

APPLIED INFORMATION TECHNOLOGY (AIT)

500 Level Courses

AIT 500: *Quantitative Foundations for Information Systems Analysis*. 3 credits.

Provides common background in basic quantitative areas focused on decision making, information processing, and telecommunications. Topics include review of precalculus, introduction to matrix algebra, problems in optimization, and introduction to probability and statistics. Notes: Does not fulfill any VSITE graduate degree requirement. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: MATH 108 or equivalent.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 504: *Issues of Cyberspace*. 3 credits.

Student panels explore, report on, and make recommendations regarding major and novel problems presented by the explosive and intrusive growth of 'cyberspace'. Legal, ethical, financial, security, utility and value to users and organizations, feasibility, and desirability aspects are considered. Each semester features a major topic area. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

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Schedule Type: Lecture

AIT 510: *Learning Technology: Theory, Application and Design*. 3 credits.

Introduces students to theory, application and design of learning technologies, discussing why technology should be used for learning and education, how it should be applied, and how one can design digital tools to improve learning and education. Use of data, analytics, and emerging applications such as social media will also be discussed. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: (IT 415 or equivalent) and (SYST 469 or equivalent).

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

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Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 512: *Algorithms and Data Structures Essentials*. 3 credits.

Introduces analysis of algorithms and basic data structures assuming basic programming knowledge. Topics include: collections, sorting, searching, graphs, strings, B-Trees, and analysis of algorithms. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Academic or industry experience with programming.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate or Senior Plus.

Enrollment is limited to students with a major in Applied Information Technology.

Schedule Type: Lecture

AIT 521: *Software Engineering Essentials*. 3 credits.

Provides an overview of essential topics in software engineering, including problem solving with computers, requirements, software design, software development, testing, verification, validation, usability, and management. Discuss concepts related to building software, including data structures, object-oriented programming, event handling in GUIs, and web application technologies and how these concepts are handled in various languages, but without requiring the students to program. Notes: This course does not count towards MS programs offered in the Computer Science Department and cannot be used to satisfy course requirements for PhD IT students. Offered by Info Sciences & Technology. May not be repeated for credit. Equivalent to SWE 521.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 524: *Database Management Systems*. 3 credits.

Relational database management systems. Covers logical and physical database design; query languages and database programming; and examines commercial systems. Computing lab. Notes: This course does not count towards MS programs offered in the Computer Science Department and cannot be used to satisfy course requirements for PhD

IT students. Offered by Info Sciences & Technology. May not be repeated for credit. Equivalent to INFS 524.

Recommended Prerequisite: Academic or industry experience with database systems.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 542: Fundamentals of Computing Platforms. 3 credits.

Contemporary information systems are platforms inextricably combining operating systems and networks. This graduate course provides an overview of OS and networking elements of information systems, and examines the particular issues relating to the range of platforms, from handheld mobile devices to cloud and supercomputer systems. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Academic or industry experience with operating systems and computer networks.

Registration Restrictions:

Enrollment limited to students with a class of Graduate or Senior Plus.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology.

Schedule Type: Lecture

AIT 580: Analytics: Big Data to Information. 3 credits.

Course provides an overview of Big Data and its use in commercial, scientific, governmental and other applications. Topics include technical and non-technical disciplines required to collect, process and use enormous amounts of data available from numerous sources. Lectures cover system acquisition, law and policy, and ethical issues. It includes brief discussions of technologies involved in collecting, mining, analyzing and using results. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 581: Problem Formation and Solving in Big Data. 3 credits.

The course explores challenges facing analysts exploiting Big Data or Bespoke Data in combination with Big Data, and looks at solutions, mindful of the fact that our intellectual and practical practices are based

entirely on the 5000 year old Bespoke Data paradigm, and considering that Big Data practices are too recent to lead to comparable Big Data tools and practices. Notes: Course may be used in other certificate and degree programs. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 582: Applications of Metadata in Complex Big Data Problems. 3 credits.

Course explores technical and analytical issues, solutions and gaps in processing large volumes of data by leveraging metadata. The goal is to find "facts of interest" (Intelligence) that represent threats to, or even opportunities for, a given industry or domain (e.g., healthcare, finance or national intelligence/national defense) where there is limited time. Notes: Course may be used in other Certificate or Degree programs. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 590: Topics in Applied Information Technology. 3 credits.

Topics in the application of information technology. Students are expected to participate actively through class dialogues and the crafting of IT solutions to specific problem areas. Notes: Course cannot be used to satisfy course requirements for PhD IT students. Offered by Info Sciences & Technology. May be repeated within the term for a maximum 6 credits.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 597: *Developing IT Leaders of Integrity*. 3 credits.

Considers the cultural and organizational influences and focuses on leadership's ethical dimensions. Students identify their core values, study the attributes of effective and toxic leaders, and examine the difference between managing and leading through selected readings, discussions, team projects, in-class activities and guest presentations. Students practice and receive in-class coaching to hone their leadership skills. Notes: Course cannot be used to satisfy course requirements for PhD IT students. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Registered student in MS, Applied IT or instructor's permission.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

600 Level Courses**AIT 601: *Foundations of Applied Information Technology*. 3 credits.**

Introduces students to foundational scholarship in applied information technology. Reviews seminal readings and applications of information technology. Students learn about the interdisciplinary history of the field, are introduced to influential scholars and important topics, and get an overview of key theoretical paradigms in applied information technology. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Admission to a graduate program in Applied IT.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 602: *Introduction to Research in Applied Information Technology*. 3 credits.

Introduces students to research methods required to conduct original research in applied information technology. Reviews different research approaches and methods, discusses issues of data collection, validity reliability, data analysis, and interpretation. Throughout, seminal research papers will be used as case studies and students will also learn to read and understand research. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Admission to a graduate program in Applied IT.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 603: *Research Practice*. 3 credits.

Complementing AIT 602's treatment on the nature of AIT research, this course examines various pragmatic aspects of conducting research, including: research venues, public & private funding sources, grant proposals, publishing, regulation and reporting obligations, operating labs and centers, legal and intellectual property issues, collaboration nationally and internationally. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: AIT 602 or equivalent.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 614: *Big Data Essentials*. 3 credits.

Hands-on course discusses emerging technologies for big data analytics and their applications in real-world environments. Students apply learned concepts and best practices using several emerging technology tools simulating development, implementation, and use of big data analytical systems. Topics include RDBMS, SQL, NoSQL, R, MapReduce Programming paradigm, Hadoop, HDFS, HIVE, PIG and others in the Hadoop ecosystem for unstructured data analytics. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Academic or industry experience with database systems.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 622: *Determining Needs for Complex Big Data Systems*. 3 credits.
Explores Big Data Systems Engineering methodologies for consensus in system needs among stakeholders having different perspectives, competing objectives. Course goal is more efficient delivery of results coming from the rigor of traditional methods. Traditional methods establish foundation for extensions to non-traditional, streamlining methods. Principles, explained and demonstrated, are applied by students to a case study based project and individual assignments/labs. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Admission to a graduate program in Applied IT or Health Informatics, or permission of the instructor.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 624: *Knowledge Mining from Big-Data*. 3 credits.
Introduction to methods and tools related to knowledge mining/representation/visualization, and annotation and retrieval for Big-Data Applications from an applied perspective with the focus on emerging research problems. This course combines survey lectures with in-depth presentation of relevant issues through seminars, and hands-on experience using existing technologies and public data sources. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Required Prerequisite: AIT 582^B.

^B Requires minimum grade of B-

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 631: *Advanced Decision Making in IT Ventures*. 3 credits.
The course provides students with an understanding of decision making processes and methodologies needed to successfully run IT companies. Topics include: assessment of IT ideas and investments; measuring IT investments performance; forecasting methods; multi-criteria information technology decision making methods; decision support systems; value analysis and benefit/risk methodologies. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: IT 496 or equivalent.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 650: *Distributed Systems and Overlay Networking*. 3 credits.
This graduate level seminar examines advanced networking research topics and potential applications, including distributed systems, peer-to-peer and overlay net workings, routing, protocols, replication strategies, tree formation, resource sharing, fault tolerance, and network modeling. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Thorough understanding of computer networking, IP and TCP protocols, congestion control, queuing, and addressing and routing mechanisms.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Schedule Type: Lecture

AIT 660: *Cyber Security Fundamentals*. 3 credits.
Introduces fundamental security principles and real-world applications of cyber security. Topics covered in the course include access control, common classes of attacks, monitoring, attack and intrusion detection, basic cryptography, computer security models, legal and privacy issues, and risk analysis. The course also provides students with opportunities to gain hands-on experience with several security tools (e.g., protocol analyzers). Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 664: *Information: Representation, Processing and Visualization*. 3 credits.

The course explores basic concepts to understand and analyze the design of information systems, and focuses on conceptual understanding of data, information, and knowledge, boundaries in representing and

processing information for humans and machines, information theory, and basic techniques to organize, structure, and interact with the information through visualization. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: AIT 524 or permission of department.

Schedule Type: Lecture

AIT 665: *Managing Information Technology Programs in the Federal Sector.* 3 credits.

This case study-grounded seminar introduces student team members to the unique complexities of the Federal Sector, including Congressional and Executive Branch oversight, reporting, justifying and sustaining annually very large IT programs. Notes: Course cannot be used to satisfy course requirements for PhD IT students. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Permission of instructor.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Seminar

AIT 670: *Cloud Computing Security.* 3 credits.

Offers a survey of security and privacy issues in Cloud Computing systems, along with an overview of current solutions and available technologies. Examines cloud computing models and threat model and security issues related to data and computation outsourcing, and explores practical applications of secure Cloud Computing. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: AIT 542.

Registration Restrictions:

Required Prerequisite: AIT 660^{B-}.
^{B-} Requires minimum grade of B-.

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 671: *Information System Infrastructure Lifecycle Management.* 3 credits. Examines information system infrastructure lifecycle management including the audit process, IT governance and best practices, system and infrastructure control, IT service delivery and support, protection of

information assets, physical security, business and disaster recovery. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Registration in MS, Applied IT program or permission of Instructor.

Registration Restrictions:

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Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

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Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 672: *Identity and Access Management.* 3 credits.

Provides a hands-on in-depth description of the principles, concepts, and technology of Identity Management. Topics include digital identity, credentials, authentication, authentication protocols, trust frameworks, cryptography and digital signatures, identity tokens (smart cards), and smart card-based identity verification and authorization applications. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Admission into MS AIT program or permission of instructor.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 673: *Cyber Incident Handling and Response.* 3 credits.

Examines Computer Emergency Response Team (CERT), including Incident Response, Vulnerability Assessment, Incident Analysis, Malcode Analysis, Forensics and Investigations. Includes exercises in CERT operations and a final Incident Handling project. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: AIT 670 or permission of instructor.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 674: *Research, Development and Technology in the Intelligence Community.* 3 credits.

Provides overview of research, development and engineering components of agencies within U.S. Intelligence Community, how they prioritize research and deliver products used in collection, processing, and dissemination of information. Examines different types of technical intelligence and related phenomenologies employed in their collection. Highlights evolution of technologies used in gathering and discusses new and emerging trends in intelligence collection and analysis. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 675: *Overview of the National Intelligence Community.* 3 credits.

Introduces structure and basic operations of the U.S. national intelligence community (IC). Students learn general information about organization, structure and missions of the IC and about the tools and techniques employed by intelligence agencies of the U.S. and other intelligence services. Surveys the range of intelligence problems and challenges, types of data and data collectors employed, and how information is processed, analyzed, and disseminated. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Admission into the MS-AIT degree program or permission of instructor.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 676: *Intelligence Technologies, Research and Development in the Intelligence Community.* 3 credits.

Overview of R & D and engineering components of agencies within U.S. Intelligence. Describes: process by which these agencies prioritize research and deliver products to collect, process and disseminate information; types of technical intelligence and the related phenomenologies employed in their collection; evolution of technologies used in gathering, and; discusses new and emerging trends in intelligence collection and analysis. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Admission into the MS-AIT degree program or permission of instructor.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 677: *Intelligence Analysis Methods.* 3 credits.

Presents various intelligence analysis methods addressing basic topics: substance-blind analysis of evidence and its credentials, chain of custody analysis, combination of evidence, divide and conquer paradigm for analysis, sources of uncertainty, competing hypotheses and analyses. Discusses case studies in various domains following a hands-on approach using educational analysis tools. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: AIT 524.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 678: *National Security Challenges.* 3 credits.

Presents the process by which decision makers identify and prioritize intelligence problems and allocate collection and analysis resources to their solutions. Discusses nation-state issues such as Russia, China, and Iran, and transnational issues such as terrorism, weapons proliferation, narcotics and smuggling, and cyber conflict and the intelligence shortcomings and needs in regard to these problems. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Admission into the MS-AIT degree program or permission of instructor.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture**AIT 679:** *Law and Ethics of Big Data*. 3 credits.

Examines Law, Ethics and Policy in Big Data operations. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Admission to the MS, AIT program or permission of instructor.**Registration Restrictions:**

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture**AIT 680:** *Social Media in Homeland Security Operations*. 3 credits.

Overview of social media uses by Homeland Security agencies and U.S. adversaries, in both active and passive modes, including recruitment and disinformation. Examines regulations and laws governing social media usage. Explores future technological developments. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Registered students in Homeland Security Information Systems and Cyber MS or permission of Instructor.**Registration Restrictions:**

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture**AIT 681:** *Secure Software Development*. 3 credits.

Provides secure software development approaches for putting software security principles into practice and addressing software-induced security risk by studying software security fundamentals and software security best practices. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:**Required Prerequisite:** AIT 542^B.^B Requires minimum grade of B-.

Enrollment limited to students with a class of Advanced to Candidacy, Graduate or Non Degree.

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture**AIT 682:** *Network and Systems Security*. 3 credits.

Introduces the principles and practices of cryptography, network security, and secure software by covering security policies, models, and mechanisms for secrecy, integrity, and availability; basic cryptography and its applications; secret key cryptography; hash functions; basic number theory and public key cryptography; trusted intermediaries, and network security (firewalls, IDS, IPsec, and SSL) etc. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: AIT 660.**Registration Restrictions:**

Enrollment limited to students with a class of Advanced to Candidacy, Graduate or Non Degree.

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture**AIT 685:** *Capstone Seminar*. 3 credits.

Student team-based experience grounded on solid understanding of the proceeding nine courses mastered in each of the program's three areas of study. Teams analyze cases of mega-system programs from the 20th Century. Notes: Course cannot be used to satisfy course requirements for PhD IT students. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Completion of all core courses and at least nine credits of concentration courses in the program, or permission of department.**Registration Restrictions:**

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment limited to students in the MS Applied Info Technology program.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Seminar**AIT 686:** *Capstone: Student Design Solution*. 3 credits.

Student teams examine several historical or hypothetical cases that demonstrate vulnerabilities to the homeland security of the nation. Task is to choose one case, conduct appropriate outside research, then design and brief detection/prevention/mitigation processes that can protect the nation. Must be among the last two courses attempted in the degree program. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Seminar

AIT 690: *Advanced Topics in Applied Information Technology*. 3 credits. Students participate actively through class dialogues and the crafting of IT solutions to specific problem areas. Notes: Course cannot be used to satisfy course requirements for PhD IT students. Offered by Info Sciences & Technology. May be repeated within the term.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 697: *Leading Organizations Through Change*. 3 credits. Introduces students to the critical tools for leading organizations through sustainable change. Through selected readings, discussions, team projects, in-class activities and guest appearances, students learn how to prepare the organization, plan the details, execute a change process across an organization and measure the plan's effectiveness and the change it brings to achieve continuous improvement. Students practice and receive in-class coaching to hone their leadership skills. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Graduate Standing in MS, AIT program or permission of instructor.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 699: *Research Project*. 3 credits. Research project chosen and completed under guidance of graduate faculty member that results in technical report. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Open only to students in the MS AIT program with at least 18 credit hours of coursework prior to registration and with advisor approval.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non Degree or Senior Plus.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Independent Study

700 Level Courses

AIT 701: *Cyber Security: Emerging Threats and Countermeasures*. 3 credits. Covers emerging security threats and current best practices in several applicative domains, ranging from the enterprise to the military. Discusses advanced topics, including advanced persistent threats, security of cyber-physical systems, distributed denial of service attacks, and mobile security. Also presents current trends and open research problems in the cyber security space. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Required Prerequisites: AIT 660^{B-} and 512^{B-}.
^{B-} Requires minimum grade of B-.

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 702: *Incident Handling and Penetration Testing*. 3 credits. Presents students with a principled approach to ethical hacking, and offers an in-depth analysis of the overall process, including aspects related to scanning, testing, ethically attacking, and eventually securing systems and networks. The course covers popular attack tools such as Social Engineering and DDoS, and concludes with a discussion about open challenges and current research in the area. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Required Prerequisite: AIT 660^{B-}.
^{B-} Requires minimum grade of B-.

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 710: *Design of Learning and Educational Technologies*. 3 credits.
Examines foundations, theoretical perspectives, underlying learning theories, case studies, and key enabling technologies to provide context for understanding, designing, and researching learning and educational technologies. Considers technologies for diverse areas and users including teachers, instructors, higher education and K-12 learners, and learning among informal communities of interest. Technologies demonstrations are combined with hands-on activities involving participation in multiple learning environments. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: AIT 501 or permission of department.

Registration Restrictions:

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 711: *Rapid Development of Scalable Applications*. 3 credits.
Presents software engineering, programming techniques, security practices, platforms and tools necessary for rapid development of applications. Provides a survey of programming techniques and static code analysis, including security and privacy consideration throughout the application life cycle. Students work in small teams and develop or maintain scalable applications exercising risk based analysis and techniques and practices presented in the course. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Required Prerequisites: AIT 512^{B-} and 524^{B-}.

^{B-} Requires minimum grade of B-.

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 716: *Human Computer Interaction*. 3 credits.
Covers the foundations of Human Computer Interaction, including: (1) Basic definitions and motivations of HCI, history, theories, interaction paradigms, design principles and models; (2) User-centered design methods, studies, design approaches for interfaces and interaction, quality factors, evaluation methods and techniques for data analysis; (3) Research frontiers of HCI, accessibility, universal design, and ubiquitous computing (mobile and wearable applications). Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology.

Enrollment is limited to Graduate level students.

Schedule Type: Lecture

AIT 721: *Design of IT Artifacts, Applications and Systems*. 3 credits.
This course will introduce students to design principles and design thinking in applied information technology. Students will learn different approaches to design IT applications across a range of domains. Students will learn how to approach design of systems for large organizations and also for individuals. Students will learn about the interdisciplinary nature of design and get introduced to influential designers. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: Enrollment in the IST concentration of the PhD in IT program and AIT 501, or permission of department.

Registration Restrictions:

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 724: *Data Analytics in Social Media*. 3 credits.
Introduce the necessary theories and the state-of-the-art techniques in Web mining, network analysis, information retrieval, and predictive modeling to study emerging problems with social media. These problems include information diffusion, recommendations, behavior analysis, and event analytics in social media. Offered by Info Sciences & Technology. May not be repeated for credit.

Registration Restrictions:

Required Prerequisite: AIT 664^{B-}.

^{B-} Requires minimum grade of B-.

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 734: *Advanced Web Analytics Using Semantics*. 3 credits.
Covers a range of current practices for metadata extraction, knowledge discovery from big complex data, as well as knowledge representation and reasoning. This course discusses Data Modeling issues in Web Information Systems and Internet of Things (IoT) Web Semantics. Current trends and open problems are also covered in this course. Offered by Info Sciences & Technology. May not be repeated for credit.

Recommended Prerequisite: AIT 582, 624.

Registration Restrictions:

Enrollment limited to students with a class of Advanced to Candidacy, Graduate or Non Degree.

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Lecture

AIT 799: Master's Thesis. 1-6 credits.

Research project chosen and completed under guidance of graduate faculty member that results in a thesis manuscript and a presentation accepted by a committee of three faculty members. Offered by Info Sciences & Technology. May be repeated within the degree for a maximum 6 credits.

Recommended Prerequisite: Open only to students in the MS AIT program with at least 18 credit hours of coursework prior to registration and with advisor approval.

Registration Restrictions:

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology.

Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the College of Science, Schar School of Policy and Gov or Volgenau School of Engineering colleges.

Schedule Type: Thesis

800 Level Courses

AIT 800: Applied Information Technology Colloquium. 1 credit.

Students attend a series of colloquia including talks by distinguished speakers, faculty candidates and Mason faculty. Topic areas include research advances in technology, its application, and policy issues.

Notes: Students must attend a minimum of three events per semester to earn one credit in this course. PhD INFT students with a concentration in Information Science and Technology must complete at least two credits of AIT 800. Offered by Info Sciences & Technology. May be repeated within the degree for a maximum 3 credits.

Recommended Prerequisite: Completion of AIT Core and at least 6 credits of AIT Field Requirements in PhD program.

Schedule Type: Seminar