Curricula in Voice and Data Communication Technology

School of Applied Technology Information Voice and Data Communication Courses

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

IIT's School of Applied Technology offers a broad range of topics in the areas of data communications and digital and analog voice communications—with a particular emphasis on Voice over IP (VoIP)—as undergraduate, graduate and continuing education courses. Course offerings are listed below; some courses are offered at both the undergraduate and graduate levels, indicated by both 4xx and 5xx course numbers. Continuing education course numbers are indicated by an "IT" prefix.

Voice and Data Communication Courses within the Information Technology & Management Curricula

ITM 440/540 / IT 540
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, Bluetooth, 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 441/541 / IT 441
Network Administration 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. A research paper in the above topic areas is required. Prerequisite: ITM 440/540 (2-2-3)

ITM 542 / IT 442
Wireless Technologies and Applications
This course will present the foundation of wireless technologies and examine state-of-the-art wireless systems and services, including digital cellular systems (DCS), wireless asynchronous transfer mode (ATM), infrared data transfer (IrDA), wireless local area network technologies including 802.11a/b/g (wireless Ethernet) and Bluetooth, and third-generation (3G) systems such as wireless code division multiple access (W-CDMA) and cdma2000. Security for wireless systems including encryption and authentication issues will also be addressed. Prerequisite: ITM 441/541 (3-0-3)

ITM 543 / ITM 443
Vulnerability Analysis and Control
This course addresses hands-on ethical hacking, penetration testing, detection of malicious probes and their prevention. It provides students with in-depth theoretical and practical knowledge of the vulnerabilities of networks of computers including the networks themselves, operating systems and important applications. Integrated with the lectures are laboratories focusing on use of open source & freeware tools; students will learn in a closed environment to probe, penetrate and hack other networks. Prerequisite: ITM 440/540 (2-2-3)

ITM 545 / IT 445
Telecommunications Technology
Introduction to voice and data communications infrastructure design and implementation. Current infrastructure including components of voice networks (such as carrier switches, PBXs, SS7, T1 trunks, and switched versus dedicated circuits), the Public Switched Telephone Network (PSTN), communications industry structure, telephone-data system interfaces and interaction, and convergence of voice and data communications systems will be examined, along with possible alternative approaches. Also examined will be components of data networks such as modems, multiplexers, virtual circuits, hubs, bridges, and routers and their relationships to voice communication systems. Future directions in the evolution of voice and data communications technology will be highlighted. (3-0-3)

ITM 546 / IT 446
Telecommunications Over Data Networks
This course covers a suite of application protocols known as Voice over IP (VoIP). It describes important protocols within that suite including RTP, SDP, MGCP and SIP and the architecture of various VoIP installations including on-net to on-net, on-net to PSTN and Inter-domain scenarios. The functions of the Network Elements that play significant roles in this architecture will be defined. Examples of network elements that are currently available as products will be examined. Prerequisite: ITM 440/540 (3-0-3)

ITM 547
Telecommunications Over Data Networks: Projects & Advanced Methods
Students create projects that exercise and expand their understanding of digital voice communication protocols, features and architectures. Instructional materials and lectures are provided as needed to support projects. These projects will develop a digital voice application or feature, or test a current digital voice product and architecture. Scope and deliverables will be determined through joint decision of the instructor and students. Students will describe requirements, create test plans as needed, demonstrate the operation when applicable, create a written description of the work and deliver a formal presentation to an audience appropriate to the scope and scale of the work completed. Prerequisite: ITM 546 (3-0-3)

ITM 448/548 / IT 448
System and Network Security
Prepares students for a role as a network security administrator and analyst. Topics include viruses, worms, other attack mechanisms, vulnerabilities and countermeasures, network security protocols, encryption, identity and authentication, scanning, firewalls, security tools, and organizations addressing security. A component of this course is a self-contained team project that, if the student wishes, can be extended into a fully operational security system in a follow-on course. Prerequisite: ITM 440/540 (2-2-3)

ITM 575 / IT 475
Networking and Telecommunications Management
This course addresses the design, implementation, and management of computer networks and enterprise telecommunication systems. Design issues in wide area networks and telecommunications with emphasis on Internet connectivity are also addressed. Tools for supporting the distribution and sharing of system resources and information are discussed, along with tools to support network design and management. Prerequisite: ITM 441/541 (3-0-3)

Curricula in Voice and Data Communication Technology

Master of Information Technology & Management with a Specialization in Voice and Data Communication

This degree requires completion of 30 credit hours with a GPA of 3.0/4.0 or better. Courses may be selected from 400- and 500-level courses, but a minimum of 18 credit hours must be at the 500-level or higher.

Students whose undergraduate degree is not in a computer-related area or who do not have significant experience or certifications in the information technology field may be required to complete prerequisite requirements and will be required to complete core courses, or may demonstrate their knowledge through equivalent course-work, certification or experience. Current prerequisite requirements include hardware and operating system literacy (ITM 301 or ITM 302).. The core

courses will ensure an ability to program at a competent level using a contemporary programming language (ITM 411); basic knowledge of networking concepts, protocols and methods (ITM 540); knowledge of the Internet, including the ability to build Web sites and deliver them on a server (ITM 461); and the ability to create and administer databases using a modern database management system (ITM 421). Courses beyond the core courses and voice and data communication technology offerings may be drawn from any course offered in the Information Technology & Management curriculum; see the current bulletin for full details. For additional information on this degree program, please contact Ray Trygstad at trygstad@iit.edu or 630.682.6032.

Core Courses (9 hours)

Required courses
ITM 411   Intermediate Software Development
and 6 hours chosen from the following
ITM 421   Data Modeling and Applications
ITM 461   Internet Technologies & Web Design
ITM 540   Introduction to Data Networks and the Internet

Notes: Core courses may be waived upon presentation of evidence of equivalent coursework, certification or expe-rience or successful completion of the placement examination. Approval of waivers will be made by the student's adviser or the ITM Associate Director. If any one core course is waived, students must still complete nine hours of core course content. Core courses that also apply to specializations will still fulfill the core course requirement**.**

Specialization in Voice and Data Communication Technology (18 hours)

Recommended courses (9 hours)
ITM 540   Introduction to Data Networks and the Internet
ITM 545   Telecommunications Technology
ITM 546   Voice Communications Over Data Networks

Plus 9 hours chosen from the following:
ITM 541   Network Administration and Operations
ITM 542   Wireless Technologies and Applications
ITM 543   Vulnerability Analysis and Control

ITM 547   Voice Communications Over Data Networks: Projects & Advanced Methods
ITM 548   System and Network Security
ITM 549   System and Network Security: Projects & Advanced Methods
ITM 571   Project Management for Information Technology Management
ITM 575   Networking and Telecommunications Management
ITM 594   Special Project in Digital Voice and Data Communication

Digital Voice and Data Communication Technologies Graduate Certificate

This program is designed for students seeking knowledge that will prepare them for careers in digital voice and data communications with a strong focus on Voice over IP (VoIP).

Complete the following three courses:
ITM 540   Introduction to Data Networks and the Internet
ITM 545   Telecommunications Technology
ITM 546   Voice Communications Over Data Networks

And select any one of the following three courses:
ITM 541   Network Administration and Operations
ITM 547   Voice Communications Over Data Networks: Projects & Advanced Methods
ITM 575   Networking & Telecommunications Management
Students who have already completed coursework, training, or certification equivalent to ITM 540 may substitute a fourth course from the above list.

School of Applied Technology Voice over Internet Protocol Laboratory

The Voice over Internet Protocol (VoIP) Laboratory at IIT's Daniel F. and Ada L. Rice Campus in Wheaton, Illinois, gives students the opportunity to develop hands-on expertise analyzing the operation and performance of VoIP networks. Lab assignments are an integral part of our VoIP courses. These include both weekly homework assignments that illustrate how a particular function or feature is implemented and semester-long projects that analyze aspects of VoIP operation in more detail.

On-going laboratory research is being conducted in the areas of security, performance, E911, and VoIP architectures including IP-PBX, SIP Trunk, P2P and IMS.

Hosted VoIP services as well as Enterprise VoIP solutions can be demonstrated and tested in the lab. The lab also includes a development platform on which students can create SIP user applications. VoIP protocols including SIP, MGCP, RTP and SDP can be recorded using protocol analysis tools. Layout of the lab enables students to create various configurations to study their effects on quality of service and other service parameters.

The lab is architected to be highly configurable with a flexible number of multiple test positions. Students connect computers or VoIP equipment to the test positions. Test positions in turn are cabled to patch panels from which they can be connected to common equipment including hubs, switches and routers, to the Internet via the IIT campus backbone network, and to analog lines into the Public Switched Telephone Network (PSTN).

We welcome project proposals from commercial and academic sources and will be happy to work with them to develop studies that can be conducted in the lab by students under the guidance and supervision of faculty. For additional information about the School of Applied Technology's Voice over Internet Protocol Laboratory please see our Web site at **http://www.itm.iit.edu/voip/**.

To discuss projects or industry-sponsored research and evaluations please contact the Director, Carol Davids, at davids@iit.edu or at 630.682.6023.

About Illinois Institute of Technology's School of Applied Technology

Illinois Institute of Technology's School of Applied Technology offers technology-oriented education and training for working professionals. The School of Applied Technology draws on Illinois Institute of Technology's (IIT) extensive experience in adult education. Courses are taught by Illinois Institute of Technology professors and industry professionals with significant working, teaching and research experience in their fields. The School of Applied Technology offers working professionals degree, non-degree, certificate, credit, non-credit programs, corporate training, short courses technology seminars ranging from a few hours to several days in length. Both Bachelors and Masters Degrees are offered in Information Technology & Management and Industrial Technology & Management, as well as a Computer and Network Security Technologies Graduate Certificate and adult education/CEU courses in all fields. Illinois Institute of Technology (IIT) is a private, Ph.D. granting university founded in Chicago in 1890, offering programs in engineering, science, technology, architecture, design, psychology, public administration, technical communication, business and law.