

# Information Technology Infrastructure (ITI)

*Infrastructure is the great invisible enabler. The stuff behind the wall. Servers, software, middleware, routers, storage – the things people never see. It's end-to-end. Top-to-bottom. It's your e-business skeleton.*  
– The Executive e-Business Infrastructure Guide, IBM Corporation, 2003

## About the Program

The University of Minnesota Bachelor of Applied Science (B.A.Sc.) degree in Information Technology Infrastructure (ITI) responds to a growing demand from all sectors for technology specialists who can ensure optimal IT service delivery to meet business-critical needs. It is designed, taught, and regularly updated by IT professionals from industry. Its partnership with the University's Computer Science Department provides a rigorous technical foundation.

For those seeking a four-year credential, the ITI Bachelor of Applied Science is the appropriate choice. A B.A.Sc. is an internationally recognized baccalaureate degree that stresses both technical theory and application, along with essential instruction in business management and communication. Students gain focused expertise through technical electives in core IT infrastructure areas: network administration, system administration, database administration, and business system analysis. Additional electives offer career-enhancing focus in management, health systems administration, finance, communication, and quality management. Note that non-baccalaureate options may sometimes be the most appropriate. Many students will find that the 16–19 credit ITI certificate, or even individual classes as skill-builders or refreshers, will meet their needs for enhancement of professional qualifications.

## Career Opportunities

Students learn to analyze IT processes, policies, components, and services. They understand business objectives, and can design, construct, and manage the technology operations that enable the organization. Professional opportunities include

- Network Engineer
- Network Administrator
- IT Project Manager
- Technology Analyst
- Technology Architect
- Security Specialist
- Data Warehouse Manager
- Database Administrator
- Database Developer
- System Administrator
- Business Analyst
- IT Operations Manager

## Student Comments

"The teachers in the program have real-world experience and practice. We gain the knowledge and can execute the task."  
– *Anne Mealey, B.A.Sc. graduate*

"I can use, on a daily basis, the skills that I developed while earning my degree." – *Dan Weaver, B.A.Sc. graduate*

## Career Outlook\*

The Bureau of Labor Statistics (BLS) estimates that IT will be the fastest growing sector of the economy through at least 2018, reaching \$1.7 trillion in 2016. This robust employment market is fueled by the global explosion in business dependence on IT, and new initiatives in areas such as cloud computing, service architectures, virtualization, and green computing. To maximize benefits of this "hard" technology in today's economy, employers require multitalented individuals who can work in multidisciplinary teams. They are looking for highly qualified IT staffers who also have solid business acumen and well-developed "soft" skills such as writing and speaking, problem solving skill, adaptability, and the ability to learn independently to meet constant technological change. ITI at the University of Minnesota offers the opportunity to develop these attributes, ones which will be rewarded in any economic climate.

## Employment\*

The U.S. Department of Labor reports that employment of computer network, systems, and database administrators is expected to increase much faster than the average (27%) through 2018. According to the National Employment Matrix of the U.S. Bureau of Labor Statistics, network and computer system administrator; and database administrator positions numbered 459,900 in the U.S. in 2008.

## Earnings\*

Earnings vary depending upon the specialty within this profession. Nationally, the median annual salary of network and computer system administrators in 2008 was \$66,830; and database administrators, \$69,472. In Minnesota in 2009, the median annual salary of network and computer system administrators was \$68,475; and database administrators, \$81,000. Sources agree that salaries vary by region, and that optimal salaries are achieved by a combination of formal education and skill-based training.

\*All Career Outlook, Employment, and Earnings data was obtained directly from the U.S. Department of Labor, Bureau of Labor Statistics, [www.bls.gov](http://www.bls.gov); the MN Department of Employment and Economic Development, 2nd Quarter 2009 data, [www.deed.state.mn.us](http://www.deed.state.mn.us); [www.computerworld.com](http://www.computerworld.com); and [www.salary.com](http://www.salary.com).

**A course, a concentration, or a degree**

Contact an adviser to discuss your options

[www.cce.umn.edu/BAS-IT-Infrastructure](http://www.cce.umn.edu/BAS-IT-Infrastructure) • [cceinfo@umn.edu](mailto:cceinfo@umn.edu)

612-624-4000 or 1-888-330-8636

## IT INFRASTRUCTURE (INet) COURSE DESCRIPTIONS

<b>C Programming for the Java Programmer</b> INet 3101	Core concepts of C programming for Java programmers. C programming skills are requisite for working with network and system administration and advanced CSci and INet coursework. Topics include memory management; C strings; pointers, data structures, compiler and additional topics. In class lab. Taught in four half-day Saturday classes, C Programming for the Java Programmer is intensive.
<b>Network Administration</b> INet 4011	This course combines theory (lecture and expert guest speakers) and applications (labs). Topics include network architecture, switching, routing, algorithms, protocols, infrastructure hardware, cable plant, security, and network management.
<b>Network Programming</b> INet 4021	Network and distributed programming concepts and design using C, Java, and other higher level programming languages. Topics include sockets, TCP/ICP, RPC, streaming, CORBA, .NET, and SOAP. Labs use UNIX/Linux and MS Windows operating systems.
<b>System Administration</b> INet 4031	Structure of system administration: the integration of hardware, software and operational practice. A refresher on machine architecture and organization leads into complex technology issues such as designing for scalability, configuring systems, architecting storage systems, monitoring and testing performance, executing recovery processes and managing software licenses. Lab based, using Microsoft Server and Linux operating systems in supporting practical applications.
<b>Storage Design and Administration</b> INet 4032	Overview of ways to meet the data management needs of today's information-based society. Using case studies, the course explores basics of data storage, protection, and encryption; advanced topics of disaster recovery and business continuity; and also best practices, legal issues, emerging storage products, and protection of personal data.
<b>Emerging Network Technologies and Applications</b> INet 4041	Underlying theory. Driving needs (technological, business). Developing technology. Competing technologies. Lectures by guest expert speakers, case studies, labs.
<b>IT Infrastructure Operations</b> INet 4051	Network, server, and database operations including: infrastructure architecture, organizational structure, security, metrics, vendor relations, outsourcing, capacity planning, strategic planning, and budgeting. Capstone course.
<b>Introduction to Data Warehousing</b> INet 4061	Business case studies. Business analytics. Data mining models. Dimensional design. OLAP analysis. Data warehouse architectures and processes. Administration. Physical design considerations. Project assignment. Hands-on lab using SQL Server 2005.
<b>IT Infrastructure Projects and Processes</b> INet 4082	IT management overview of business partnerships, project management and lifecycles, methodologies, processes and organizational structures. Technology management, resource estimating, cost, quality, metrics and architecture concepts. Emphasis on best practices. Project assignment in student-selected IT infrastructure area of interest.
<b>System Analysis &amp; Design</b> INet 4083	Requirements management, analysis, and design of computer system solutions that target business objectives. Foundation for effective business analysts and systems analysts. Topics include the systems development lifecycle, development methodologies, analysis and design tools and techniques, and communication strategies. System architecture as a business strategy. Case studies, course projects, and in-class exercises.
<b>Policy and Regulation: Effects on Global IT Infrastructure</b> INet 4153	Progress and change in telecommunications networks have been functions of policies and regulations as much as of technology. If you plan, implement, manage and maintain networks, you need an understanding of local to global telecommunications policy, technology convergence and the emerging digital complex.
<b>Information Security: Technology, Ethics, Legality, and Standards</b> INet 4165	In-depth exploration of real-world IT security issues and processes in the information security profession. Research security incidents; develop incident response plans; implement countermeasures; create standards-compliant policies. Topics include detection, risk assessment, technology, secure design, business continuity, forensics, law.
<b>Practice of Database Systems</b> INet 4707	Concepts, conceptual data models with case studies, common data manipulation languages, logical data models, database design, facilities for database security/integrity, applications.
<b>Database Administration</b> INet 4709	Basics of database administration. Planning, administration, backup and restore, security, monitoring, availability, replication, and scalability.

For prerequisite requirements for the above courses, please see the University Catalog Twin Cities course listings:  
[onestop2.umn.edu/courses](http://onestop2.umn.edu/courses)

To see the entire ITI major curriculum, please see the University Catalog Twin Cities major listings:  
[www.catalogs.umn.edu/programs.html](http://www.catalogs.umn.edu/programs.html)