM (Technical) Electives	9
Linguistics Elective	3
Art and Architectural History (AAH) or **Architecture (ARCH) Elective***	3
Ethics Elective	3
STS Electives	12
Computer Science Requirements CS 201 or (CS 115 and 116), 331, 350, 450, 455	16
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Natural Science/Engineering Requirements See general education requirements on page 25	11
Introduction to the Profession	2
Mathematics Requirements See general education requirements on page 25	5
Interprofessional Projects	6
Free Electives	15
Total Credit Hours	**127**

* Choose from AAH 119, AAH 120, AAH 301, or ARCH 331.

iCOM Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
Humanities 100-level Elective	3	0	3
Natural Science or Engineering Elective	3	3	4
MATH 151 Calculus I	4	1	5
Introduction to the Profession	0	2	2
Social Science Elective	3	0	3
Totals	**13**	**6**	**17**

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
Natural Science or Engineering Elective	3	3	4
AAH or ARCH Elective*	3	0	3
Humanities Elective	3	0	3
Linguistics Elective	3	0	3
Free Elective	3	0	3
Totals	**15**	**3**	**16**

Semester 3				
Natural Science or Engineering Elective		3	0	3
CS 201	Accelerated Introduction to Computer Science	3	2	4
iCOM (technical) Elective		3	0	3
Free Elective		3	0	3
Social Science Elective		3	0	3
Totals		**15**	**2**	**16**

Semester 4				
COM 421	Technical Writing			
	OR			
COM 423	Writing in the Workplace	3	0	3
CS 331	Data Structures and Algorithms	2	2	3
iCOM (technical) Elective		3	0	3
STS Elective**		3	0	3
Humanities Elective		3	0	3
Free Elective		3	0	3
Totals		**17**	**2**	**18**

Semester 5				
COM 430	Introduction to Web Design and Management	3	0	3
CS 350	Computer Organization and Assembly Language Programming	2	2	3
STS Elective**		3	0	3
Interprofessional Project		1	6	3
Social Science Elective		3	0	3
Totals		**12**	**8**	**15**

Semester 6				
COM 431	Intermediate Web Design and Management	3	0	3
CS 450	Operating Systems	3	0	3
COM 424	Document Design	3	0	3
Ethics Elective**		3	0	3
Free Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 7				
COM 432	Advanced Web Design and Management	3	0	3
iCOM (technical) Elective		3	0	3
COM 425	Editing	3	0	3
STS Elective**		3	0	3
Interprofessional Project		1	6	3
Totals		**13**	**6**	**15**

Semester 8				
CS 455	Data Communications	3	0	3
COM 428	Verbal and Visual Communication	3	0	3
STS Elective**		3	0	3
Free Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**15**	**0**	**15**

Total Credit Hours **127**

* Choose from AAH 119, AAH 120, AAH 301, ARCH 331.

** CS 485 is strongly recommended as an ethics or STS Elective.

Bachelor of Science in Professional and Technical Communication (PTC)

Department Web site: www.iit.edu/~techcomm

The Professional and Technical Communication Program requires much of the same coursework as the iCOM degree, but allows for more flexibility in the choice of a graphics track and an academic minor. PTC graduates might work in desktop publishing, web design, instructional design, science or engineering journalism, and technical writing and editing for industry and the professions.

Required Courses	Credit Hours
Communication Requirements COM 421 (or 423), 424, 425, 428	12
One of the following three nine-credit sequences:	9
WebCom Sequence COM 430, 431, 432	
Engineering Graphics Sequence EG 225, 325, 425	
Architectural CAD Sequence ARCH 125 and two CAD Elects**	
PTC (Technical) Electives	9
Linguistics Elective	3
Art and Architectural History (AAH) or **Architecture (ARCH) Elective***	3
Ethics Elective	3
Computer Science Requirement CS 105	2
STS Electives	12
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Introduction to the Profession	2
Natural Science/Engineering Requirements See general education requirements on page 25	11
Mathematics Requirements See general education requirements on page 25	5
Interprofessional Projects	6
Minor Electives	15
Free Electives	15
Total Credit Hours	**128**

* Choose from AAH 119, AAH 120, AAH 301, ARCH 331.

** Chosen in consultation with adviser.

PTC Curriculum (with Architectural CAD sequence)

Semester 1		Lec.	Lab. Hrs.	Cr. Hrs.
Humanities 100-level Elective		3	0	3
Natural Science or Engineering Elective		3	3	4
	Introduction to the Profession	0	2	2
Math 151	Calculus I	4	1	5
Social Science Elective		3	0	3
Totals		**13**	**6**	**17**

Semester 2		Lec.	Lab. Hrs.	Cr. Hrs.
Natural Science or Engineering Elective		3	3	4
Humanities Elective		3	0	3
CS 105	Introduction to Computer Programming I	2	1	2
Linguistics Elective		3	0	3
Free elective		3	0	3
Totals		**14**	**4**	**15**

Semester 3				
Natural Science or Engineering Elective		3	0	3
Ethics Elective**		3	0	3
AAH or ARCH Elective*		3	0	3
PTC (technical) Elective		3	0	3
Free Elective		3	0	3
Social Science Elective		3	0	3
Totals		**18**	**0**	**18**

Semester 4				
PTC (technical) Elective		3	0	3
STS Elective**		3	0	3
Minor Coursework		3	0	3
Humanities Elective		3	0	3
Free Elective		3	0	3
Totals		**12**	**0**	**15**

Semester 5				
COM 421	Technical Writing **OR**			
COM 423	Writing in the Workplace	3	0	3
COM 430	Introduction to Web Design and Site Management **OR**			
EG 225	Engineering Graphics for Non-Engineers **OR**			
ARCH 125	Introduction to Architectural Computing	3/2/1	0/1/2	3
STS Elective**		3	0	3
Interprofessional Project		3	0	3
Minor Coursework		3	0	3
Social Science Elective		3	0	3
Totals		**13–15**	**0–2**	**18**

Semester 6				
COM 424	Document Design	3	0	3
COM 431	Intermediate Web Design and Site Management **OR**			
EG 325	Advanced Engineering Graphics for Non-Engineers **OR**			
CAD Elective***		3/2/2	0/1/2	3
Humanities or Social Science Elective		3	0	3
Minor Coursework		3	0	3
Free Elective		3	0	3
Totals		**14–15**	**0–2**	**15**

Semester 7				
COM 432	Advanced Web Design and Site Management **OR**			
EG 425	Computer Graphics for Non-Engineers **OR**			
CAD Elective***		3/2/3	0/1/0	3
COM 425	Editing	3	0	3
STS Elective**		3	0	3
Interprofessional Project		3	0	3
Minor Coursework		3	0	3
Totals		**14–15**	**0–1**	**15**

Semester 8				
PTC (technical) Elective		3	0	3
COM 428	Verbal and Visual Communication	3	0	3
STS Elective**		3	0	3
Minor Coursework		3	0	3
Free Elective		3	0	3
Totals		**15**	**0**	**15**

Total Credit Hours **128**

* Choose from AAH 119, AAH 120, AAH 301, ARCH 331.

** CS 485 is strongly recommended as an ethics or STS Elective.

*** Chosen in consultation with adviser.

Bachelor of Science in Journalism of Technology, Science and Business (JTSB)

Journalism is possibly the most important occupation in a free and democratic society, and the demand for journalists is increasing as news outlets proliferate. Today, in addition to newspapers and magazines, there is news on radio, television, cable, satellite TV and radio, web sites, and even cell phones and iPods. And as the number and types of news outlets increase, many are also specializing in science, technology and business. The JTSB degree program meets this specialized demand by incorporating IIT's considerable resources in the sciences, business, engineering and other technological areas with the Humanities department's strengths in communication and STS (science and technology in society). This is a rigorous curriculum: our students go above and beyond the minimum general education requirements in mathematics, the sciences and engineering, computer science, business, communication and humanities courses. By educating strong writers who have a clear understanding of science, technology and business, and the way such disciplines relate to society, the JTSB program gives its graduates a competitive edge in the workplace.

Required Courses	Credit Hours
Journalism Requirements COM 372, 373, 377, 421, 425, 435, 440	21
Journalism Electives and Supervised Field Projects	8
Technology, Science and Business Electives*	15 – 16
Science, Technology and Society Electives	6
Business Requirements BUS 205, 210, ECON 211	9
Mathematics Requirements MATH 151, 152	10
Science Requirements BIOL 107, CHEM 124, PHYS 123	11
Science Elective* BIOL 115, CHEM 125, 126, or PHYS 221	3-4

Required Courses	Credit Hours
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Introduction to the Profession	2
Interprofessional Projects	6
Computer Science Requirements CS 115, 116, 331	7
Free Electives	9
Total Credit Hours	**129**

* Students who complete a 3 credit hour science elective must complete 16 credit hours of Science, Technology, and Business Electives.

Journalism of Technology, Science and Business Curriculum

Semester 1		Lec.	Lab. Hrs.	Cr. Hrs.
BIOL 107	General Biology Lectures	3	0	3
ITP 100	Introduction to the Profession	1	2	2
MATH 151	Calculus I	4	1	5
HUM 100-level Elective		3	0	3
CS 115	Object-Oriented Programming I	2	1	2
Totals		**12**	**2**	**15**

Semester 2		Lec.	Lab. Hrs.	Cr. Hrs.
CHEM 124	Principles of Chemistry I	3	3	4
ECON 211	Principles of Economics	3	0	3
COM 372	Mass Media and Society	3	0	3
MATH 152	Calculus II	4	1	5
CS 116	Object-Oriented Programming II	2	1	2
Totals		**15**	**5**	**17**

Semester 3		Lec.	Lab. Hrs.	Cr. Hrs.
PHYS 123	General Physics I	3	3	4
COM 377	Communication Law and Ethics	3	0	3
BUS 205	Business Basics	3	0	3
CS 331	Data Structures and Algorithms	2	2	3
Social Science Elective		3	0	3
Totals		**14**	**5**	**16**

Semester 4		Lec.	Lab. Hrs.	Cr. Hrs.
BIOL 115/CHEM 125/PHYS 221*		3	0/3	3/4
COM 440	Introduction to Journalism	3	0	3
STS Elective		3	0	3
Humanities Elective		3	0	3
Free Elective		3	0	3
Totals		**15**	**0/3**	**15/16**

Semester 5		Lec.	Lab. Hrs.	Cr. Hrs.
COM 373	Writing about Science, Technology & Business	3	0	3
BUS 211	Financial Accounting and External Reporting	3	0	3
TSB Elective		3	0	3
IPRO Elective		3	0	3
Humanities/Social Science Elective		3	0	3
Supervised Field Project		0	3	1
Totals		**15**	**3**	**16**

Semester 6		Lec.	Lab. Hrs.	Cr. Hrs.
COM 435	Intercultural Communication	3	0	3
TSB Elective		3	0	3
TSB Elective		3	0	3
Journalism Elective		3	0	3
Social Science Elective		3	0	3
Supervised Field Project		0	3	1
Totals		**15**	**3**	**16**

Semester 7		Lec.	Lab. Hrs.	Cr. Hrs.
COM 421	Technical Communication	3	0	3
TSB Elective		3	0	3
STS Elective		3	0	3
IPRO Elective		3	0	3
Social Science Elective		3	0	3
Free Elective		3	0	3
Totals		**18**	**0**	**18**

Semester 8		Lec.	Lab. Hrs.	Cr. Hrs.
COM 425	Editing	3	0	3
TSB Elective*		3	0	3/4
Journalism Elective		3	0	3
Humanities Elective		3	0	3
Free Elective		3	0	3
Totals		**15**	**0**	**15/16**

Total Credit Hours **129**

* Students who complete a 3 credit hour science elective must complete 16 credit hours of Science, Technology, and Business Electives.

Industrial Technology and Management

Department Web site: www.mtm.iit.edu

The objective of the Bachelor of Industrial Technology and Management (BINTM) program is to prepare skilled adults for managerial positions in industry. This is a completion program designed for working individuals who have technical training in manufacturing or industrial specialties. The program enables students to build upon existing skills, improve their technical capabilities, and thereby expand their career opportunities.

To suit full-time work schedules, courses are offered evenings and Saturdays at IIT's Main Campus in Chicago, IIT's Rice Campus in Wheaton, Illinois, and via the Internet for students who are unable to attend live classes.

The program offers three professional specializations: Manufacturing Technology (MT), Industrial Facilities (IF), and Industrial Logistics (IL). In Chicagoland, approximately 30% of the workforce is employed in these three sectors of the economy. Students in this program learn principles applicable to all of these sectors while taking courses in the area of greatest interest to them.

The ideal candidate for this program is a person who is already working within these industries. This degree provides a broad background that 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. Candidates are interviewed prior to being admitted. Nominally, a minimum of 60 semester hours from an accredited college is required for admission (only courses graded "C" or better are accepted for transfer). A student without sufficient coursework related to one or more of these specializations must have two to three years of industrial experience in order to be accepted.

A three-course INTM certificate program is available for individuals interested in improving management and decision-making skills. The courses are part of the regular curriculum and can be applied toward the BINTM degree.

Faculty

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Faculty
Arditi, Ayman, Caltagirone, Donahue, Feldy, Field, Foley, Footlik, Gibson, Goldman, Gopal, Kumiega, Lazowski, Lemming, Levine, Maurer, McKee, Nemeth, Prendergast, Safar, Shankar, Shields, Sud, Tijunelis, Tomal, Twombly, Vohra

Admission Requirements

Mathematics
Six credit hours at the level of college algebra or above.

Computer Science
Three credit hours of computer programming.

Natural Science
Eleven 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 graphics/drafting. In some cases, certain technology courses might be applied to this requirement.

Humanities and Social Sciences
Nine 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 credit hours in each category is required.

Technical coursework
Thirty-one credit hours. (Candidates with adequate college credit but lacking the technical coursework may qualify for admission if they have two or more years of relevant industrial experience).

Industrial Technology and Management Curriculum

A total of 66 credits (22 courses) of junior- and senior-level courses are required for the bachelor's degree, along with the 60 transfer credits required for admission (totaling 126 credit hours). This includes four senior-level humanities and social science electives.

The core curriculum (14 courses) emphasizes proficiency in the essential functions of industrial enterprises with a focus on management-related topics. Students complete four (4) technical electives and four (4) specialization electives, which provide more in-depth coverage of specific aspects of industrial organizations and their related sectors.

The three specializations available are:

Manufacturing Technology (MT)
Coursework includes manufacturing processes, quality and management information systems.

Industrial Facilities (IF)
Coursework includes construction, project management, and renovation and maintenance of buildings, facilities and equipment.

Industrial Logistics (IL)
Coursework includes supply chain management, warehousing and distribution, purchasing, and export/import activities.

Industrial Technology and Management Curriculum

A suggested program based on half-time attendance. Students may complete coursework at their own pace.

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
INTM 301 Communications for the Workplace	3	0	3
INTM 305 Advances in Information Technology	3	0	3
INTM 311 Production and Operations	3	0	3
Totals	**9**	**0**	**9**

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
INTM 315 Industrial Enterprises	3	0	3
Technical Elective	3	0	3
Humanities Elective*	3	0	3
Totals	**9**	**0**	**9**

Semester 3			
INTM 323 Industrial Management and Planning	3	0	3
Technical Elective	3	0	3
Totals	**6**	**0**	**6**

Semester 4			
INTM 404 Sales, Marketing and Product Introduction	3	0	3
Technical Elective	3	0	3
Social Science Elective*	3	0	3
Totals	**9**	**0**	**9**

Semester 5			
INTM 408 Cost Management	3	0	3
Technical Elective	3	0	3
Specialization Elective	3	0	3
Totals	**9**	**0**	**9**

Semester 6			
INTM 432 Vendor/Customer Relations	3	0	3
Specialization Elective	3	0	3
Social Science Elective*	3	0	3
Totals	**9**	**0**	**9**

Semester 7			
INTM 409 Inventory Control	3	0	3
Specialization Elective	3	0	3
Humanities Elective*	3	0	3
Totals	**9**	**0**	**9**

Semester 8			
Interprofessional Project	1	6	3
Specialization Elective	3	0	3
Totals	**4**	**6**	**6**

Total Credit Hours 66

* Six credit hours of 300/400 level social science electives and six credit hours of 300/400 level humanities electives are required.

Technical Electives:
INTM 314 Maintenance Technology and Management
INTM 319 Electronics in Industry
INTM 322 Industrial Project Management
INTM 332 Systems Safety
INTM 340 Industrial Logistics
INTM 425 Human Resource Management
INTM 427 E-Commerce

Specializations in Industrial Technology & Management

Manufacturing Technology (MT)
INTM 406 Quality Control in Manufacturing
INTM 412 Manufacturing Processes
INTM 422 Mechanical Technology
INTM 424 Manufacturing Information Systems

Industrial Facilities (IF)
INTM 407 Construction Technology
INTM 413 Facilities and Construction Management
INTM 415 Advanced Project Management
INTM 417 Construction Estimating

Industrial Logistics (IL)
INTM 441 Supply Chain Management
INTM 442 Warehousing and Distribution
INTM 443 Purchasing
INTM 444 Export/Import Management

Certificate in Industrial Technology and Management

The three-course INTM certificate provides an introduction to industrial organizations and how they operate.

Students must complete the following courses:
INTM 311 Production and Operations
INTM 315 Industrial Enterprises
INTM 323 Industrial Management and Planning

Certificate in Training the Technical Trainer

This three-course certificate assists potential teachers of technology in making the transition from performing on the job to teaching.

Students must complete the following courses:
INTM 381 Industrial Training Curriculum Development
INTM 382 Methods of Adult Training
INTM 383 Developing Training Programs

Information Technology and Management

Department Web site: www.cpd.iit.edu/itm/

Designed for students who have achieved an Associate's Degree and would like to complete a Bachelor's Degree, the objective of the Bachelor of Information Technology & Management program 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.

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 thirty years. The purpose of the Bachelor of Information Technology & Management program is to provide students with up-to-date knowledge of the technologies that are being used in today's work place. Courses are taught by professionals who work in the field and are in tune with changing information technologies.

Admission to the degree program is competitive. Admission is based on a review of college transcripts, documentation of work experience, and an admission interview. Applicants must submit an application for admission as a degree-seeking student. The applicant must hold an Associate's Degree (A.A.) from an accredited college or the equivalent (completion of 60 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.

Faculty & Staff

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Part-Time Faculty
Bartek, Fitzgerald, Friedman, Gehrs, Hendry, Hood, Howard, Kandemir, Kimont, M. Kozi, Manov, Scarlata, Wakharia, Xu

Admission Requirements

Admitted students are expected to have satisfied the following General Education Requirements prior to admission. If not, the student must complete them while working on the ITM degree. The degree requires 126 semester hours including transfer and coursework completed at IIT.

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.

Natural Science or Engineering
Eleven semester hours of natural science or engineering courses. Relevant courses include physics, chemistry, or biology. In some cases, certain technology courses might be applied to this requirement.

Computer Science
Two credit hours of computer programming; may be satisfied by taking ITM 311.

Humanities and Social Science
Nine 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 three semester hours in Social or Behavioral Sciences.

Mathematics
Five semester hours of mathematics at the level of Math 119 or above. Probability and Statistics is highly recommended.

Free or Technical Electives
Thirty-three semester hours of approved courses. Students should contact the Office of Educational Services for additional information.

Bachelor of Information Technology and Management

Students are required to take 66 semester hours at IIT and transfer 60 semester hours to complete the Bachelor's Degree for a total of 126 semester hours. This includes 16 information technology courses for a total of 48 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 General Education Requirements.

These include four 300/400 level humanities and social science electives and two IPRO courses. Students must also complete a minimum of 42 semester hours of courses with a significant written and oral communication component, identified with a (C) in the bulletin. The computer science general education requirement may be satisfied by taking ITM 311.

Bachelor of Information Technology and Management

Required Courses	Credit Hours
Courses Transferred (or taken at IIT)	60
Humanities Electives 300/400 level courses required	6
Social Science Electives 300/400 level courses required	6
Interprofessional Projects	6
ITM Requirements ITM 301, 302, 311, 312, 411, 421, 440, 448, 461, 471	30
ITM Electives	18
Total Credit Hours	**126**

Bachelor of Information Technology and Management (Freshman Program)

Required Courses	Credit Hours
ITM Requirements ITM 100, 301, 302, 311, 312, 411, 421, 440, 448, 461, 471	32
ITM Electives	18
Mathematics Requirement Two courses above MATH 119 including PSYC 203	5
Engineering Requirement EG 225	3
Natural Science/Engineering Requirements See General Education Requirements on Page 25	8
Humanities and Social Science Requirements See General Education Requirements on Page 25	21
Psychology Requirement PSYC 301	3
Technical Communication Requirement COM 421	3
Interprofessional Projects	6
Minor Courses	15
Free Electives (may be used for additional ITM specialization)	12
Total Credit Hours	**126**

ITM students completing a minor are strongly encouraged to consider minors which complement their primary program of study; these include (but are not limited to) Industrial Logistics; Industrial Facilities; Manufacturing Technology; Professional and Technical Communications; Management; Technology and Human Affairs; Circuits and Systems; Computer Architecture; and ROTC. Students entering the Bachelor of Information Technology and Management program as freshmen are required to complete a minor.

Information Technology and Management Curriculum

(students entering as transfer, part-time)

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
ITM 301	Introduction to Contemporary Operating Systems and Hardware I	2	2	3
ITM 311	Introduction to Object-Oriented Programming	2	2	3
ITM 421	Data Modeling and Applications	2	2	3
Totals		**6**	**6**	**9**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
ITM 302	Introduction to Contemporary Operating Systems II	2	2	3
ITM 312	Introduction to Systems Software Programming	2	2	3
Humanities Elective*		3	0	3
Totals		**7**	**4**	**9**

Semester 3				
ITM 440	Introduction to Data Networks and the Internet	2	2	3
ITM 411	Intermediate Object-Oriented Programming	2	2	3
Social Science Elective*		3	0	3
Totals		**7**	**4**	**9**

Semester 4				
ITM 461	Internet Technologies & Web Design	2	2	3
ITM 488	Systems and Network Security	2	2	3
Humanities Elective*		3	0	3
Totals		**7**	**4**	**9**

Semester 5				
ITM Elective		2	2	3
ITM Elective		2	2	3
Social Science Elective*		3	0	3
Totals		**7**	**4**	**9**

Semester 6				
ITM 471	Project Management for Information Technology	3	0	3
ITM Elective		2	2	3
IPRO 497	Interprofessional Project	1	6	3
Totals		**6**	**8**	**9**

Semester 7				
ITM elective		2	2	3
IPRO 497	Interprofessional Project	1	6	3
Totals		**3**	**8**	**6**

Semester 8				
ITM elective		2	2	3
ITM elective		3	0	3
Totals		**5**	**2**	**6**

Total Credit Hours **66**

* Six credit hours of 300/400-level social science and six credit hours of 300/400-level humanities electives are required.

See the ITM website at http://www.cpd.iit.edu/itm for additional undergraduate transfer student curriculum structure.

Information Technology and Management Curriculum

(students entering as Freshman)

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MATH	Course above MATH 119	3	0	3
Natural Science/Engineering Elective		3	3	4
EG 225	Engineering Graphics for Non-Engineers	2	1	3
Humanities or Social Science Elective		3	0	3
Totals		**11**	**4**	**13**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
PSYC 203	Undergraduate Statistics	3	0	3
ITM 100	Introdction to the Profession	2	0	2
ITM 301	Introduction to Contemporary Operating Systems and Hardware I	2	2	3
ITM 311	Introduction to Object Oriented Programming	2	2	3
Natural Science/Engineering Elective		3	3	4
Totals		**12**	**7**	**15**

Semester 3				
ITM 302	Introduction to Contemporary Operating Systems II	2	2	3
ITM 312	Introduction to Systems Software Programming	2	2	3
ITM 461	Internet Technologies & Web Design	2	2	3
Humanities 100-level Elective		3	0	3
Social Science Elective		3	0	3
Minor Elective		3	0	3
Totals		**15**	**6**	**18**

Semester 4				
ITM 440	Introduction to Data Networks and the Internet	2	2	3
ITM 411	Intermediate Object Oriented Programming	2	2	3
ITM Elective		2	2	3
ITM Elective		2	2	3
Minor Elective		3	0	3
Free Elective		3	0	3
Totals		**14**	**8**	**18**

Semester 5				
ITM 448	System and Network Security	2	2	3
ITM Elective		2	2	3
PSYC 301	Industrial Psychology	3	0	3
Humanities Elective		3	0	3
Minor Elective		3	0	3
Free Elective		2	0	2
Totals		**15**	**4**	**17**

Semester 6				
ITM 421	Data Modeling and Applications	2	2	3
COM 421	Technical Writing	3	0	3
IPRO 497	Interprofessional Project	1	6	3
Social Science Elective		3	0	3
Free Elective		3	0	3
Totals		**12**	**8**	**15**

Semester 7				
ITM 471	Project Management for Information Technology	3	0	3
ITM Elective		2	2	3
Humanities Elective		3	0	3
Minor Elective		3	0	3
Free Elective		3	0	3
Totals		**14**	**2**	**15**

Semester 8				
ITM Elective		2	2	3
ITM Elective		2	2	3
Social Science Elective		3	0	3
Minor Elective		3	0	3
IPRO 497	Interprofessional Project	1	6	3
Totals		**11**	**10**	**15**

Total Credit Hours **126**

Information Technology Curriculum Specializations

The ITM electives may be chosen from one or more of the following course specializations:

Systems Security
Focuses on application, data, and network security and the management of information technology security.

ITM 428	Database Security
ITM 451	Distributed Workstation System Administration
OR	
ITM 452	Client-Server System Administration
ITM 458	Operating System Security
ITM 478	Information Systems Security Management

Data Management
Focuses on the design, development and administration of traditional and Internet-based data management.

ITM 414	Visual Programming Environments
ITM 422	Advanced Database Management
ITM 428	Database Security
ITM 463	Internet Application Development

Internet Development and Electronic Commerce
Focuses on the design and development of fully-interactive web sites and applications for Internet deployment.

ITM 441	Network Applications and Operations
ITM 462	Web Site Application Development
ITM 463	Internet Application Development
ITM 465	Dynamic Web Page Development
ITM 466	Web Services and Service-Oriented Architectures

IT Entrepreneurship and Management
Focuses on the managerial and entrepreneurial skills needed to launch a new enterprise.

ITM 441	Network Applications and Operations
BUS 210	Financial and Managerial Accounting
BUS 301	Theory of Organization and Management
BUS 305	Operations Management
BUS 371	Introduction to Marketing

Software Development
Focuses on programming and the development of sophisticated applications.

ITM 412	Advanced Structured and Systems Programming
ITM 414	Visual Programming Environments
ITM 415	Advanced Object Oriented Programming
ITM 462	Web Site Application Development
ITM 478	Information System Security Management

System Administration
Focuses on the administration and management of servers.

ITM 441	Network Applications and Operations
ITM 451	Distributed Workstation System Administration
OR	
ITM 452	Client-Server System Administration
ITM 456	Introduction to Open Source Operating Systems
ITM 478	Information System Security Management

Networking and Communications
Focuses on network applications and management.

ITM 441	Network Applications and Operations
ITM 451	Distributed Workstation System Administration
OR	
ITM 452	Client-Server System Administration
ITM 478	Information System Security Management
ITM 491	Undergraduate Research

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 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 grade point average of at least 3.0 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 Educational Services 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 Baccalaureate Degree.

Mathematics and Science Education

Department Web site: www.iit.edu/departments/msed

The Department of Mathematics and Science Education has an education program that prepares students for a teaching certificate at the secondary level while they receive a Bachelor of Science degree in biology, chemistry, physics, applied mathematics, computer sciences, or an engineering discipline.

The department's guiding principle is that those who can, do; those who understand, teach. That is, a math or science instructor 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 personal curriculum focuses on each student's chosen discipline.

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 structures of 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.

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);
- development and implementation of instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for regular as well as special needs students (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); and
- 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

Faculty

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Professor
N. Lederman

Associate Professor
Zawojewski

Assistant Professors
Berkaliev, Meyer, Newman

Visiting Assistant Professor
Noethen

Director of Teacher Education and Senior Lecturer
J. Lederman

Mathematics and Science Education Secondary Science or Mathematics Teaching Certification

Required Courses		Credit Hours
Sophomore year		
MSED 200	Analysis of Classrooms (Practicum and Seminar)	3
MSED 250	Curriculum / Foundations	3
Junior year		
MSED 300	Instructional Methods / Strategies I	3
MSED 320	Inquiry and Problem Solving	1
MSED 350	Informal Education Practicum and Seminar	3
Senior year		
MSED 400	Instructional Methods / Strategies II	3
MSED 450	Professional Internship	6
Total Credit Hours		**22**

*This program has been approved by Illinois State Board of Education.

Mechanical, Materials and Aerospace Engineering

Department Web site: www.mmae.iit.edu

The Department of Mechanical, Materials and Aerospace Engineering offers the Bachelor of Science degree in Mechanical Engineering (B.S.M.E.), Materials Science and Engineering (B.S.M.S.E.), and Aerospace Engineering (B.S.A.E.). These degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The objectives of the MMAE undergraduate programs are to educate aerospace, mechanical and materials engineering students for a broad range of professional careers, provide the inspiration for lifelong learning, and prepare students for advanced studies at the graduate level. Recognizing the changing professional environment that MMAE graduates will encounter, the programs aim to develop graduates who:

- Possess a strong foundation in mathematics, science and engineering and who are proficient in the engineering sciences on which the major discipline is based.
- Are able to link science and engineering principles to identify, formulate and solve engineering problems in professional practice and research and development contexts.
- Are able to design and conduct experiments, as well as analyze and interpret data.
- Have experience working in multidisciplinary and interprofessional teams.
- Utilize effective oral, written, graphical and computational communication skills.
- Understand the economic, ethical, societal, environmental and global contexts of their professional activities.
- Pursue lifelong learning.
- Translate knowledge of their respective disciplines to a broad spectrum of professions.

Objectives for the respective degree programs are presented below:

Aerospace Engineering (AE)

The AE program objectives are to develop graduates with an understanding of aircraft and spacecraft design and analysis using the principles of aerodynamics, structures and materials thermodynamics and propulsion, and flight mechanics.

Mechanical Engineering (ME)

The ME program objectives are to develop graduates with the ability to perform engineering design and analysis tasks using the principles of solid and fluid mechanics, manufacturing, and thermal, structural and control systems.

Materials Science and Engineering (MSE)

The MSE program objectives are to develop graduates who understand the structure, properties, processing, performance, selection and service behavior of engineering materials, including metals, ceramics, polymeric and composite materials. This knowledge applies to design of new materials, improvement of existing materials, and optimization of methods of manufacture.

Mechanical, Materials and Aerospace Engineering

Faculty

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Associate Chair for Undergraduate Studies
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Professors
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Associate Professors
Cassel (Associate Chair, Graduate Studies), Clack, Gosz, Mostovoy, Pervan, Raman, Rempfer, Ruiz, Tin

Assistant Professors
Qian, Vural

Lecturer
Cesarone

Research Professors
Broutman, Copley, Kumar, Sciammarella

Adjunct Professors
Khounsari, Morel, Natarajan, Patwardhan, Routbort, Singh, Thakkar

Faculty Emeriti
Bonthron, Breyer, Dix, Donnell, Gordon, Graham, Higgins, Kalpakjian, Lavan, Morkovin, Porter, Rasof, Rettaliata, Way

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 three 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 design 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.

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.

Mechanical, Materials and Aerospace Engineering

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.

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.

Advising

The MMAE department considers the advising of students an important obligation. Each student must meet with a faculty adviser during the pre-registration period each semester. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements for ABET accreditation. Faculty advisers for all MMAE students can be obtained from the department coordinator.

Program requirements may not be waived, nor will substitutions be permitted, without the approval of the appropriate associate chair.

Double Majors

A double major in ME and AE, ME and MSE, or AE and MSE may generally be completed in one additional semester. Interested students should consult their academic adviser.

Minors

Minors available to students who wish to broaden their knowledge can be found beginning on page 131. In all programs, two of the required minor courses substitute for two technical electives. Minors other than those listed below may be undertaken with the approval of the student's faculty adviser 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
- Construction Management
- Electromechanical Design and Manufacturing (for ME and AE students only)
- Energy/Environment/Economics (E^3)
- Environmental Engineering
- Management
- 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

Graduate Courses

Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

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

Required Courses for the first two years	Credit Hours
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Engineering Graphics Requirement EG 105	2
Materials Science Requirement MS 201	3
Mechanical, Materials and Aerospace Engineering Requirements MMAE 100, 201, 202, 350 (Note: MMAE 350 is recommended but not required for MSE majors.)	12
Humanities and Social Science Electives See general education requirements on page 25	15

Additional Courses Required for the B.S.M.E. Degree in the third and fourth years	Credit Hours
Mechanical and Aerospace Engineering Requirements MMAE 305, 306, 310, 320, 321, 322, 371, 430, 432, 433, 443, 485	39
Physics Requirement PHYS 300	3
Interprofessional Projects	6
Technical Electives	6
Humanities and Social Science Electives See general education requirements on page 25	6
Free Elective	3
Total Credit Hours, B.S.M.E.	**130**

Additional Courses Required for the B.S.M.S.E. Degree in the third and fourth years	Credit Hours
Materials Science and Engineering Requirements MMAE 363 (or 320), 365, 370, 371, 463, 465, 467 (or 483), 468 (or 486), 476, 482, 485	33
Physics Requirement PHYS 300	3
Interprofessional Projects	6
Materials Engineering Electives or approved Technical Electives	12
Humanities and Social Science electives See general education requirements on page 25	6
Free Elective	3
Total Credit Hours, B.S.M.S.E.	**127**

Additional Courses Required for the B.S.A.E. Degree in the third and fourth years	Credit Hours
Mechanical and Aerospace Engineering Requirements MMAE 304, 305, 310, 311, 312, 320, 322, 371, 430, 436, 437, 441, 452	39
Physics Requirement PHYS 300	3
Interprofessional Projects	6
Technical Electives	6
Humanities and Social Science Electives See general education requirements on page 25	6
Total Credit Hours, B.S.A.E.	**130**

B.S.M.E., B.S.M.S.E. and B.S.A.E. Curricula

Curricula for B.S.M.E., B.S.M.S.E. and B.S.A.E. are the same for the first three semesters.

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MMAE 100	Introduction to the Profession	1	4	3
EG 105	Engineering Graphics and Design	1	2	2
CHEM 124	Principles of Chemistry I	3	3	4
MATH 151	Calculus I	4	1	5
Humanities or Social Science Elective		3	0	3
Totals		**12**	**10**	**17**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
MS 201	Materials Science	3	0	3
CS 105	Introduction to Computer Programming I	2	1	2
PHYS 123	Mechanics	3	3	4
MATH 152	Calculus II	4	1	5
Humanities or Social Science Elective		3	0	3
Totals		**15**	**5**	**17**

Semester 3				
MMAE 201	Mechanics of Solids I	3	0	3
PHYS 221	Electromagnetism and Optics	3	3	4
MATH 251	Multivariate and Vector Calculus	4	0	4
Humanities or Social Science Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**16**	**3**	**17**

Mechanical Engineering: Semesters Four Through Eight

Semester 4				
MMAE 202	Mechanics of Solids II	3	0	3
MMAE 350	Computational Mechanics	3	0	3
PHYS 224	Thermal and Modern Physics	3	0	3
MATH 252	Introduction to Differential Equations	4	0	4
Humanities or Social Science Elective		3	0	3
Totals		**16**	**0**	**16**

Semester 5				
PHYS 300	Instrumentation Laboratory	2	3	3
MMAE 305	Dynamics	3	0	3
MMAE 310	Fluid Mechanics	3	3	4
MMAE 320	Thermodynamics	3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**6**	**16**

Semester 6				
MMAE 306	Analysis and Design of Machine Elements	3	0	3
MMAE 321	Applied Thermodynamics	3	0	3
MMAE 322	Heat and Mass Transfer	3	3	4
MMAE 371	Engineering Materials and Design	2	3	3
IPRO 497	Interprofessional Project I	1	6	3
Totals		**12**	**12**	**16**

Semester 7				
MMAE 430	Engineering Measurements	2	6	4
MMAE 433	Design of Thermal Systems	2	3	3
MMAE 485	Manufacturing Processes	3	0	3
Technical elective*		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**13**	**9**	**16**

Semester 8				
MMAE 432	Design of Mechanical Systems	1	6	3
MMAE 443	System Analysis and Control	3	0	3
IPRO 497	Interprofessional Project II	1	6	3
Technical Elective*		3	0	3
Free Elective		3	0	3
Totals		**11**	**12**	**15**

Total Credit Hours **130**

* 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 adviser for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any deviations require written approval by the associate chair of the department.

Materials Science and Engineering: Semesters Four Through Eight

MSE students may satisfy a materials design experience requirement either through appropriate selection of a senior year IPRO, or by taking three credit hours of MMAE 494 as a technical elective. In either case, adviser approval is required.

Semester 5		Lect.	Lab. Hrs.	Cr. Hrs.
PHYS 300	Instrumentation Laboratory	2	3	3
MMAE 365	Structures and Properties I	3	0	3
MMAE 363	Metallurgical and Materials Thermodynamics	3	0	3
MMAE 370	Materials Laboratory I	1	6	3
MMAE 371	Engineering Materials and Design	2	3	3
Totals		**11**	**12**	**15**

Semester 6		Lect.	Lab. Hrs.	Cr. Hrs.
MMAE 463	Structures and Properties II	3	0	3
MMAE 465	Electrical, Magnetic and Optical Properties of Materials	3	0	3
Technical Elective*		3	0	3
IPRO 497	Interprofessional Project I	1	6	3
Humanities or Social Science Elective		3	0	3
Totals		**13**	**6**	**15**

Semester 7				
MMAE 467	Fundamental Principles of Polymer Materials†	3	0	3
MMAE 476	Materials Laboratory II	2	3	3
MMAE 485	Manufacturing Processes	3	0	3
Technical Elective*		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**3**	**15**

Semester 8				
MMAE 468	Introduction to Ceramic Materials††	3	0	3
MMAE 482	Composites	3	0	3
Technical Electives*		6	0	6
IPRO 497	Interprofessional Project II	1	6	3
Totals		**13**	**6**	**15**

Total Credit Hours 127

† MMAE 470 may be substituted. * See footnote on page 116.

†† MMAE 486 may be substituted.

Aerospace Engineering: Semesters Four Through Eight

Semester 4		Lect.	Lab. Hrs.	Cr. Hrs.
MMAE 202	Mechanics of Solids II	3	0	3
MMAE 350	Computational Mechanics	3	0	3
PHYS 224	Thermal and Modern Physics	3	0	3
MATH 252	Introduction to Differential Equations	4	0	4
Humanities or Social Science Elective		3	0	3
Totals		**16**	**0**	**16**

Semester 5				
MMAE 305	Dynamics	3	0	3
MMAE 310	Fluid Mechanics	3	3	4
MMAE 320	Thermodynamics	3	0	3
PHYS 300	Instrumentation Laboratory	2	3	3
Humanities or Social Science Elective		3	0	3
Totals		**14**	**6**	**16**

Semester 6				
MMAE 371	Engineering Materials and Design	2	3	3
MMAE 304	Mechanics of Aerostructures	3	0	3
MMAE 311	Compressible Flow	3	0	3
MMAE 312	Aerodynamics of Aerospace Vehicles	3	0	3
IPRO 497	Interprofessional Project I	1	6	3
Totals		**12**	**9**	**15**

Semester 7				
MMAE 322	Heat and Mass Transfer	3	3	4
MMAE 441	Aerospace Dynamics	3	0	3
MMAE 452	Aerospace Propulsion	3	0	3
Technical elective*		3	0	3
Humanities or Social Science Elective		3	0	3
Totals		**15**	**3**	**16**

Semester 8				
MMAE 430	Engineering Measurements	2	6	4
MMAE 436	Design of Aerospace Vehicles I	2	3	3
MMAE 437	Design of Aerospace Vehicles II	2	3	3
IPRO 497	Interprofessional Project II	1	6	3
Technical Elective*		3	0	3
Totals		**10**	**18**	**16**

Total Credit Hours 130

* See footnote on page 116.

Institute of Psychology

Department Web site: www.iit.edu/colleges/psych

Psychology's objective is to understand the manner in which organizations, human beings and animals behave, learn and interact, as well as the ways in which their behavior can be modified. The Institute's curriculum encompasses the past 25 years' worth of major changes in psychology and prepares students for modern careers in psychology or other allied professions.

The Institute offers a distinct program that is research-based, human behavior-oriented and B.S. granting, blending the strengths of highly successful graduate programs in clinical, industrial/organizational, and rehabilitation psychology as well as options for honors pre-med and law. Designed for highly motivated, career-oriented students, this program emphasizes the integration of applied research with faculty, practical experience in professional settings, and traditional classroom activities. It is characterized by faculty mentorship, individual advising, and group activities with faculty, graduate students, and other undergraduate students.

The objectives of the Bachelor of Science degree program in psychology are:

- To prepare students for graduate training in psychology
- To prepare students for baccalaureate level careers that draw on an understanding of human behavior (Students who have an interest in such areas as sports counseling, child care, disability, or human resources can include a preliminary preparation for those professions in their studies)
- To provide a basic understanding of research methods in the behavioral sciences
- To incorporate the recommendations of the American Psychological Association for undergraduate education in the four basic areas of social differences, individual differences, physiology, and learning and cognition

The curriculum is flexible and supports students with diverse career goals. Most psychologists hold advanced degrees and the program offers excellent preparation for graduate school. A bachelor's degree in psychology offers diverse options, including those in the burgeoning areas of geriatrics, health and sports counseling, behavioral medicine, and managed health care, as well as traditional settings such as schools, courts, hospitals, industries and research laboratories. Many students also will find psychology highly beneficial as a pre-professional major for advanced studies in medicine, dentistry, law, business or public administration.

Faculty

Director
M. Ellen Mitchell
Room 252 Life Sciences
Ext. 73500

Professors
Ayman, Corrigan, Huyck, Lam, Schleser

Associate Professors
Hopkins, Mitchell, Morris, Sher, Towler, Young

Assistant Professors
Bach, Gordon, Lane

Clinical Assistant Professor
Larson

Visiting Assistant Professors
Pipher, Stanard

Faculty Emeriti
Geist, Wolach

Institute of Psychology

Bachelor of Science in Psychology

Required Courses	Credit Hours
Psychology Requirements PSYC 100, 101, 204, 221, 222, 301, 303, 310,406, 409, 423, 435 or 436	34
Mathematics Requirements PSYC 203, MATH 119, & 122 OR PSYC 203, MATH 148, & 149 OR PSYC 203 & MATH 151	8-12
Computer Science Requirement CS 105	2
Natural Sciences Requirements One required biology class; Human Biology suggested One class must have a lab See general education requirements on page 25 Suggested courses: CHEM 124, BIOL 107 and/or 115, and PHYS 211	11
Humanities and Social Sciences Requirements See general education requirements on page 25	21
Interprofessional Projects	6
Psychology Capstone Project	3
Free Electives	37-45
Total Credits	**126-130**

Psychology Curriculum

Semester 1		Lect.	Lab Hrs.	Cr. Hrs.
PSYC 100	Introduction to the Profession I	2	0	2
Humanities	100-level Elective	3	0	3
CHEM 124	Principles of Chemistry I	3	3	4
PSYC 221	Human Behavior, Growth and Learning	3	0	3
PSYC 203	Undergraduate Statistics for the Behavioral Sciences	3	0	3
Totals		**14**	**3**	**15**

Semester 2		Lect.	Lab Hrs.	Cr. Hrs.
PSYC 101	Introduction to the Profession II	2	0	2
BIOL 115	Human Biology	3	0	3
PSYC 222	Brain, Mind and Behavior	3	0	3
MATH 148	Calculus/Precalculus I	4	0	4
Humanities or Social Sciences Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 3				
PSYC 303	Abnormal Psychology	3	0	3
PSYC 301	Industrial Psychology	3	0	3
BIOL 107	General Biology Lecture	3	0	3
MATH 149	Calculus/Precalculus II	4	1	5
IPRO 497	Interprofessional Project	1	6	3
Totals		**14**	**7**	**17**

Semester 4				
PSYC 310	Social Psychology	3	0	3
CS 105	Introduction to Computer Programming I	2	1	2
PHYS 211	Basic Physics I	3	0	3
Humanities or Social Science Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Totals		**17**	**1**	**17**

Semester 5				
PSYC 435	Early Development			
	OR			
PSYC 436	Adult Development	3	0	3
PSYC 204	Experimental Psych and Research Methods	2	2	3
Free Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Humanities or Social Sciences Elective		3	0	3
Totals		**17**	**2**	**18**

Semester 6				
PSYC 409	Psychological Testing	3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Humanities or Social Sciences Elective		3	0	3
Humanities or Social Sciences Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 7				
IPRO 497	Interprofessional Project	1	6	3
PSYC 423	Learning Theory	3	0	3
PSYC 406	History and Systems of Psychology	3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Totals		**13**	**6**	**15**

Semester 8				
Psychology Capstone Project		3	0	3
Humanities or Social Sciences Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Totals		**15**	**0**	**15**

Minimum Credit Hours **126**

Optional Programs

Accelerated Combined-Degree Programs

Today, an undergraduate degree doesn't necessarily guarantee a job in the workforce or provide long-term career security. However, the Institute of Psychology offers combined, accelerated undergraduate and graduate 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.), rehabilitation counseling (B.S./M.S.) or personnel and human resources development (B.S./M.S.) offered by IIT. Students wishing to participate in the accelerated B.S./J.D. option must indicate this as early as possible.

With the consent of the Institute of Psychology director, undergraduate psychology students may enroll in some graduate-level psychology courses. Close communication with advisers 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.

For undergraduate psychology majors, it is possible to earn a Masters of Science in Rehabilitation Counseling or a Masters of Science in Personnel and Human Resources Development (PHRD) in one-and-a-half years instead of the normal two years. By taking psychology courses that apply to the rehabilitation counseling or PHRD program, graduate program coursework can be reduced by up to 15 credit hours, or one full-time semester.

Rehabilitation

IIT's Rehabilitation Counseling Master's Program prepares students to assume vital roles as counselors fully qualified to help in the vocational, educational and personal adjustment of people with physical, mental and emotional disabilities.

Since its inception, IIT's Rehabilitation Counseling Education Program has been continuously funded by the Rehabilitation Services Administration of the U.S. Department of Education to provide rehabilitation-counseling education. The Council of Rehabilitation Education has accredited the program since 1975. IIT rehabilitation graduates are eligible to become nationally certified rehabilitation counselors and licensed professional counselors in Illinois.

U.S. News & World Report ranked the Rehabilitation Counseling Program **fifth** in the nation in 2003 & 2004.

Current Research Projects
Assessment of readiness for change and treatment matching.
Psychosocial adjustment to disability and chronic illness.
Traumatic brain injury rehabilitation and neuropsychological assessment.
Disability and health.
Technology applied to human behavior and rehabilitation.

Rehabilitation Counseling 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 Rehabilitation Counseling program. A grade of B or better is required for courses to be used toward a graduate degree.

PSYC 410 Vocational Rehabilitation
PSYC 411 Medical Aspects of Disabling Conditions
PSYC 412 Multicultural and Psychosocial Aspects of Disability
PSYC 513 Assessment in Rehabilitation Counseling
PSYC 523 Introduction to Theories of Psychotherapy
PSYC 557 Pre-Practicum in Rehabilitation Counseling
PSYC 562 Job Placement
PSYC 563 Human Growth and Career Development
PSYC 583 Rehabilitation Engineering Technology I
PSYC 590 Introduction to Psychiatric Rehabilitation

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 Psychology Program, the Personnel and Human Resources Development program is based on a scientist/practitioner model and the guidelines of the Society of Industrial and Organizational Psychology, Division 14, of the American Psychology Association.

The most recent Princeton Review's ***The Gourman Report of Graduate Programs*** ranked the IIT Industrial/Organizational Psychology program **thirteenth** in the nation.

Current Research Projects
Women in the Workplace
Leadership
Training
Organizational Effectiveness
Employee Selection
Customer Service Climate

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 programs. 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 Program

Students who meet the requirements of the Dual Admission Program (DAP) may enroll simiultaneously 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 grade point average of at least 3.0 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 re-instatement. Transcripts must be sent to the IIT Office of Educational Services 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 Baccalaureate 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 and is granted in addition to other funding.

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.

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	3
PSYC 455	Development of Evaluation of Training in Organizations	3
PSYC 489	Undergraduate Psychology Seminar	3
Total Credits		**9**

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 advisers in their respective major departments.

Minors offered through the Institute of Psychology are:

Organizational Psychology:
PSYC 221, PSYC 301, PSYC 303, PSYC 310 or SOC 201, PSYC 409.

Psychology:
At least 15 credit hours must be completed, including the following two required courses: PSYC 203, PSYC 221.

Rehabilitation Services:
PSYC 410, PSYC 411, PSYC 412, PSYC 583, PSYC 590.

Human Resources:
PSYC 221, PSYC 310, PSYC 455, PSYC 431, PSYC 481, PSYC 301, PSYC 482 or 483, PSYC 497.

ROTC: Air Force Aerospace Studies

Department Web site: www.iit.edu/departments/airforce/

The mission of Air Force Reserve Officer Training Corps (AFROTC) is to produce leaders for the Air Force and build better citizens for America. Its vision is to be "a highly successful organization, respected throughout the Air Force, the educational community and the nation." Students who become cadets have the opportunity to earn a commission in the United States Air Force while earning their baccalaureate degrees. Most graduates who enter the Air Force through this program are assigned to positions consistent with their academic majors. Highly qualified, interested graduates may compete for selection as pilots or navigators.

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

Chair
Lt. Col. Mark R. Benz
208 Stuart Building
Ext. 73526

Professor
Benz

Assistant Professors
Acosta, Hunt, Morgan

ROTC: Air Force Aerospace Studies

Financial Aid

The Air Force ROTC College Scholarship Program (CSP) offers four- and three-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 General Military Courses without entering the AFROTC program.

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. Not meeting this requirement does not prevent students from enrolling in the AS 300 course, but rather postpones award of POC privileges and pay until field training is accomplished. The major areas of study during field training include junior officer training, career orientation, base functions, and the Air Force environment.

Two-Year Program

This program is designed for undergraduate and graduate students in qualified majors with fewer than three, but at least two, years of coursework remaining towards their degree. Completion of this program requires a five-week summer field training encampment and the two-year POC. The five-week field training session is normally and preferably the summer prior to the start of the senior year (or first semester of the POC), but may be completed the following summer. Not meeting this requirement does not prevent students from enrolling in the AS 300 course, but rather postpones award of POC privileges and pay until field training is accomplished. The major areas of study for the five-week encampment are the same as the four-week encampment with the addition of the GMC curriculum. Interested students should contact the Air Force ROTC Detachment 195 at 312-567-3525 as soon as possible during the fall term of their sophomore year.

Minor

Students may select a minor in Air Force aerospace studies. See page 126 for course requirements.

ROTC Air Force Aerospace Studies Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.	Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
AS 101	The Foundations of the USAF I	1	2	1	AS 102	The Foundations of the USAF II	1	2	1
Semester 3					**Semester 4**				
AS 201	The Evolution of USAF Air and Space Power I	1	2	1	AS 202	The Evolution of USAF Air and Space Power II	1	2	1
Semester 5					**Semester 6**				
AS 301	Air Force Leadership Studies I	3	2	3	AS 302	Air Force Leadership Studies II	3	2	3
Semester 7					**Semester 8**				
AS 401	National Security Affairs	3	2	3	AS 402	Preparation for Active Duty	3	2	3
					Totals		**16**	**16**	**16**

GMC courses AS 101, 102, 201 and 202 academic curricula are included in the two-year program's five-week field training.

ROTC: Military Science

Department Web site: www.iit.edu/departments/army/

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

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ROTC: Military Science

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 courses. 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 402 Farr Hall.

ROTC: Military Science Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MILS 101	Foundations of Officership	1	2	1
MILS 147*	Aerobic Conditioning	0	3	2
Totals		**1**	**5**	**3**

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
MILS 102	Basic Leadership	1	2	1
MILS 148*	Aerobic Conditioning	0	3	2
Totals		**1**	**5**	**3**

Semester 3				
MILS 201	Individual Leadership Studies	2	2	2
MILS 247*	Aerobic Conditioning	0	3	2
Totals		**2**	**5**	**4**

Semester 4				
MILS 202	Leadership and Teamwork	2	2	2
MILS 248*	Aerobic Conditioning	0	3	2
Totals		**2**	**5**	**4**

Semester 5				
MILS 301	Leadership and Problem Solving	3	2	3
MILS 347**	Aerobic Conditioning	0	3	2
Totals		**3**	**5**	**5**

Semester 6				
MILS 302	Leadership and Ethics	3	2	3
MILS 348**	Aerobic Conditioning	0	3	2
Totals		**3**	**5**	**5**

Semester 7				
MILS 401	Leadership and Management	3	2	3
MILS 447**	Aerobic Conditioning	0	3	2
Totals		**3**	**5**	**5**

Semester 8				
MILS 402	Officership	3	2	3
MILS 448**	Aerobic Conditioning	0	3	2
Totals		**3**	**5**	**5**

* 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 Web site: http://nrotc.iit.edu/

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 unit 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.

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ROTC: Naval Science

ROTC: Naval Science Undergraduate Study

The objective of the program in naval science is to supplement the student's academic study with specialized education in naval subjects and practical training and experience so that, upon commissioning, the future officer can become a productive member of the naval community. Active duty naval officers are assigned as instructors in the NROTC unit. It is their responsibility to assist the students in translating the theoretical knowledge they receive into the practical skills and knowledge they will require after commissioning and to provide both professional and personal counseling.

Classroom experience is principally directed toward providing education in those technical areas that are peculiar to the naval environment, such as marine navigation. Knowledge of customs and traditions of the service is provided through seminars and contact with Navy personnel. During the summer, students are assigned to naval ships and stations where their education as future naval officers is enhanced by on-the-job training. Scholarship NROTC students receive about four weeks of summer training each year; 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 an 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 an 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 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. 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 page 132.

ROTC: Naval Science Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.	Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
NS 101	Introduction to Naval Science	2	2	2	NS 202	Seapower and Maritime Affairs	3	2	3
Semester 3					**Semester 4**				
NS 401	Leadership and Management	3	2	3	NS 301	Navigation & Naval Operations I	3	2	3
Semester 5					**Semester 6**				
NS 102	Naval Ship Systems	3	2	3	NS 201	Naval Weapons Systems	3	2	3
Semester 7					**Semester 8**				
NS 302	Navigation & Naval Operations II	3	2	3	NS 402	A Seminar on Wartime Leadership and Ethics	3	2	3

Marine Option

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.	Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
NS 101	Introduction to Naval Science	2	2	2	NS 202	Seapower and Maritime Affairs	3	2	3
Semester 3					**Semester 4**				
NS 401	Leadership and Management	3	2	3					
Semester 5					**Semester 6**				
NS 310	Evolution of Warfare	3	2	3					
OR									
NS 410	Amphibious Warfare	3	2	3					
Semester 7					**Semester 8**				
NS 310	Evolution of Warfare	3	2	3	NS 402	A Seminar on Wartime Leadership and Ethics	3	2	3
OR									
NS 410	Amphibious Warfare	3	2	3					

Social Sciences

Department Web site: www.iit.edu/departments/socsci/

The Department of Social Sciences encompasses the disciplines of political science, sociology, anthropology and public administration. The department offers coursework and awards degrees at both the undergraduate and graduate levels. Our faculty concentrates on a variety of subjects using an interdisciplinary approach, including: American and urban politics; organization and management; policy analysis; science, technology, and environment; urban sociaology and ethnography; international migration; and sociology of architecture and design.

An undergraduate program is offered leading to a Bachelor of Science with a concentration in political science, as well as minors in political science, sociology and public administration. The department participates with other IIT departments in offering interdisciplinary minors in legal studies, law and society, technology and human affairs, and urban studies.

At the graduate level, the department offers the master's degree in public administration (M.P.A.). Degrees are offered combining several different undergraduate degrees including political science with a master's degree in public administration. These combined degrees can usually be completed in five years. The department cooperates with the university's law school (Chicago-Kent College of Law) in offering a program leading to a bachelor's degree and law degree in six years instead of the usual seven years.

The educational objectives of the degree program in Political Science are to provide students with knowledge of the central concepts and theories in political science and a set of practical skills preparing the student for success in either the public sector, non-profit and private sectors, graduate school or law school.

The practical skills set emphasizes skills necessary to identify and formulate policy, operational and business problems, and do the analysis necessary to identify their solutions. Specific skills emphasized include written and oral communication, modeling, statistical and other forms of analysis. Most students majoring in political science focus their study on American government, urban affairs, administrative and organization theory or public policy.

Basic courses in the social sciences have the objective of providing both majors and non-majors with an understanding of local and global issues that are addressed by the study of the social sciences and of the techniques that are used to address those issues. Specialized courses in the policy areas have the objective of offering both majors and non-majors the opportunity to pursue a variety of social science subjects at advanced levels.

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Faculty Emeriti
Beam, Stover

Political Science

Political science emphasizes making connections between the theory and practice of politics. Concerns range from perennial philosophical issues regarding justice, equality and freedom to practical political matters such as conflict resolution, collective decision making, and public policy. Opportunities are provided to consider how theoretical understandings of politics can inform political action and how participation in politics offers the basis for understanding it.

Since the ancient Greeks, knowledge of the affairs of state has always been deemed essential for all educated citizens. A knowledge of political science is central to any occupation or profession that needs an understanding of human behavior and the relations between people and governments or the analysis and communication of information about public problems. A background in political science is virtually indispensable to people in politics and government, whether at the state, local or national level.

Social Sciences

A political science undergraduate degree is common for the following types of professionals: lawyers, journalists, policy analysts, planners, scientists, business managers, politicians or medical people. Such professionals are in constant need for information on and understanding of the political, legal, governmental and public implications of their fields.

Students seeking a major in political science are required to complete 33 credits in political science. With department approval, up to 18 hours of coursework in related fields may be applied toward this requirement. Majors are also required to complete an approved course in statistics and a course in research methods and may also be required to take a course requiring completion of a research paper. Students seeking a minor in political science are required to complete 15 credits in political science. Additional courses may be required to prepare students for professional training and for entrance in their chosen professional field, such as law or medicine.

Sociology

Sociology may be defined as the study of societies, communities, organizations and groups. It examines the structure and process of society and of the social groups that compose it. The focus is often on how people coordinate their activities to reach individual and collective goals in a wide range of settings including work, educational, religious, familial and political settings.

Sociological analysis explores social situations from the standpoint of the roles, meanings and norms that make behavior predictable and organized. It investigates how such patterns of interdependent activity arise and what sustains them; why they take one shape instead of another; how some change more rapidly than others; how they are related to each other, and how people justify and explain their organizations and activities. Thus, the field provides an understanding of the crucial problems facing our rapidly changing society.

Sociology provides intellectual and research skills, as well as a body of concepts and information useful to those entering numerous professions, including architecture, engineering, design, government, planning, social work, law and medicine. Students completing a minor in sociology are required to take five three-hour courses offered in the discipline.

Public Administration

Public administration emphasizes public management, policy analysis and financial management of governmental organizations. Public administration courses are generally offered only at the graduate level, but are generally open to qualified undergraduate students. A joint-degree program leading to a combined B.S./M.P.A. Degree program is offered for students interested in government careers.

Bachelor of Science in Political Science

Required Courses	Credit Hours
Mathematics Requirements Two courses of MATH 119 or above including PSYC 203	6
Humanities and Social Science Requirements See general education requirements on page 25	21
Natural Science Requirements See general education requirements on page 25	11
Computer Science Requirement CS 105	2
Political Science Requirements PS 100, 200, 309	9
Political Science Electives	27
Required Minor Electives	15
Free Electives	29
Interprofessional Projects	6
Total Credit Hours	**126**

Political Science Curriculum

The political science curriculum consists of 126 semester hours, which are distributed as follows: at least 33 hours in political science (including PS 200 and PS 309); a minor of at least 15 hours; up to 29 hours of free electives; and completion of the general education program (three hours of Introduction to the Profession; six hours of Interprofessional Projects; five hours of mathematics, including PSYC 203; two hours of computer science; 21 hours of humanities and social science; and 11 hours of natural science or engineering). Students should consult their academic adviser regarding course sequences. A typical program might be as follows.

Semester 1		Lab. Lect.	Cr. Hrs.	Hrs.
PS 100	Introduction to the Profession	3	0	3
Humanities 100-level Elective		3	0	3
MATH	Course above MATH 119	3	0	3
Natural Science or Engineering Elective		3	3	4
PS 200	American Government	3	0	3
Totals		**15**	**3**	**16**

Semester 2		Lab. Lect.	Cr. Hrs.	Hrs.
Free Elective		3	0	3
Humanities or Social Science Elective		3	0	3
Social Science Elective		3	0	3
CS 105	Introduction to Computing Programming I	2	1	2
Natural Science or Engineering Elective		3	3	4
Political Science Elective		3	0	3
Totals		**17**	**4**	**18**

Semester 3				
Humanities Elective		3	0	3
Social Science Elective		3	0	3
PSYC 203	Undergraduate Statistics for the Behavioral Sciences	3	0	3
Political Science Elective		3	0	3
Political Science Elective		3	0	3
Totals		**15**	**0**	**15**

Semester 4				
IPRO Elective		1	6	3
Minor Course Elective		3	0	3
Natural Science or Engineering Elective		3	0	3
Political Science Elective		3	0	3
Political Science Elective		3	0	3
Totals		**13**	**6**	**15**

Semester 5				
Social Science Elective		3	0	3
Minor Course Elective		3	0	3
Free Elective		2	0	2
Free Elective		3	0	3
Political Science Elective		3	0	3
Political Science Elective		3	0	3
Totals		**17**	**0**	**17**

Semester 6				
Humanities Elective		3	0	3
Minor Course Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
PS 309	Research Methods in Social and Political Science	3	0	3
Totals		**15**	**0**	**15**

Semester 7				
IPRO Elective		1	6	3
Minor Course Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Political Science Elective		3	0	3
Totals		**13**	**6**	**15**

Semester 8				
Minor Course Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Free Elective		3	0	3
Political Science Elective		3	0	3
Totals		**15**	**0**	**15**

Total Credit Hours **126**

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 advisers 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 Engineering (ME majors only): MMAE 311, MMAE 312, MMAE 436, MMAE 441, MMAE 443, MMAE 452.

Air Force Aerospace Studies: AS 101, AS 102, AS 201, AS 202, AS 301, AS 302, AS 401, AS 402. Attendance at a five-week field training camp may be substituted for AS 101, AS 102, AS 201 and AS 202.

Applied Mathematics: MATH 230, MATH 252, MATH 332, and at least two courses in mathematics at the 400 level.

Architecture (non-architecture majors only). This minor consists of 15 semester hours: ARCH 100, ARCH 109, ARCH 113, either AAH 119 or AAH 120, and one of the following courses: ARCH 114, ARCH 125, ARCH 321, ARCH 403 and ARCH 413. Those 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 210, BIOL 214, BIOL 403, BIOL 404, BIOL 445.

Biology: BIOL 107, BIOL 109, BIOL 115, BIOL 117, BIOL 210 and BIOL 214.

Business: see Management minor

Chemistry: At least 15 credit hours must be completed from the following courses: CHEM 247; one of the sequences: CHEM 237, 239 or CHEM 343, 344; and electives chosen from: CHEM 321, CHEM 334, CHEM 335, CHEM 455.

Circuits and Systems (non-EE, non-CPE majors only): ECE 211, ECE 213, ECE 218 and one of the following sequences: ECE 308 and ECE 403, ECE 308 and ECE 438, or ECE 319 and ECE 420.

Communication: 15 credit hours of communication coursework, at least (9) nine of which must be at or above the 300 level, chosen in consultation with the minor adviser.

Computational Structures: CS 201, CS 330, CS 331, CS 430, MATH 471.

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 425, CS 445 and one of the following courses: CS 422 or CS 429.

Electromechanical Design and Manufacturing (AE and ME majors only):
- **AE majors:** MMAE 445, MMAE 485, BUS 305, ECE 218, ECE 242, ECE 441 (replaces PHYS 300).
- **ME majors:** MMAE 444, MMAE 485, BUS 305, ECE 218, ECE 242, ECE 441 (replaces PHYS 300).

Energy/Environment/Economics (E^3): This minor consists of 15 semester hours:
- **Energy, Environment, Economics:** CHE 543
- **Energy Sources, Conversion, Utilization and Distribution:** Six credit hours from the following courses: CHE 465, CHE 467, CHE 481, CHE 483, CHE 489, CHE 491, CHE 517, CHE 520, CHE 522, CHE 541, CHE 565, CHE 582, ECE 319, ECE 411, ECE 419, ECE 420, ECE 438, MMAE 423, MMAE 424, MMAE 425.
- **Energy and Environment, System Analysis, and Special Problems:** Six credit hours from the following courses: CHE 426, ENVE 404, ENVE 463, ENVE 485, ECE 491, ECE 497, MMAE 491, MMAE 494, MMAE 497, ECON 423, PS 338. Appropriate substitution may be made with the approval of the program adviser.

Engineering Graphics and CAD: EG 105, EG 305, EG 306, EG 405, EG 406, EG 419.

English Language/Literature: 6 credit hours of English linguistics courses, 6 credit hours of Literature courses, and a 3 credit hour course in either English linguistics or literature. At lease nine credit hours must be at or above the 300 level.

Minors

Environmental Engineering: This minor consists of 15 semester hours.
- **Chemical Engineering:** At least six credit hours from the following courses: CHE 426, ENVE 404, ENVE 463, ENVE 485, ENVE 491.
- **Civil Engineering:** Six credit hours from the following courses: CAE 421, CAE 482, CAE 483, CAE 484.

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

Entrepreneurship: BUS 210, BUS 361, BUS 371, two entrepreneurial IPROs (EnPROs), and one of the following courses: BUS 363, ECON 211, or ECON 423.

Graphics and CAD for Non-Engineers: EG 225, EG 325, EG 329, EG 425, EG 429.

Health Care and American Society: SOC 201, SOC 301, SOC 348, PS 332 and PS 351.

History: At least 15 credit hours of history courses numbered 300 level or above must be completed. These courses should be chosen in consultation with minor adviser.

Human Resources: PSYC 221, PSYC 301, PSYC 310, PSYC 431, PSYC 455, PSYC 481, PSYC 482 or 483, PSYC 497.

Law and Society: At least 15 credit hours must be completed, including the following: PS 256, PS 318, SOC 348, PHIL 362, PS 425.

Linguistics: 15 credit hours of linguistics coursework, at least (9) nine of which must be at or above the 300 level, chosen in consultation with the minor adviser.

Literature: At least 15 credit hours in 300 level literature courses must be completed, including LIT 337 or LIT 338.

Philosophy and Sociology of Science: At least 15 credit hours must be completed, including PHIL 341, and at least four of the following courses: PHIL 302, PHIL 326, PHIL 342, PHIL 343, PHIL 350, SOC 301, SOC 302, SOC 303.

Management: BUS 210, ECON 211, BUS 301 and two of the following three courses: ECON 423, BUS 371 and BUS 305. Chemical engineering majors should also take CHE 426 or another engineering science course.

Materials Engineering:
- **ME majors:** MMAE 365, MMAE 463, MMAE 370 and two of the following courses: MMAE 465, MMAE 467, MMAE 468 (or MMAE 476), MMAE 482, MMAE 483, MMAE 484, MMAE 486, MMAE 487, or an approved IPRO.
- **AE majors:** MMAE 365, MMAE 463, MMAE 474, MMAE 485 and two of the following courses: MMAE 465, MMAE 467, MMAE 468, MMAE 482, MMAE 483, MMAE 484, MMAE 486, MMAE 487, or an approved IPRO.

Mechanical Engineering (AE majors only): MMAE 406, MMAE 432, MMAE 433, MMAE 443, MMAE 485.

Military Science: MILS 101, MILS 102, MILS 201, MILS 107 or MILS 202 (these courses will at times be interchanged) or attendance at military training; MILS 301, MILS 302, MILS 401, MILS 402.

Naval Science: NS 101, NS 102 (navy option), NS 201 (navy option), NS 202 (attendance at the Naval Science Institute may be substituted for the preceding courses), NS 301 (navy option), NS 302 (navy option), NS 310 (marine option), NS 350, NS 402, NS 410 (marine option), BUS 301.

Music: 15 credits in music theory or practice taken at VanderCook College of Music. A maximum of three semester hours of performance courses may be used towards a minor. Students should contact Educational Services concerning applicability of courses toward graduation.

Operating Systems: CS 201, CS 331, CS 350, CS 351, CS 450.

Organizational Psychology: PSYC 221, PSYC 301, PSYC 303, PSYC 310 or SOC 201, PSYC 409.

Philosophy: At least 15 credit hours of philosophy courses numbered 300 level or above.

Physics: PHYS 300 or PHYS 427, PHYS 308, PHYS 348, PHYS 405, PHYS 413.

Political Science: At least 15 credit hours in political science must be completed, including at least nine hours at or above the 300 level.

Polymer Science and Engineering: This minor consists of 15 semester hours.
- One course from the following: CHE 470, CHEM 470, MMAE 470.
- At least three courses from the following: CHE 538, CHE 555, CHE 575, CHE 581, CHEM 535, CHEM 537, CHEM 542, MMAE 483, MMAE 487, MMAE 579, MMAE 580, MMAE 581.
- Up to one course from the following: CHE 426, CHE 489, CHE 491, CHE 582, FPE 541, MMAE 451, MMAE 485.

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

Premedical Studies : This specialized minor is intended for those students who plan to apply to a medical school, and have been approved by the Premedical Advisory Committee. Note: Students who major in biology or molecular biochemistry and biophysics satisfy the premedical studies course requirements.
- **Biomedical Engineering:**
  Neural Engineering or Medical Imaging Track: CHEM 237, CHEM 239, CHEM 240 and at least six credit hours chosen from the following: BIOL 210, BIOL 214, BIOL 225, BIOL 403, BIOL 404, BIOL 445, BIOL 446, BME 491 (1-3 credit hours), BME 495 (1-3 credit hours). If CHEM 237 or 239 is taken as an option then add equivalent number of credit hours from courses listed above.
  Cell and Tissue Track: CHEM 240, and at least 13 credit hours chosen from the following: BIOL 210, BIOL 214, BIOL 225, BIOL 403 BIOL 404, BIOL 445, BIOL 446, BME 491 (1-3 credit hours), BME 495 (1-3 credit hours).
- **Chemical Engineering:** BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 240, CHE 426 or one three-credit engineering science course.
- **Chemistry:** Students interested in pursuing chemistry as a premedical degree can elect the Bachelor of Science in Chemistry with emphasis in Biolgical Chemistry optional degree program which includes all of the necessary courses for entrance into medical school. Alternatively, students can pursue any of the other optional degree programs in chemistry but must take the following additional courses to be awarded the premedical minor: BIOL 107, BIOL 109, BIOL 115, BIOL 117, BIOL 214 and choose one of the following: BIOL 430, or BIOL 445.
- **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.
- **Computer Science:** BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 124, 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 plus 12 credit hours of communication coursework in consultation with the minor adviser.

Programming Languages: CS 201, CS 331, CS 350, CS 351, CS 440.

Psychology: At least 15 credit hours must be completed, including the following two required courses: PSYC 203, PSYC 221.

Public Administration: PS 200 or PS 201, and PS 351, PS 452, PS 462, SOC 311.

Rehabilitation Services: PSYC 410, PSYC 411, PSYC 412, PSYC 583, PSYC 590.

Sociology: SOC 200 or SOC 201, plus an additional 12 credit hours chosen in consultation with the sociology faculty.

Software Engineering: CS 201, CS 331, CS 441, CS 445, CS 487.

Structural Engineering (non-CAE majors only): CAE 303, CAE 304, CAE 307, CAE 310, CAE 315.

Technology and Human Affairs: At least 15 credit hours must be completed from the following: HIST 383, PHIL 370, PS 332, PS 338, PS 339, SOC 303, SOC 304, SOC 356, SOC 362.

Telecommunications: CS 116 or CS 201; ECE 403, ECE 406, ECE 407 and ECE 436; and two telecommunications electives chosen from CS 331, CS 450, ECE 448, or ECE 449.

Urban Studies: HIST 350, HIST 352, PS 315, PS 317, and SOC 350 or SOC 411.

Web Communication: COM 430, COM 431, COM 432, and two courses chosen in consultation with the minor adviser.

Special Programs

Dual Undergraduate Degree Options

Depending upon interest, capabilities, and goals, and with the permission of their advisers 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 adviser. 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 adviser. 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/Bachelor of Science in Aerospace Engineering/Bachelor of Science in Materials Science and Engineering

A dual major in ME and AE, ME and MSE, or AE and MSE may generally be completed in one additional semester. Interested students should consult their adviser.

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 advisers and department chairs, students may choose combined degree programs or select one of the following options.

Bachelor of Architecture/Master of Business Administration

Qualified students may earn both the Bachelor of Architecture and Master of Business Administration degrees in about six years, rather than the usual seven years. Students who are completing their eighth semester, or an equivalent of 124 credit hours, in architecture at IIT may apply for entry into the joint program. They should take preparatory courses for the M.B.A. prior to entry and the GMAT during the eighth semester. Students who anticipate entering the program should seek advising in the Stuart School of Business and the College of Architecture early in their studies at IIT.

Special Programs

Bachelor of Architecture/Master of Civil Engineering

Qualified students enrolled at IIT may earn both the Bachelor of Architecture and one of two professional masters' 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: MATH 151, MATH 152, MATH 251, MMAE 201, MMAE 202, CAE 303, CAE 304, CAE 307, CAE 310, CAE 431, and CAE 432. Students who seek the Master of Construction Engineering and Management (MAS CM) must successfully complete the following courses as part of their undergraduate program in architecture: CAE 323, CAE 431, CAE 432, and CAE 457.

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.

Bachelor of Science/Master of Business Administration

One of the most appealing career preparations is the combination of a bachelor's degree with the Master of Business Administration (M.B.A.) degree. IIT students who complete the necessary undergraduate management courses may earn both the bachelor's degree and the M.B.A. degree in about five years, rather than the usual six years. An exception exists in the case of architecture, where qualified students may earn a bachelor's degree and the M.B.A. degree in about six years, rather than the usual seven years. The undergraduate courses listed below, when included as part of the bachelor's degree program, replace graduate courses that are part of the M.B.A. program. This allows students to complete the M.B.A. with as few as 16 quarter courses.

Taken as undergraduate:	Advanced standing in graduate school for:
BUS 210	MBA 510
BUS 301	MBA 520
BUS 305	MBA 570
BUS 371	MBA 560

Students who are considering the Bachelor/M.B.A. program should consult with the Stuart School of Business undergraduate programs adviser as early as possible in their academic career in order to plan a program enabling them to receive the maximum number of advanced standing credits toward their M.B.A. Formal application to the M.B.A. program, which includes a Graduate Management Admission Test (GMAT) score, should be submitted prior to the completion of the seventh semester of the bachelor's program.

Bachelor of Science/Master of Public Administration

Qualified students who are interested in careers in the public sector may complete their BS and Master's Degree in Public Administration in five or fewer years.

The requirements for the Bachelor of Science concentration in Political Science and Master of Public Administration are often completed in four and a half years. Requirements for a BS degree in engineering or science can be combined with an MPA 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 submit their request to the MPA program after their fourth semester. Qualified students are granted provisional admission to the program and begin taking the graduate level MPA courses, usually at the rate of one per semester. When the student has completed substantially all the requirements for the BS 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 request for regular admission. By then, the student will have completed the MPA foundation courses. Students in this program receive credit toward their BS electives for two MPA courses and with the approval of the academic director, may receive credit toward their MPA 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 and Juris Doctor degrees. Students apply to the Honors Law Program prior to the beginning of their freshman year. 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:

a) maintain a 3.25 cumulative undergraduate GPA
b) take the Law School Admissions Test (LSAT) by February of their third undergraduate year at IIT and achieve an LSAT score at or exceeding the median score for the Chicago-Kent entering class
c) submit a completed application to Chicago-Kent by April 15 of the third undergraduate year
d) 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 years of undergraduate study. In reviewing such applications, consideration will be given to the student's participation in the Honors Law Program.

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 their B.S. and J.D. degrees in six years instead of the usual seven years. Students in other majors may also be able to accelerate completion of both degrees. Undergraduates may seek four-year, merit-based financial aid, including full- and half-tuition scholarships.

Business Honors Law Program

The Business Honors Law Program allows students to obtain both a B.S. in Business Administration and a J.D. degree. Students apply to the Business Honors Law Program prior to the beginning of their freshman year. Business Honors Law students are guaranteed admission to Chicago-Kent College of Law provided they meet the following criteria:

a) maintain a 3.25 cumulative undergraduate GPA
b) take the Law School Admissions Test (LSAT) by February of their third undergraduate year at IIT and achieve an LSAT score at or exceeding the median score for the Chicago-Kent entering class
c) submit a completed application to Chicago-Kent by April 15 of the third undergraduate year
d) fulfill the undergraduate requirements specified by the B.S.B.A. program and complete the required undergraduate courses
e) maintain a record consistent with the requirements of the bar examining program

Students who participate in the program but do not meet the academic standards for guaranteed admission are invited to apply through the regular competitive application process for admission to Chicago-Kent College of Law after three years of undergraduate study.

While the B.S.B.A. program is a full 4-year program, students in the Business Honors Law Program have the possibility of accelerating the curriculum to complete the B.S. and the J.D. in 6 years. This will require incoming Advanced Placement credit and/or summer school and should be discussed with an academic adviser.

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.

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 undergraduate B.S. 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 D.O. degree.

Special Programs

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 and to students attending other colleges or universities who transfer to IIT at the end of their sophomore year. Students must demonstrate high academic standards and research experience prior to admittance. This program is not open to international students. The MCAT is required for tracking purposes. Students admitted to this program will complete their undergraduate B.S. 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 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 B.S. in Biology and four years at Illinois College of Optometry. Courses taken during the first year at ICO also count as senior year level Biology courses. Students receive the B.S. in Biology from IIT after completing the first year at ICO and receive the Doctor of Optometry 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 Web site: 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 B.S. 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 p. 34, 138). 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 (chemical, electrical, materials science, mechanical) with a minor in premedical studies (see p. 64, 85, 112, 138).
- Computer science with a minor in premedical studies (see p. 79, 138).

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 adviser 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, CHEM 125, CHEM 237, CHEM 239, CHEM 240, PHYS 123, PHYS 221, BIOL 107, BIOL 109, BIOL 115, BIOL 117. To improve performance during the first year in medical school or to prepare for the MCAT, BIOL 214, BIOL 430, BIOL 445 and PHYS 223 are recommended.

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) (BCPS)
Konstintinos Arfanakis (BME)
Nick Menhart (BCPS)
Victor Perez-Luna (CHEE)
Jialing Xiang (BCPS)

Cathie D'Amico, Coordinator
116 Engineering 1
Ext. 78852

Todd Kersh, Coordinator
182 Life Sciences
Ext. 77986

Special Programs

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.

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 Pre-calculus, 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 advisers, who together constitute the Premedical Advisory Committee, see: **www.iit.edu/~premed/.** Post-Baccalaureate premedical students will be assigned an adviser 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 grade point average 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 grade point average 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 admissions office for full consideration.

Special Programs

Post-Baccalaureate Certificate and Certificate Programs

Certificate Programs

The Department of Civil and Architectural 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. Consult the civil and architectural engineering section in this bulletin for further information.

The Industrial Technology and Management Program also offers two certificate programs. The Industrial Technology and Management (INTM) certificate is designed for individuals who want to improve management, supervisory and decision-making skills required for world-class industrial operations. The Training the Technical Trainer (T3) certificate assists potential teachers of technology with curriculum development, teaching approaches, and training program development.

The Institute 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.

Post-Baccalaureate Certificate Programs

IIT offers a number of certificate programs at the graduate level including bioengineering, computer networking and telecommunications, computer science, construction management, earthquake and wind engineering design, electrical and computer engineering, energy/environment/economics, environmental studies, food process engineering, geoenvironmental engineering, infrastructure engineering, and management, intelligent information systems, non profit management, process operations management, psychology, public safety and crisis management, software engineering, technical communication, transportation systems planning, and wireless communications engineering. For information on post-baccalaureate certificate programs, please consult the Graduate College.

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 grade point average 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.**

Joint Programs

IIT has established joint programs with the following Chicago-area institutions: DePaul University, Wheaton College, Benedictine University, Elmhurst College, Dominican University and University of St. Francis. 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 Educational Services.

Dual Admissions Programs

IIT has established dual admissions 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 4 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, under Optional Programs, or contact the Office of Educational Services.

Study Abroad

IIT encourages students of all majors to consider studying abroad for part of their undergraduate career. Studying abroad enriches the college experience by providing a different intellectual or cultural environment and often enriches the academic program by providing special research facilities or by giving breadth to the major discipline.

Exchange Programs and Study Abroad Opportunities

IIT has undergraduate exchange programs with the following universities: Institute National des Sciences Appliques (INSA), Lyon, France (engineering); Kungliga Tekniska Hogakolan (KTH), Sweden (science and engineering); University of Oviedo, Spain (science, engineering, and psychology); and International School of Technology, Krakow, Poland (mathematics and engineering). In addition, IIT is a member of Global Engineering and Education Exchange, which is an international exchange program designed for engineering students with 20 countries participating.

Students may participate in study abroad opportunities of their own choosing other than the formal exchange programs listed above. Prior to participating in a study abroad program, a student must meet the international university's admission criteria and must submit an academic plan of study. Recently, students have attended universities in France, Germany, Hong Kong, Japan, and Spain.

In addition to semester based study abroad programs, students may participate in IIT's summer study abroad programs in Paris, France or Krakow, Poland.

Students wishing to participate in an exchange program or to study abroad should first contact the International Center for information, application forms, and procedural guidelines. The application process should begin approximately one year before study abroad is anticipated. Only students whose applications are approved by the Study Abroad Committee are permitted to participate in an exchange program or a study abroad program. For more information, please visit the Study Abroad website at studyabroad.iit.edu.

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 IIT Admission Office 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 also be approved by both Shimer College and IIT to enroll in these classes. Please contact the Office of Educational Services for further information.

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 Educational Services 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

Numbers in parentheses indicate lecture hours–laboratory hours–credit hours.

Letters in parentheses

(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, 120
History of World Architecture I, II
Comprehensive background as well as concentration on individual cultures and their architects from ancient to modern times. Discussion of architectures from around the world. Specific details and expressions of more generalized theories and strategies will be explored. (3-0-3); (3-0-3) (**H**) (**C**)

AAH 301
Thinking About Art
A course designed for those who find art pleasing, meaningful or significant and who want to extend the range of their sensibilities. Theories of art will be studied for insight, as well as for historical interest and continuity. Works of art will be studied for their intrinsic value, for their relation to ideas and events, and as cultural artifacts. Regular visits to area museums and galleries will be required. Prerequisite: a 100-level humanities course. (3-0-3) (**H**) (**C**)

AAH 380
Topics in Art and Architectural 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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

AAH 468
Five Centuries of Contemporary French Architecture
By studying theoretical texts written by five very influential architects over five centuries, the course will provide insight into the qualities of national definition marked by an innovative and transformative tradition. This tradition has been a central source of the modernist agenda as much as of French culture. This course prepares students for ARCH 469, a course that is part of the Semester Abroad Program. This course may be used for an architectural history elective or a humanities elective, however, it may not be used for both. Students who are not committed to, or do not plan to enroll in, the Semester Abroad Program may also take this course if space is available. Prerequisite: AAH 119, AAH 120 or consent of instructor. (3-0-3) (**H**) (**C**)

AAH 491
Independent Reading and Research
For advanced students. Prerequisite: Consent of the department. (Credit: Variable) (**H**) (**C**)

AAH 494
Senior Seminar: Theories of Architecture in Historical Perspective
An investigation of the development of formal architectural theory. Writings by architects from antiquity to the present will be studied, analyzed, and criticized. The relation between theory and practice will be emphasized. The implications of particular theories for such other questions as environment, tradition, change, innovation, revolution and meaning will be considered. Prerequisite: AAH 119, AAH 120 or consent of instructor. (3-0-3) (**H**) (**C**)

Anthropology

ANTH 202
General Anthropology
Introduces students to the study of fossil man, prehistoric archaeology, the origins of civilization, and the nature of human culture. (3-0-3) (**S**)

ANTH 300
Anthropology of Technology
In this course, technology will be studied from a cross-cultural perspective using modern ethnographics and historical case studies. Through time, the role of culture is strongly considered in the acceptance and rejection of material things and methods of manufacture. We will examine an assortment of technologies and end-products by looking at the social, economic, and ideological contexts in which they are embedded. (3-0-3) (**S**) (**C**)

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 presentation skills. (2-1-3) (**C**)

ARCH 109, 110
Freehand Drawing I, II
Drawing from still life, human figure and architecture, both out-of-doors and in the studio; drawing from life in various mediums. ARCH 109 is prerequisite for ARCH 110. (0-4-2); (0-4-2)

ARCH 113, 114
Architecture Studio I, II
Studio exercises to develop excellence in craftsmanship and visual sensitivity as a foundation for a basic architectural language. Problems of various lengths will deal with the technical skills of drawing and model-making materials and in both two and three dimensions. Using problems of both an abstract and an architectural

character, this course will build verbal communication skills and model shop ability. ARCH 113 is prerequisite for ARCH 114. (0-12-6); (0-12-6) **(C)**

ARCH 125
Introduction to Architectural Computing
The class introduces concept development, design thinking and problem solving related to architectural representation and production technique (digital and analog). The class will look critically at recent digital design developments, as well as introduce students to the history of each "type" of computer program; and the class will introduce students to the basic skills required to productively work with a variety of practice-based software programs. The class will also introduce 3-D "craft-based" thinking/working. (1-2-3)

ARCH 201, 202
Architecture III, IV: Structures, Building Systems and Assemblies
The development of architectural principles through the study and analysis of building materials. Development of the graphic language in architecture. Consideration of the appropriate use of materials, energy and clear construction as the basis of architecture. Prerequisites: ARCH 113, ARCH 114. ARCH 201 is a prerequisite for ARCH 202. (0-10-5); (0-12-6)

ARCH 226
CAD in Practice
Review of drafting, modeling and rendering computer hardware and software used in the practice of architecture design. Design and management issues are explored with the extensive use of PC CAD systems, including AutoCAD. Contemporary practice applications are discussed. Prerequisite: ARCH 125. (2-2-3)

ARCH 230
Structure and Architecture
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 the 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. (3-0-3) **(N)**

ARCH 305, 306
Architecture V, VI
Continued development of architectural principles of ARCH 201 and ARCH 202 through the correlation of design process and building systems. Consideration of the interrelation of building, programming, site planning, structure, enclosure systems, energy consumption, and environmental control systems, and the cultural concepts supporting their organization. Prerequisites: ARCH 201, ARCH 202. ARCH 305 is a prerequisite for ARCH 306. (0-12-6); (0-12-6)

ARCH 319
History of Modern Architecture
These courses will offer specialized and advanced studies in the history and critical interpretation of architecture in the modern era. (3-0-3) **(C)**

ARCH 320
History of Chicago Architecture
This course focuses on the Chicago School and offers specialized and advanced studies in the history and critical interpretation of various aspects of the related art, architecture and technology. (3-0-3) **(C)**

ARCH 321
History of Modern Thought in Architecture: 20th Century
Mies, Gropius, Le Corbusier and others constructed modernist canon as much with their manifestos — provocative, assertive, entirely subjective texts packaged in the rhetoric of objectivity — as with their buildings. This course studies the major texts and concepts that have produced architecture in the twentieth century. Study will be made of the modernist legacy and its basis in a canon that has experienced transformations across the course of decades, while retaining essential principles and acquiring a mythic status today. (3-0-3) **(C)**

ARCH 331, 332
Visual Training I, 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. ARCH 331 is a prerequisite for ARCH 332. (3-0-3); (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 the visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions. Prerequisites: ARCH 331, ARCH 332. (3-0-3)

ARCH 334
Frame Structural Systems and Steel
Based on 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 shear 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. (3-0-3) **(N)**

ARCH 335
Reinforced Concrete and Continuous Structures
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. (3-0-3) (**N**)

ARCH 403, 404
Mechanical and Electrical Building Systems for Architects I, 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. ARCH 403 is prerequisite for ARCH 404. (3-0-3); (3-0-3)

ARCH 408
Freehand Drawing
A multi-purpose drawing course offering students a chance to develop on-site sketching skills and creative expression in drawing through a combination of sketching field trips and in-class drawing assignments. (0-3-3)

ARCH 409
Advanced Freehand Drawing
Advanced development of freehand drawing skills in various mediums; still life, human figure, the natural and built environment; studio and field settings. Prerequisite: ARCH 110, ARCH 408 or permission of the instructor. (0-3-3)

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, 418
Architecture VII, VIII
Structure as an architectural factor; space as an architectural problem; proportion as a means of architectural expression; the expressive value of materials; painting and sculpture in their relationship to architecture. Application of principles in comprehensive projects involving program, site, and code analysis. Prerequisites: ARCH 305, ARCH 306. ARCH 417 is a prerequisite for ARCH 418. (0-12-6); (0-12-6)

ARCH 419, 420
Architecture IX, X
These studios represent the most extended and developed exercises in macro planning issues. First priority is given to the urgent needs of our environment such as housing, schools or community buildings for urban centers; projects reinforce the entire curriculum, emphasizing complex relationships of buildings in an urban landscape taking all factors into consideration. Students increase their ability to make value judgments, and learn to critically review, test and improve conventional concepts of architecture relative to current demands placed upon the profession. These studios also offer students a variety of possible specialization topics. (0-12-6); (0-12-6)

ARCH 421, 422
Energy Conscious Design I, 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. ARCH 421 is a prerequisite for ARCH 422. (3-0-3); (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 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 426
Computer-Aided Design in Practice
This course reviews drafting, modeling and rendering computer hardware and software used in the practice of architectural design. Design and management issues are explored with the extensive use of PC CAD systems. Prerequisite: ARCH 125. (2-1-3)

ARCH 427
Digital Architectural Media II
A review of 3-D modeling concepts, computer-aided rendering concepts, and methods in the development of architectural design. Extensive use of PC CAD software is expected. Prerequisite: ARCH 125, ARCH 426, AutoCAD or consent of instructor. (3-0-3)

ARCH 428
3-D Animation in CAD Presentations
Review 3-D modeling concepts for animation, preparing camera movements, lighting conditions, special effects, and the digital editing of animation sequences. Extensive use of PC animation and editing software. Prerequesite: ARCH 427. (1-4-3)

ARCH 429
Digital Form Generation
Review programming in CAD systems; programming basics in AutoCAD, extensive creation of 2-D and 3-D objects, data interrogation, manipulation, and extraction, and 2-D and 3-D parametric- and rule-based design. Investigation of form creation, based on mathematical relationships and random generation. Prerequisite: ARCH 427. (1-3-3)

ARCH 430
Networked Technologies
Study of the relationship between the built environment and networked technologies. Students will learn principals of designing for networked digital space, ways of augmenting physical space through digital technologies, and how networks and web based communication have transformed the practice of architecture and our daily lives. Prerequisite: ARCH 427. (1-2-3)

ARCH 431
Visual Training I
The development of visual acuity through the analysis of fundamental elements of form. 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 judgement. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive condition. (0-2-2)

ARCH 432
Visual Training II
The development of visual acuity through the analysis of fundamental elements of form. 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. (0-2-2)

ARCH 441, 442
Landscape Architecture I, II
The natural landscape as a basis of landscape work. Ecotones and their relation to vital habitats including plant materials, their selection and installation. The focus will be on housing with its associated planting including various gardens both formal and informal. ARCH 441 is a prerequisite for ARCH 442. (2-2-3); (2-2-3)

ARCH 443
Ecology, Sustainability and Site
The role of natural systems in meeting human needs; climate, geology, landforms, soils, vegetation, and animal populations as the bases of agricultural and industrial technologies. Competing demands on natural systems and the necessity for integration and coherence. Ecological sustainability as a basis of architectural works. Site forming and reforming, soils and drainage, grading, orientation, microclimate development and plant materials will be emphasized. (3-0-3)

ARCH 445
Prairie School and 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 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 in urban planning. (3-0-3)

ARCH 456
Topics in Modernism:
Post-World War II Europe
Historical and critical study of a significant cultural and intellectual shift that occurred in Modern architecture in Europe in the immediate post-World War II period. This seminar will discuss the integration of this new agenda within the development of Modern architecture from the ethically based modernism of Ruskin and Morris in the 19th century to the creation of the "Modern Movement" in the inter-war years. Examination of the manner in which this theoretical position has been expressed in architectural practice since the 1950s. (3-0-3) (**C**)

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 industrial tours and 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 free-hand 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. (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. (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 past 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 473
Conflict and Time
This seminar employs comparative studies of other arts, in particular cinema, to illuminate architectural esthetics and the creative process. (3-0-3)

ARCH 474
Production/Design
This seminar examines aspects of design in motion pictures. The premise under lying 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 485
Structural Design in Architecture I
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
Structural Design in Architecture II
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. Prerequesite: ARCH 485. (3-0-3)

ARCH 488
Long-Span and 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 and 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 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)

Air Force Aerospace

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 the 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 and 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 and 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 and 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 and 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 the 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**)

Leadership Laboratory

A study of Air Force customs and courtesies, drills and ceremonies, issuing military commands, instructing, directing and evaluating the preceding skills, studying the environment of an Air Force officer, and learning about the areas of opportunity available to commissioned officers. Planning and controlling of military activities of the cadet corps, preparation and presentation of briefings and other oral and written communications. Providing interviews, guidance and information which will increase the understanding, motivation and performance of other cadets.

Biology

BIOL 100

Introduction to the Profession

Introduction to the biological sciences, scientific method, computing tools, and interrelations of biological sciences with chemistry, physics and other professions. (2-0-2) (**C**)

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, 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. Prerequisite: Concurrent or previous enrollment in BIOL 107. (1-2-2) (**C**)

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; and 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

Experimental Biology

A biology laboratory course to accompany 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 relationships between cell function and structure. (1-2-2) (**C**)

BIOL 210

Microbiology Lectures

A study of microorganisms and their relation to water, sanitation, soil, disease, biotechnology, bioremediation, bioinformatics and genetic engineering. Prerequisite: BIOL 107, BIOL 115 or equivalent. (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: One semester of college-level biology, e.g., BIOL 107, BIOL 115, or consent of the instructor. (3-0-3)

BIOL 225

Microbiology Laboratory

Isolation and identification of micro organisms, microbial growth, design of culture media, microorganisms as biocatalysts, environmental microbiology, quantitative microbiology, introduction to microbial genetics, and genetic engineering. Prerequisite: Concurrent or previous enrollment in BIOL 210 or consent of instructor. (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: BIOL 115 or consent of instructor. (3-0-3)

BIOL 320
Biological Literature
Library research on advanced topics in biology, followed by oral presentations of this research. (2-0-2) (**C**)

BIOL 327
Introduction to Immunology
This course 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: BIOL 107, BIOL 115, or consent of instructor. (3-0-3)

BIOL 403
Biochemistry Lectures
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. Prerequisite: BIOL 107 or BIOL 115 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: Previous or concurrent enrollment in BIOL 403. (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: BIOL 210 or consent of instructor. (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 solution of various practical problems. A term paper will be required in addition to in-class examinations. Prerequisite: Consent of the instructor. (3-0-3) (**C**)

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. Same as BME 450. Prerequisite: BIOL 107 or BIOL 115. (3-0-3)

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. Prerequisites: BIOL 107 or BIOL 115 and CHEM 237 or consent of the instructor. (3-0-3)

BIOL 446
Cell Biology Laboratory
A laboratory course in cell biology to accompany BIOL 445. (0-6-3) (**C**)

BIOL 490
Individual Study
Prerequisite: Consent of instructor. (Credit: Variable; maximum three credit hours) (**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. Prerequisite: Consent of instructor. (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)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for full descriptions.

BIOL 503
Virology

BIOL 513
Advanced Biochemistry

BIOL 514
Toxicology

BIOL 515
Molecular Biology

BIOL 526
Development

BIOL 527
Immunology and Immunochemistry

BIOL 542
Advanced Microbiology Lectures

BIOL 550
Industrial and Computational Biology

BIOL 562
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. (3-0-3) (**C**)

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. Prerequisites: BIOL 115, MATH 251, MMAE 200. (3-0-3)

BME 308
Reaction Kinetics for Biomedical Engineers
Introduction to the fundamentals of chemical kinetics. Analysis of rate data; single and multiple reaction schemes. Biomedical topics include: enzymatic pathways, biological systems, receptor-ligand kinetics, microbial cell growth and product formation and the design and analysis of biological reactors. Prerequisites: CHE 202, MATH 252. Corequisite: BME 301. (3-0-3)

BME 309
Biomedical Imaging and 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. Prerequisite: PHYS 221. Corequisite: BME 330. (3-0-3)

BME 310
Biomaterials
Application 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. Corequisite: CHEM 237. (3-0-3) (**C**)

BME 315
Instrumentation Laboratory
Laboratory exercises stress instrumentation usage and data analysis used to determine physiological functions and variables and the relations to physiological variability. Prerequisite: ECE 211. Corequisite: BME 330. (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. Prerequisites: BME 315, BIOL 115. (0-3-1) (**C**)

BME 330
Analysis of Biosignals and 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. Prerequisites: BME 100, MATH 252, ECE 211. (3-0-3)

BME 405
Physiology Laboratory
A laboratory course that 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 non-invasive diagnostics in humans. Prerequisite: BME 315. (0-3-1) (**C**)

BME 410
Transport Phenomena in Living Systems
Convective and diffusive movement and reaction of molecules in biological systems. Kinetics of homogeneous and heterogeneous reactions in biological environments. Mechanisms and models of transport across membranes. Convective diffusion with and without chemical reaction. Prerequisites: BME 301, MATH 252. (3-0-3)

BME 415
Concepts of Neural Engineering
Introduction to the fundamentals and principles of neural engineering. Emphasis is placed on pathological conditions that motivate the engineering design and clinical use of neural prosthetic devices. Pacemakers, FES stimulators, as well as CNS devices are examined, including extacorporeal, and implantable systems. Prerequisites: ECE 312, BME 315. (3-0-3) (**C**)

BME 419
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. Prerequisite: Senior Standing. (1-0-1) (**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: BME 419. (3-0-3) (**C**)

BME 422

Mathematical Methods for Biomedical Engineers

This is a senior level course that 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. Prerequisites: BME 320, BME 330. (3-0-3)

BME 425

Concepts of Tissue Engineering

An introduction to the strategies and fundamental bioengineering design criteria behind the development of cell-based tissue substitutes. Topics include biocompatibility, biological grafts, gene therapy-transfer, and bioreactors. (3-0-3) (**C**)

BME 430

Concepts of Medical Imaging

This course is an introduction to the basic concepts in medical imaging, such as: receiver operating characteristics, the rose model, point spread function and transfer function, covariance and autocovariance, noise, filters, sampling, aliasing, interpolation and image registration. Prerequisites: BME 315, PHYS 221 or PHYS 224. (3-0-3) (**C**)

BME 433

Biostatistics

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. (3-0-3)

BME 435

Thermodynamics of Living Systems

Principles of thermodynamics and conservation of mass applied to livings systems and biomedical devices. Macroscopic material balances, the first and second laws of thermodynamics, phase and chemical equilibrium, metabolic stoichiometry and energetics. Prerequisites: CHE 202, MATH 251. (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 magnetoencephalography 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 of the relationship between the diffusion properties of tissue and its structural characteristics, white matter fiber tractography. Prerequisites: BME 315, PHYS 224, PHYS 221. (3-0-3)

BME 440

Bioelectric Interfaces

Examination of the fundamental principles and theory behind the interface between recording and stimulating electrodes, and biological tissue. Equivalent circuit models for recording and stimulating electrodes are presented. Safety issues and electrochemical stability of stimulating electrodes are detailed. Prerequisites: ECE 312, BME 315. (3-0-3)

BME 443

Biomedical Instrumentation and Electronics

Principles of circuit analysis are applied to typical tranducer and signal recording situations found in biomedical engineering. Basic electrical and electronic circuit theory is reviewed with an emphasis on biomedical measurement applications. A design project is completed by the student. Prerequisites: BME 315 and junior standing. (3-0-3)

BME 445

Quantitative Neural Function

Computational approach to basic neural modeling and function, including cable theory, ion channels, pre-synaptic potentials, stimulation thresholds, and nerve blocking techniques. Synaptic function is examined at the fundamental level. Neural encoding theories are introduced. Prerequisite: 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: BIOL 107 or BIOL 115. (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. Prerequisite: BME 100. (3-0-3)

BME 460
Advanced Biomaterials
Continuation of biomaterials applications to tissue and organs. Novel applications of materials to replace living tissues and organs, such as skin, blood vessels and heart valves will be considered. Prerequisite: BME 310. (3-0-3)

BME 470
Engineering Biocompatible Materials
This course aims to describe synthetic materials that are routinely used as components of various medical devices implanted in the human body. Students will critically examine prosthetic materials used in specific devices. The biological environment relevant to the discussed implant will be reviewed. Problems with current materials will be analyzed. Strategies and techniques required to engineer sophisticated biomaterials for future applications will be developed. Prerequisites: BIOL 107, BIOL 109, BIOL 115, BIOL 117. (3-0-3) (**C**)

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. Prerequisites: BME 330, BIOL 115. (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. Prerequisites: CHE 202, BME 301. (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 the 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. Prerequisite: Consent of instructor. (Credit: 1-3 credit hours) (**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. Prerequisite: Consent of instructor. (Credit: 1-3 credit hours) (**C**)

Business

BUS 100
Introduction to the Profession
Introduction to business as a profession. Topics include the role of business in our society, career opportunities in business, the interface between business and technology, business ethics, and communication skills. (1-2-2) (**C**) (**E**)

BUS 205
Business Basics
The course will provide a basic introduction to accounting and marketing principles, two of the core business skills that every entrepreneur, engineer, or scientist involved with new product introduction needs. It is intended for engineering, science and architecture students who are not taking a business minor. This course would not count towards a business degree or business minor. (3-0-3)

BUS 210
Financial and Managerial Accounting
Basic financial and managerial accounting topics: GAAP, the major financial statements, accrual accounting, financial reporting alternatives, financial statement analysis, cost behavior, cost systems, short- and long-term decision-making and product costing. Formerly ACCT 151. (3-0-3)

BUS 211
Financial Accounting and External Reporting
Introduces the three major financial statements: The Balance Sheet, the Income Statement, and the Statement of Cash Flows. The course emphasizes the difference between cash flows and income. Emphasis is placed on understanding financial statements and the procedures underlying them rather than on the preparation of such statements. Accounting software will be used to facilitate the preparation of statements. (3-0-3) (**E**)

BUS 212
Managerial Accounting and Control
The sequel to BUS 211, this course concentrates on the uses of accounting information within an enterprise for the following purposes: product costing; short-term and long-term decision-making; budgeting; control of operations; and performance evaluation. The major topical areas covered are cost-volume-profit relationships, relevant costs, cash flow forecasts, flexible budgets and standard costs. Prerequisite: BUS 211. (3-0-3)

BUS 221
Statistics for Managerial Decision Making
Introduction to probability concepts; descriptive statistics; probability distributions (binomial, Poisson, normal and t) and their applications. Statistical inference (confidence intervals, hypothesis testing and sample size determination); simple regression and correlation. (3-0-3)

BUS 301

Theory of Organization and Management

Introduction to the theory and practice of management; includes the basic managerial functions: planning, organizing, leading and controlling. Communication, motivation and decision-making techniques are stressed. Also covered are organization structure and design, the dynamics of individual and group interaction, organization climate, managerial styles, the implication of increasing work force diversity, coping with conflict, and methods for achieving organizational improvement. Issues in international business are dealt with at relevant points. Formerly MGT 351. (3-0-3) (**C**) (**E**)

BUS 305

Operations Management

Operational problems studied from a systems viewpoint. Development and application of policies, techniques, and models for making decisions in the areas of product and service design, design of operating systems, production and control of the product or service. Formerly OM 312. (3-0-3)

BUS 311

Strategic Cost Management

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. Prerequisites: BUS 212 and BUS 221. Corequisite: BUS 351. (3-0-3)

BUS 321

Management Science

Introduction to the use of mathematical models in the solution of business problems. Linear programming, Network analysis and simulation, Analysis of waiting lines. (3-0-3)

BUS 341

Introduction to Business Law

Legal implications of business transactions are studied. Specific topics include: the nature of law and its place in society, especially in relation to business; contracts and property law studied by the case method; formation and operation of contracts; their significance to the economic order. (3-0-3) (**C**) (**E**)

BUS 351

Financial Management and Decision Making

Provides an introduction to financial management principles that are useful for individuals as well as firms. The three major areas covered are: capital budgeting; capital structure; and the management of working capital. Time will be spent on understanding discounted cash flow methods, valuing debt and equity securities, the capital asset pricing model, risk and return tradeoffs, equity versus debt tradeoffs, and derivative securities. Corequisite: BUS 212. (3-0-3)

BUS 361

Introduction to Entrepreneurship

The course will examine how social, psychological and economic factors influence and shape entrepreneurship and new venture formation. Students will explore the impact of entrepreneurship and new venture formation on society. This includes an investigation into the contributions that entrepreneurs make to both social and economic systems. Insights into what it is like to work in an entrepreneurial organization including the dynamics and challenges associated with new venture formation and start-up are investigated. The characteristics and attributes of successful entrepreneurial companies will be discussed. This includes comparing and contrasting the similarities and differences between entrepreneurial led small and medium enterprises (SMEs) closely held and family businesses, and public corporations. Formerly MGT 360. (3-0-3) (**C**) (**E**)

BUS 362

Entrepreneurship and New Venture Formation

This course is a first introduction to fundamentals of technology entrepreneurship. It will explore the factors that influence entrepreneurial activity as well as the effects of entrepreneurship on society. Technology entrepreneurship involves identifying high potential technologyintensive commercial opportunities, gathering resources and capital, and managing rapid growth and significant risks using principled decision-making skills. The course introduces students to the skills necessary to successfully identify a true business opportunity, and to start, grow, and maintain a technology based enterprise. This course is designed for all majors except for business, particularly science, engineering, and architecture students. (3-0-3)

BUS 363

Creativity and Inventions for Entrepreneurs

Students learn to brainstorm for patentable, feasible ideas and then put them through the initial development stages, including: project workup, patent searches, prototyping, market research, design interaction, and financial projections. The course involves frequent presentations and reports, including: first prototype, second prototype, project proposal, patent description and claims and business plans. (3-0-3) (**C**) (**E**)

BUS 371

Introduction to Marketing

Introduction to the activities and decisions faced by marketing managers in modern organizations. Topics include: consumer and organizational buying behavior, marketing research, market segmentation, new product development, product line decisions, pricing channels, distribution, promotion, international marketing and introduction to marketing strategic planning. Formerly MKT 371. (3-0-3) (**C**) (**E**)

BUS 381

Understanding Cultures

This course will familiarize and sensitize students to issues of intercultural perception and communication, with particular attention to interaction within the business world and among professionals in different fields. It provides a context for understanding cultural differences and different taken for granted assumptions about "proper" behavior and the social world. The course has both theoretical and practical aspects. Individual and group tasks include analysis, observation and interviewing, role playing, papers, and presentations. The course systematically examines important cultural aspects ant their variation across a broad cultural spectrum, and brings in occasional guest lecturers with international business and professional experience. Same as SOC 381. (3-0-3) (**S**) (**C**)

BUS 400

Business Seminar

A series of speakers will be brought in to broaden the perspective of Business majors. (2-0-1)

BUS 402

Leadership Seminar

This course is designed to help students: Understand the nature of leadership in terms of the traits and behaviors that define effective leadership. Practice and develop leadership behaviors through a series of "simulations" or hands on exercises. Gain feedback regarding their individual leadership strengths and development opportunities. Design a personal development plan to continue to enhance leadership skills outside of this class. (2-0-1) (**E**)

BUS 423

Management Information Systems

Application of information systems to business strategy and performance, includes functional capabilities of hardware and software, system development and successful implementation, case studies and software exercises. Prerequisite: CS 105 or CS 115 or CS 200, BUS 321. Formerly BUS 223. (3-0-3)

BUS 441

Employee Rights and Legal Protections

This course will focus primarily on the principal policies governing the individual employment relationship, examine the development of the employment contract and protectable legal interests in the employment relationship. Employment handbooks and policy manuals including Best Practices in drafting lawful policies and procedures and maintaining personnel records will be addressed. Hiring, firing, disciplining and investigating employee complaints will be analyzed. Specific attention will also be given to the regulation of pay and hours, recent "Whistle Blower" laws, and alternatives to litigations under alternative dispute resolution procedures. Prerequisite: BUS 341. (3-0-3) (**E**)

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 this course, participants should be able to construct portfolios and analyze the risk of their positions. Prerequisite: BUS 351. (3-0-3)

BUS 454

Valuation and Portfolio Management

This 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. The course is co-taught with MSF 541 in the Stuart School of Business. Prerequisite: BUS 351. (2.4-0-2.4)

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 the modern corporation. The course is co-taught with MSF 532 in the Stuart School of Business. Prerequisite: BUS 351. (2.4-0-2.4)

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, meanvariance 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). The course will be co-taught with MSF 511 in the Stuart School of Business. Prerequisite: BUS 351. (2.4-0-2.4)

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). This course is co-taught with MSF 521 in the Stuart School of Business. Prerequisite: BUS 351. (2.4-0-2.4)

BUS 458
Futures Options and 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 arbitragefree 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 throughout the course. Particular emphasis is given to the pricing of interest rate derivatives, e.g., FRAs, swaps, bond options, caps, collars, and floors. The course is co-taught with MSF 551 in the Stuart School of Business. Prerequisites: BUS 221, BUS 321, BUS 351. (2.4-0-2.4)

BUS 462
New Product Development
This course offers students a solid grounding in the theory of 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: BUS 371. (3-0-3) (**C**)

BUS 465
Entrepreneurship in Industry
This course places emphasis on the role of entrepreneurship and innovation in existing manufacturing companies, as well as exploring how to recognize, screen and bring to market new manufacturing and industrial opportunities. Manufacturing for the purposes of this course considers all activities that combine labor, technology and materials to produce products of greater value. This includes engineered products, food, pharmaceuticals, and chemicals to name a few. Topics covered in this course include opportunity recognition and new venture formation, building competitive advantage, managing technology and innovation, marketing and sales, management of operations, and financing for growth. (3-0-3)

BUS 466
Entrepreneurship in Science and Technology
This course introduces the fundamentals of science and technology entrepreneurship. Science and technology entrepreneurship, in itself, is a spirited approach to business leadership that involves identifying high-potential, science and technologyintensive commercial opportunities, gathering resources and capital, and managing rapid growth and significant risks using principled decision-making skills. This course is designed for graduate students in all majors, particularly science, engineering, and design students. Topics introduced in this course are not only relevant to future entrepreneurs, but also to future engineers and scientists in industry. This course introduces the student to the basic tools necessary to successfully identify a true business opportunity, and to start, grow and maintain a science and technology enterprise. (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: BUS 371 (3-0-3) (**C**)

BUS 473
Marketing Research
This course provides students with a detailed exposure to stateoftheare 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: BUS 371. (3-0-3) (**E**) (**C**)

BUS 475
Sales Management
Addressing modern technology and methods of selling and presenting highly technical subjects is the basis of this course. Engineers, Information Technology and 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 ecommerce firms to discuss basic requirements for sustaining current customer base and increase gross sales. Application, simulation and case studies from small and midsized firms will be reviewed. Prerequisite: BUS 371. (3-0-3)

BUS 480
Business Strategy
This course is the integration and application of the knowledge and skills learned in the foundation, tools and concepts, and functional field component of the undergraduate management core. Prerequisite: 40 credit hours in management, economics, senior standing or consent of instructor. (3-0-3) (**C**) (**E**)

Civil and Architectural Engineering

CAE 100
Introduction to the Profession I
Introduction to the profession; an introduction to engineering graphics as a problem-solving tool. Basic traditional techniques of orthographic projection, multiview sketching, isometric and oblique pictorials, sectioning, auxiliary views, dimensioning, detail drawing, use of ANSI standards; and applications in civil and architectural engineering. (2-2-3) (**C**)

CAE 101
Introduction to the Profession II
A continuation of CAE 100. Application of PC-based CAD (computer-aided drawing and design) software to presentation and problem solving in civil and architectural engineering applications. Introduction to basic principles of design. Prerequisite: CAE 100. (1-4-3) (**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, transits, total stations and photogrammetric equipment. Corequisite: CAE 100. (2-2-3)

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; airphoto interpretation, soil and rock mechanics in relation to engineering geology; subsurface exploration; dams, reservoirs, tunnels; case-history illustrations. (3-0-3)

CAE 301
Hydraulics and Hydrology
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. Corequisite: MATH 252. (2-3-3)

CAE 302
Fluid Mechanics and 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; turbomachinery; measurement in fluid mechanics and hydraulics. Prerequisite: MATH 252.Corequisite: CAE 315. (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 fracture mechanics phenomena are related to design practice. The design of tension member, beams and columns in steel. Prerequisite: 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. Prerequisites: MMAE 202, MATH 252. (2-3-3)

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. Prerequisites: MMAE 202, CAE 304, CAE 315. (2-3-3) (**D**) (**C**)

CAE 309
Thermodynamics and Heat Transfer
Basic principles of thermodynamics and their applications to various systems composed of pure substances and their homogeneous non-reactive mixtures. First Law of Thermodynamics (Closed Systems, Control Volumes). Second Law of Thermodynamics. Entropy. Simple power production and utilization cycles. One-, two- and three-dimensional steady-state and transient conductive heat transfer together with convection and radiation as applied to building materials and geometries. Introduction to heat exchangers. Prerequisites: CHEM 124, CS 105, MATH 251. (4-0-4)

CAE 310
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: CAE 304. (2-3-3)

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. Prerequisite: 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: MMAE 202. (2-3-3) (**C**)

CAE 323
Soil Mechanics
Physical and mechanical properties of soils; elementary principles of soil identification and testing. Principles of soil permeability and seepage, consolidation, failure theories, earth pressures, and bearing capacity. Laboratory included. Prerequisites: MMAE 202, CAE 221, CAE 301. (2-3-3) (**C**)

CAE 331
Building Science
Study of the physical phenomena that make climate (rain, snow, humidity, temperature, wind, sun, etc.) influence buildings. The topics include heat transfer methods, solar radiation, vapor in air, air leakage and water condensation, fluids dynamics, and wind movement. Study of indoor thermal environment and thermal comfort of building occupant is offered as well. Prerequisites: PHYS 224 and CAE 309 or consent of the instructor. (3-0-3)

CAE 334
Illumination and Acoustics
General introduction to the aural and visual environment. Subjective and objective scales of measurement. Laws of psychophysics. Introduction to vibration. The hearing mechanism. Transfer of sound. Passive control of noise in buildings, transmission loss. Absorption and reverberation time. Active control of the aural environment. Visual perception. Photometry, brightness, luminance and illumination. Natural lighting of buildings. Artificial lighting. Prerequisite: PHYS 221. (3-0-3)

CAE 383
Electrical and 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. Prerequisite: PHYS 221. (3-0-3)

CAE 401
Building Systems Integration Studio I
Principles and elements of design; synthesis of structural, mechanical, electrical, sanitary and construction, considering interrelationship in performance and economics. Emphasis will be given to system identification, typical usage and manner or means of integration. Prerequisite: Senior standing or consent of the instructor. (1-3-2) (**D**)

CAE 403
Sound and Vibraton 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. Prerequisite: MATH 151, PHYS 123. (2-1-3)

CAE 408
Bridge and Structural Design
Design of modern bridges, bridge design requirements, LRFD approach, seismic and wind effects, fatigue in bridges, support design. Prerequisite or Corequisite: CAE 431. (3-0-3) (**D**)

CAE 410
Introduction to Wind and 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. Prerequisite: CAE 310. (3-0-3)

CAE 412
Traffic Engineering Studies and 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. Prerequisite: Senior standing or consent of the instructor. (3-0-3) (**D**)

CAE 415
Pavement Design, Construction and Maintenance
Pavement types, stresses in flexible and rigid pavements, vehicle pavement interaction. Mathematical models for pavement systems, subgrade support, design of flexible and rigid pavements. Construction procedure, drainage considerations, environmental effects. Rehabilitation and maintenance of pavements. Prerequisite: 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: guideways, terminals, and other elements for railroads, airports and harbors. Prerequisite: Senior standing or consent of the instructor. (3-0-3) (**D**)

CAE 417
Railroad Engineering and 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. Prerequisite: Senior standing or consent of the instructor. (3-0-3) (**D**) (**C**)

CAE 419
Transportation Engineering and 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. Prerequisite: Senior standing or consent or the instructor. (3-0-3) (**D**)

CAE 420
Dynamics of Structures
Fundamentals of free, forced and transient vibration of single and multi-degree of freedom structures, including damping of lumped and distributed parameters systems. Time, frequency, and approximate methods of analysis. Application of numerical methods in time and frequency domain. Response spectra, normal modes, coupling and normal coordinates and an introduction to earthquake engineering. Prerequisite: CAE 310, MMAE 305. (3-0-3)

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, risk analysis applications with practical statistics, etc. (3-0-3)

CAE 422
Sprinklers, Standpipes, Fire Pumps, Special Suppression and 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: CAE 301 or CAE 302 or consent of the instructor. (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: CAE 309 or consent of the instructor. (3-0-3)

CAE 425
Fire Protection and 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 426
Computer Fire Modeling Theory and Applications
Introduction to fire heat-transfer processes and fire testing materials; application of a set of quantitative engineering tools (fire models) to construct a description of conditions that occur or might occur during the course of a fire; life and structural impacts from hostile fires in buildings. Prerequisite: CAE 424 or consent of instructor. (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: 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. Prerequisites: CAE 303, CAE 310, CAE 315. (3-0-3) (**D**)

CAE 432
Concrete and Foundation Design
Design of reinforced concrete building frames and continuous structures. Design of girders, slabs, columns, foundations and retaining walls. Prerequisites: CAE 307, CAE 310, CAE 315. (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, and timber), occupancy and function (residential, commercial), and building values are covered along with demonstration case studies and illustrative examples. Prerequisites: CAE 431 and CAE 432 or consent of instructor. (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. Prerequisites: CAE 304 and CAE 310; or CAE 351 and CAE 352. (2-2-3)

CAE 436
Design of Masonry and 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. Prerequisite: CAE 310, CAE 307 or CAE 352 or consent of the instructor. (3-0-3) (**D**)

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 442
Finite Element Methods in Framed Structures
Basic principles and review of elasticity, energy methods, stiffness method, element stiffness matrix, finite elements applications in frames, trusses, curved and non-prismatic and plate structures, convergence of finite element models, practical problems. Prerequisite: CAE 310. (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. Prerequisites: CAE 301, CAE 323. (3-0-3) (**D**)

CAE 461
Plumbing and Fire Protection Design
Study of plumbing systems and fixtures including wastewater, water supply, and venting systems. Study of fire protection systems for buildings including pipe sizing, pumps, sprinklers, gravity and pressure vessels, and controls. Prerequisite: CAE 301 or CAE 302. (3-0-3)

CAE 462
Construction Drawings and Cost Estimating
An introduction to the production of construction documents used in the building industry. A preliminary building design is developed to include detailed materials and construction information. A set of drawings for a small building is completed including floor plans and elevations, site, structure and foundation, wall and roof sections and details, doors and windows, HVAC, plumbing, lighting, electricity, and communication. All drawings are to be developed using CAD software. Study of the types of cost estimation, quantity take-off and the preparation bid for complete building project. Prerequisite: Senior standing. (2-6-4)

CAE 463
Building Enclosure Design
Study of wall, window and roof design. Consideration for the factors that influence the 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: CAE 331 or consent of the instructor. (3-0-3)

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. Prerequisites: MMAE 320, CAE 302, CAE 309, CAE 331 or consent of the instructor. (3-0-3)

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: CAE 309, CAE 331 or consent of the instructor. (3-0-3)

CAE 466
Electric and Communication Systems Design
Study of the analysis and design of electrical systems in buildings utilizing the National Electrical Code. The topics include basic circuits, AC and DC single phase, three-phase power, transients, capacitance and inductance, branch circuits, panelboards, motors, system sizing, and electrical distribution in buildings. Study of the design and specification of communication systems in buildings, including fire alarm, security, sound and telephone. Prerequisite: CAE 383. (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 the major topics. Prerequisite: MATH 151. (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, Design Approach, and Architectural Presentation Techniques taught through lecture and lab instruction. Prerequisites: CAE 331, 334. (2-1-2)

CAE 469
Architectural Studio
Architectural Studio is the second 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, Design Approach, and Architectural Presentation Techniques taught through Studio instruction. Prerequisite: CAE 468. (0-4-2)

CAE 470
Construction Methods and 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. Prerequisite: senior standing. (2-3-3) (**D**)

CAE 471
Construction Planning and 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. Prerequisites: CAE 470 and senior standing. (3-0-3) (**D**) (**C**)

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. Prerequisite: Senior standing. (3-0-3)

CAE 473
Construction Project Administration
Characteristics of the construction industry. Project delivery systems. Duties and liabilities of the parties at the pre-contract 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. Prerequisite: 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. Prerequisite: CAE 301 or consent of instructor. (3-0-3) (**D**)

CAE 483, 484
Environmental Systems for Buildings I, II
Introduction of the operation and design of building systems for climate control, water and drainage, fire safety, electrical supply, illumination, transportation, and noise control. (3-0-3); (3-0-3)

CAE 486
Soil and 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 situcompac tion, preloading and subsurface drainage, grouting, freezing, prewetting, and heating. Prerequisites: CAE 323 or consent of instructor. (3-0-3)

CAE 491
Undergraduate Research
Special research problems in civil engineering under individual supervision of instructor. Seminar presentation is required. Prerequisite: Senior standing, minimum GPA of 3.0, and consent of instructor. (Credit: Variable; maximum four credit hours)

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; maximum four credit hours)

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 flowsheeting. Team project research and project management skills. Internet publishing. Prerequisite: CHE 100. (1-2-2) (**C**)

CHE 202
Material and Energy Balances
Material and energy balances for engineering systems subjected to chemical and physical transformations. Calculations on industrial processes. Prerequisites: CS 105, MATH 152 and one semester of chemistry. (3-0-3) (**C**)

CHE/IPRO 296
Introduction to IPRO
Introduction to process design. Principles and techniques in effective team work. Performance of selected design tasks in project groups integrated with CHE/IPRO 496. Practice with process design software. First part of the CHE/IPRO 296–CHE/ IPRO 496 project package. *Only CHE students should register for this course.* Prerequisites: CHE 101, CHE 202. (0-2-1) (**C**)

CHE 301
Fluid Mechanics
Flow of fluids. Fundamentals of fluid flow design equations as applied to selected unit operations. Prerequisites: CHE 202, MATH 252. Corequisites: CHEM 343, MATH 251. (3-0-3)

CHE 302
Heat and 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: CHE 301. (3-0-3)

CHE 311
Foundations of Biological Science for Engineering
This 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: CHEM 125. (3-0-3)

CHE 317
Chemical and Biological Engineering Laboratory I
Laboratory work in the unit operations of chemical engineering, fluid flow, heat transfer and other selected topics. Prerequisite: CHE 301. (1-3-2) (**C**)

CHE 351
Thermodynamics I
Laws of thermodynamics and their application to chemical engineering operations. Prerequisites: CHE 202, CHEM 343. (3-0-3)

CHE 402
Introduction to Microelectronics Fabrication Technology
Fundamentals of integrated circuit technology. Epitaxy and doping of epitaxial layers. Film deposition techniques. Bipolar and MOS integrated circuit devices. Integrated and hybrid circuit fabrication. (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. Prerequisites: CHE 301, CHE 302, MATH 252. (3-0-3)

CHE 412
Foundations of Biological Science for Engineering
This 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: CHEM 125. (3-0-3)

CHE 418
Chemical and Biological Engineering Laboratory II
Laboratory work in distillation, humidification, drying, gas absorption, filtration and other areas. Prerequisites: CHE 302, 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. Prerequisites: CHE 302, CHE 351, 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. Prerequisites: MATH 151 and junior standing. (3-0-3)

CHE 430
Petrochemical Process Operations and Design
Chemical and engineering aspects of current petrochemical and petroleum refining processes will be emphasized, including chemical conversions (catalytic and thermal), physical separations, and evaluation of alternatives. Design and simulation of refinery separation systems with emphasis on distillation columns. Prerequisite: CHE 494. (3-0-3)

CHE 431
Artificial Intelligence Applications in Engineering
Knowledge-based system (KBS) architecture, knowledge representation, inferencing strategies. Real-time KBS. Commercial KBS shells. Neural networks, backpropagation, radial basis functions, recurrent neural networks. Applications in product design, process modeling, diagnosis, and control. Prerequisite: Consent of instructor. (3-0-3)

CHE 433
Process Modeling and 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. Prerequisites: CHE 302, CHE 351. (3-0-3)

CHE 435
Process Control
Dynamic process models, stability assessment, feedback and feedforward 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. Prerequisites: CHE 302, CHE 433. (3-0-3)

CHE 437
Discrete Time Systems and Computer Control
Sampling of continuous-time signals, Z-transforms, modeling, digital controller design using state-space and pole-placement design methods, adaptive control and self-tuning regulators. Emphasis on chemical process systems and applications. Prerequisite: CHE 433. (3-0-3)

CHE 439
Numerical and 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. Prerequisites: CHE 423, CHE 435, MATH 252. Corequisite: CHE 406. (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: CHE 351. (2-0-2)

CHE 461
Aerosol Measurement Principles, Techniques and Applications
In this course the principles of particle motion in liquid and gaseous media, different methods of aerosol measurement, and the application of aerosol measurements will be discussed. The course will include some introductory concepts on different size definitions, and defining the mass and volume concentration of particles, and will move to statistical analysis as related to methods of size distribution data analysis. Subsequently properties of gaseous and liquid media and the motion of particles inside each media will be discussed. The course will also deal with different methods of sampling, monitoring and measurement of the particles. Different methods of particle measurement including dynamic mass measurement techniques, optical direct-reading techniques, electrical and time of flight measurement techniques will also be discussed. Prerequisites: CHE 301 and junior standing. (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. Prerequisites: CHEM 244 and CHE 302 or comparable mass-transfer course. (3-0-3)

CHE 467
Fuel Cell System Design
This course will introduce students to the system (or chemical reactor) perspective of fuel cell design. The course will emphasize macro-scale modeling as a vehicle to highlight design challenges for expected fuel cell applications. Topics to be covered include: description of electrode/electrolyte assemblies and the three phase region, characterization of polarization curves, analysis of continuous flow systems, typical fuel cell stack configurations, analysis of spatial non-uniformities in stacks and balance of plant design issues. Homework assignments will be simulation based illustrations of topics covered in lecture. In the final written project, the student is expected to propose, describe and defend their design of fuel cell system targeted to a specific application and power requirement. Prerequisite: CHE 423 or consent of instructor. (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. Prerequisites: CHEM 124, MATH 251, PHYS 221. (3-0-3)

CHE 475
Food Engineering I
Fundamentals of food engineering. Theory and practice in food processing operations including material and energy balances, flow of fluid foods, heat transfer, thermal process evaluation, and evaporation. Problem-solving and calculation sessions. (3-0-3)

CHE 476
Food Engineering II
Companion course to CHE 475 and normally follows it. Covers freezing and thawing, dehydration (including freeze-drying), distillation and extraction. (3-0-3)

CHE 481
Flow-Through Porous Media and Fundamentals of Reservoir Engineering
Introduction to petroleum geology and formation of oil and gas. Reservoir and fluid properties. Single- and two-phase flow of gases and liquids through porous media. Darcy's Law and its application in oil and gas reservoirs. Fundamentals of enhanced oil and gas recovery. Prerequisite: CHE 406. (3-0-3)

CHE 483
Synthetic Energy
Introduction to synthetic energy processes. Analysis, design, and operation features of synthetic energy conversion processes. Fluidized beds, packed beds and dilute gas solids systems. The principles of low, medium and high-BTU coal gasification and waste-to-energy conversion processes. Prerequisite: CHE 351 or MMAE 320. (3-0-3)

CHE 486
Applied Particulate Technology
Applications of particulate technology to industrial processes: sampling, collection, characterization, segregation, flow, handling, storage, agglomeration, mixing, pulverization, attrition and transport of particles. Application of powder technology to material processing and environmental engineering. (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: CHE 302. (3-0-3)

CHE 491
Undergraduate Research
Students undertake an independent research project under the guidance of a Chemical and Environmental Engineering faculty member. (Credit: Variable, 3 hours maximum)

CHE 494
Chemical Process Design
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. Prerequisites: CHE 302, CHE 451, CHE 433. Corequisites: CHE 423, CHE 435. (2-2-3) (**C**)

CHE/IPRO 496
Design IPRO
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 (3 credits) and their contribution to the project tasks will be defined accordingly. *Only CHE students should register for this course.* Prerequisites: CHE 494, CHE/IPRO 296. Corequisites: CHE 423, CHE 435. (1-2-2) (**C**)

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, tires and fire protection, and HAZOP and Fault Tree analysis. Prerequisite: CHE 494. (3-0-3)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

CHE 503
Thermodynamics

CHE 505
Fluid Properties

CHE 506
Entrepreneurship and Intellectual Property Management

CHE 507
Computer-Aided Design

CHE 508
Process Design Optimization

CHE 509
Advanced Topics in Reactor Engineering

CHE 510
Fluid Dynamics

CHE 511
Regulatory Issues in Pharmaceutical Process

CHE 512
Heat Transfer

CHE 514
Process Analytical Technology

CHE 515
Natural Gas Processing

CHE 516
Gas Transmission and Distribution

CHE 517
Gas Utilization Technologies and Economics

CHE 518
Mass Transfer

CHE 519
Biosensors

CHE 520
LNG Fundamentals and Technologies

CHE 522
Fundamentals of Combustion

CHE 523
Fundamentals of Heterogeneous Catalysis

CHE 524
Industrial Catalysts

CHE 525
Chemical Reaction Engineering

CHE 527
Petrochemical Systems

CHE 528
Analysis and Simulation of Chemical Processes

CHE 529
Advanced Process Design of Chemical Process

CHE 530
Advanced Process Control

CHE 532
Process Modeling

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 540
Flow-Through Porous Media and Fundamentals of Reservoir Engineering

CHE 541
Renewable Energy Technologies

CHE 542
Fluidization and Gas-Solids Flow Systems

CHE 543
Energy, Environment and Economics

CHE 544
Kinetic Theory of Multiphase Flow

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 561
Chemical Engineering Calculations

CHE 563
Separation Processes

CHE 565
Electrochemical Engineering

CHE 566
Fundamentals of Electrochemistry

CHE 573
Bioseparations

CHE 575
Polymer Rheology

CHE 576
Industrial Chemistry

CHE 577
Bioprocess Engineering

CHE 579
Enzyme Reactor Engineering

CHE 580
Biomaterials

CHE 581
Processing and Applications of Polymer Composite Materials

CHE 582
Interfacial and Colloidal Phenomena with Applications

CHE 583
Pharmaceutical Engineering

CHE 584
Tissue Engineering

CHE 585
Drug Delivery

CHE 586
Particulate Technology

CHE 587
Particle Processing and Characterization

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
Same as CHEM 124 except without the laboratory. (3-0-3)

CHEM 124
Principles of Chemistry I
Foundations of chemistry, atoms and molecules, stoichiometry of chemical reactions, thermochemistry, properties of gases, states of matter, chemical solutions, and 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: CHEM 124. (3-3-4) (**C**)

CHEM 126
Principles of Chemistry II
Same as CHEM 125 except without the laboratory. Prerequisite: CHEM 124. (3-0-3)

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: CHEM 125 or consent of instructor. (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: 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 or corequisite: CHEM 239. (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: CHEM 125 or consent of instructor. (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. Prerequisites: CHEM 247, CHEM 344. (2-6-4) (**C**)

CHEM 334
Spectroscopic Methods in Identification and 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. Prerequisites: CHEM 239, CHEM 247. (2-0-2)

CHEM 335
Spectroscopic and Separation Techniques
Characterization of prepared or separated organic compounds by chromatographic, chemical, and spectroscopic methods. Prerequisites: CHEM 240, CHEM 247. Corequisite: CHEM 334. (0-6-2) (**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. Prerequisites: CHEM 247, PHYS 221, MATH 251. (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, thermochemistry, liquid solutions, phase equilibria, electrochemistry, chemical kinetics, spectra, molecular structure and treatment of data. Prerequisite: CHEM 343. (3-4-4) (**C**)

CHEM 415
Inorganic Chemistry
In-depth introduction to the vast sub-field of the discipline dealing with all 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: CHEM 344. (3-0-3)

CHEM 416
Advanced Chemistry Laboratory
An advanced laboratory with emphasis on synthesis and characterization of inorganic and organometallic compounds. Prerequisites: CHEM 240, CHEM 321. (1-7-3) (**C**)

CHEM 450
Introduction to Research
Designed to give research experience in a faculty research laboratory. Prerequisites: CHEM 334, CHEM 335. (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. Prerequisites: CHEM 239, CHEM 343. (2-0-2)

CHEM 454
Computer Applications in Chemistry
A numerical methods and computer applications course for chemists; emphasis on software rather than hardware; results of numerical analysis and linear algebra presented and applied to solution of chemical problems. Prerequisites: CS 105, MATH 152, CHEM 344. (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. Prerequisites: CHEM 239, CHEM 344. (3-0-3)

CHEM 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 CHE 470 and MMAE 470. Prerequisites: CHEM 124, MATH 251, PHYS 221. (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. Prerequisite: CHEM 125 or CHEM 126 or consent of instructor. (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. (0-12-4) (**C**)

CHEM 497
Special Projects
For juniors and seniors. (Credit: Variable) (**C**)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for full descriptions.

CHEM 500
Advanced Analytical Chemistry

CHEM 501
Liquid Chromatography

CHEM 502
Gas Chromatography

CHEM 503
Chromatography Techniques

CHEM 504
Chemometrics

CHEM 505
Spectroscopic Methods

CHEM 506
Sampling and Sample Preparation

CHEM 508
Analytical Methods Development

CHEM 509
Spectral and Physical Methods

CHEM 510
Electronics and Interfacing

CHEM 518
Electrochemical Methods

CHEM 520
Advanced Inorganic Chemistry

CHEM 521
Structural Inorganic and Solid-State Chemistry

CHEM 522
Efficient Chemical and Materials Synthesis

CHEM 524
Intellectual Property Management

CHEM 530
Organic Reaction Mechanisms

CHEM 531
Tactics of Organic Synthesis

CHEM 535
Advanced Polymer Chemistry

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
Advanced 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. (3-0-3) (**C**) This course satisfies IIT's Basic Writing Proficiency Requirement. It does not satisfy a general education requirement in the humanities and social or behavioral sciences.

COM 111
Writing in the University for Non-Native Students
Designed to deal with the special writing problems of those students whose native language is not English. Equivalent to COM 101. (3-0-3) (**C**) This course satisfies IIT's Basic Writing Proficiency Requirement. It does not satisfy a general education requirement in the humanities and social or behavioral sciences.

COM 121
Japanese Language and Culture I
An introduction to basic Japanese language and culture, this course assumes no prior knowledge of either. (3-0-3) (**H**) (**C**)

COM 122
Japanese Language and Culture II
Students will learn about the traditions, culture, and language of Japan. Prerequisite: COM 121 or consent of instructor. (3-0-3) (**H**) (**C**)

COM 123
Chinese Language and Culture I
This course is an introduction to the languages and culture of China. Focusing on the dialects, writing systems, and history of the language. Students will also be exposed to many aspects of China's culture and subcultures. Prerequisite: A 100-level humanities course (3-0-3) **(H)** (**C**)

COM 301
Introduction to Linguistics
The objective analysis of language structure and structural hierarchies; a survey of the basic concepts of linguistics; the phoneme, the morpheme, language change over time and space. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100- level humanities course. (3-0-3) (**H**) (**C**)

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: A 100- level humanities course. (3-0-3) (**H**) (**C**)

COM 309
History of the English Language
Beginning with basic concepts in language development, this course traces the evolution of modern English, from its IndoEuropean roots, through Germanic, AngloSaxon, Middle English and Early Modern English. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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. A 100-level humanities course. (3-0-3) (**H**) (**C**)

COM 334
Literature of Modern Science
A study of the literature of science from the Renaissance to modern times. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

COM 371
Persuasion
The study of covert and overt persuasion and their influences on society and individuals. Prerequisite: A 100-level humanities course. (3-0-3)

COM 372
Mass Media and Society
This course will cover the history and structure of mass media, from print through film and broadcasting to the internet, and their influence on American society. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

COM 377
Communication Law and Ethics
This course 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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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. Prerequisites: A 100-level humanities course. (3-0-3) (**H**) (**C**)

COM 401
Advanced Composition and Prose Analysis
Critical analysis of various types of prose, with stress on the art as well as the craft of writing. The student is required to write several critical papers. Prerequisite: Satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (**C**)

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 and proposals, including the use of graphics. Works by modern writers are analyzed. Credit not granted for both COM 421 and MT 301. Prerequisite: Satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (**C**)

COM 423
Communication in the Workplace
A study of communications relating to scientific, technological, and corporate structures. This course will help students develop workplace communication skills, including the ability to analyze situations, determine appropriate communications forms, write and revise work-related documents, and give oral presentations. Prerequisite: Satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (**C**)

COM 424
Document Design
Theory and practice of designing scientific, technical and business documents whose primary aim is usability. Focus on overall organization, page design, visuals and typography. Emphasis on print media such as brochures, reports and user manuals, but with attention to parallels in screen-based media (Web, CD-ROM). Prerequisite: Satisfaction of IIT's Basic Writing Proficiency Requirement.(3-0-3) (**C**)

COM 425
Editing
Principles and strategies for revising technical and scientific works for usability, clarity, consistency and reliability. Examination of professional standards and practices for text, tables, graphics and documents, but with emphasis on cohesion (signals of the line of thought), style and usage. Prerequisite: Satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (**C**)

COM 428
Verbal and 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: Satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (**C**)

COM 430
Introduction to Web Design and Management
Presupposing only that students know how to use a web browser, this course teaches beginning HTML, basic page layout and design principles, basic multimedia, and the structure of websites, and also introduces students to WYSIWYG web page generation software and FTP software. (3-0-3)

COM 431
Intermediate Web Design and Management
A continuation of COM 430, this course goes more deeply into HTML, multimedia, and some of the advanced features of WYSIWYG editors. Prerequisite: COM 430 or permission of instructor. (3-0-3)

COM 432
Advanced Web Design and Management
A continuation of COM 430 and COM 431, this course covers the most current web technologies. Prerequisite: COM 431 or permission of instructor. (3-0-3)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

COM 491
Independent Reading and Research
For advanced students. Prerequisite: Consent of department. (Credit: Variable) (**H**) (**C**)

COM 497
Special Project
(Credit: Variable)

City and Regional Planning

CRP 201
The Dwelling
Programming and planning for human habitation in dwellings and neighborhoods. Housing as a response to human needs. Environmental impacts and their amelioration. Building types and their impacts on programmatic needs. Examples of various housing schemes in and around Chicago. (3-0-3)

CRP 203
Housing and Housing Types
The planning of rooms, houses, and groups of houses. Analysis of climatological, physical, psychological and social needs and their influence on the planning of housing. Government regulations, costs and financing, and their impact on housing. Includes single-family detached, row housing, walk ups, and low-rise construction. Limited work in other buildings. Lectures, seminars and drawing problems. Prerequisite: Drawing ability. (1-4-3)

CRP 425, 426
History and Architecture of Cities I, II
Selected topics in the history and development of human settlements. Examination of the forces affecting city development in history. These courses are taught as seminars and meet for one three-hour period per week. (3-0-3); (3-0-3)

CRP 465
The Ecological Basis of Planning
The role of natural systems in meeting human needs. Natural systems. Climate, geology, land forms, soils, vegetation, and animal populations as the bases of agricultural and industrial technologies. Competing demands on air, water and land. Limiting factors. (3-0-3)

CRP 470
Urban Form in History: Pre-20th Century
This course studies historical and modern urban form in relation to contemporary urban problems. In the first semester, historical examples of high-density urban form and housing are selected and analyzed. Many examples of innovative urbanism and housing have features that are relevant to modern problems. They can be found in the different historical periods of major world regions, cultures and climates. Each student will take two or more examples and will prepare a report with text, diagrams and data. Prerequisite: Graduate or upper-level undergraduate standing. (2-2-3) (**C**)

CRP 471
Urban Form in History: 20th Century Low-Rise Urbanism
The second semester of this course examines modern innovative examples of high-density, low-rise urban form, housing and neighborhood design. The redevelopment of urban residential areas and the rapid expansion of suburbs, low-density areas with the problems of environment, traffic, pollution, land-use, etc., logically call for an improved urbanism criteria. Modern low-rise, high-density examples, both built and theoretical, will be selected and analyzed. Each student will take two or more projects and prepare a report with diagrams, data and descriptive text. Prerequisite: CRP 470. (2-2-3) (**C**)

CRP 472
Low-Rise Urbanism: House Components, Form/Cluster Design
As low-density suburbs expand, so do the problems of environmental quality, land use, traffic, pollution, etc. The alternative model of high-density, low-rise, energy-efficient urbanism is the subject of this course. The first semester deals with the components of the house and their assembly into unit form, the guiding principles of unit aggregation, solar orientation, gardens, access and garaging. Each student will prepare designs for unit types and diagrammatic clustering. Prerequisite: Graduate or upper level undergraduate standing. (2-8-6)

CRP 497
Special Problems
Independent study of projects and problems. Prerequisites: Students must be advised and have consent of the instructor and approval of the dean. (Credits: Variable)

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 105
Introduction to Computer Programming I
Introduces the use of a high-level programming language (C/C++) 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 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
Continuation of CS 115. 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: CS 115. (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: CS 105 or experience using any programming language. (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. Corequisite: CS 116 or CS 201. Credit will not be granted for both CS 330 and MATH 230. (3-0-3)

CS 331
Data Structures and 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: CS 116 or CS 201. (2-2-3)

CS 350
Computer Organization and 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. Prerequisite: CS 116 or CS 201. Credit will not be granted for both CS 350 and ECE 242. (2-2-3) (**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. Prerequisites: CS 331 and (CS 350 or ECE 242). (2-2-3)

CS 397
Special Projects
Prerequisite: Written consent of instructor. (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: CS 331, 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: CS 331 or CS 401 or CS 403 and strong programming knowledge. (3-0-3) (**T**) (**C**)

CS 425
Database Organization
Overview of database architectures, including the Relational, Hierarchical, Network, and Object Models. Data base interfaces, including the SQL query language. Database design using the Entity-Relationship Model. Issues such as security, integrity and query optimization. Prerequisite: CS 331, CS 401 or CS 403. (3-0-3) (**T**) (**C**)

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. Prerequisite: CS 331 or CS 401 and strong programming knowledge. (3-0-3) (**T**) (**C**)

CS 430

Introduction to Algorithms

Introduction to the design, behavior and analysis of computer algorithms. Searching, sorting and combinatorial algorithms are emphasized. Worst case and average bounds on time and space usage. Prerequisites: (CS 330 or MATH 230) and CS 331; or CS 401 or CS 403. (3-0-3) (**T**) (**C**)

CS 440

Programming Languages and 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. Prerequisites: (CS 330 or MATH 230 and CS 351); or CS 401 or CS 403. (3-0-3) (**T**)

CS 441

Current Topics in Programming Languages

New topics in programming language design such as concepts of concurrent and distributed programming, communicating sequential processes, and functional programming. System development tools and language features for programming. Introduction to programming language semantics. Prerequisite: CS 331 or CS 401 or CS 403. (3-0-3) (**T**)

CS 445

Object-Oriented Design and 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: CS 331 or CS 401 or CS 403. (3-0-3) (**T**)

CS 447

Distributed Objects

This course provides an introduction to the 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: CS 445. (3-0-3) (**T**) (**C**)

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. Prerequisites: (CS 331 and CS 350) or (CS 331 and ECE 242) or (CS 401 and CS 402) or CS 403. (3-0-3) (**T**)

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: CS 450. (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. Prerequisites: CS 425 and CS 450 (3-0-3) (**T**) (**C**)

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. Prerequisites: (CS 350 or ECE 242) and ECE 218. (2-2-3) (**T**) (**C**)

CS 480

Artificial Intelligence

Styles of programming and software engineering with applications to artificial intelligence and to the creation of good programming environments through the use of key ingredients of these styles. These include techniques of search, data-driven programming, demons, frames, object-oriented program-ming, production-rule systems, logic programming, and code that constructs code including language-extension through macros. Prerequisite: CS 331 or CS 401 or CS 403. (3-0-3) (**T**)

CS 481

Intelligent Text Analysis for Knowledge Management

This course is about how to build systems that analyze unstructured natural language texts and extract useful information from them. This course will cover a variety of existing text analysis and text mining systems and discuss them in depth. Prerequisites: MATH 474 and (CS 422 or CS 429 or CS 480). (3-0-3) (**T**)

CS 482

Information and Knowledge Management Systems

This Capstone course is designed as a project course whose purpose is to enable students to see how various algorithms and systems from the 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. Prerequisites: CS 425 and two of (CS 422, CS 429, CS 481) or consent of instructor. (3-0-3) (**T**)

CS 485
Computers and Society
Discussion of the impact of computer technology on present and future society. Historical development of the computer. Social issues raised by cybernetics. Prerequisite: COM 421 or COM 428. (3-0-3) (**C**)

CS 487
Software Engineering
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: CS 331 or CS 401 or CS 403. (3-0-3) (**T**) (**C**)

CS 491
Undergraduate Research
Prerequisite: Written consent of instructor. (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. Prerequisite: Consent of instructor. (Credit: Variable)

Graduate Courses
The following graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

CS 511
Topics in Computer Graphics

CS 512
Computer Vision

CS 520
Database Design and Engineering

CS 521
Object-Oriented Analysis and Design

CS 522
Advanced Data Mining

CS 524
Theory of Information Systems Design

CS 525
Advanced Database Organization

CS 527
Client/Server Applications Development I

CS 528
Client/Server Applications Development II

CS 529
Advanced Information Retrieval

CS 530
Theory of Computation

CS 531
Topics in Automata Theory

CS 532
Formal Languages

CS 533
Computational Geometry

CS 535
Analysis of Algorithms

CS 536
Science of Programming

CS 537
Software Metrics

CS 538
Combinatorial Optimization

CS 540
Foundations of Programming Language Design

CS 541
Compiler Construction

CS 542
Computer Networks I: Fundamentals

CS 543
Advanced Topics in Computer Networks

CS 544
Computer Networks II: Network Services

CS 545
Distributed Computing Landscape

CS 546
Parallel 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 Systems

CS 553
Pervasive 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
Comparative Computer Architecture

CS 572
Advanced Computer Architecture

CS 580
Medical Informatics

CS 581
Advanced Artificial Intelligence

CS 582
Robotics

CS 583
Expert Systems

CS 584
Neural Networks

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 Quality Assurance

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. Concurrent registration in ECE 212 and ECE 218 is strongly encouraged. Corequisite: MATH 252. (3-0-3)

ECE 212
Analog and Digital Laboratory I
Basic experiments with 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. Corequisites: ECE 211, ECE 218. (0-3-1) (**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. Concurrent registration in ECE 214 is strongly encouraged. Prerequisite: Grade of "C" or better in ECE 211. (3-0-3)

ECE 214
Analog and Digital Laboratory II
Design-oriented experiments including 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. Prerequisite: ECE 212. Corequisite: ECE 213. (0-3-1) (**C**)

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. Prerequisite: Sophomore standing. (3-0-3)

ECE 242
Digital Computers and 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. Prerequisites: CS 116, 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. Impedence 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. Prerequisites: ECE 213, MATH 251, PHYS 221. (4-0-4)

ECE 308
Signals and 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: ECE 213. Corequisite: MATH 333. (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. Prerequisites: ECE 213, ECE 214. (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: ECE 311. (3-3-4) (**C**)

ECE 319
Fundamentals of Power Engineering
Principles of electromechanical energy conversion. Fundamentals of the operation of transformers, synchronous machines, induction machines, and fractional horsepower machines. Introduction to power network models and per-unit calculations. Gauss-Siedel 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. Prerequisites: ECE 213, ECE 214. (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. Prerequisites: ECE 307, ECE 312. Corequisite: ECE 403. (3-0-3) (**P**)

ECE 403
Communication Systems
Power spectral density. Analysis and design of amplitude and frequency modulation systems. Signal-to-noise ratio analysis. Frequency division multiplexing: spectral design considerations. The sampling theorem. Analog and digital pulse modulation systems. Time division multiplexing. Design for spectral efficiency and crosstalk control. Introduction to information theory. Prerequisite: ECE 308. (3-0-3) (**P**)

ECE 404
Digital and Data Communications
Channel capacity, entropy; digital source encoding considering bit-rate reduction, quantization, waveshaping and intersymbol interference. Analysis and design of digital modulators and detectors. Matched filters. Probability of error analysis. Credit will be given for either ECE 404 or ECE 406, but not for both. Prerequisites: ECE 308 and MATH 474 or MATH 475 or ECE 475. (3-0-3) (**P**)

ECE 406
Digital and Data Communications with Laboratory
Channel capacity, entropy, digital source encoding considering bit-rate reduction, quantization, waveshaping, and intersymbol interference. Analysis and design of digital modulators and detectors. Matched filters. Probability of error analysis. Laboratory covers modulation, detection, sampling, analog-to-digital conversion, error detection, and an open-ended project. Credit will be given for either ECE 404 or ECE 406, but not for both. Prerequisites: ECE 308 and MATH 474 or MATH 475 or ECE 475. (3-3-4) (**P**) (**C**)

ECE 407
Computer Communications Systems
The ISO-OSI layered architecture, packet switching and circuit switching, error detection and recovery (ARQ) protocols, bridges and routers, basic queueing theory, telephone switches, Erlang-B and Erlang-C blocking formulae, TCP/IP, X.25, signaling (Signaling System 7), Personal Communication Services (PCS) networks, Broadband Networks. Prerequisite: MATH 474 or MATH 475 or ECE 475. (3-3-4) (**P**) (**C**)

ECE 409
Communication Electronics with Laboratory
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 specifications. Laboratory experiments reinforce concepts and include an open-ended design problem. Credit will be given for either ECE 401 or ECE 409, but not for both. Prerequisites: ECE 307, ECE 312. Corequisite: ECE 403. (3-3-4) (**P**) (**C**)

ECE 411
Power Electronics
Power electronic circuits and switching devices such as power transistors, MOSFETs, SCRs, GTOs, IGBTs and UJTs are studied. Their applications in AC/DC, DC/DC, DC/AC and AC/AC converters as well as switching power supplies are studied. Simulation mini-projects and lab experiments emphasize power electronic circuit analysis, design and control. Prerequisite: ECE 311. (3-3-4) (**P**) (**C**)

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 motors and 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. Prerequisites: ECE 311, ECE 319. (3-3-4) (**P**) (**C**)

ECE 414
Audio and Electroacoustics
Analysis and design of audio preamplifiers, power amplifiers, passive and active filters. Acoustic principles. Basics of magnetic recording. Project laboratory: the design, construction, trouble shooting and testing of components of an audio system. Prerequisite: ECE 312. (3-3-4) (**P**) (**C**)

ECE 415
Solid-State Electronics
Comprehensive introduction to the basic concepts of Solid State Physics as applied to electonic 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: ECE 307 or PHYS 348 or consent of instuctor. (3-0-3) (**P**)

ECE 416

Industrial Electronics Design and Automation

This course provides hands-on experience. It covers the principles of industrial electronics and automation systems, automation components and devices, implementation of fundamental industrial electronics algorithms using digital processors, electronic design methodologies, rapid prototyping, and sensors/transducers. The simulation miniprojects and lab experiments in the course will emphasize industrial electronics systems analysis, design, and automation. Prerequisite: ECE 311. Corequisite: ECE 411. (3-3-4) (**P**)

ECE 417

Automation and Control

This course provides hands-on experience. It covers principles of industrial controls and automation, fundamentals of programmable logic controllers (PLC), PLC design and automation, PLC hardware and programming tools, automated manufacturing processes, and PLC networking. The simulation miniprojects and laboratory experiments will emphasize automation and control systems analysis, design, and applications. Prerequisite: ECE 311. (3-3-4) (**P**)

ECE 419

Power Systems 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. Power system controls: voltage regulators and speed governors. Prerequisite: ECE 319. (3-3-4) (**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: ECE 319. (3-0-3) (**P**)

ECE 421

Microwave Circuits and 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: ECE 307. (3-0-3) (**P**)

ECE 423

Microwave Circuits and 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: ECE 307. (3-3-4) (**P**) (**C**)

ECE 425

Analysis and 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. Team design projects. Prerequisites: ECE 312, senior standing. (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. Prerequisites: ECE 218, ECE 311 and senior standing. (3-3-4) (**P**) (**C**)

ECE 434

Control Systems with Laboratory

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. The laboratory consists of the complete design of a control system, with major tasks being modeling, controller design, and performance testing. Credit will be given for either ECE 434 or ECE 438, but not for both. Prerequisite: ECE 308. (3-3-4) (**P**) (**C**)

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: ECE 308. (3-3-4) (**P**) (**C**)

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: 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. Credit will be given for either ECE 438 or ECE 434, but not for both. Prerequisite: 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. Prerequisites: ECE 218 or CS 470, ECE 242 or CS 350, and senior standing. (3-3-4) (**P**) (**C**)

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, programmable logic, and application-specific integrated circuits (ASICs). Design-oriented laboratory stressing the use of programmable logic devices. Prerequisites: ECE 218, ECE 311, and senior standing. (3-3-4) (**P**) (**C**)

ECE 448
Mini/Micro Computer Programming
Engineering applications programming using the C language in a UNIX environment. Use of UNIX tools including filters and shell scripts. Overview of UNIX software design practices using tools such as Make and SCCS. The UNIX system interface. Software design projects. Credit for this course is not applicable to a B.S. CP.E. degree. Prerequisites: CS 116, ECE 242 or CS 350 and senior standing. (3-0-3) (**P**)

ECE 449
Object-Oriented Programming and 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 class libraries. Event-driven simulation techniques in an object-oriented environment. Programming projects will include the development of a simulator for an engineering application. Prerequisites: ECE 448, senior standing. (3-0-3) (**P**)

ECE 470
Photonics
An engineering-oriented treatment of optics and photonics, concentrating on optical design for communications and sensor systems. Electromagnetic theory of optics and its application to free-space and guided-wave optical systems; polarization states; optical components; fiber and integrated-optic waveguides; semiconductor sources and detectors; electro-optic and acousto- optic modulation techniques. Credit will be given for either ECE 470 or ECE 471, but not for both. Prerequisites: ECE 307, ECE 312. (3-0-3) (**P**)

ECE 471
Photonics with Laboratory
An engineering-oriented treatment of optics and photonics, concentrating on optical design for communications and sensor systems. Electromagnetic theory of optics and its application to free-space and guided-wave optical systems; polarization states; optical components; fiber and integrated-optic waveguides; semiconductor sources and detectors; electro-optic and acousto-optic modulation techniques. Laboratory section introduces optical measurement techniques. Characterization of passive optical components and dielectric waveguides. Design of interferometric sensors. Design and testing of optical transmitters and receivers for communication systems. Credit will be given for either ECE 470 or ECE 471, but not for both. Prerequisites: ECE 307, ECE 312. (3-3-4) (**P**) (**C**)

ECE 475
Random Phenomena in Electrical Engineering
Basic axioms of probability. Signals as random variables. Distribution and density functions. Functions of random variables. Applications to the binary symmetric communication channel, square-law and other nonlinear devices. The Gaussian, Poisson and other distributions. Application to photon counting. The signal-plus-noise problem. The DC and AC value of signals: mean and variances. The meaning of signal-to-noise ratio. Higher moments. Estimation of the mean and variance. Confidence intervals. Credit will be given for either ECE 475 or MATH 475, but not for both. Prerequisite: ECE 308. (3-0-3)

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: ECE 436 or ECE 437. Corequisite: MATH 474 or MATH 475 or ECE 475. (3-0-3) (**P**)

ECE 485
Computer Organization and 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 for both. Prerequisites: ECE 218, ECE 242, and senior standing. (3-0-3) (**P**)

ECE 491
Undergraduate Research
Independent work on a research project supervised by a faculty member of the department. Prerequisites: Written consents of academic adviser and instructor. (Credit: 1–3 credit hours) (**P**)

ECE 494
Undergraduate Projects
Students undertake a project under the guidance of an ECE faculty member. Prerequisite: Approval of the ECE instructor and the ECE chair. (Credit: 1–4 credit hours) (**P**)

ECE 497
Special Problems
Design, development, analysis of advanced systems, circuits or problems as defined by a faculty member of the department. Prerequisites: Written consent of academic adviser and instructor. (Credit: 1-3 credit hours) (**P**)

Special Note
ECE undergraduate students are not permitted to take any ECE courses via Internet, unless they have the written permission of the course instructor, their academic adviser, 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, faculty adviser and the ECE department chair. Generally, a 3.5/4.0 major GPA is required for departmental approval. The following ECE graduate courses are available to qualified degree-seeking undergraduate students under the above conditions.

Course descriptions are in the current *IIT Bulletin: Graduate Programs* or online at **www.iit.edu. Current Students—go to Web for Students**.

ECE 502
Basic Network Theory

ECE 504
Wireless Communication System Design

ECE 505
Applied Optimization for Engineers

ECE 506
Analysis of Nonlinear Systems

ECE 508
Signal and Data Compression

ECE 509
Electromagnetic Field Theory

ECE 511
Analysis of Random Signals

ECE 512
Mobile Communication Systems

ECE 513
Communication Engineering Fundamentals

ECE 514
Digital Communication Principles

ECE 515
Modern Digital Communications

ECE 519
Coding for Reliable Communications

ECE 521
Quantum Electronics

ECE 523
Electronic Circuit Theory

ECE 524
Electronic Circuit Design

ECE 525
RF Integrated Circuit Design

ECE 526
Active Filter Design

ECE 529
Advanced VLSI Systems Design

ECE 531
Linear System Theory

ECE 535
Discrete Time Systems

ECE 537
Optimal Feedback Control

ECE 540
Reliability Theory and System Implementation

ECE 541
Performance Evaluation of Computer and Communication Networks

ECE 545
Computer Communication Networks

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 Systems Relaying

ECE 555
Power Market Operations

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
Seminar on Nanodevices and Technology

ECE 575
Electron Devices

ECE 576
Antenna Theory

ECE 577
Advanced Antenna Theory

ECE 578
Microwave Theory

ECE 579
Numerical Methods in Electromagnetics and Solid-State Electronics

ECE 583
High Speed Computer Arithmetic

ECE 584
Advanced Switching Theory

ECE 585
Advanced Computer Architecture

ECE 586
Fault Detection in Digital Circuits

ECE 587
Hardware/Software Codesign

ECE 588
CAD Techniques for VLSI Design

Economics

ECON 151
The Economics of the Firm
The course looks at the consequences of scarcity on business behavior—the use of cost-benefit analysis, opportunity cost, and comparative advantage. It examines the influence of supply and demand on markets, and the influence of cost conditions and market structure on the behavior of the firm. The concept of economic efficiency is then used to examine government regulation of business. (3-0-3) (**S**) (**C**)

ECON 152
National and Global Economics
The course looks at national and international statistics—real output, inflation, unemployment, and interest rates. It examines fiscal and monetary policy and how they influence the important measures of an economy's performance. Then the analysis is extended to the interaction between national economies and how this influences trade and capital flows between countries and determines exchange rates. (3-0-3) (**S**) (**C**) (**E**)

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
The evaluation of proposed capital investments in the public and private sectors. Equivalent worth, rate of return, and benefit/cost methods. Treatment of the time value of money, taxes, inflation, risk, inter related investments and capitalbudgeting. Credit for this course not applicable to a B.S.B.A. or a B.S.B.A.A.S. degree. Offered in fall and spring. (3-0-3) (**S**)

Engineering Graphics

EG 100
Basic Technical Drawing
Designed for students who are not prepared to take EG 105 because they have had little or no high school technical drawing or who need a slower approach to the subject. Special emphasis is placed upon the use of instruments, lettering, line technique, and introductory multiview projection. (0-4-1)

EG 105
Engineering Graphics and Design
Basic traditional and computer-based techniques and applications, multiview sketching, orthographic projection, isometric and oblique pictorials, sectioning, auxiliary views, principles of descriptive geometry, dimensioning, detail drawings, introduction to design and computer-aided drafting and design (CAD). Prerequisites: Trigonometry. (1-2-2)

EG 204
Blueprint Reading for Machine Industries
Industrial prints, views of objects, analysis of edges and surfaces, sectional views, auxiliary views, screw threads and fasteners, dimensioning, shop processes, first-angle drawing, R.H. and L.H. drawings, and welding representation. (1-3-2)

EG 224
Blueprint Reading for Building Trades
Analysis of building construction drawings and details, dimensioning, shop processes, use of symbols and conventions, material takeoff, and elementary estimating. (1-3-2)

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 and 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 drafting and design. Engineering design project. Prerequisite: EG 105. (2-2-3)

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 problems. Shades and shadows, conics, map projection and spherical triangles. Emphasis on those applications that promote visualization and introduce new engineering experience. Applications of computers to problem solving. Prerequisite: EG 105. (2-2-3)

EG 308
Architectural Drawing I
Elements of architectural drafting. Lettering, symbols, plan layout, and elementary design in basic materials. Standard details of windows, doors, floors, roofs, stairs, framing. Perspective sketching. Prerequisite: EG 105 or consent of instructor. (2-2-3)

EG 309
Architectural Drawing II
A continuation of EG 308, with more complicated layout problems of residential, small commercial, and industrial buildings. Detailed study of functions of the building. Methods of construction and use of materials and simple perspectives. Prerequisite: EG 308. (2-2-3)

EG 310
Architectural Drawing III
Individual problems assigned to each student; each project developed from schematic plan through all stages of design, including sketches, working drawings, and presentation drawings; perspective drawing with rendering in all media. Prerequisite: EG 309. (2-2-3)

EG 312
Architectural Freehand Drawing
Accurate and rapid sketching, with special emphasis on architectural forms, proportions, perspective; pencil, crayon, chalk, and brush techniques; simple composition problems. Prerequisite: EG 105 or consent of instructor. (2-2-3)

EG 313
Architectural Detailing
Comprises design and drawing and the fitting together of various materials used in erecting and finishing contemporary and traditional buildings. Prerequisite: EG 309 or consent of instructor. (2-2-3)

EG 325
Advanced Engineering Graphics for Non-Engineers
Continuation of EG 225. 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: 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 two- and three-dimensional line 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: 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 data processing systems and procedures, application of computers to design, and CAD/CAM. Prerequisite: EG 305. (2-2-3)

EG 406
Technical and 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. Prerequisite: EG 105. (2-2-3)

EG 409
Computer-Generated Pictorial Projections
Study of computer-generated representations of three dimensional objects. Projections include multiview, perspective, axonometric and oblique. Prerequisites: EG 406. (2-2-3)

EG 419
Computer Graphics in Engineering
Techniques of computer-aided design and computer-aided manufacturing. Study of various computer graphic hardware and software systems through demonstrations and use. Prerequisites: EG 105 and junior standing or consent of instructor. (2-2-3)

EG 425
Computer Graphics for Non-Engineers
Principles and applications of computer graphics in business and non-technical 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. Prerequisite: 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. Prerequisite: EG 329. (2-2-3)

Environmental Engineering

ENVE 401
Introduction to Water-Resources Engineering
Principles of hydraulics and water demand projections as used in the design of reservoirs, water distribution systems, and storm and sanitary sewers; aspects of water resource management and environmental engineering economics. Prerequisite: CHE 301. (3-0-3)

ENVE 404
Water and Wastewater Engineering
Principles and applications of physical, chemical and biological processes for water and waste purification. Design of engineering treatment systems to meet water quality and effluent standards. Prerequisite: ENVE 302. (3-0-3)

ENVE 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. Prerequisite: 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; legal and administrative aspects of air pollution control. Prerequisite: CHE 301. (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. Prerequisites: ENVE 305, ENVE 426. (3-0-3)

ENVE 485
Pollution Prevention
An interdisciplinary course that draws upon material from chemical, electrical, environmental and mechanical engineering disciplines. This course reviews regulations and explores the tools used to set up and maintain pollution prevention programs. Topics include process assessments; defining and ranking pollution prevention options; feasibility analyses including technical, environmental, and economic aspects; and life cycle analysis. (3-0-3)

Graduate Courses
The following graduate courses are available to degree-seeking under graduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

ENVE 501
Environmental Chemistry

ENVE 503
Water and Wastewater Analysis

ENVE 506
Chemodynamics

ENVE 513
Biological Processes in Wastewater Treatment

ENVE 542
Physical and Chemical Processes of Water and Waste Treatment

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

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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 America 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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 332
American Women 1840–1990
An examination of how women shaped the course of U.S. 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: A 100-level humanities course.(3-0-3) (**H**) (**C**)

HIST 333
Ethnicity in American History and 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. Prerequisites: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 334
The Creation of America: The New World to 1789
Examines how the U.S., its values and its institutions came to be. Colonization, "Indian" relations, slavery, the American Revolution and the *Constitution* are studied in the context of the colonial world, including Latin America. Controversial issues and the challenge of discovery are stressed. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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 1960s. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 338
Contemporary America: 1960 and 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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 340
Rise of Global Economy
A historical analysis of contemporary globalization in trade, technology, labor and culture. The course includes a comparative analysis of the world's leading economies (e.g. Great Britain, Germany, United States and Japan) and considers their varied responses to industrial revolutions in the past two centuries. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 343
Islam in the Modern Era
This course will examine the philosophical, theological, and legal roots of Islam from Mohammed to the present. We will focus on what it means to be Islamic in the Middle East, what it means to practice Islam in a Western culture, and the ways in which individuals who practice Islam are affected by Western ideology: both theological (i.e. Judeo-Christian) ideations as well as Western notions of civil liberties dating as far back as the Magna Carta and even to First Century Roman Law. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 345
Women and 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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 349
African-American Experience
A study of the African-American experience since 1800, including African roots, formal and informal institutions of oppression, change in continuity in folk culture, and history of social institutions. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 350
U.S. 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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 361
The Atomic Age
A historical inquiry into the development of nuclear energy, its military uses, policy formation, and the attendant problems. Topics included: Manhattan Project, decision to use the bomb, legislation, AEC, arms race, testing, fallout, civil defense, disarmament efforts, foreign programs, espionage. This upper level course is reading intensive. Students are expected to read the required

materials for discussion. A mid-term and final examination will assess student understanding of the nuclear issues. A research paper on an approved topic will comprise the remainder of requirements. There are also several films included for this class. Prerequisite: A 100-level humanities course.(3-0-3) (**H**) (**C**)

HIST 372
History of Engineering
Examines the birth and evolution of professional engineering. Topics include engineering education, professional standards, industrial and government contexts, distinctive modes of thinking and engineering in popular culture. Prerequisites: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 381
Science in Industrial Society: 1750–1900
The transformation of the physical and biological sciences from the Enlightenment to the 20th Century and its effects on culture, politics and belief; the creation of science-based technologies and the creation of the profession of scientist. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 384
Science in the Twentieth Century
Development of quantum theory, relativity and molecular biology; the growth of science to its present important position in government, economic life and technological development. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 385
The Origins of Modern Science
An examination of the profound change in our conception of the natural world from Copernicus (1500 A.D.) to Newton (1700 A.D.); how the adoption of experimentation, quantification and new instruments created a new conception of scientific method; and the goals and nature of scientific knowledge. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

HIST 491
Independent Reading and Research
For advanced students. Prerequisite: Consent of department. (Credit: Variable) (**H**) (**C**)

Humanities

HUM 102
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. Prerequisite: Satisfaction of IIT's Basic Writing Proficiency Requirement.
(3-0-3) (**H**) (**C**)

HUM 104
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. Prerequisite: Satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (**H**) (**C**)

HUM 106
Life Stories
An interdisciplinary study of autobiographies, written chiefly by Americans. The syllabus varies, but may include Benjamin Franklin, Harriet Jacobs, Maya Angelou, Malcolm X, Langston Hughes, Richard Rodriguez, Thomas Merton, Frank Lloyd Wright and Judy Chicago. In addition to considering autobiography as a genre, the course examines the historical events and the philosophical issues that have shaped the lives and attitudes of these writers. Prerequisite: Satisfaction of IIT's Basic Writing Proficiency Requirement.
(3-0-3) (**H**) (**C**)

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 305
Advances in Information Technology
Management in an industrial environment now requires a fundamental understanding of information technology. Topics addressed are relevant to planning, operations and control of information technology, including converging network deployments, wireless applications, data modeling, production modeling, security and the impact of e-commerce. Computer exercises are included. (3-0-3)

INTM 311
Production and Operations
Introduces industrial engineering concepts and prepares the student to perform fundamental industrial engineering tasks. These include design of work standards, human factors, work groups, layout and equipment selection, and justification. (3-0-3)

INTM 314
Maintenance Technology and 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. Prerequisites: INTM 301, INTM 305. (3-0-3)

INTM 315
Industrial Enterprises
This course provides an introduction to the world of industrial enterprises. The world-wide evolution of business will be considered leading to today's competitive world. The range of industrial activities is reviewed, and students are introduced to the organization and purpose of various industrial sectors. (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
This course will teach the techniques for managing projects and programs of all types. Coverage includes organization and operation of the project team. Techniques for managing and tracking projects will be covered along with the computerized tools available for project management. Prerequisites: INTM 301, INTM 305. (3-0-3)

INTM 323
Industrial Management and Planning
This course introduces students to various concepts of management, specifically as applicable to industrial companies. Management of people and organizations will be discussed, as well as concepts of forecasting and strategic planning. Prerequisites: INTM 301, INTM 305, INTM 315. (3-0-3) (**C**)

INTM 332
Systems Safety
Safety represents a major challenge for all industrial operations. This course covers human factor approaches along with the systems analyses required to implement safety systems in the workplace. Rules and regulations applying to safety will be considered. Prerequisites: INTM 301, INTM 305. (3-0-3)

INTM 340
Industrial Logistics
Basic principles of transportation, distribution and logistics (TDL) in both the private and public sectors. TDL activities are the infrastructure that supports the overall economy, including the retail, service and construction sectors. TDL is also an integral aspect of the internal operations of all businesses. Topics covered include regulations, costs, and software, as well as the interaction of TDL functions with the overall enterprise. Prerequisite: INTM 305, INTM 315. (3-0-3) (**C**)

INTM 381
Industrial Training Curriculum Development
Fundamentals of curriculum development for adult learners are covered. Starting with a needs assessment, the students learn to analyze the training requirements. Based on this understanding, a syllabus for the training is developed and lesson plans prepared for covering the subject materials. Finally the students will be provided with tools to evaluate the success of the training. Assignments will require participants to apply the material covered to training situations within the participant's area of expertise. (3-0-3)

INTM 382
Methods of Adult Training
This course will offer alterntive presentation methods based on the demographics and background of the target audience. Emphasis will be on understanding how adults learn as well as providing an introduction to the range of available educational technologies. Traditional approaches using lectures, slides, and video will be covered as well as the various interactive TV and web based options. Assignments will require demonstration of knowledge of and ability to use the range of tools and techniques that are available. (3-0-3)

INTM 383
Developing Training Programs
This course will provide skills for the administration of training courses and/or programs. Coverage will include management of facilities and equipment including record keeping and budgeting. Preparation of proposals and reports will also be taught. The administrative and management skills required to work with various people within an organization will be covered. Finally techniques for recruiting students for the training program will be considered. (3-0-3)

INTM 404
Sales, Marketing and Product Introduction
Covers techniques of marketing research, strategies for new product introduction, and sales management and planning. Prerequisite: INTM 323. (3-0-3) (**C**)

INTM 406
Quality Control in Manufacturing
Topics include quality control based on metrology and overall quality control systems. Metrological techniques covered include mechanical, electrical, materials and chemical perspectives. Such QC issues as SPC, ISO 9000, MilSpec and TQM are examined. Emphasis is on exploring options and consequences of selecting appropriate methodologies. (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 specialities 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. Prerequisite: INTM 315. (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. Prerequisite: INTM 305. (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, external and internal lead times, excess/obsolete inventory, and inventory controls. Material Resource Planning (MRP) and Enterprise Resource Planning (ERP) are included. Prerequisites: INTM 305, INTM 315. (3-0-3) (**C**)

INTM 412
Manufacturing Processes
Process areas studied include metals, plastics and electronics manufacturing. Key processes in each of these industries are explored, with particular consideration given to interactions between materials and processes, as well as related design issues. Prerequisite: INTM 315. (3-0-3)

INTM 413
Facilities and Construction Management
Students learn about management of existing facilities including routine service and maintenance activities. Tools and techniques for managing new construction and renovation projects are covered, as well as organizational structures and management approaches for these activities. Prerequisites: INTM 314, INTM 407. (3-0-3)

INTM 414
Topics in Industry
Students will use this course to capitalize on previous studies to select and complete a "job specific" project. Topics are selected with the approval of the student's employer and INTM staff, and presentation of the project report is made to both. Prerequisite: Completion of five 300-level INTM courses. (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. Prerequisites: INTM 305, INTM 322 (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. Prerequisites: INTM 409, INTM 415. (3-0-3)

INTM 422
Mechanical Technology
This course reviews the technical fundamentals applicable to industrial operations and systems for mechanical components, subassemblies and products. The student surveys a broad range of topics starting from basic technical principles and continues through application of devices, systems and standards commonly encountered in industry. Prerequisites: INTM 305, INTM 412. (3-0-3)

INTM 424
Management Information Systems
Integration of all elements of manufacturing enterprise into a common database is critical to efficiency and profitability. This course details how Management Information Systems (MIS) tie together such operational aspects as order entry, production scheduling, quality control, shipping and collections. Prerequisite: INTM 305. (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. Prerequisites: INTM 301, INTM 315. (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. Prerequisites: INTM 305, INTM 404. (3-0-3) (**C**)

INTM 432
Vendor/Customer Relations
Relations with customers and vendors constitute a critical aspect of company profitability. The course pursues such topics as appropriate involvement of customers and vendors in product development, as well as price and contract negotiations. Prerequisite: INTM 404. (3-0-3) (**C**)

INTM 434
Industrial Futures
This course allows a futuristic view of industrial establishments of interest to the student and MT staff, who must work to develop individual or group project. Prerequisite: Completion of five 300-level INTM courses. (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. Prerequisite: INTM 340. (3-0-3) (**C**)

INTM 442
Warehousing and 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 car 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. Prerequisite: INTM 340. (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. Prerequisite: INTM 340. (3-0-3) (**C**)

INTM 444
Export/Import Management
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. Prerequisite: INTM 340. (3-0-3) (**C**)

INTM 477
Entrepreneurship in Industry
This course is available to all students interested in manufacturing and the activities that support manufacturing including logistics, business, facilities and engineering. The emphasis will be on the role of entrepreneurship in existing manufacturing and related industries as well as in start-up companies. Since manufacturing and related industrial activities represent over 30% of the economy, the economic future of the nation depends on the health of this sector. The objective of this course is to provide the skills to the students to introduce innovation and entrepreneurship in manufacturing and the industry that supports it. (3-0-3)

Interprofessional Projects

IPRO 497
Interprofessional Project (IPRO)
The interprofessional project (IPRO) course develops the knowledge and skills of students in teamwork, leadership, and project management while working in multidisciplinary teams on open-ended problem solving projects involving technical, ethical, environmental, economic, public policy, and legal issues. Students also gain experience in a wide range of communication methods and choose from a range of IPRO project experiences that apply one or more methodologies associated with research, design, process improvement, service learning, entrepreneurship and international engagement. IPRO project experiences are a proven way to enhance a student's resume and credentials in recruiting. IPRO project team sections typically have 12 members, but may range from 5 to 20 depending on the scope of the project. Students on a team may range from sophomore to graduate level and represent a variety of disciplines and professional programs that can broadly contribute to a project effort. Specific rules governing a student's selection of IPRO course sections may apply in certain degree programs. Some projects may carry humanities or social sciences credit. Students should review the detailed IPRO Project listings at http://ipro.iit.edu and consult their academic adviser before enrolling in an IPRO course section. (1-6-3) (**C**)

Information Technology and Management

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 and Hardware I
Students study the basics of computer architecture and learn to use a contemporary operating system. Hardware requirements, micro-computer components, software compatibility and system installation and options are covered, along with post-installation topics, storage, security, and system diagnosis and repair. (2-2-3)

ITM 302
Introduction to Contemporary Operating Systems II
Introduces features of an advanced operating system, including basic commands, file and directory manipulation, text editing and suitability for server applications. Basic programming in this environment will be addressed through shell scripting for job automation along with shell built-in data types, condition, loops, functions and regular expressions. (2-2-3)

ITM 311
Introduction to Object-Oriented Programming
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, creating stand-alone applications and applets for enhancing Web pages. (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 header files, work with and effectively use basic data types, compile source code into binary executable files, and understand use of the "make" utility for project management. (2-2-3)

ITM 411
Intermediate Object-Oriented Programming
Covers object oriented programming concepts using a Java application generator. Creating user interfaces, working with data, implementing security, and deploying the application are discussed in detail. Hands-on exercises reinforce concepts taught. Prerequisite: ITM 311. (2-2-3)

ITM 412
Advanced Structured and 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: ITM 312. (2-2-3)

ITM 414
Visual Programming Environments
Students will study the fundamental problems associated with man-machine interfaces. Students will learn to apply several GUI techniques to design, lay out and implement screen controls, menus and graphical objects using techniques such as logic flow and input validation. GUI programming elements of contemporary visual programming languages are introduced. Prerequisite: ITM 311 or ITM 312. (2-2-3)

ITM 415
Advanced Object-Oriented Programming
Addresses advanced concepts in object-oriented programming. Hands-on exercises reinforce concepts taught. Using an integrated OO programming and HTML development environment, students will build a final Web project. Prerequisite: ITM 411. (2-2-3)

ITM 421
Data Modeling and 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)

ITM 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 how to design and develop Client/Server database applications for various business solutions, incorporating Client/Server application design. Business system planning, analysis, development and implementation are discussed. Students will learn how to design event-driven applications utilizing application management tools as well as use of graphical user interface design to create user-friendly applications. Prerequisite: ITM 421. (4-4-6) (**C**)

ITM 428
Database Security
Students will engage in an in-depth examination of topics in data security including security considerations in applications & systems development, encryption methods, cryptography law and security architecture & models. Prerequisite: ITM 421. (3-0-3)

ITM 440
Introduction to Data Networks and 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)

ITM 441
Network Applications and 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 2000 workgroups and domains: file and printer sharing, remote access, and the Windows Network Neighborhood are addressed. Prerequisite: ITM 440. (2-2-3)

ITM 448

System and Network Security

Prepares students for a role as a network security analyst and administrator. Topics include hacking, vulerabilities, and countermeasures; network security architectures; policy and legal issues; security assessment; cryptography, tools used for network privacy, security and detecting and logging of incidents; and organizations addressing network security. Prerequisite: ITM 440. (2-2-3) (**C**)

ITM 451

Distributed Workstation System Administration

Students learn to set up and maintain PC workstations and servers and to administer PC servers and networks. Topics include hardware requirements; software compatibility; and system installation, configuration and options and post-installation topics; administrative practices required for file system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention. Prerequisite: ITM 301. (4-4-6)

ITM 452

Client-Server System Administration

Students learn to setup and configure a contemporary operating system, including the actual installation of the operating system on the student workstation in a networked client-server environment. User account management, security, printing, disk configuration, and backup procedures are addressed, with particular attention to coverage of TCP/IP and TCP/IP applications. System installation, configuration and administration issues as well as network file systems, network access and compatibility with other operating systems are also addressed. Prerequisite: ITM 302. (4-4-6)

ITM 456

Introduction to Open Source Operating Systems

Students learn to set up and configure an industry-standard open source operating system, including the actual installation of the operating system on the student workstation. Also addressed are applications and graphical user interfaces as well as support issues for open source software. Prerequisite: ITM 302 or permission of instructor. (2-2-3)

ITM 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, antivirus and anti-spyware measures and other operating system security strategies will be examined. Prerequisite: ITM 301 or ITM 302. (2-2-3)

ITM 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**)

ITM 461

Internet Technologies & Web Design

This course will cover how the Internet is organized, addressing, routing, DNS, protocols, TCP/IP, SMTP, the use of Internet applications, and the creation of Web pages using HTML 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**)

ITM 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: ITM 461. (2-2-3) (**C**)

ITM 463

Internet 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. Also addressed is the role of the Application Service Provider (ASP) in enterprise information technology management. Prerequisites: ITM 461, ITM 411. (2-2-3)

ITM 465

Dynamic Web Page Development

Students will learn the W3C and major vendors' Document Object Models (DOM) and how to use scripting syntax and techniques to make use of the DOM in the preparation of dynamic web pages. The role of Cascading Style Sheets in dynamic pages will also be covered in detail. Prerequisite: ITM 461. (2-2-3)

ITM 466

Web Services & Service-Oriented Architectures

The student is introduced to the extensible markup languages and associated modeling techniques required to develop leading edge Web

documentation for a next generation Web site, and learns to design structured and intuitive markup utilizing schema and stylesheets which flexibly augment the underlying extensible markup language infrastructure. Principles of extensible markup language use are reinforced by analysis of business case studies including an XML-based Web site. Prerequisite: ITM 461. (2-2-3)

ITM 471
Project Management for Information Technology
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**)

ITM 478
Information System 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 and models using current standards and models. (3-0-3) (**C**)

ITM 491
Undergraduate Research
Prerequisite: written consent of instructor (Credit: variable)

ITM 492
Embedded Systems & Reconfigurable Logic Design
This course covers embedded system design fundamentals. Working with various microcontrollers, microprocessors, and DSPs, the student will discover hardware, software, and firmware design trade-offs, tool chains, and best practices in current embedded systems development. Laboratory exercise and experience reinforce the lecture concepts. A course project encapsulates all topics culminating in an embedded system designed and implemented from the ground up. The student should be familiar with analog and digital design methods, computer architecture and structured/procedural programming techniques. Prerequisite: Knowledge of digital logic and C or consent of instructor. (4-4-6)

ITM 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. Prerequisite: consent of instructor (Credit: variable) (**C**)

ITM Graduate Courses
The following graduate courses may be available to degree-seeking undergraduate students with approval of the course instructor and faculty adviser.

ITM 511
Application Development Methodologies

ITM 521
Client/Server Technologies and Applications

ITM 531
Object-Oriented System Analysis, Modeling and Design

ITM 532
UML Based Software Development

ITM 534
Human Computer Interaction

ITM 535
Systems Architectures

ITM 542
Wireless Technologies and Applications

ITM 545
Telecommunications Technology

ITM 546
Telecommunications Over Data Networks

ITM 549
System and Network Security: Projects and Advanced Methods

ITM 555
Handheld Device Technologies

ITM 564
Electronic Commerce Applications and Management

ITM 567
Enterprise Web Application Development

ITM 572
Process Engineering for Information Technology Managers

ITM 573
Building and Leading Effective Teams

ITM 574
Strategic Information Technology Management

ITM 575
Networking and Telecommunications Management

ITM 581
ITM Entrepreneurship

ITM 585
Legal and Ethical Issues in Information Technology

ITM 593
Embedded Systems

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

LIT 315
The Novel
Analysis of the novel as a literary form with attention to its place in ongoing cultural and political discourse. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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, Gabriel Marquez, Nadine Gordimer, Toni Morrison and Salman Rushdie. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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 perspectives of globalism and nationalism. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

LIT 328
Poetry
Study of poetry and imaginative prose, including an analysis of the theoretical, literary, and sociocultural contexts of these works. The course may include creative writing by students. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

LIT 341
Modern Drama
Study of major dramatists and movements in the theater since Ibsen and Strindberg, with special emphasis on such writers as Chekhov, Shaw, Brecht, O'Neill, Ionesco and Pinter. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

LIT 342
Theater in Chicago
Designed to introduce students to the variety of professional theater performances in and around Chicago. Main emphasis is on seeing plays, ancient to contemporary; essays and oral reports; study of dramatic genres and theater history. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

LIT 353
Writing in Black
An examination of works by Toni Morrison, Paule Marshall, W.E.B. DuBois, Richard Wright and other black writers. The course includes formal and ideological analysis, emphasizing both nationalism and transnationalism in black culture. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

LIT 360
Chicago in Literature
A survey of great American novelists, poets and dramatists who have lived and worked in Chicago from the time of the Great Fire to the present day, and who have made Chicago one of the great world literary centers. Writers discussed include such figures as Theodore Dreiser, Carl Sandburg and Richard Wright. Prerequisite: A 100-level humanities course. Requirement. (3-0-3) (**H**) (**C**)

LIT 366
Twentieth-Century American Literature
Study of such writers as Steinbeck, Frost, Eliot, Anderson, O'Neill, Hemingway, Cather, Wolfe, Faulkner and contemporary writers such as Updike and Toni Morrison. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

LIT 491
Independent Reading and Research
For advanced students. Prerequisite: Consent of department. (Credit: Variable) (**H**) (**C**)

LIT 497
Special Project
(Credit: Variable)

Mathematics

* This course does not count for graduation in any engineering, mathematics, natural science or computer science degree program.

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. (2-0-2) (**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 and quadratic surfaces. Applications. (3-0-3) (**C**)

MATH 120*, 121*
Business Mathematics I, II
An introduction to the mathematics used in the study of finance, financial markets, and economics. (3-0-3); (3-0-3)

MATH 122*
Introduction to Calculus
Basic concepts of calculus of a single variable; limits, derivatives and integrals. Applications. (3-0-3)

MATH 148*
Calculus/Precalculus I
Review of algebra and analytic geometry. Functions, limits and 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, and optimization. Antiderivatives, first-order differential equations. Definite integral and applications. Implicit and inverse functions, and inverse trigonometric functions. Prerequisite: MATH 148. (4-1-5) (**C**)

MATH 151
Calculus I
Analytic geometry. Functions and their graphs. Limits and continuity. Derivatives of algebraic, trigonometric and inverse trigonometric functions. Applications of the derivative. Introduction to integrals and their applications. Prerequisite: Placement. (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: Grade of "C" or better in MATH 151 or MATH 149; or Advanced Placement. (4-1-5) (**C**)

MATH 230
Introduction to Discrete Mathematics
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. (3-0-3) (**C**)

MATH 251
Multivariate and Vector Calculus
Analytic geometry in three-dimensional space. Partial derivatives. Multiple integrals. Vector analysis. Applications. Prerequisite: 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: 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. Prerequisites: MATH 251 and MATH 252 or consent of the instructor. (3-0-3)

MATH 332
Matrices
Matrix algebra, rank, inverses; systems of linear equations, determinants; eigenvalues and eigenvectors. Corequisite: MATH 251. (3-0-3)

MATH 333
Matrix Algebra and 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. Prerequisite: 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 of 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. Prerequisite: MATH 251, MATH 252, and (CS 105 or CS 115). Same as MMAE 350. (3-0-3)

MATH 400
Real Analysis
Real numbers, continuous functions; differentiation and Riemann integration. Functions defined by series. Prerequisite: MATH 251 or consent of instructor. (3-0-3)

MATH 401
Analysis II
Functions of several variables, partial differentiation, and multiple integrals. Prerequisite: MATH 400. (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: MATH 251. (3-0-3)

MATH 405
Introduction to Iteration and 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. Prerequisites: MATH 251; MATH 252; one of the following: MATH 332, or MATH 333, or consent of the instructor. (3-0-3) (**C**)

MATH 410
Number Theory
Divisibility, congruences, distribution of prime numbers, functions of number theory, diophantine equations, applications to encryption methods. Prerequisite: MATH 230 or consent of instructor. (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: Consent of instructor. (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. Prerequisite: Junior standing. Same as CHE 426. Credit not given for both MATH 426 and CHE 426. (3-0-3)

MATH 430
Applied Algebra
Relations; modular arithmetic; group theory:symmetry, permutation, cyclic, and abelian groups; group structure: subgroups, cosets, homomorphisms, classification theorems; rings and fields. Applications to crystallography, cryptography, and check-digit schemes. Prerequisite: MATH 230 or 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: MATH 230 or consent of instructor. (3-0-3)

MATH 454
Graph Theory and 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: MATH 230, MATH 251, or MATH 252. (3-0-3)

MATH 461
Fourier Series and 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. Prerequisites: MATH 251, MATH 252. (3-0-3)

MATH 471
Numerical Methods
Number representation; errors; iterative methods for nonlinear equations; polynomial interpolation; differentiation; integration; Gauss elimination. Prerequisites: MATH 251, MATH 252. Corequisite: MATH 332 or MATH 333. (3-0-3)

MATH 474
Probability and Statistics
Elementary probability theory including discrete and continuous distributions, sampling, estimation, confidence intervals, hypothesis testing and linear regression. Prerequisite: MATH 251. Credit not granted for both MATH 474 and MATH 475. (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. Prerequisite: MATH 251. Credit not granted for both MATH 474 and MATH 475. (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: MATH 475. (3-0-3)

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. Prerequisite: MATH 471 or consent of the instructor. (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. Prerequisite: MATH 471 or consent of instructor. (3-0-3)

MATH 481
Introduction to Stochastic Processes
This is an introductory 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 the business applications. The course introduces the most fundamental ideas in the area of modeling and analysis of real world phenomena in terms of stochastic processes. The course covers different classes of Markov processes: discrete and continuous-time Markov chains, Brownian motion and diffusion processes. It also presents some aspects of stochastic calculus with emphasis on the application to financial modeling and financial engineering. Credit will not be granted for MATH 481 and 542. Prerequisites: (MATH 332 or MATH 333) and MATH 475 (3-0-3)

MATH 482
Introduction to Markov Processes
Random walks, discrete time Markov chains; Poisson processes, continuous time Markov chains; renewal theory. Prerequisite: MATH 475. (3-0-3)

MATH 483
Design and Analysis of Experiments
Principles of estimation; hypothesis tests, confidence intervals. Contingency tables; goodness-of-fit. Analysis of variance; linear regression. Hierarchical and split-plot designs; analysis of covariance. Multiple regression. Prerequisite: MATH 476. (3-0-3)

MATH 485
Introduction to Mathematical Finance
This is an introductory course in mathematical finance. Technical difficulty of the subject is kept at a minimum by considering a discrete time framework. Nevertheless, the major ideas and concepts underlying modern mathematical finance and financial engineering will be explained and illustrated. Credit may not be granted for MATH 485 and MATH 548. Prerequisite: MATH 475 or equivalent. (3-0-3)

MATH 486
Mathematical Modeling I
A general introduction to optimization problems. Linear programming: the simplex method. Elements of graphs and networks. Introduction to game theory. Applications. Prerequisite: MATH 475 or consent of instructor. (3-0-3) (**C**)

MATH 487
Mathematical Modeling II
The formulation of mathematical models, solution of mathematical equations, and interpretation of results. Selected topics from queueing theory and financial derivatives. Prerequisite: MATH 252. (3-0-3) (**C**)

MATH 488
Ordinary Differential Equations and 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. Prerequisites: MATH 251, 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: MATH 461. (3-0-3)

MATH 491
Reading and Research
(Credit: Variable) (**C**)

Military Science

MILS 101
Foundations 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, 148, 247, 248, 347, 348, 447, 448
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness. (0-3-2)

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 and 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 301
Leadership and 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. Prerequisites: Basic course or equivalent and consent of the department. (3-2-3) (**C**)

MILS 302
Leadership and 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. Prerequisites: MILS 301 and consent of the instructor. (3-2-3) (**C**)

MILS 401
Leadership and 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. Prerequisites: MILS 301, 302 and consent of the instructor. (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. Perquisites: MILS 301, 302, 401 and consent of the department. (3-2-3) (**C**)

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. Prerequisite: Department approval. (Credit: 1-4 hours)

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. (1-4-3) (**C**)

MMAE 200
Introduction to Mechanics
Equilibrium concepts. Statics of a particle. Statics of a system of particles and rigid bodies. Distributed forces, centroids and center of gravity. Friction. Kinetics of particles: Newton's Laws of motion, energy and momentum. Kinematics and of particles. Dynamics of rotating bodies. Credit for this course is not applicable to BSME, BSMSE and BSAE programs. Prerequisites: PHYS 123, MATH 152, CS 105. Corequisite: MATH 252. (3-0-3)

MMAE 201
Mechanics of Solids I
Free body diagrams. Equilibrium of a particle, and a rigid body. Distributed forces, centroids, centers of gravity, and moments of inertia. Analysis of structures. Friction. Internal loads in bars, shafts, cables, and beams. Prerequisites: CS 105, PHYS 123. Corequisite: MATH 152. (3-0-3)

MMAE 202
Mechanics of Solids II
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: MMAE 201. (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. Bending of multi-cell tubes. Energy methods. Castigliano's theorems. Structural instability. Prerequisites: MMAE 202, MATH 251, MATH 252. (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: MMAE 201. Corequisite: MATH 252. (3-0-3)

MMAE 306
Analysis and Design of Machine Elements
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. Design of shafts, beams and springs. Design of gears and bearings. Prerequisites: MMAE 202, MATH 251, MATH 252. Corequisite: MMAE 371. (3-0-3)

MMAE 310
Fluid Mechanics with Laboratory
Basic properties of fluids in motion. Lagrangian and Eulerian viewpoints, material derivative, streamlines, etc. Continuity, energy and linear and angular momentum equations in integral and differential forms. Integration of equations for one-dimensional flows 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. Lab Component: Introduction to measurements of fluid properties and basic features of fluid flows; flow through pipes and channels, flow-induced forces on bodies; Conservation of energy; six laboratory experiments in small groups supplemented by demonstrations and films. Prerequisites: MMAE 201, MATH 251, MATH 252. Corequisite: MMAE 320. (3-3-4) (**C**)

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. Prerequisites: MMAE 310, 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. Prerequisites: MMAE 310, MMAE 320. (3-0-3)

MMAE 313
Fluid Mechanics without Laboratory
Same as MMAE 310 without the laboratory component. Prerequisites: MMAE

201, MATH 251, MATH 252. Corequisite: MMAE 320. (3-0-3)

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. Prerequisites: CHEM 124, PHYS 224, MATH 251. Corequisite: MATH 252. (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. Prerequisites: MMAE 320, MATH 251. Corequisite: MMAE 310. (3-0-3)

MMAE 322
Heat and 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. Lab component: one-dimensional steady-state conduction; multi-dimensional steady-state conduction; convection; heat exchanger analysis; radiation; phase change.
Six laboratory experiments in small groups. Prerequisites: MMAE 320, MMAE 310. (3-3-4) (**C**)

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. Prerequisites: CS 105, MATH 251. Corequisites: MATH 252, MMAE 202. Same as MATH 350. (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. Prerequisites: MS 201, MMAE 371. (3-0-3)

MMAE 362
Physics of Solids
Introduction to 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: MS 201. (3-0-3) (**C**)

MMAE 363
Metallurgical and Materials Thermodynamics
The three laws of thermodynamics. Extensive problem solving in metallurgical and materials applications of heat and mass balances, free-energy criteria, and equilibrium relations. Prerequisite: MS 201. (3-0-3)

MMAE 365
Structure and 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: MS 201. Corequisites: MMAE 363 or MMAE 320 and consent of instructor. (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. Corequisite: MMAE 371. (1-6-3) (**C**)

MMAE 371
Engineering Materials and Design
Mechanical behavior of metals, polymers, ceramics and composites, laboratory testing methods including tension, torsion, hardness, impact, toughness, fatigue and creep. Evaluation of structural performance in terms of material processing, service conditions and design. Prerequisites: MS 201, MMAE 201, MMAE 202.
(2-3-3) (**C**) Formerly MMAE 271.

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. Prerequisites: MMAE 305, 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. Exo- and endoprosthetics. Implants and biomechanical compatibility. Prerequisite: MMAE 306 or consent of instructor. Corequisite: MMAE 430. (3-0-3) (**C**)

MMAE 423
Air Conditioning and Refrigeration
Environmental control for winter and summer; elements of psychrometrics, load calculations. Space heating and cooling methods; extended surface coils; absorption refrigeration; system analysis and planning. Prerequisites: MMAE 321, MMAE 322. (3-0-3)

MMAE 424
Internal Combustion Engines
Fundamentals of spark ignition and diesel engines. Combustion knock and engine variables; exhaust gas analysis and air pollution; carburetion; fuel injection; lubrication; engine performance; vehicle performance. Engine balance and vibrations. Electronic

control. Prerequisites: MMAE 321, MMAE 322. (3-0-3)

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 magnetohydrodynamic generators, thermoelectric devices, thermionic converters, fuel cells and solar cells. Prerequisites: MMAE 321, PHYS 224. (3-0-3)

MMAE 430
Engineering Measurements
Introduction to applications of measurement instrumentation and design of engineering experiments. Generalized characteristics of sensors and measurements systems. Signal conditioning and computer-based data acquisition and analysis. Measure ment of motion, force, strain, torque, shaft power, pressure, sound, flow, temperature and heat flux. Design of experiments proposals. Team-based projects addressing application of engineering measurements to a variety engineering problems. Effective communication of experimental results. Prerequisite: PHYS 300. (2-6-4) (**C**)

MMAE 431
Design of Machine Elements
Design factors and fatigue. Application of principles of mechanics to the design of various machine elements such as gears, bearings, clutches, brakes and springs. (2-3-3)

MMAE 432
Design of Mechanical Systems
Small-group design projects drawn from industry. Prerequisite: MMAE 306 or consent of instructor. (1-6-3)

MMAE 433
Design of Thermal System
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. Prerequisites: MMAE 321, MMAE 322. (2-3-3) (**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: MMAE 431. (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. Prerequisite: Senior standing. (3-0-3)

MMAE 436
Design of Aerospace Vehicles
Aircraft design including aerodynamic, structural and powerplant characteristics to achieve performance goals. Focus on applications ranging from commercial to military and from man powered 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. Prerequisites: MMAE 304, MMAE 311, MMAE 312. (2-3-3) (**C**)

MMAE 437
Design of Aerospace Vehicles II
Spacecraft systems design including mission analysis and astrodynamics, 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. Prerequisites: MMAE 441, MMAE 452. (2-3-3)

MMAE 440
Introduction to Robotics
Classification of robots; kinematics and inverse kinematics of manipulators; trajectory planning; robot dynamics and equations of motion; position control. Prerequisites: MMAE 305, PHYS 300. (3-0-3)

MMAE 441
Spacecraft and Aircraft Dynamics
Kinematics and dynamics of particles, systems of particles, and rigid bodies; translating and rotating reference frames; Euler angles. Aircraft longitudinal and lateral static stability; aircraft equations of motion. Space craft orbital dynamics; two-body problem classic orbital elements; orbital maneuvers. Prerequisite: MMAE 305, MMAE 312. (3-0-3)

MMAE 442
Aircraft and Spacecraft Response and Control
Aircraft lateral modes of motion and approximations; the yaw damper. Aircraft response to control and external inputs; introduction to automatic control. Spacecraft attitude control devices, gyroscopic instruments, momentum exchange and mass movement techniques, gravity gradient stabilization. Introduction to spacecraft automatic attitude control systems. Prerequisite: MMAE 441. (3-0-3)

MMAE 443
Systems Analysis and 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. Prerequisites: MMAE 305, PHYS 300. (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: MMAE 485 or equivalent. (3-0-3)

MMAE 445
CAD/CAM with Numerical Control
Computer graphics in engineering design and CAD software and hardware. Numerical control of machine tools by various methods. Prerequisites: CS 105, MATH 252. (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, isoparametric elements, and problems of stress concentration. General finite element codes: data generation and checks, ill-conditioned problems, and node numbering. Prerequisite: MMAE 304 or MMAE 306. (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. Prerequisites: MMAE 311, MMAE 320. (3-0-3)

MMAE 463
Structure and Properties of Materials II
Continuation of MMAE 365. Solidification structures, diffusional and diffusionless transformations. Structure-property relationships in commercial materials. Prerequisite: 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: MMAE 361 or MMAE 365. (3-0-3)

MMAE 465
Electrical, Magnetic and Optical Properties of Materials
Electronic structure of solids, semiconductor devices and their fabrication. Ferroelectric and piezoelectric materials. Magnetic properties, magnetocrystalline anistotropy, magnetic materials and devices. Optical properties and their applications, generation and use of polarized light. Prerequisite: MMAE 365 or consent of instructor. (3-0-3)

MMAE 466
Microstructural Characterization of Materials
Advanced optical microscopy. Scanning and transmission electron microscopes. X-ray microanalysis. Surface characterization. Quantitative microscopy. Prerequisite: 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 glass; 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: 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. Prerequisites: CHEM 124, MATH 251, PHYS 221. Same as CHE 470 and CHEM 470. (3-0-3)

MMAE 472
Ferrous Technology
Consideration of the basic mass and energy balances involved in the production of ferrous materials in integrated mills and in mini-mills. Historical overview of significant developments in primary steelmaking. Prerequisite: MMAE 363. (3-0-3)

MMAE 473
Corrosion
Theory and prevention of corrosion of metals, including oxidation, sulphidation, other atmospheric attacks, aqueous corrosion, and other topics. Prerequisites: MMAE 361, MMAE 365. (3-0-3)

MMAE 474
Metals Processing
The principles and practice of (a) melting and casting processes; sand, die, investment, evaporative mold, and permanent mold casting processes; and (b) the heat treatment of carbon and low alloy steels, stainless steels, tool steels, cast irons, and selected non-ferrous alloys including titanium, aluminum and nickel base alloys. Prerequisites: MMAE 463, MMAE 464. (2-3-3) (**C**)

MMAE 475
Powder Metallurgy
Production, pressing and sintering of metal powders. Effects of particle size, friction and die design on pressed densities. Theories of sintering. Relation of sintering practice to physical properties. Homogenization of alloys. Industrial equipment. Applications. Laboratory simulation of a series of P/M manufacturing cycles from powder to finished product are used to reinforce the classwork. Prerequisite: MMAE 365. (2-3-3) (**C**)

MMAE 476
Materials Laboratory II
Advanced synthesis, processing and characterization of metallic, non metallic and composite materials. Experimental investigation of relationships between materials structures, processing routes and properties. Design of experiments/ statistical data. Prerequisite: MMAE 370 or instructor's consent. (1-6-3)

MMAE 477
Commercial Alloys
Classification of the commercially significant groups of ferrous and nonferrous alloys. Mechanical, chemical and physical behavior; the relationship to basic structure-property principles. The significance of the various alloy groups in engineering practice. Prerequisite: MMAE 463. Corequisite: MMAE 474. (3-0-3)

MMAE 478
Service Failure Analysis
Theory and analyses of materials failures. Prerequisite: Consent of instructor. (2-3-3)

MMAE 480
Forging and Forming
Mechanical and metallurgical basis for successful production of forgings and stampings. Forming limits, mechanical instability, plastic anisotropy, yielding and plastic flow rules. Prerequisite: Consent of instuctor. (3-0-3)

MMAE 481
Introduction to Joining Processes
An introduction to principles and processes for joining similar and dissimilar materials. Emphasis is given to fusion processes. Prerequisite: Consent of instuctor. (3-0-3)

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: MS 201 (3-0-3)

MMAE 483
Structure/Property Relationship in Polymers
Detailed study of the relationship between polymer structure, morphology and properties. Topics include theories of rubber elasticity, the glassy state, semi-crystalline structure, and polymer melts. Effects of molecular weight and different types of intermolecular interactions are presented. Prerequisite: MMAE 470 or Consent of instructor (3-0-3)

MMAE 484
Materials and Process Selection
Context of 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: MMAE 371. (3-0-3)

MMAE 486
Properties of Ceramics
Thermal, optical, mechanical, electrical and magnetic properties of ceramics and their applications. Includes a review of defect equilibria and ceramic microstructures. Prerequisites: MS 201, MMAE 365. (3-0-3)

MMAE 487
Fiber Reinforced Polymeric Composite Materials
The materials, structure and fabrication methods for fiber reinforced polymeric composites will be discussed. Prediction of mechanical properties such as stiffness and strength. Prediction methods for laminates. Thermal and diffusion properties. Prerequisite: MMAE 202. (3-0-3)

MMAE 489
Ferrous Products: Metallurgy & Manufacture
Relationships between the engineering aspects of steels are developed by considering the behavior of high purity iron; effects of interstitial and substitutional alloying element additions, metallurgical principles of engineering properties. Plain-carbon steels, low-alloy steels, quenched and tempered steels, stainless steels, and electrical steels. Impact of production developments on microstructure and properties. Prerequisite: Consent of instructor. (3-0-3)

MMAE 491
Undergraduate Research
Student undertakes an independent research project under the guidance of an MMAE faculty member. Requires approval of the MMAE Department Undergraduate Studies Committee. (Credit: Variable; three hours maximum.)

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; three hours maximum.)

MMAE 497
Undergraduate Special Topics
(Credit: Variable)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Program*s for course descriptions.

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: CHEM 124 or consent of instructor. (3-0-3)

Mathematics and Science Education

MSED 200
Analysis of Classrooms
(Practicum and Seminar)
This course includes a two-hour seminar on campus each week along with approximately five hours per week in an area school. This is an introductory course that provides students background in learning theory, motivation theory, classroom management, aspects of effective teaching, critical classroom variables, and the school as

a system. (2-5-3) (**C**)

MSED 250
Curriculum/Foundations
This lecture/discussion course focuses on history/sociology of education, rationales and goals of current reform efforts, curriculum design, development and curriculum analysis. (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. Prerequisites: MSED 200, MSED 250. (3-0-3) (**C**)

MSED 320
Inquiry/IPRO Seminar
Seminar taken concurrently with IPRO course (preferably second IPRO) and provides students with opportunities for reflection on aspects of inquiry/problem solving, and nature of science/mathematics. Provides background for student development of instructional materials focusing on inquiry/problem solving and nature of science/mathematics. Prerequisites: MSED 200, MSED 250. (1-0-1) (**C**)

MSED 350
Informal Education Practicum and Seminar
Students spend approximately five hours per week in an informal education venue (e.g., museum, aquarium, zoo) along with a two-hour on-campus course per week. This course will help students develop an understanding of the roles informal institutions can play in math/science achievement and the ability to create instructional materials that capitalize on these community resources. Prerequisites: MSED 200, MSED 250. (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, synectics, inquiry role development, and cooperative learning. Students will have several opportunities to practice instructional models in peer teaching lessons. Prerequisites: MSED 300. Corequisites: MSED 320, MSED 350. (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. Prerequisites: MSED 300, MSED 320, MSED 350. (0-40-6) (**C**)

Naval Science

NS 101
Introduction to Naval Science
A general introduction to seapower and the naval service. The instruction places particular emphasis on the mission, organization, regulations and broad warfare components of the Navy. Included is an overview of officer and enlisted rank and rating structures, procurement and recruitment, training and education, promotion and advancement, and retirement policies. The course also covers the basic tenets of naval courtesy and customs, discipline, naval leadership and ship's nomenclature. The student is made cognizant of the major challenges facing today's naval officer, especially in the areas of human resource management. Prerequisite: Consent of instructor. (2-2-2) Offered fall semester.

NS 102
Naval Ships Systems
Designed to familiarize midshipmen with the types, structure, and purpose of naval ships. The design of naval ships is examined with respect to safety of operations and ship stability characteristics. Included are nuclear and conventional propulsion systems, auxiliary power systems, interior communications, and basic damage control. Prerequisite: Consent of instructor. (3-2-3) Offered fall semester.

NS 201
Naval Weapons Systems
This course provides an introduction to the theory, principles and operation of naval weapons systems. It includes coverage of types of weapons and fire control systems, capabilities and limitations, theory of target acquisition, identification and tracking, trajectory principles, and basics of naval ordnance. This course also covers the moral and ethical responsibilities of the military leader. Prerequisite: Consent of instructor. (3-2-3) Offered fall semester.

NS 202
Seapower and Maritime Affairs
A course based on the premise that the student must develop knowledge and interest in seapower and maritime affairs. The course is oriented toward the general concept of seapower (including the merchant marine), the role of various warfare components of a navy in supporting the Navy's mission, and the implementation of seapower as an instrument of national policy. It covers U.S. Naval history as well as the historical evolution of seapower and its effects on world history. Prerequisite: Consent of instructor. (3-2-3) (**C**) Offered spring semester.

NS 301, 302
Navigation and Naval Operations I, II
A comprehensive study of the theory, principles, and procedures of ship navigation, movement and deployment. Competency is achieved in the areas of piloting and celestial and electronic means of shipboard navigation. Operations topics include communications, sonar-radar search and screening theory. Tactical formations and dispositions, relative motion, maneuvering board and tactical plots are analyzed for force effectiveness and unity. Rules of the road, lights, signals and navigational aids are also covered. Prerequisite: Consent of instructor. (3-2-3); (3-2-3)

NS 310
Evolution of Warfare
A survey of all military history designed to provide the student with a basic knowledge of the art and concepts of warfare and its evolution from the beginning of recorded history to the present. Included within this study is a consideration of the influence that leadership, political, economic, sociological and technological factors have had on warfare and the influence they will continue to exert in the age of limited warfare. Prerequisite: Consent of instructor. (3-2-3) (**C**) Offered fall semester.

NS 401
Leadership and Management
This course teaches leadership and management skills to young leaders. These include strategic and tactical planning, time-management, communication, counseling, team-building, and decision-making in stressful environments. Required for NROTC students. Prerequisite: Consent of instructor. (3-2-3) (**C**) Offered Fall Semester.

NS 402
A Seminar on Wartime Leadership and Ethics
A seminar on leadership and ethics during war. Students learn the fundamentals necessary for them to evaluate wartime decisions made by U.S. Presidents, Cabinet Secretaries, and Military Commanders at all levels. Appropriate for students seeking military or civilian careers. Seminar discussion focus on evaluating historical case studies. Papers and exams evaluate current wartime events. (3-2-3) (**C**) Offered spring semester.

NS 410
Amphibious Warfare
The course is designed to provide the student with a historical survey of the evolution of amphibious warfare. An in-depth survey of amphibious landings is concluded with a study of the development of modern amphibious doctrine. Emphasis is placed on case studies of WW II: Pacific landing operations and Allied landings in North Africa, Northern Europe and Italy. Prerequisite: Consent of instructor. (3-2-3) (**C**) Offered fall semester.

NS 497
Special Topics

Public Administration

Undergraduates may enroll in the following courses with department permission.

PA 501
Introduction to Public Management

PA 502
Complex Organizations

PA 503
Administrative Law

PA 513
Public Policy Analysis and Evaluation

PA 514
Government Management and Information Systems

PA 522
Public Personnel Administration

PA 531
Governmental Accounting and Budgeting

PA 532
Public Finance

PA 542
Planning for Governments and Agencies

PA 551
Public Works Management

PA 552
Health and Human Services Policy and Administration

PA 553
Police Administration

PA 554
Administration of Science and Technology

PA 561
Political Process and Administration

PA 562
Urban and Metropolitan Government

PA 563
Intergovernmental Relations

PA 564
Comparative Administration and Policy

PA 577
Topics in Public Management

PA 590
Internship in Public Administration

Philosophy

PHIL 301
Ancient Philosophy
A study of major works by Plato, Aristotle and other important ancient philosophers. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 302
Origins of Modern Philosophy
A study of major 17th and 18th century philosophers, such as Descartes, Hobbes, Spinoza, Locke, Leibniz, Berkeley, Hume and Kant. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 305
20th-Century Philosophy
A study of recent philosophical trends (or movements), including logical positivism, existentialism, ordinary language philosophy, etc. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 311
Great Philosophers
An in-depth study of a single out standing philosopher, chosen by the instructor. The focus of the course will be announced when the course is scheduled. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 332
Political Philosophy
Examination of different conceptions of legitimate political authority; includes discussion of ideas of social justice, natural rights, sovereignty. Prerequisite: A 100- level humanities course. (3-0-3) (**H**) (**C**)

PHIL 333
Social Philosophy
A systematic examination of contemporary Social issues, such as abortion, euthanasia, war, environmental destruction, poverty, terrorism, and sexual morality. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 342
Philosophy of Mind
An examination of the conception of "mind" as opposed to body, and its implications for psychology, artificial intelligence and neuroscience. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 343
Philosophy of Social Inquiry
An examination of the methods and theories of the social sciences, especially sociology, anthropology and their relationships to the natural sciences. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 350
Science and Method
A history of the 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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 351
Science and 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: A 100- level humanities course. (3-0-3) (**H**) (**C**)

PHIL 360
Ethics
A study of the fundamental issues of moral philosophy. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 361
Political and Social Philosophy
An analysis of the concepts of legitimate political authority, social justice, natural rights, sovereignty, etc. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 365
Philosophy of Free Speech
Analysis of the philosophical foundations of the right of free speech within the American *Constitution*'s framework. Topics include: the philosophical underpinnings of the right of free speech, judicial review under the *Constitution*, selected free speech issues such as libel, defamation, speech in the workplace, pornography, flag-burning, and others. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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, their and economy arising from the special responsibilities of architects to and public, client, employer, and colleagues. Prerequisite: A 100- level humanities course. (3-0-3) (H) (C)

PHIL 373
Business Ethics
Ethical issues relating to individual and corporate responsibility, self and governmental regulation, investment, advertising, urban problems, the environment, and preferential hiring. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100- level humanities course. (3-0-3) (H) (C)

PHIL 377
Communication Law and Ethics
This course 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, mar-

riage. Prerequisite: A 100-level humanities course. (3-0-3) (**H**) (**C**)

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: A 100-level humanities course. (3-0-3) (**H**) (**C**)

PHIL 490, 491
Independent Study
Supervised individual research for advanced students. Prerequisite: Consent of the department. (Credit: Variable.) (**H**) (**C**)

Physics

PHYS 100
Introduction 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 and 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 and waves. Corequisite: MATH 149 or MATH 151. (3-3-4) (**C**)

PHYS 200
Basic Physics for Architects
This class is a onesemester course primarily for students of architecture. The course will address the basic physical principles and concepts associated with structures and buildings. Although quantitative at times, the course will stress conceptual understanding and practical applications. Hands-on exercises will be conducted both in class, and out of class. Extensive web-based materials will be available in lieu of a textbook. (4-0-4)

PHYS 211, 212
Basic Physics I, II
Intended to give students in the liberal arts, architecture and design an understanding of the basic principles of physics and an appreciation of how the results of physics influence contemporary society. Prerequisite: MATH 122. These courses do not satisfy graduation requirements in any engineering or physical science program. (3-0-3); (3-0-3)

PHYS 221
General Physics II: Electromagnetism and Optics
Simple harmonic motion, oscillations and waves. Charge, electric field, Gauss' Law and potential. Capacitance resistance, simple AC and DC circuits. Magnetic fields, Ampere's Law, Faraday's Law and induction. Maxwell's equations and electromagnetic waves. Prerequisite: PHYS 123. Corequisite: MATH 152. (3-3-4) (**C**)

PHYS 223
General Physics III: Thermal and Modern Physics
Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Geometric and physical optics. Special relativity. Light and quantum physics, wave nature of matter, structure of the hydrogen atom. Atomic physics, nuclear physics and particle physics. Prerequisite: PHYS 221. Corequisite: MATH 251 or MATH 252. (3-3-4)

PHYS 224
General Physics III Lecture: Thermal and Modern Physics
Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Gratings and spectra, polarization. Light and quantum physics, wave nature of matter, structure of the hydrogen atom. Atomic physics, electrical conduction in solids, nuclear physics and particle physics. Prerequisite: PHYS 221. Corequisite: MATH 251 or MATH 252. (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: PHYS 223 or permission of the department. (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: PHYS 221. (2-3-3) (**C**)

PHYS 304
Kinetic Theory and Thermodynamics
The notion of phenomenological characterization: pressure, volume, temperature, etc. The first and second laws of thermodynamics. Transport phenomena; thermodynamic functions and their applications. Introduction to Maxwell-Boltzmann statistics. Prerequisite: PHYS 223. (3-0-3)

PHYS 308, 309
Classical Mechanics I, 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 techniques; Lagrangian and Hamiltonian formulations of classical mechanics; small oscillations. Prerequisites: PHYS 223, MATH 252. (3-0-3); (3-0-3)

PHYS 348
Modern Physics for Scientists and Engineers
An introduction to modern physics with emphasis on the basic concepts that can be treated with elementary mathematics. Subjects covered include Einstein's special theory of relativity, black body radiation, the Bohr atom, elementary wave mechanics, and atomic and molecular spectra. Prerequisite: PHYS 223 or PHYS 224. (3-0-3)

PHYS 401
Statistical Physics
Statistical basis of thermodynamics. Kinetic theory. Fundamentals of statistical mechanics. Quantum statistics. Fluctuations and noise. Transport phenomena. Boltzmann equation. Prerequisites: PHYS 223, PHYS 304, PHYS 348. (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. Prerequisites: PHYS 309, MATH 251 or consent of instructor. (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: 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. Prerequisites: PHYS 308, PHYS 348, MATH 252 or permission of department. (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: PHYS 405. (3-0-3)

PHYS 410
Molecular Biophysics
Thermodynamic properties of biological molecules. Irreversible and open systems, information theory. Biophysical measurements. Structure and properties of proteins. Enzyme action. Structure and properties of nucleic acids. Genetics at the molecular level. Molecular aspects of important biological systems. Prerequisite: Consent of instructor. (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: PHYS 223 or consent of instructor. (3-0-3)

PHYS 412
Modern Optics and 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. Prerequisites: PHYS 348 or consent of instructor; CS 105. (3-0-3)

PHYS 413
Electromagnetism I
Differentiation and integration of vector fields; electrostatics and magnetostatics. Calculation of capacitance, resistance, and inductance in various geometries. Prerequisites: PHYS 308, MATH 252. (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: 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: PHYS 348 or consent of instructor. (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, and solid-state lasers. Laser applications. Prerequisite: PHYS 348 or consent of instructor. (3-0-3)

PHYS 427, 428
Advanced Physics Laboratory I, 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: PHYS 348 or consent of instructor. (2-3-3); (2-3-3) (**C**)

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. Super conductivity. Prerequisite: PHYS 348 or consent of instructor. (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 autocorrelation functions to simulate sonar or radar ranging problems. Prerequisites: PHYS 240, PHYS 308, PHYS 348, PHYS 405 or permission of department. (2-3-3) (**C**)

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 the academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement. Prerequisite: PHYS 223 or PHYS 224. (1-0-1)

PHYS 491
Undergraduate Research
Student participation in undergraduate research, usually during the junior or senior year. Prerequisites: Recommendation of adviser and approval of the department chair. (Credit: Variable) (**C**)

PHYS 497
Special Topics in Physics
(Credit: Variable) (**C**)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for full descriptions.

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
Physics of the Solid State I

PHYS 538
Physics of the Solid State II

PHYS 553
Quantum Field Theory

PHYS 561
Radiation Biophysics

PHYS 570
Introduction to Synchrotron Radiation Research

PHYS 571
Health Physics I

PHYS 572
Health Physics II

PHYS 573
Standards, Statistics and Regulations

PHYS 575
Case Studies in Health Physics

PHYS 576
Internal Dosimetry

PHYS 577
External Dosimetry

Political Science

PS 100
Introduction to the Profession
Political Science
This course is for freshman political science majors. It builds on the material in the first semester ITP course, exposing students to quasi-experimental methods, quantitative and qualitative approaches, and the history of the profession. Students will examine several fundamental works in the discipline. (3-0-3) (**C**)

PS 200
American Government
Surveys American politics and government. The informal political institutions, such as parties and interest groups, are analyzed and related to the 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) (**S**) (**C**)

PS 201
Politics and Public Policy
Analyzes how social problems become

public problems and how the government develops public policies and with what effect. Emphasizes the characteristics of the American policy-making process. Case studies are used to clarify the process. (3-0-3) (**S**) (**C**)

PS 256

Law in American Society

Examines the nature of law and the legal system in American society. Special attention will be paid to the institutions of the legal system, how they are supposed to function, and how they actually function. Topics for study may include the police, prosecutors, lawyers, judges, juries, grand juries and public defenders. The courts, ranging from the U.S. Supreme Court to local trial courts, are studied. The impact of U.S. Supreme Court decisions on the system of justice in America is explored. (3-0-3) (**S**) (**C**)

PS 273

Great Political Thinkers

Introduces students to the ideas of the world's great political philosophers. Plato, Aristotle, Hobbes, Locke, Rousseau, Marx and others will be covered. (3-0-3) (**S**) (**C**)

PS 300

Introduction to the Social Sciences

The course introduces the foundations of the social science disciplines, notably economics, history, political science, psychology and sociology. Primary emphasis will be placed on how the disciplines employ distinctive assumptions and perspectives, which are used to generate understanding, form explanations, and construct theories. (3-0-3) (**S**) (**C**)

PS 301

Introduction to Political Science

Introduces students to some of the classic literature in modern American political science, covering theory, the presidency, Congress and federalism. (3-0-3) (**S**) (**C**)

PS 303

Politics and the Media

Analyzes the media's role in con temporary American politics and government. Emphasis is placed on how the media, both newspapers and television, manufacture the news and how the news influences political and government agenda, decision making and public policies. (3-0-3) (**S**) (**C**)

PS 309

Research Methods in Social and Political Science

Introduces students to explanation in the social sciences and both qualitative and quantitative research methods. Topics covered include formulation of research questions, measurement, data collection, survey research, significance tests, experimental and quasi-experimental design, sampling, and various techniques of qualitative research. Prerequisite: A statistics course approved by the department. Same as SOC 309. (3-0-3) (**C**)

PS 310

Social and Political Thought

Examines central social and political theories and their ideas concerning such things as the relationship between individual and society, social harmony and conflict, social equality and the role of the state. Same as SOC 310. (3-0-3) (**S**) (**C**)

PS 312

Contemporary Social Problems

The course investigates various "social problems" and how they came to be defined as problematic. General sociological concepts and theoretical perspectives include 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. Prerequisite: A social science course. Same as SOC 312. (3-0-3) (**S**) (**C**)

PS 315

Urban Politics

Examines city and metropolitan politics and government. Emphasizes how economic and demographic changes influence local politics, how local politics work, and how state and national policies influence local politics. Special attention is devoted to Chicago politics. (3-0-3) (**S**) (**C**)

PS 317

Chicago Politics

The study of 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 opposition. (3-0-3) (**S**) (**C**)

PS 318

Contemporary Constitutional Issues

The course examines how decisions about some of our basic rights are made. Emphasizes U.S. Supreme Court decisions in the areas of criminal law, desegregation, education, welfare, housing and consumer law. Related topics of special interest to students in the class can be added to the syllabus. Supreme Court decisions are read and supplemented by textual material. (3-0-3) (**S**) (**C**)

PS 321

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 the United States. Same as SOC 321. (3-0-3) (**S**) (**C**)

PS 330

International Relations

Examines the relations among nations from the perspective of both the international system and the nation state. Emphasizes the transformation in the international system caused by weapons, production and communications technologies. Compares the nature, function and purpose of modern warfare and other forms of conflict with the prospects for international order through law, organization, communications and arms control. Gives special attention to the international policies of the United States toward various regions and its role in international organizations. (3-0-3) (**S**) (**C**)

PS 331
World Politics
This course explores the changes to the International system associated with the end of the Cold War, including the increase of violence at the end of the 20th century and the rejection of existing definitions of the nation state by many ethnic and sub-national groups. The course examines the changing concept of the nation state as many ethnic groups reject the multi-ethnic nation states created as the Colonial powers withdrew from parts of Africa, Asia and the Middle East. Changing approaches to warfare, and controversies about intervention in internal ethnic conflicts will also be studied. Students completing the course will acquire an understanding of the origin of numerous international problems and an awareness of the policy and military challenges such conflicts pose to the United States. (3-0-3) (**S**) (**C**)

PS 332
Politics of Science and Technology
Explores the complex interrelationships among science, technology and politics, with emphasis on the political issues created by contemporary scientific advances. Gives roughly equal attention to the politics of scientific discovery; the development of government organization for science and 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. Same as SOC 304. (3-0-3) (**S**) (**C**)

PS 333
National Defense Policy
Examines the formulation and implementation of national security and military policy in the United States. Surveys the emergence and growth of military strategy and the defense establishment, with primary emphasis on contemporary issues, institutions and policies, and prospects for the future. Emphasizes the impact of nuclear weapons on military strategy and security and the post Cold war struggle over forces and missions. (3-0-3) (**S**) (**C**)

PS 334
Post Colonial Politics
Post Colonial Politics examines political developments in those parts of the world which had been under colonial domination during the period of European Colonialism. Areas covered include movements of liberation and how they produced different forms of postcolonial states, the role of ethnicity and religion in providing both unifying as well as divisive factors in the stability and instability of the post colonial state. The course also introduces students to recent political developments in a variety of post colonial states and the impact of recent developments on the United States. This is a comparative course. From year to year, the post colonial nations examined in detail will vary, but often include Algeria, Sudan, Rwanda, Iran, and Vietnam. (3-0-3) (**S**) (**C**)

PS 338
Energy and Environmental Policy
Places energy and environmental policy in domestic and global contexts. Traces the economic and political implications of dependence on fossil fuels and the attempt to develop alternate energy sources and promote conservation. Assesses the environmental effects of resource consumption and the effort to control these effects by increased efficiency and regulation of pollution. Explores such problems as nuclear waste, acid rain, global warming and deforestation. Examines national and international attempts at economic, political and technological solutions. (3-0-3) (**S**) (**C**)

PS 339
Nuclear Energy and Society
Explores the relationship between nuclear energy—science, technology, and products, and society—national, local, and global. Gives detailed attention to the discovery of nuclear fission and its exploitation during World War II and after, culminating in the global nuclear arms race. Examines the emergence and growth of nuclear power and the rise of the controversy over its safety, security, and economy. Considers the risks of continued proliferation, the prospects for arms control and the "peaceful atom," and the chances for survival in a nuclear world. Uses films, case studies, guest lectures, and simulations where appropriate. (3-0-3) (**S**) (**C**)

PS 340
Social Organization and Control
This course surveys theories explaining the organization and structure of complex societies. The problem of social control, or the capacity of society to formally or informally regulate itself according to its desired principles, is viewed as a central problem of social organization. Prerequisite: A 200-level or higher social science course. Same as SOC 340. (3-0-3) (**S**) (**C**)

PS 345
The American Presidency
Surveys the evolution of the office and powers of the presidency as a result of historical forces, institutional factors, and the actions of those who have served as president. Studies the relationships of presidents with political parties, Congress, the bureaucracy, media, and the public, emphasizing both domestic and foreign policy. Gives major attention to changes in the presidential selection process and their implications for those who run and win the office. Examines the alleged crisis of the contemporary presidency and the proposals for overcoming it. (3-0-3) (**S**) (**C**)

PS 346
Citizenship and State: American Politics Since 1945
This course will investigate the unfolding of politics in the United States since the Second World War. The central focus of the course will be political changes and ideas from the tumultuous sixties as well as the reactions to the ideas and events of the sixties which remain with us to this day. Though the rhetoric was often revolutionary, for the most part the goals were consistent with the ideas of the founders: equality of opportunity and a commitment to democracy and the rights of citizens. Though the sixties will be central focus of the course the antecedents of the politics of the 60s and the impact of these ideas on subsequent politics will be explored in depth. The class

explores evolution of political participation, political processes and transformation of the American state since 1945. (3-0-3) **(S)** **(C)**

PS 351
Public Administration
Examines the nature of administrative organization, decision making in organization, and organization structure and processes: division of work, authority, communications and planning. Considers the role of the government executive. Analyzes relation of fiscal procedures and personnel management to organization. (3-0-3) **(S)** **(C)**

PS 353
The Promise and Problems of Policy
This course analyzes the policy making process including both policy formulation and implementation. Subjects covered include the necessity for policy, environmental factors and their effect on policymaking, the process of policymaking and a brief introduction to methods of analysis. Material included covers both theory and an examination of the factors that must be considered and the problems that arise in applying the theoretical material to the practice of solving actual problems. Same as SOC 353. Prerequisite: At least one social science course. (3-0-3) **(S)** **(C)**

PS 354
Urban Policy
Course 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 will be analyzed. Same as SOC 354. Prerequisite: At least one social science course (3-0-3) **(S)** **(C)**

PS 355
Political Sociology
Surveys major issues and problems in the field of political sociology. Topics include the forms of political power structures, elitist approaches to politics, community and national power structure, and political socialization. Same as SOC 355. (3-0-3) **(S)**

PS 360
Globalization
Globalization has become a powerful buzzword in social science and in popular discourse. This course utilizes a sociological perspective to examine the economic, socio-political, and cultural aspects of globalization within the context of contemporary debates about the phenomenon. Prerequisite: A 200-level or higher social science course or a 300-level humanities course (preferably history). Same as SOC 360. (3-0-3) **(S)** **(C)**

PS 361
Theories of Capitalism
Course examines excerpts from sociological and political literature of Capitalism. Portions of the course are intended to familiarize students with the operation of various types of capitalist systems and a variety of normative issues relating to capitalist systems. Themes include labor value, bureaucratic theory, freedom and capitalism, problems of exploitation, class conflicts, status anxiety, and the internationalization of capital. Prerequisite: A 200-level or higher social science course. (3-0-3) **(S)** **(C)**

PS 362
Technology and Social Change
The course examines the social implications of selected emerging and cutting edge technology with an emphasis on recent developments and events. The course investigates the consequences of those technologies for society using both a short term and long term perspectives. The issues examined include moral, ethical, socioeconomic, and educational considerations. Same as SOC 362. (3-0-3) **(S)** **(C)**

PS 365
Introduction to Legal Analysis
This course is designed to provide upper-level undergraduate students with an introduction to legal analysis and effective legal writing through the preparation of a legal memorandum, judicial opinion and other written assignments. For students interested in attending law school, this course will bridge the gap between the undergraduate experience and the law school. Prerequisite: Consent of Instructor (3-0-3) **(S)** **(C)**

PS 380
Modeling Complexity
This course acquaints the student with agent based modeling and other techniques for understanding the behavior of complex systems. Students will learn to construct and test models linking individual behavior and the interaction of individuals to social structures and group behaviors. Prerequisite: consent of instructor. (3-0-3) **(S)** **(C)**

PS 401
Terrorism, Security and Civil Liberties
With increased globalization, and changes to the international system, our understanding of war as conflict between states no longer describes many of the military conflicts across the globe. In its place is a new kind of violence with different organization, funding and outcomes. This course is designed to acquaint students with the new kinds of organized violence, the theories and technology of terrorism, and possible policy responses that may be undertaken to protect the nation. The impact of the responses to terrorist threats on individual freedom, civil liberties and security will be closely examined along with normative issues associated with proposed increases in governmental monitoring, control over individuals and possible loss of civil liberties. (3-0-3) **(S)** **(C)**

PS 408
Methods of Policy Analysis
Introduces students to the field of Policy Analysis and acquaints students with basic methods policy analysis and urban planning. Course covers methods of analyzing and resolving policy issues relating to a broad range of public sector problems. Emphasis is on methods of analysis and problem solving rather than on politics or political process.

Topics include decision theory, benefit/cost analysis, problem simulation, population projection, problem formulation and definition. Course will be taught using the case method. The course is of particular interest to students interested in applications of quantitative models to solve public sector problems. (3-0-3) (**S**) (**C**)

PS 425
Rhetoric and Narrative in Legal Analysis
During the first half of this small seminar, students will be provided with theoretical material drawn from literary theory and cognitive science on categorizations, narrative and rhetoric. They will read case studies demonstrating how this material provides useful analysis and understanding of legal thinking and can be used to analyze Supreme Court opinions. During the second half of the course, students will apply the techniques learned in undertaking their own analysis of judicial opinions, briefs and testimony of experts. For people intending to practice law, the course provides skills that are useful in construction and analysis of legal arguments. For others, the course provides techniques fostering understanding of the manner in which courts and experts reach and justify their conclusions. Prerequisite: Consent of instructor. (3-0-3)

PS 440
Issues in Globalization
Globalization has become a powerful buzzword in social science and in popular discourse. This course utilizes a sociological perspective to examine the economic, socio-political, and cultural aspects of globalization within the context of contemporary debates about the phenomenon. Prerequisite: A social science course or consent of instructor. (3-0-3) (**S**) (**C**)

PS 442
Race and Ethnicity in International Perspective
The course examines the conceptual construction of race and ethnicity in different societies around the world at various eras. The course pays special attention to the causes and consequences of racial and ethnic conflict and cooperation for cultural groups, and also from the perspective of national and state institutions. Same as SOC 442. (3-0-3) (**S**) (**C**)

PS 452
Bureaucracy
Analyzes bureaucracy in its social context. The evolution of the theory and practice of bureaucracy as a form of control, coordination, and social order are considered. Emphasizes government bureaucracies, with selected examples from other organizations. (3-0-3) (**S**) (**C**)

PS 453
Regulatory Policy and Politics
Examines the changing role of government regulation of private and public activities from a political and administrative perspective. Explores reasons for the growth of government regulation from the Progressive era through the New Deal to the social regulation of the 1970s and for the subsequent controversy over economic and social deregulation. Investigates the regulatory process, including administrative law, standards for rule-making, and the involvement of organized groups and the courts. Studies specific cases from such areas as transportation, environment, energy, public health and research and development. (3-0-3) (**S**) (**C**)

PS 462
American Governmental Institutions
An advanced course in American government intended to develop knowledge and analytical skills to assess how well our government works and how it might work better. The course focuses on the operation of federal executive, legislative and judicial institutions, the policy-making process (including the role of administrators), and the power exercised by organized groups, experts and the media. (3-0-3) (**S**) (**C**)

PS 465
Political Economy
An introduction to political economy exploring the relationship between economy and government or political system. Role of the state, role of the market, impact of the economic ideologies on political and economic systems will be examined. Structure of political and economic interests and the mediating effects of institutions on political and economic outcomes will be examined. Normative issues connected to ideal political and economic institutions and appropriate political and economic institutions and outcomes will be examined. Prerequisite: Consent of instructor. (3-0-3) (**S**) (**C**)

PS 477
Topics in the Study of Politics
Provides students a reading and seminar course on a selected topic of politics. Subject matter will change in successive offerings of the course. (3-0-3) (**S**) (**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. Prerequisite: Consent of instructor. (Credit: Variable; maximum 4 credit hours) (**S**) (**C**)

Psychology

PSYC 100, 101
Introduction to Profession
Introduction to psychology and social science professions. Topics include problem formulation and career opportunities, spreadsheets and relevant computer applications, as well as data search tools. (2-0-2); (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 (eg. descriptive statistics, ANOVA, regression, correlation). 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. This course is equivalent to **MATH 221** . Students may not receive credit for both **MATH** 221 and PSYC 203. (3-0-3)

PSYC 204
Experimental Psychology and Research Methods
Introduction to experimental methodology in learning, motivation and psychophysics. Design, performance and analysis of basic experiments. Prerequisites: PSYC 221 or PSYC 222. Note: Offered in Fall. (2-2-3) (**N**) (**C**)

PSYC 221
Human Behavior, Growth and Learning
Survey of personality, developmental, assessment, learning and social psychological aspects of human behavior. (3-0-3) (**S**) (**C**)

PSYC 222
Brain, Mind and Behavior
Survey of sensation, perception, motivation, physiological and neuropsychological bases of behavior. (3-0-3) (**S**) (**C**)

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, job placement, morale, safety, turnover, absenteeism and training. (3-0-3) (**S**) (**C**)

PSYC 303
Abnormal Psychology
Survey of the dynamics underlying behavior deviations. Considers therapeutic procedures and psychopathology. (3-0-3) (**S**) (**C**)

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 406
History and Systems of Psychology
Historical development of influential psychological systems: structuralism, functionalism, behaviorism, psychoanalysis and Gestalt psychology. Prerequisite: 12 credit hours of psychology. (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. Prerequisites: PSYC 221, PSYC 222, PSYC 203. (3-0-3)

PSYC 410
Vocational Rehabilitation
Historical, philosophical, and legal bases of rehabilitation. Study of vocational, independent living, public and private rehabilitation, service delivery systems, and roles and functions of the practitioner. Prerequisite: PSYC 221. (3-0-3) (**S**) (**C**)

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. Prerequisites: PSYC 221, PSYC 222. (3-0-3) (**N**)

PSYC 412
Multicultural and Psychosocial Aspects of Disability
Review of diversity issues in rehabilitation, including culture, disability, gender, aging, socio-economic status, and spirituality and religion. Study of individual and family adaptation and coping processes following disability; psychological and sociological consequences of disability; attitudes toward persons with disabilities; impact of social and environmental barriers. One of a two-course sequence. Prerequisites: PSYC 221, PSYC 222. (3-0-3) (**S**) (**C**)

PSYC 414
Physiological Psychology
An introduction to the biological bases of behavior with an emphasis on the neuroanatomy and neurophysiology of sensory and central nervous systems. Prerequisites: PSYC 221, PSYC 222. (3-0-3) (**N**)

PSYC 420
Single-Subject Design and Applied Behavior Analysis
Single-subject experimental designs for the evaluation of environmental variables on behavior of individuals. Applied behavior analysis, precision teaching and frequency measures for logical inference. Ethical, logical, scientific and practical aspects of "real-world" experimentation for optimizing performance or learning in education, treatment and training. (3-0-3) (**S**)

PSYC 423
Learning Theory
Survey of contributions of major learning theorists and pertinent studies. Prerequisite: 12 hours of psychology. Note: Offered every other year. (3-0-3) (**S**) (**C**)

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: 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: PSYC 203. (3-0-3)

PSYC 435
Early Development
Processes and theories of mental, social, emotional and physical development of infants, children and adolescents. Prerequisite: Nine credit hours of psychology or consent of instructor. (3-0-3) (**S**)

PSYC 436
Adult Development
Explores processes and changes in cognitive, social, physical and emotional functioning across adult life.

Prerequisite: Nine credit hours of psychology or consent of instructor. (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. Prerequisites: SOC 480, PSYC 410, PSYC 411, and PSYC 412 or concurrent registration. (3-0-3)

PSYC 452
Personality Theory
Survey of personality theories and their application to everyday life. Prerequisites: PSYC 221, PSYC 222. (3-0-3) **(S)**

PSYC 455
Development and Evaluation of Training 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: PSYC 221 or PSYC 301. (3-0-3)

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. Prerequisites: PSYC 221, PSYC 222. (3-0-3) **(S)**

PSYC 481
Group & Leadership at Work
The course will review a system 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. Prerequisites: PSYC 221 and PSYC 301. (3-0-3) **(S)**

PSYC 482, 483
Undergraduate Research Seminar I, 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. Prerequisites: PSYC 221, PSYC 222 and PSYC 204; or consent of instructor. (1-2-3)

PSYC 487
Integrative Psychology Seminar I
A synthesis of issues and areas in psychology. Prerequisites: Junior standing, 21 credit hours in psychology, and 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. Prerequisites: Junior year standing, 24 credit hours in psychology. (3-0-3)

PSYC 489
Undergraduate Psychology Seminar
Reports and discussion of current problems and issues in psycho logy. Prerequisites: PSYC 221, PSYC 222 and PSYC 204; or instructor's consent. (3-0-3) **(S)**

PSYC 497
Special Problems
Independent study involving compilation and analysis of data bearing on a significant problem. Prerequisites: Junior standing and consent of instructor. (Credit: Variable)

Graduate Courses
The following graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

PSYC 501
Psychological Foundation 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 Counseling

PSYC 523
Introduction to Theories of Psychology

PSYC 529
Personnel Selection and Evaluation

PSYC 545
Graduate Statistics

PSYC 556
Organizational Psychology

PSYC 557
Pre-practicum in Rehabilitation Counseling

PSYC 561
Applied Counseling Techniques

PSYC 562
Job Placement

PSYC 563
Human Growth and Career Development

PSYC 583
Rehabilitation Engineering Technology

PSYC 590
Introduction to Psychiatric Rehabilitation

Sociology

SOC 200
Introduction to Sociology
Introduces students to the structure and operation of society. Analyzes individual behavior. Emphasizes the structure and problems of American society. (3-0-3) **(S)** **(C)**

SOC 242
Industrial Society
Analyzes social issues of particular relevance to scientists and engineers: demographic trends and their effects on schools, labor markets, workplaces and other institutions; the changing role of the United States in the world political economy; the impact of changing technology on work and employ ment; the shift to a service economy; the Japanese challenge to American business and industry; responses of both the public and private sectors to these issues. (3-0-3) **(S)** **(C)**

NOTE: All sociology courses numbered above 300 require as prerequisites successful completion of at least one sociology course at the 200 level and satisfaction of IIT's Basic Writing Proficiency Requirement.

SOC 301
The Social Dimension of Science
Examines how social and psychological factors influence the reasoning and behavior of scientists. Through contrasting traditional views of science with actual scientific practice, the course aims at understanding such phenomena as "hype," resistance to scientific discovery, controversy, vicious competition, error, self-deception and fraud. (3-0-3) **(S)** **(C)**

SOC 302
Science and Belief
Explores the relationship between science and belief through 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. (3-0-3) **(S)** **(C)**

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. The course addresses broader theoretical issues such as boundaries of science, autonomy, control of science, and science and power. (3-0-3) **(S)** **(C)**

SOC 304
Politics of Science and Technology
Explores the interrelationships among science, technology and politics, with emphasis on the political issues created by contemporary scientific advances and molecular biology. Investigates the politics of scientific discovery, as well as procedures for scientific advice to government, the impact of industrial technology on the economy and society, and the social implications of science and technology and how they can be predicted, measured and controlled. Same as PS 332. (3-0-3) **(S)** **(C)**

SOC 305
Social Communication
This course 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, team work, leadership, and intercultural communication. Group and individual exercises develop skills in social analysis, problem finding, problem solving, and oral and written presentation. (3-0-3) **(S)** **(C)**

SOC 308
Social Psychology in Society
We are all social psychologists in everyday life - and we must be pretty good ones, otherwise we wouldn't be here! In this course we explore different aspects of our out-of awareness instant 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. In each case we examine the situational factors and psychological mechanisms that typically bring about particular social consequences, as well as measures that can be taken to promote desirable outcomes and avoid undesirable ones. The course also briefly covers interpersonal communication and the role of spatial factors in social interaction. (3-0-3) **(S)** **(C)**

SOC 309
Research Methods in Social and Political Science
Introduces students to explanation in the social sciences and both qualitative and quantitative research methods. Topics covered include formulation of research questions, measurement, data collection, survey research, significance tests, experimental and quasi-experimental design, sampling, and various techniques of qualitative research. Prerequisite: A statistics course approved by the department. Same as PS 309. (3-0-3) **(C)**

SOC 310
Social and Political Thought
Examines central social and political theories and their ideas concerning such things as the relationship between individual and society, social harmony and conflict, social equality, and the role of the state. Same as PS 310. (3-0-3) **(S)** **(C)**

SOC 312
Contemporary Social Problems
The course investigates various "social problems" and how they came to be defined as problematic. General sociological concepts and theoretical perspectives include symbolic interactionism, conflict theory, structural functionalism, and constructionism. Students also examine the role of state advocates and the media in the definition of social problems. Case studies illustrate how different theoretical perspectives lead to different "solutions" and policy recommendations. Prerequisite: A social science course. Same as PS 312. (3-0-3) **(S)** **(C)**

SOC 321
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 the United States. Same as PS 321. (3-0-3) **(S)** **(C)**

SOC 340
Social Organization and Control

This course surveys theories explaining the organization and structure of complex societies. The problem of social control, or the capacity of a society to formally or informally regulate itself according to its desired principles, is viewed as a central problem of social organization. Prerequisite: A 200-level or higher Social Science course. Same as PS 340. (3-0-3) **(S)** **(C)**

SOC 348
Deviant Behavior and Conformity

Analyzes the definition, development, and control of deviant behavior in relation to social processes. Societal reaction to and the amount, distribution, and behavior systems of various forms of deviance (drug addiction, suicide, crime, alcoholism, illegitimacy, etc.) are examined. (3-0-3) **(S)** **(C)**

SOC 350
Urban Sociology

The course examines the historical origin of cities and their present place in society and culture. Important themes in the modern discourse on urban areas include the impact of industrialization and globalization, the significance of racial, ethnic, and economic structures, and the consequences of residential segregation and alternative physical structures of urban areas. The course includes a short fieldwork assignment that introduces student to qualitative methods for studying urban life. While the course focuses on urbanization within the US, comparative perspectives with other urban areas around the world are encouraged. Prerequisite: A 200-level or higher Social Science course. (3-0-3) **(S)** **(C)**

SOC 351
Sociology of Work

This is an introductory-level course in the sociology of work. We begin with a brief comparison of the nature, role, and meaning of work across time and space. We continue with a survey of some of today's most important topics in the study of work, primarily looking at the United States. These include: work as a source of social power; the workplace as a microcosm; organizational structure and culture; varieties of work arrangements; occupations and professions; management; daily life in the workplace; technology in the workplace; the importance of work for identity and family life; gender and race at work; workplace policies and legislation; and the future of work in our society. Prerequisite: A 200-level or higher Social Science course. (3-0-3) **(S)** **(C)**

SOC 352
Sociology of Education

Analyzes the organization and purpose of schooling in American society, including the historical development of American education; the relationship of schooling to life chances and individual success; the bureaucratic characteristics of schooling; contemporary problems facing American education and proposals recommended for their solution; and how the U.S. educational system compares with those of other societies. Prerequisite: A 200-level or higher Social Science course. (3-0-3) **(S)** **(C)**

SOC 353
The Promise and Problems of Policy

This course analyzes the policy making process including both policy formulation and implementation. Subjects covered include the necessity for policy, environmental factors and their effect on policymaking, the process of policymaking and a brief introduction to methods of analysis. Material included covers both theory and an examination of the factors that must be considered and the problems that arise in applying the theoretical material to the practice of solving actual problems. Prerequisite: At least one social science course. Same as PS 353. (3-0-3) **(S)** **(C)**

SOC 354
Urban Policy

Course 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 will be analyzed. Prerequisite: At least one social science course. Same as PS 354. (3-0-3) **(S)** **(C)**

SOC 355
Political Sociology

Surveys major issues and problems in political sociology, including the forms of political power structures, elitist approaches to politics, community and national power structure, voting behavior, nation building and modernization, and civil-military relations. Same as PS 355. (3-0-3) **(S)** **(C)**

SOC 356
Transformative Technologies

Technological innovations commonly have widespread effects within a society. A handful of technologies, however, have such a profound impact on social institutions and culture that they can be considered "transformative" for the societies in which they are adopted. Examples include writing, the plow, the clock, the automobile and the computer. This course focuses on such technologies, typically one per semester, and charts the social transformations that have historically accompanied their introduction. Attention will be directed to issues of institutional interdependence, the question of technological determinism, and luddism/resistance. Prereuisite: A 200-level or higher Social Science course. (3-0-3) **(S)** **(C)**

SOC 359
Humans, Ecology and Environment
This course examines the relationship between humans and nature, including reasons for some well-known ecological catastrophes in human history. It traces people's changing attitudes to the environment, from early industrial optimism to the 1960's rise of concerns about pollution and overpopulation, to the 1970's Limits to Growth debate, and to more recent concerns about such things as preservation of nature, and global climate change. The course explores various measures that have been offered to solve problems, for instance the Green Revolution, sustainable development, renewable energy, or various "clean" technologies, and the potential social and ecological consequences of these solutions (3-0-3) (**S**) (**C**)

SOC 360
Globalization
Globalization has become a powerful buzzword in Social Science and in popular discourse. This course utilizes a sociological perspective to examine the economic, sociopolitical, and cultural aspects of globalization within the context of contemporary debates about the phenomenon. Prerequisite: A 200 level or higher social science course or a 300-level humanities course (preferably History). Same as PS 360. (3-0-3) (**S**) (**C**)

SOC 362
Technology and Social Change
The course examines the social implications of selected emerging and cutting edge technology with an emphasis on recent developments and events. The course investigates the consequences of those technologies for society using both a short term and long term perspectives. The issues examined include moral, ethical, socioeconomic, and educational considerations. Same as PS 362. (3-0-3) **(S) (C)**

SOC 371
Occupations and Professions
This course considers all factors affecting work, including the transition from school to work; the determinants of earnings and other job benefits; job satisfaction; labor unions and professional associations; class position in American society; the effects of foreign competition; government labor force policies; and the work environment in a comparative perspective. Prerequisite: A 200-level or higher Social Science course. (3-0-3) (**S**) (**C**)

SOC 381
Understanding Cultures
This course will familiarize and sensitize students to issues of intercultural perception and communication, with particular attention to the workplace and business world and among professionals in different fields. It provides a context for understanding cultural difference and different taken-for-granted assumptions about "proper" behavior and the social world. The course has both theoretical and practical aspects. Individual and group tasks include analysis, observation and interviewing, role-playing, papers, and presentations. The course systematically examines important cultural aspects and their variation across a broad cultural spectrum and brings in occasional guest lecturers with international business and professional experience.
Same as BUS 381. (3-0-3) (**S**) (**C**)

SOC 411
Social Use of Space
This course is designed to give students basic insights in 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. Readings cover cognitive, sensory, functional, proxemic, cross-cultural, and symbolic aspects of the built environment. The course involves group research projects and presentations, and mid-term and final exams. Prerequisite: An introductory sociology, psychology, or architecture course. (3-0-3) **(S) (C)**

SOC 420
Managers and Management
Managers possess unique positions within the workplace. This course examines the structural constraints and cultural expectations associated with the role of "manager." We will draw from works within the sociology of business, organizations, work and occupations to explore the historical development and place of managers in society, and the current expectations, reward structure, and dilemmas of managers in a variety of work settings. Some of the dynamics we will address are distinctions between managers, their employers and their subordinates, the infiltration of managerial ideology throughout the broader society; constraints on managers' decision-making processes; currently popular policies and attitudes among managers in business; and experimental employer/management/employee configurations. This is a readings and discussion seminar. Prerequisite: SOC 200 or, with approval of instructor, significant life experience relevant to course subject matter. (3-0-3) (**S**) (**C**)

SOC 422
Complex Organizations
Introduces students to the significant theoretical frameworks that have emerged over time to describe and explain organizations, as well as organizational actors and actions. Emphasis is on both public and non-profit large administrative agencies. The course includes consideration of relations between an organization and its environment, the importance of interorganizational networks, and the role of power in organizational life. Prerequisite: a 200-level or higher social science course. (3-0-3) (**S**) (**C**)

SOC 431
Development of Sociological Thought
Surveys ideas and issues that have influenced the history of sociology and continue to bear significantly on current theory. Analyzes major figures, schools of thought, conceptual themes and controversies. Prerequisite: SOC 200, PS 300, or SOC/PS 310. (3-0-3) (**S**) (**C**)

SOC 442

Race and Ethnicity in International Perspective

The course examines the conceptual construction of race and ethnicity in different societies around the world at various eras. The course pays special attention to the causes and consequences of racial and ethnic conflict and cooperation for cultural groups, and also from the perspective of national and state institutions. Prerequisite: A 200-level or higher Social Science Course. Same as PS 442. (3-0-3) **(S) (C)**

SOC 450

Human Nature

This course discusses and evaluates the traditional tension between "nature" and "nurture" explanations of human behavior. It examines recent theories in biology and evolutionary psychology and the compatibility of these with social scientific theory. An important focus will be on recent controversies in biology and anthropology about such things as human universals, the origin of language, sociobiology and IQ research and the moral/political underpinnings of scientific positions. Requirements include individual and group presentations and a final research paper. Prerequisite: A 200-level or higher Social Science Course. (3-0-3) (**S**) (**C**)

SOC 454

Gender and Work through Film

Gendered expectations permeate our culture. They are visible everywhere but take some especially interesting forms in the world of work. In this course, we examine the ways that gendered expectations and the opportunities based on them translate into workplace realities for women and men in our society. We do this through a combination of readings, lectures, discussions and films. The films substitute "for the field"—the real workplaces, dynamics and issues that sociologists and other workplace experts study. The readings and lectures are the maps that guide us through the films as we analyze them. The goals of the course are to introduce students to the sociological study of gender and work and to help develop the observational and analytical skills necessary to understand what's going on in today's workplace. Prerequisites: At least one previous course in sociology, i.e., SOC 200 or higher. In addition, previous study in observational methods or exercises, such as those used in SOC 411 or a variety of ID courses, is highly recommended. (3-0-3) (**S**) (**C**)

SOC 491

Undergraduate Research in Sociology

Students engage in supervised readings or research in order to obtain more intensive training in special interest areas of sociology. Prerequisite: Consent of instructor. (Credit: Variable) (**C**)

SOC 496

The Art of the Interview

This seminar includes a class project collecting stories about Chicago Lowland Gorillas, guest speakers from various media, and discussion of the student efforts regarding: the homework necessary for a good interview; the kinds of questions one can use; external influences and impact on interviews; the value of good conversationalists—and difficult ones; the trials and politics of transcription; and how to create a finished product from the interview material. (3-0-3)

SOC 497

Directed Readings

Students read selected literature on a particular topic. Prerequisite: Consent of instructor. (Credit: Variable) (**S**) (**C**)

SOC 498

Exercises in Behavioral Observation

This course will provide students with an opportunity to acquire better fieldwork skills but providing a forum for discussing and practicing the craft of fieldwork. We will begin by using the more primitive animals at the Shedd Aquarium for our observations and discussions, working our way up to the mammals in the Oceanarium. The course will finish with discussions and observations of primates at the Lincoln Park Zoo. Same as ID 598. (3-0-3) (**S**)

Academic Policies and Procedures

Academic Policies and Procedures

Academic Loads

The average full-time academic load during the fall or spring semester is 15–18 credit hours. The minimum registration required for full-time status for those semesters is 12 credit hours. During the summer session, six credit hours is regarded as full-time enrollment for financial aid consideration. Students who wish to enroll for more than 18 credit hours during the fall or spring semester must obtain permission from their academic dean. Students who wish to enroll for more than two courses during the summer must obtain permission from their academic dean. Part-time degree-seeking students who wish to enroll for 9 to 11 credit hours must have permission from their academic dean. Non-degree students requesting a course overload must obtain permission from the Office of Educational Services.

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. Most undergraduate students who have completed at least 60 semester hours (including applicable transfer credit) will receive an audit from the Office of Educational Services. After receiving their first audit, students may request updates.

Academic Progress, Probation and Dismissal

All students who are degree candidates are expected to maintain satisfactory academic progress. This includes earning satisfactory grade point averages 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, and a 2.00 GPA in their major field are placed on academic probation. Their eligibility for financial aid also will be reviewed.

Degree-seeking students also are required to maintain a satisfactory rate of progress. For full-time students, this means earning a minimum of 12 credit hours per semester applicable to their degrees. For part-time students, a satisfactory rate of progress 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 are placed on probation the following semester. Their eligibility for financial aid also will be reviewed.

Students on probation are not permitted to:

- Register for more than 15 credit hours per semester.
- Hold office in any student organization.
- Represent the university on any athletic team, student organization or committee.
- Participate in the cooperative education program.

Students who are on academic probation for two consecutive semesters are subject to dismissal from IIT.

The progress of non-degree students also is reviewed and any student who does not maintain an acceptable record is subject to being placed on probation or being dismissed.

A student dismissed by the university can petition the Academic Standing Committee to review his or her case. The student must present substantial academic or other relevant new evidence not available at the time of dismissal 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 an academic adviser who is available to discuss opportunities and career plans in the student's chosen field and to plan and approve coursework to meet department and university requirements. Students are urged to consult their advisers often. The associate chairs of a department (or their counterparts) also offer information on university requirements and academic procedures.

Change of Major or Declaration of Additional Majors

A student who wishes to change or declare a major must obtain a *Change of Major Form* from the Office of Educational Services. The form must have the signature from the academic unit head of the intended major before being returned to the Office of Educational Services.

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 (or preregistration).

- 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 adviser'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 Educational Services. 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 apply for reinstatement as an undergraduate student in the Office of Educational Services.

Class Attendance

Students may not attend any class unless they are properly registered for that class. (See Payments and Refunds, page 20.) All students are expected to attend their classes regularly. Excessive absences may be grounds for a failing grade. When illness or emergency requires a student to miss more than two days of class, the student must notify his or her instructor(s). It is also recommended that the student contact the Dean of Students.

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 one or more of the following examination procedures. Total credit from proficiency examinations and CLEP may not exceed 18 semester hours. There is no limit for advanced placement credit.

Advanced Placement Program

Students who take the AP examinations need to have their scores sent to IIT. Acceptable credit varies by subject.

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 Educational Services, a proficiency examination will be administered. This is a graded exam and the letter grade will be entered on the permanent record. The exam grade is final and repeating the course for a grade change is not permitted. 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* can be obtained in the Office of Student Records and Registration and a fee of $150 per credit hour is charged for each examination.

Dean's List

Every semester the names of all undergraduate students who have completed at least 12 graded hours without any "D" or "E" grades and who have a semester grade point average of 3.50 or better appear on the Dean's List.

Grade Point Average

To determine a grade point average (GPA), divide the total number of grade points earned by the total number of graded semester hours. Graded semester hours do not include courses graded "I," "W" or "AU." All courses taken at IIT apply to the cumulative GPA, including those that do not apply toward graduation.

Grades

The following grades are used to report the quality of an undergraduate student's work:

A Excellent, 4 grade points for each semester hour.

B Good, 3 grade points for each semester hour.

C Satisfactory, 2 grade points for each semester hour.

D Minimal Passing, 1 grade point for each semester hour.

E Failure, 0 grade points for each semester hour.

W Withdraw. To withdraw from a course with a grade of "W," a student must submit a *Drop/Add Form* to the Office of Student Records and Registration before the end of the tenth week of the semester (the sixth week of an eight-week summer session and the fourth week of a six-week summer session). Withdrawal without submission of this form is unofficial and will result in a grade of "E."

NOTE: Withdrawal with a grade of "W" is not possible for a student who has been assigned a failing grade because of academic dishonesty.

NOTE: Grades will only be awarded for classes in which a student is properly registered at the time the class is taken. Retroactive registration is not permitted.

AU Audit. A student may register to audit a course. A *Request to Audit Form* must be submitted at the time of registration and courses may not be changed to or from audit after registration. There is no credit given for an audited course. Regular tuition rates apply.

I Incomplete work. The "I" grade indicates that the student's work to date is of passing quality but is incomplete for reasons acceptable to the instructor. The student must have substantial equity in the course with no more than four weeks of coursework remaining to be completed. A grade of "I' will be assigned only in case of illness or for unusual or unforseeable 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. Prior to assignment of the "I" grade, the student and instructor must reach a written agreement concerning the work still outstanding. The work must be completed by no later than the end of the sixth week of class of the next regular (fall or spring) semester. A grade of "I" will be removed with the approval of the academic unit head and the appropriate academic dean, after all remaining work is completed and the instructor assigns a regular grade. If no regular grade has been received in the Office of Student Records and Registration by the above deadline, the "I" grade will change to a grade of "E."

Repeating Courses for a Grade Change

Undergraduate students may repeat a course for a change of grade. A *Course Repeat Form* must be submitted during the registration period. Both grades will be recorded on all transcripts issued. However, only the second grade will be used to compute the GPA, even if the second grade is lower, except when the second grade is "W" or "AU." The course repeat policy is as follows:

- 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 grade change.
- No more than three courses may be repeated for a grade change.
- Re-registration for courses in which a student received a passing grade requires the approval of the student's academic adviser 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.
- Grades for proficiency exams are final and repeating the course for a change of grade is not permitted.

Graduate Course Enrollment Approval

An undergraduate degree-seeking student who wishes to enroll in a graduate 500-level course must first obtain written approval from the course instructor and faculty adviser stating that the student is qualified. This approval must be presented at the time of registration. An undergraduate non-degree student may be allowed to enroll in a graduate 500-level course in certain instances, but will require the permission of the Office of Educational Services. 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* with the Office of Educational Services at the beginning of the semester in which they plan to graduate. Failure to do so will result in the postponement of the student's graduation. Please refer to the IIT calendar on page 3 for specific deadlines.

Students in all undergraduate curricula must complete:

- Departmental curriculum as listed under various departmental headings or an approved program of study.
- Credit hour requirements as appropriate to the various curricula (a minimum of 126 hours).
- General education and special academic requirements as shown on page 25.
- Residence requirements as outlined on page 222.
- A minimum cumulative grade point average of 2.00 and a minimum grade point average 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 grade point average.

Graduation Requirements continued

- Completion of all the above within a period of eight calendar years from the semester of initial admission for full-time students or twelve 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".

Beginning in January, 2007, a student who has a grade point average of 3.90 and higher will graduate with "summa cum laude" honors; a student who has a grade point average between 3.80-3.89 will graduate with "magna cum laude" honors; and a student who has a grade point average between 3.50-3.79 will graduate with "cum laude" honors.

Registration

Students are required to be registered during any semester that they attend classes or make use of university facilities. They are required to be registered for all classes that they attend before the university deadline for registration. Once the deadline has passed, registration for a course will not be permitted. Students who are in an exchange, study abroad or cooperative education program also must be registered for their particular programs.

Undergraduate registration (including adding or withdrawing from a course) requires the authorization of an academic adviser.

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 Educational Services 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 a student petition. Students must contact the Office of Educational Services to receive a petition as well as instructions regarding the petition process.

Students who wish to take a course at another institution during the summer must submit a student petition to the Office of Educational Services in order to receive university approval. This must be done prior to the registration at another institution.

Transcripts

Transcripts can be requested from the Office of Student Records and Registration. Requests must have the signature of the student to comply with the Family Educational Rights and Privacy Act of 1974 as amended.

Transcripts will be released only after the student has fulfilled all financial obligations to the university. Official copies of transcripts are not issued directly to students. A fee is charged for each transcript issued.

Withdrawal from the University and Leave of Absence

A full-time degree-seeking student who withdraws from all of his or her courses is in effect withdrawing from the university. A student who withdraws from the university is required to complete the *Official Withdrawal Form* in the Office of Educational Services. Failure to complete this form may create difficulties in the student's eligibility to receive a tuition credit, if any is appropriate; in clearing his or her financial record; and in having academic records reflect an official withdrawal.

Full-time students who withdraw with the intention of returning to complete their degree program may be granted a leave of absence. Students must complete the *Official Withdrawal Form* in the Office of Educational Services and ask for the leave of absence designation in their exit interview. This designation may be granted only to those students who are in good academic standing. A leave of absence cannot exceed one academic year.

A part-time degree-seeking student who withdraws from all of his or her courses is not required to submit an *Official Withdrawal Form*.

Any undergraduate student who is not in attendance for a semester must apply for reinstatement in the Office of Educational Services.

Campus Resources

Campus Resources

Academic Resource Center

The Academic Resource Center (ARC), in Galvin Library, is a comprehensive center for academic excellence. Its mission is to provide both students and faculty with intellectual resources to achieve success through student-centered education with an emphasis on peer tutoring.

Select undergraduate and graduate peer-tutors are available on a drop-in basis for consultation in chemistry, computer science, engineering, mathematics, and physics course work during the fall and spring semesters.

The ARC hosts a state-of-the-art multimedia computer laboratory funded by the Dr. Scholl Foundation. The lab features an array of Apple, Dell, and IBM computers, scanners, projectors, cameras, and laser printers. Students may learn to use discipline specific software programs from trained ARC scholars in the laboratory.

Interdepartmental coordination keeps the ARC peer tutors apprised of, and ready to assist their clients in, the understanding of those topics under current discussion in core technical courses. Student feedback is solicited and reviewed on a periodic basis to assess the ARC program effectiveness and to provide for ongoing development.

The ARC is open from 9:30 a.m. until 7:00 p.m., Monday through Thursday, and from 9:30 a.m. until 4:00 p.m. on Friday. A weekend and late evening tutoring service is sponsored by the ARC at the McCormick Campus Center. For more details please visit the ARC website: **arc.iit.edu.**

Athletics and Recreation

The Department of Athletics and Recreation offers a comprehensive program of varsity sports, intramural competition, instruction and informal recreational activities for both men and women. The Scarlet Hawks men's varsity teams compete in intercollegiate baseball, basketball, cross-country, soccer and swimming; women's varsity teams compete in cross-country, swimming, basketball, soccer and volleyball. The university is an active member of the National Association of Intercollegiate Athletics (NAIA).

For nonvarsity athletes, intramural teams provide spirited competition in basketball, handball/squash, cricket, racquetball, softball, tennis, touch football, swimming, cross-country and volleyball. Recreational activities, open swimming and open free-play activities are all available.

Campus Ministry

The Campus Ministry works with student religious organizations on campus. These organizations sponsor activities for faith development, worship, socializing and service. This office leads efforts in community service for all students. Students are encouraged to take advantage of this out-of-classroom learning experience. The campus minister is available to discuss personal or spiritual issues.

Career Development Center

Located on the upper level of the Galvin Library, the Career Development Center (CDC) offers individual career counseling and testing, résumé critiques, job search assistance, mock interviews, and labor market and salary data. The CDC also facilitates the Cooperative Education and Summer Internship Programs, 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 CDC conducts a variety of professional development workshops on topics including résumé and cover letter writing, job search strategies, and interviewing skills. The CDC also hosts bi-annual career fairs, an annual summer job fair, employer information sessions, and on-campus interviews. Career related resources, articles, workshop schedules, and a link to job postings may be accessed by students and alumni registered in e-Recruiting (**www.cdc.iit.edu**). Individual sessions with a career counselor may be scheduled by appointment at (312) 567-6800.

Cooperative Education Program

Cooperative education is a learning approach that integrates college studies with professional working experiences in industry, business, or government. Salaries among IIT co-op students are competitive and help defray educational expenses. Frequently the co-op experience improves employment opportunities upon graduation. Full-time IIT students who are in their second through fifth semesters at IIT and who have and maintain at least a 2.5 GPA are eligible to apply for the co-op program.

The cooperative education program uses three established schedules. These schedules are listed on the **www.cdc.iit.edu website**.

Campus Resources

Part-Time Employment

Part-time employment opportunities may be available for students both on- and off- campus. Positions may be career related co-ops or internships, Federal Work Study jobs, part-time, or seasonal work. Co-ops, internships and some on-campus jobs are posted in the Career Development Center (CDC) e-Recruiting database. Other on-campus positions may be announced directly by individual university departments. Students interested in finding employment off-campus in their field of study may wish to get job search assistance and attend an Introduction to Cooperative Education and Internship Workshop hosted by the CDC. Workshop schedules are posted at **ww.cdc.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 or Summer Internship Programs.

Communication Across the Curriculum Program

The CAC helps students understand the role of writing and speaking in their academic and professional lives. Both on its website (**www.cac.iit.edu**) and through the IIT Writing Center (see page 230), located in Siegel Hall 232-233, 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), writing-intensive courses (C-Courses), and Interprofessional Projects (IPROs). The CAC director also administers IIT's Basic Writing Proficiency requirement.

Counseling Center

The Counseling Center provides professional counseling and psychological services, including evaluations and therapy for a wide variety of personal situations. These range from adjusting to a new environment to significant depression, anxiety, anger, trauma, interpersonal problems, and other difficulties. Psychological assessments are available for learning disabilities, attention deficit disorders, and other conditions that may affect a student's performance and for which accommodations may be made in the classroom and for exams. Academic and career concerns are also addressed, including assistance with study skills, test taking, and indecision about majors or career directions.

Services are provided by professionals with doctoral degrees in counseling and psychology and externs from local doctoral programs who are closely supervised by the Counseling Center staff. A psychiatrist is on campus one half-day a week for medication. There is no charge for most services, although there is a fee, usually covered by insurance, for appointments with the psychiatrist and medication. The Counseling Center follows the ethics and professional standards of the American Psychological Association and state laws regarding confidentiality.

In addition to individual appointments, the Counseling Center offers therapy groups, educational programs on topics such as cultural adjustment, time management, stress reduction, alcohol and drug use, communicating effectively, dating, and responsible sexual behavior. For emergencies when the Counseling Center is closed, contact Public Safety.

Disability Resources

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 educational programs are invited to call the center or email **kehr@iit.edu** prior to their arrival on campus to discuss their individual needs. Enrolled students with disabilities are encouraged to consult the office regarding access to IIT facilities.

Ed Kaplan Entrepreneurial Studies Program

The entrepreneurial studies program is designed for students who are planning to go into business for themselves, join an entrepreneurial venture, or want to develop a better understanding of what entrepreneurship is and what it might be like to work for a start-up company. The program will be multidisciplinary and will include business courses and courses on entrepreneurship, entrepreneurial projects, an Entrepreneurs Club, and opportunities to listen to and network with entrepreneurs, venture capitalists and others involved with technology based start-up companies.

Campus Resources

Educational Services

The Office of Educational Services provides a variety of academic support services for an undergraduate student 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; change of major; monitoring of academic progress; certification of student's eligibility for graduation; and official withdrawal from the university. In addition, this office admits part-time undergraduate students, all students for the INTM and ITM programs, and reinstates former undergraduate students to the university. The office also maintains the official academic files for all undergraduate students.

Greek Life

Greek Life plays an integral role in student life. IIT's seven fraternities and three sororities offer a wide range of programs and services that benefit the student community. Membership is open to commuting as well as resident students.

Health Center

The Student Health Center focuses on primary care with a strong emphasis on wellness and patient education. The staff includes nurse practitioners and a registered nurse. All members of the senior staff have advanced degrees and certifications or licenses to practice their specialities. Numerous programs are presented throughout the year to promote health and wellness.

The center can provide diagnosis and treatment of common illnesses and injuries and prescriptions for medication. Both women's and men's health care concerns are addressed, including gynecological exams and birth control. Additional services include allergy shots, immunizations, and laboratory testing. Complicated medical cases are referred to the physician who is available on campus for 2 hours, one day per week, or to specialists. The health center also manages the student health insurance program.

For emergencies occurring after office hours, the Public Safety Department will transport students to a local hospital emergency room. Health services are confidential, and there is no charge for office visits. Charges may apply for laboratory tests and medications.

International Center

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 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 student 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.

Leadership Academy

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 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.

Campus Resources

Libraries

IIT's library system includes Paul V. Galvin Library; the Center for the Study of Ethics in the Professions Library (Main Campus), the Graham Resource Center (Main Campus); the Louis W. Biegler Library (Rice Campus); the Downtown Campus Library, serving the Chicago-Kent College of Law and the Stuart School of Business; University Archives (Main Campus); and the National Center for Food Safety & Technology Library (Moffett Campus).

Paul V. Galvin Library
www.gl.iit.edu
312-567-5136
As the university's central library, Paul V. Galvin Library combines a unique blend of cutting-edge information technology with traditional library services. The library's holdings include approximately 980,000 volumes, including books, printed journals, government publications, and microforms. This collection supports all of IIT's major academic programs except law and architecture which are housed in other IIT libraries. Digital library services provide 24-hour internet access to more than 100 electronic databases, indexing millions of journal articles; approximately 19,000 full-text electronic journals; electronic course reserves; CARLI, which provides access to the online catalogs of 65 university libraries; and OCLC interlibrary loan services. Additionally, Galvin Library provides web-based delivery of a variety of materials, including documents requested via interlibrary loan. The Library's Instruction and Outreach 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 cover a broad range of types of information and retrieval techniques. Workshops are available on a drop-in basis or can be scheduled in advance and can be specifically tailored for a course or program.

Graham Resource Center
www.gl.iit.edu/grc
312-567-3256
The Graham Resource Center (GRC) is a branch of IIT's Paul V. Galvin Library serving the College of Architecture. The GRC houses books, journals, images, maps, and architecture-related special collections. The GRC is found on the lower level of S.R. Crown Hall.

Louis W. Biegler Library
www.gl.iit.edu/biegler
630-682-6050
The Louis W. Biegler Library on the Rice Campus in Wheaton, provides access to a small circulating collection, reference materials, and journals, as well as digital access to all of the databases subscribed to by Galvin Library. Services include interlibrary loan, electronic reserves, web-based document delivery, research consultations, and library instruction.

Center for the Study of Ethics in the Professions
www.iit.edu/departments/csep/library.html
312-567-6913
Located in Hermann Hall on IIT's Main Campus, the Center contains a variety of materials dealing with topics in practical and professional ethics, such as autonomy, confidentiality, conflict of interest, and self regulation.

Downtown Campus Library
library.kentlaw.edu
312-606-5600
Besides collections in law, business and social sciences, this Downtown Library includes the Library of International Relations, an official depository of the United Nations and the European Union.

National Center for Food Safety & Technology Library
www.ncfst.iit.edu
708-563-8163
Located on IIT's Moffett Campus, the NCFST Library supports research on food technology and food safety. It is a depository library for the FAO (Food and Agriculture Organization of the United Nations), and provides digital access to all of the databases subscribed to by Galvin Library.

Campus Resources

Multicultural Student Services

The Office of Multicultural Student Services (OMSS) addresses issues of diversity and encourages awareness and respect of all cultures globally. The OMSS serves as a clearing house for data on multicultural issues and assists the IIT community to better understand the issues that confront multicultural students.

Serving as the primary office of advocacy for underrepresented students of color, gay/lesbian, and disabled students, the OMSS offers support services, and educational and social programming aimed at the recruitment, retention, personal and professional development, and success of all IIT students.

Multicultural Student Services will:

- Promote and enhance multicultural opportunities for the campus.
- Prepare students to live and work in an increasingly diverse and global society.
- Create more culturally sensitive climates on the campus and in the surrounding communities.

Residence Life

More than half of IIT's full-time undergraduates live on campus. The Residence Life Office offers a wide range of programs and services designed to enhance campus life. The office coordinates resident advisers, student security, and the Residence Hall Association. Housing for married students is available in four campus apartment buildings. Please consult the Housing Office for further information.

Student Activities

The Office of Student Activities and Orientation provides campus programs that enhance students' educational experience at the university. This office also coordinates New Student Orientation and student leadership opportunities. The Office of Student Activities and Orientation provides oversight to the IIT Student Government Association (SGA) and all other registered student organizations. These organizations include: the National Society of Black Engineers (NSBE), Latinos Involved in Further Education (LIFE), Union Board (UB), Tech News, Commuter Student Association (CSA), and WIIT Radio. This office also manages the student organization offices (located in the McCormick Tribune Campus Center).

Student Affairs

The Office of the Dean of Students 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*.

Campus Resources

Technology Services

The Office of Technology Services (OTS) supports IIT's primary technology systems including administrative systems, network and telephone infrastructure, and distance learning programs. OTS departments include Technology Infrastructure, Programming and Client Services, Telecommunications, and IIT Online Technical Services.

OTS maintains over 300 computers in its computer labs and public terminals throughout Main and Rice campuses. The computer labs are used for both academic courses and IIT-organized events. The computers are refreshed on a three-year cycle, to ensure that students have access to equipment that supports their academic needs. Instructional software in the computer labs is reviewed every semester by the IIT Software Committee, and is updated after thorough testing for compatibility with existing lab hardware/software.

The Blackboard course management system is also maintained by OTS. The system hosts a website for every course offered at IIT and serves as a portal to IIT Online streaming media, which can be accessed by students in both online and live course sections. Instructors post notes, lectures, and assignments on the course page, which also features a discussion board and chat room. IIT Online continues to grow rapidly with an increasing number of classes being broadcast over the Internet and IITV microwave channels each semester. IIT Online also broadcasts special IIT events such as guest lectures and commencements.

The OTS Support Desk provides technical troubleshooting and administrative support for all students, faculty and staff. Services include troubleshooting, account management, and configuration assistance. The Support Desk website (**support.iit.edu**) houses a knowledge database that is available to all students and includes how-to and self-help information for common technical issues and questions. Members of the IIT community may submit a request for technical support by opening a ticket on the support website and via email (support@iit.edu) or by calling the Support Desk at 312.567.3375 (on-campus ext. 7-DESK).

At IIT there are two options for connecting to the network, wired and wireless. Most campus buildings have wired internet access and wireless access is available in Galvin Library, most residential areas, and many academic buildings. Visit the OTS web site to view IIT's current wireless zones. Instructions for connecting to the Internet through the IIT Network, including how to configure your computer and register your wireless network card, are also available on the OTS website, **ots.iit.edu**.

The OTS website contains links to detailed information on all of the topics discussed above, as well as useful details for other services, such as e-mail and software licensing. For any questions about the services that OTS provides, the most current information can be obtained by consulting the Support Desk or OTS website.

Women's Services and Diversity Education

The Office of Women's Services and Diversity Education serves a dual function. This office provides programs and services that assist women students. In addition, it also provides diversity education workshops and seminars that help the entire IIT community better understand and appreciate our diverse community.

Writing Center

IIT students can seek assistance with written and oral assignments at the IIT Writing Center, located in Siegel Hall 232-233. 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. 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.

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B.S., University of Pennsylvania; M.B.A., Ph.D., University of Chicago; Certified Public Accountant
Clinical Professor of Accounting, 1992

Donald Richard Ucci
B.E., M.E., Ph.M., Ph.D., City University of New York
Associate Professor of Electrical and Computer Engineering, 1987

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Professor of Chemical and Environmental Engineering and Associate Chair for Graduate Affairs, 1989

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Peng–Jun Wan
B.S., Tsinghua University (China); Ph.D., University of Minnesota
Associate Professor of Computer Science, 1997

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Professor of Mechanical and Aerospace Engineering and Associate Dean of Armour College of Engineering, 1988

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Professor of Law and Faculty Director of the Center for Law and Computers, 1990

* ROTC Faculty
** CPD Faculty

Faculty

Darsh Tilakchand Wasan
B.S., University of Illinois–Urbana–Champaign; Ph.D., University of California–Berkeley
Professor of Chemical and Environmental Engineering and Vice President for International Affairs, 1964

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A.B., M.A., University of Chicago; Ph.D., University of Illinois
Professor of Ethics and Director of the Center for the Study of Ethics in the Professions, 1972

Miles N. Wernick
B.A., Northwestern University; Ph.D., University of Rochester
Professor of Electrical and Computer Engineering and Director of Medical Imaging in the Pritzker Institute of Biomedical Science and Engineering, 1994

Catherine Wetzel
B.Arch., University of Cincinnati; M.Arch., University of Pennsylvania
Assistant Professor of Architecture, 1989

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Associate Professor of Physics and Director of the Illinois Consortium for Accelerator Research, 1998

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Steelcase Professor and Director of the Institute of Design, 1983

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Associate Professor of Organizational Behavior, 2005

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Lecturer of Financial Markets, 2004

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Professor of Electrical and Computer Engineering and Chinese Programs Coordinator, 1981

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Professor of Law, 1985

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Professor of Mechanical and Aerospace Engineering and Chair, 2002

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Associate Professor of Psychology, 1996

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Professor of Physics and Chair of Biological, Chemical and Physical Sciences Department, 1982

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B.S. Ed., Ph.D., Northwestern University; M.S. Ed., National Lewis College of Education;
Associate Professor of Mathematics and Science Education, 2002

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Assistant Professor of Biology, 2004

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Research Associate Professor of Computer Science, 2000

Wei Zhang
B.S., M.S., Huazhong Agricultural University; Ph.D., Pennsylvania State University
Assistant Professor of Biology and Joint Assistant Professor of Food Microbiology at National Center for Food Safety and Technology, 2005

Yuzhu Zhang
B.S., Zhengzhou University; Ph.D., University of Pennsylvania
Assistant Professor of Biology, 2001

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Assistant Professor of Electrical and Computer Engineering, 2006

Faculty Emeriti

William Applebaum
Associate Professor of History, 1972–1995

Ralph Elmer Armington
Professor of Electrical Engineering, 1966-1982

Robert Arzbaecher
Professor of Electrical Engineering and Director of the Pritzker Institute of Medical Engineering, 1981-2001

Charles R. Bauer
Associate Professor of Computer Science, 1985–1996

David R. Beam
Associate Professor of Political Science, 1987-2004

Robert John Bonthron
Professor of Mechanical and Aerospace Engineering, 1947–1991

Fred P. Bosselman
Professor of Law, 1991-2003

Harold Walter Bretz
Associate Professor of Microbiology, 1957–1991

Norman Nathan Breyer
Professor of Metallurgical and Materials Engineering, 1964–1991

Ilene J. Burnstein
Associate Professor of Computer Science, 1986–2003

Ray Aaron Burnstein
Professor of Physics, 1965–2001

George D. Byrne
Professor of Applied Mathematics, 1994–1998

Thomas Manuel Calero
Associate Professor of Management, 1968–1993

Kwang–Han Chu
Professor of Civil Engineering, 1956–1984

Joseph San–Hoon Chung
Professor of Economics, 1964–1995

Martin Alvin Cohen
Associate Professor of Economics Management, 1964–1980

George Edson Danforth
Professor of Architecture, 1940–1981

William Frank Danforth
Professor of Physiology, 1952-1984

William Frank Darsow
Associate Professor of Mathematics, 1961–1990

Pearce Davis
Professor of Economics, 1948–1973

John DeCicco
Professor of Mathematics, 1962–1976

Platon C. Deliyannis
Professor of Applied Mathematics, 1962–2003

Rollin Dix
Professor of Mechanical Engineering, 1964-2004

Lloyd Hamilton Donnell
Research Professor of Mechanics, 1939–1962

John Drac
Associate Professor of Law, 1957–1980

John Thomas Dygdon
Professor of Engineering Graphics, 1952–1996

Walter C. Eisenberg
Professor of Chemistry, 1987-2003

Joseph A. Erwin
Associate Professor of Biology, 1967–2001

Martha Evens
Professor of Computer Science, 1975-2003

Paul Edward Fanta
Professor of Chemistry, 1948–1984

Robert Filler
Professor of Chemistry, 1955–1994

Glen O. Geist
Professor of Psychology, 1971-2003

Paul Gordon
Professor of Metallurgical Engineering, 1954-1982

Lois Graham
Professor of Mechanical Engineering, 1949–1985

Nicholas Grecz
Professor of Microbiology, 1963–1982

Peter H. Greene
Associate Professor of Computer Science, 1974-2003

Sidney Aaron Guralnick
Perlstein Distinguished Professor of Engineering, 1958-2004

R. Ogden Hannaford
Professor of Architecture, 1960–1986

Boyd A. Hartley
Associate Professor of Fire Protection and Safety Engineering, 1966–1985

Isidore Hauser
Professor of Physics, 1958–1986

Warren Heindl
Professor of Law, 1949–1994

Fred F. Herzog
Professor of Law and Dean of Chicago–Kent College of Law, 1947–1973

Geoffrey Trevor Higgins
Professor of Materials Engineering, 1969–1998

Robert Francis Irving
Associate Professor of English, 1967–1995

Donald Komen Jasper
Professor of Biology, 1969–1996

Serope Kalpakjian
Professor of Mechanical and Materials Engineering, 1963-2001

C. Jotin Khisty
Professor of Civil and Architectural Engineering, 1990-2002

Daniel Koblick
Associate Professor of Physiology, 1963–1991

Willis George Labes
Professor of Fire Protection Engineering, 1946–1979

Zalman Lavan
Professor of Mechanical and Aerospace Engineering, 1965–1991

Robert Joseph Malhiot
Professor of Physics, 1956–1987

Thomas Lyle Martin Jr.
President and Professor of Electrical Engineering, 1974-1987

Faculty Emeriti

Kenneth Phillip Milbradt
Associate Professor of Civil Engineering, 1946–1985

Mark Vladimir Morkovin
Professor of Mechanical Engineering, 1967–1982

H. Lennart Pearson
Associate Professor of Applied Mathematics and Dean of Graduate Studies, 1954–1994

Robert William Porter
Professor of Mechanical and Aerospace Engineering, 1966-2001

Bernard Rasof
Professor of Mechanical Engineering, 1964–1982

John Theodore Rettaliata
Professor of Mechanical Engineering and President Emeritus, 1945–1973

Robert Mark Roth
Professor of Biology, 1968-2003

Allan H. Roush
Professor of Biochemistry, 1951–1982

Gerald F. Saletta
Professor of Electrical and Computer Engineering, 1962-2006

Abe Sklar
Professor of Mathematics, 1956–1995

Spencer B. Smith
Professor of Management Sciences and Industrial Management, 1966–1996

Harold Norman Spector
Professor of Physics, 1966–2001

Leon Eugene Stover
Professor of Anthropology, 1965–1995

Edwin Stueben
Associate Professor of Applied Mathematics, 1962-2006

Bernet Steven Swanson
Professor of Chemical and Environmental Engineering, 1945-1985

Paul Amandus Thomas
Associate Professor of City and Regional Planning, 1958–2003

San Utsunomiya
Associate Professor of Architecture, 1966–1993

John Lawrence Way
Professor of Mechanical and Aerospace Engineering, 1970–2001

Erwin Wilbur Weber
Associate Professor of Electrical and Computer Engineering, 1961–1998

Dale Arroy Webster
Professor of Biology, 1968–2001

Alan Wolach
Professor of Psychology, 1969-2004

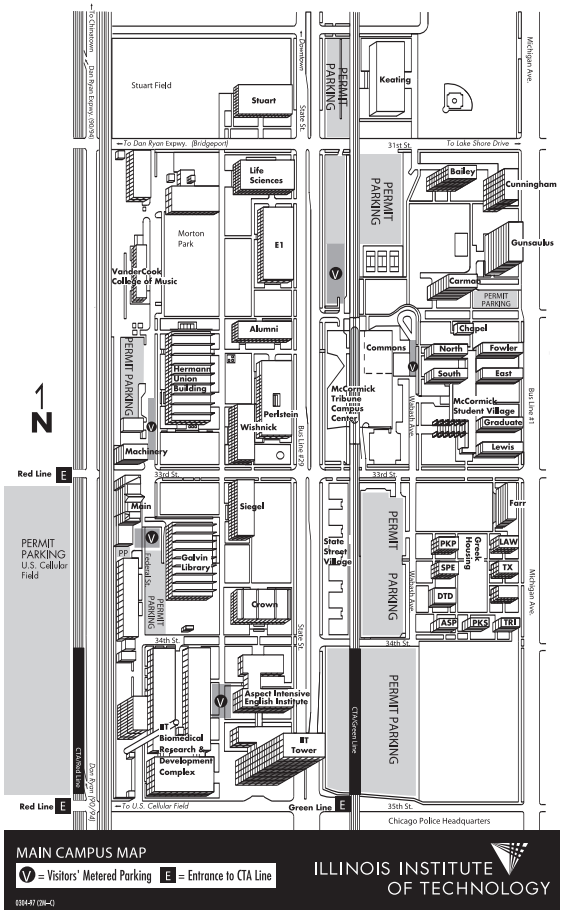
William F. Zacharias
Professor of Law and Dean of the Chicago–Kent College of Law, 1933–1970

David Mordecai Zesmer
Professor of English, 1962–1992

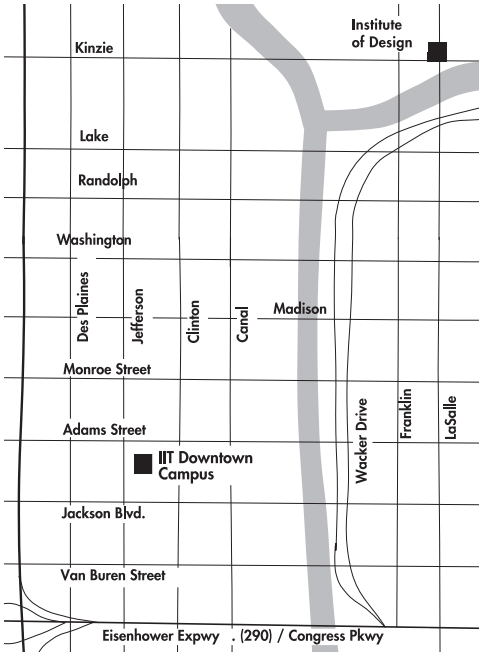
Earl Frederick Zwicker
Professor of Physics, 1956–1991

Maps

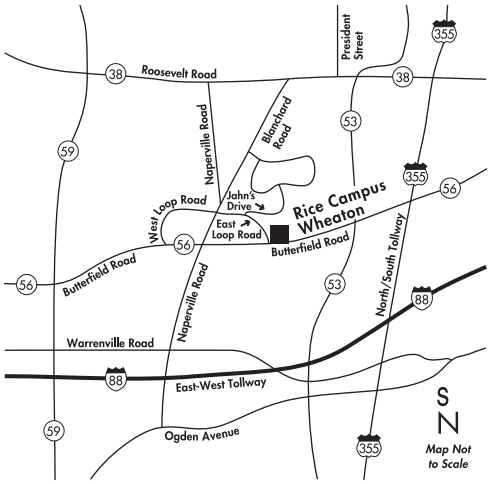
Main Campus



Downtown Campus and Institute of Design



Rice Campus



Directions

Getting to the Main Campus

Airports

IIT and Chicago are served by O'Hare International Airport and Midway Airport. Public and private transportation is available from the airports to downtown Chicago and IIT campuses.

Train

Commuter railroads to Union and Northwestern train stations (both off Canal Street), then public transportation, taxi or IIT shuttle bus from the Downtown Campus at 565 W. Adams Street to Main Campus.

Bus

To Greyhound 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) to just past State Street. Visitor parking is on the right (southeast corner). From South: Dan Ryan Expressway west to 35th Street exit, continue north to 33rd Street, turn right (east) to just past State Street. Visitor parking is on the right (southeast corner). From Lake Shore Drive: Exit at 31st Street, go inland (west) to State Street, turn left (south) to 33rd Street, turn left and visitor parking is on the right (southeast corner).

Parking

Some visitor parking is available in lots at the southeast corner of 33rd and State streets and the northeast corner of 31st and State streets. By special arrangement, events parking is usually available in the fraternity lot at 33rd and Wabash and, for evening events, in the lot west of Hermann Union Building. A few hourly spaces are available just south of the Commons Building and west of Hermann Union Building. Please call the Public Safety Department at 312.808.6300 if you need assistance in finding parking.

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