

Program Remarks and Basic Admission Requirements

I. Objectives

The objective of the MS in IT Administration and Security degree (MS IT AS), offered by the Information Technology (IT) program at NJIT, is to educate students in the concepts, principles, techniques, and practices needed to administer a modern IT environment and its security. Students will gain extensive practical experience doing IT administration. Security will be a component of core courses in addition to a specific security course. Those who complete the program will be well prepared to play leadership roles as database, network, security and web services administrators, as enterprise application administrators, and as IT administration managers.

II. Need

The MS in IT Administration and Security degree program will fill a persistent and growing need for specialists in computer system administration and security, as organizations, large and small, deploy progressively more complex computer and software systems. Every computing infrastructure needs IT administration and security personnel. These positions are difficult to outsource because they tend to require local presence for a variety of reasons, including security restrictions and strong requirements for direct personal interactions. The graduates of this program will be well-qualified for high level IT administration positions because they will be trained in the required principles, skills and practices of IT administration and security. This program will provide its graduates with a broad perspective on the different elements of computer system administration and security. A MS in IT Administration and Security graduate could become an IT administration manager, in addition to being able to fill customary IT administration roles.

III. Students

Students are expected to be a mix of working professionals and graduates of our undergraduate computing programs. The new program focuses on the administrative and security aspects of IT, which are closely related to the largest concentration area in our undergraduate IT degree (approximately 70% of the BS IT students select the networks and security concentration).

Applicants with other professional backgrounds will be considered. See section on Admission Requirements and Bridge Program.

IV. Admission and Bridge Program Requirements

To be eligible for admission, a student must have completed an undergraduate degree, preferably in Information Technology, Computer Science, Computer Engineering, Information Systems, or a related field, with a GPA of 2.8 or higher. Students not satisfying these criteria will be considered for conditional admission on a case-by-case

basis. This includes students whose bachelor's degree is in a non-technical field but who have professional experience in computing or systems administration. Such students are expected to have had the following courses or their equivalent in order to qualify for matriculation:

- CS 505 Programming, Data Structures and Algorithms (or a background in C or C++ such as CS 114)
- IT 102 Introduction to Information Technology II
- IT 230 Computer and Network Security
- CS 332 Principles of Operating Systems
- IT 420 Computer Systems and Networks

An admitted student not fulfilling these requirements will be required to complete corresponding bridge courses with a GPA of 3.0 or higher, which will not be counted towards the Master's degree.

Contact the Graduate Admission Office for other general graduate program admissions conditions:

<http://www.njit.edu/admissions/graduate/index.php>

V. Curriculum

The Information Technology Program will administer the MS in IT Administration and Security. The IT Program Director, Professor James McHugh, together with a CCS Faculty Committee composed of IT University Lecturers and CS and IS faculty will oversee the advisement of students in the program and monitor their progress.

The Faculty Advisory Committee for the program will consist of:

- IT faculty: S. Senesy (System Administration), R. Statica (Networks and Security),
J. Kettering (System Administration and Security)
- CS faculty: C. Borcea (Networking), D. Karvelas (Networks and Security)
- IS faculty: G. Widmeyer (Management of Information Systems), J. Scher (Databases)

Required Courses

IT 620 – Wireless Network Security & Administration

IT 635 – Database Administration

IT 610 – System Administration

CS 656 - Internet and Higher Layer Protocols (or ECE 637 Introduction to Internet Engineering)

CS 696 - Network Management and Security (or ECE 683 Network Management and Security)

IT 640 – Web and Domain Server Administration

Elective Courses (EXISTING – select four)

CS 631 - Data Management System Design
CS 632 - Advanced Database System Design
CS 633 - Distributed Systems
CS 652 - Computer Networks-Architectures, Protocols and Standards (or ECE 683
Computer Network Design and Analysis)
IS 631 - Enterprise Database Management
IS 677 - Information System Principles
IS 679 - Management of Computer and Information Systems
IS 680 - Information Systems Auditing
IS 681 - Computer Security Auditing
ECE 645 - Wireless Networks
CS 697/ECE 639 - Principles of Broadband Networks
HRM 601 – Organizational Behavior

Core Course Descriptions are below. The descriptions for the rest of the courses can be found under: <http://catalog.njit.edu/>

IT 620 – Wireless Network Security & Administration (3 credits)

Prerequisites: Completion of Bridge requirements. This course introduces the fundamentals of wireless network security administration. Topics include: Wireless LAN Vulnerabilities, Passive and Active Wireless Attacks, Enterprise Wireless Hardware Security, Secure Wireless Authentication and Communication, Wireless Intrusion Detection and Prevention Systems, WiFi and Cellular Networks Management, Privacy in Wireless Networks, Bluetooth Security, Ad Hoc and Sensor Networks Security. The course provides both a theoretical foundation in security and hands-on experience in these areas.

IT 610 System Administration (3 credits)

Prerequisites: Completion of Bridge requirements. This course is an introduction to the skills needed for and tasks performed by a System Administrator. The course will cover administration of host and server systems in modern operating system environments. Topics to be covered include: user, configuration and change management, shell scripting, performance analysis, disaster mitigation and recovery, and auditing.

IT 635 Database Administration (3 credits)

Prerequisite: Completion of Bridge requirements and IT 6XX System Administration
This course provides a broad overview of the tasks and techniques necessary to function as a Database Administrator (DBA) in a modern relational database environment. Students will learn the duties typically performed by a DBA, which include: disaster

planning and recovery, performance analysis, metadata maintenance as well as data modeling, analysis and database design.

IT 640 – Web and Domain Server Administration (3 credits)

Prerequisites. Completion of Bridge requirements. Servers play an increasingly important role in the IT infrastructure of businesses. This course provides an introduction to the basics of web and domain oriented services. It introduces how web-based and domain services operate, integrate and communicate. Topics covered include: the fundamental technologies that underpin the web service paradigm and the key standards necessary for their development, as well as other critical domain oriented services. The student will gain the skills necessary to plan, install, configure, secure and maintain resources such as web servers, the Domain Naming System (DNS), email & print servers, resource sharing systems, as well as domain authentication systems.

CS 656 - Internet and Higher Layer Protocols (3 credits)

Prerequisite: Completion of Bridge requirements. The course provides a foundation of knowledge of the Internet and its protocols. Topics include: Addressing, Routing and Forwarding, Classless Interdomain Routing, the IP and ICMP protocols, the UDP and TCP protocols, the layering models in OSI and in TCP/IP, IGMP, Routing methods (RIP, OSPF, BGP), The Domain Name System, The World Wide Web and http. In addition, students will be made familiar with use of a packet sniffer (such as tcpdump or ethereal) and with tools such as ping, nslookup and traceroute. Students will develop the detailed knowledge of packet headers needed to understand output of packet sniffers.

CS 696 - Network Management and Security (3 credits)

Prerequisites: Completion of Bridge requirements (or CS 652 or ECE 683), and CS 656. Thorough introduction to current network management technology and techniques, and emerging network management standards. In-depth study of the existing network security technology and the various practical techniques that have been implemented for protecting data from disclosure, for guaranteeing authenticity of messages, and for protecting systems from network-based attacks. SNMP family of standards including SNMP, SNMPv2, and RMON (Remote Monitoring), OSI systems management. Various types of security attacks (such as intruders, viruses, and worms). Conventional Encryption and Public Key Cryptology. Various security services and standards (such as Kerberos, Digital Signature Standard, Pretty Good Privacy, SNMPv2 security facility).