

**APPLIED INFORMATION TECHNOLOGY M.S.**

Degree: Master of Science  
Program Director: Suranjan Chakraborty  
410-704-4909

Applied Information Technology is the study, design, development, implementation and support of computer-based information systems to address real-world problems. This program provides graduate-level education in IT for students preparing to enter the high-tech work force and those already in the work force who need to update and enhance their skills. We offer courses in areas such as systems development, IT project management, Internet application development, and IT and business analysis. Post-baccalaureate certificates in Internet application development, information security and assurance, information systems management, networking technologies, software engineering and database management systems are integrated with the M.S. degree program.

**Admission Requirements**

- A baccalaureate degree from a regionally accredited college or university**  
- A minimum undergraduate GPA of 3.00 for full admission and 2.75 for conditional admission  
- Minimum TOEFL score of 550 (where applicable)

These programs are intended for students who have a bachelor’s degree in information technology, computer science, computer information systems or a related field who will enter the program for advanced studies; students who have a bachelor’s degree in a field not listed above who are already employed in the IT field and are seeking additional academic studies for professional growth or career advancement; and students who have a bachelor’s degree in disciplines other than IT who are seeking preparation for careers in this field.

**Non-immigrant international students:** See additional admission information in Graduate Admissions ([https://www.towson.edu/academics/graduate/admissions/apply/international.html](https://www.towson.edu/academics/graduate/admissions/apply/international.html))

**See Exception to Policy** in Graduate Admissions ([https://www.towson.edu/academics/graduate/admissions/apply/policies.html](https://www.towson.edu/academics/graduate/admissions/apply/policies.html))

**Degree Requirements**

- Completion of any assigned preparatory courses. (Credit from preparatory courses do not count toward the M.S. degree.)  
- Completion of 33 graduate units as follows:

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>AIT 600</td>
<td>INFORMATION TECHNOLOGY INFRASTRUCTURE</td>
<td>15</td>
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<tr>
<td>AIT 610</td>
<td>SYSTEMS DEVELOPMENT PROCESS</td>
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<tr>
<td>AIT 632</td>
<td>DATABASE MANAGEMENT SYSTEMS</td>
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**Required Courses**

Students must complete the requirements for a graduate certificate in applied information technology. Currently, the following graduate certificates in information technology are available. Additional graduate certificates may be added to this list in the future.

**Database Management Systems**

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**Information Security and Assurance**

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<tr>
<td>AIT 612</td>
<td>INFORMATION SYSTEMS VULNERABILITY AND RISK ANALYSIS</td>
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<tr>
<td>AIT 614</td>
<td>NETWORK SECURITY</td>
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**Information Systems Management**

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<td>AIT 630</td>
<td>INFORMATION TECHNOLOGY PROJECT MANAGEMENT</td>
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<tr>
<td>AIT 730</td>
<td>CASE STUDIES IN INFORMATION SYSTEMS</td>
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**Internet Application Development**

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<tr>
<td>AIT 616</td>
<td>FUNDAMENTALS OF WEB TECHNOLOGIES AND DEVELOPMENT</td>
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<tr>
<td>AIT 618</td>
<td>CLIENT/SERVER-SIDE PROGRAMMING ON THE WEB</td>
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<tr>
<td>AIT 715</td>
<td>CASE STUDIES IN INTERNET APPLICATIONS</td>
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**Networking Technologies**

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<tr>
<td>AIT 620</td>
<td>BUSINESS DATA COMMUNICATIONS</td>
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<td>AIT 622</td>
<td>NETWORKS ARCHITECTURE AND PROTOCOLS</td>
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<tr>
<td>AIT 720</td>
<td>CASE STUDIES IN NETWORKING TECHNOLOGY</td>
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**Software Engineering**

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<tr>
<td>AIT 624</td>
<td>SOFTWARE ENGINEERING FUNDAMENTALS</td>
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<tr>
<td>AIT 725</td>
<td>CASE STUDIES IN SOFTWARE ENGINEERING</td>
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Select at least one of the following courses:

<table>
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<tr>
<th>AIT 641</th>
<th>SOFTWARE REQUIREMENTS ENGINEERING</th>
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<tr>
<td>AIT 642</td>
<td>SOFTWARE TESTING AND MAINTENANCE</td>
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<tr>
<td>AIT 643</td>
<td>ENTERPRISE ARCHITECTURE</td>
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**Electives**

Students must complete six graduate-level elective courses. A maximum of two elective courses may be in any of the following disciplines: accounting, computer science, human resource development, management, mathematics and technical writing. Those who want to take elective courses from a discipline other than AIT must get the AIT program director’s approval before enrolling in the course. At least four of the elective courses must be graduate-level AIT courses from the following list:

<table>
<thead>
<tr>
<th>AIT 612</th>
<th>INFORMATION SYSTEMS VULNERABILITY AND RISK ANALYSIS</th>
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<tr>
<td>AIT 613</td>
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<tr>
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<td>NETWORK SECURITY</td>
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</table>
AIT 610 SYSTEMS DEVELOPMENT PROCESS (3)
Structured and object-oriented analysis, design and implementation of information systems; distributed information systems; information systems life cycle models, platforms and security. Discussions of requirements definition, modeling quality assurance and development environments. Prerequisite: AIT 600; may be taken concurrently with AIT 600.

AIT 612 INFORMATION SYSTEMS VULNERABILITY AND RISK ANALYSIS (3)
The identification of vulnerabilities and risks inherent in the operation of information systems will be explored. Countermeasures will be discussed and documented in an effort to counter identified vulnerabilities. Prerequisite: AIT 610. May take concurrently with AIT 610.

AIT 613 INTRODUCTION TO SOFTWARE SECURITY (3)
A study of security concepts in software. This course discusses design principles for secure software development, and some of the security issues in current applications, database systems, and web systems. It provides the foundation for identifying vulnerabilities, their impact, and solutions to securing them. Prerequisite: AIT 610.

AIT 614 NETWORK SECURITY (3)
Network security, hacker attacks, Web security, e-mail security, e-commerce security, systems and operation environment security, database security, algorithms for making data communications secure, encryption and coding techniques and IP security. Prerequisite: AIT 612.

AIT 616 FUNDAMENTALS OF WEB TECHNOLOGIES AND DEVELOPMENT (3)
Introduction to HTTP protocol, dynamic HTML and common gateway interface (CGI) programming. Study and practice of object-oriented programming concept using Java. Design and implementation of application software including graphical user interfaces (GUIs), concurrent and distributed programming, distributed information systems server architectures, database connectivity and the enterprise packages provided by the Java programming language. Prerequisite: AIT 610. May take concurrently with AIT 610.

AIT 618 CLIENT/SERVER-SIDE PROGRAMMING ON THE WEB (3)
Discussion of HTTP protocol, dynamic HTML, common gateway interface (CGI) programming, Java applets and server-side programming. Development of information systems incorporating applications executing on a client-server system. Design and implementation of distributed information systems involving the technologies developed for the Web. Prerequisite: AIT 616.

AIT 620 BUSINESS DATA COMMUNICATIONS (3)
Business data communications, distributed data processing, fundamental data transmission, network types, distributed applications, client/server architecture, network management and security, and Internet /intranet, extranet. Prerequisite: AIT 610; may be taken concurrently with AIT 610.

AIT 622 NETWORKS ARCHITECTURE AND PROTOCOLS (3)
Review of fundamentals of network technology, Internet protocols, multicasting, subnet and supernet addressing, routing algorithms, client-server, socket interface, bootstrap and auto configuration, file transfer, e-mail, and Internet security. Prerequisite: AIT 620.

Courses

AIT 500 FUNDAMENTALS OF COMPUTER PROGRAMMING AND DATA STRUCTURES (6)
Structured problem solving, algorithm development, fundamentals of computer programming, basic data structures and their implementation, sort and search algorithms, and an introduction to the design and development of information systems. Serves as a preparatory/foundational course for MS in AIT and does not count towards the degree. Prerequisite: Admission to AIT program.

AIT 600 INFORMATION TECHNOLOGY INFRASTRUCTURE (3)
A discussion of information systems architectures including software systems, hardware, operating systems, data bases, object-oriented technology, networking and enterprise-wide systems. Prerequisite: Admission to AIT program.

AIT 606 WEB DEVELOPMENT (3)
Introduction to web development, including HTML, CSS, JavaScript, and server-side technologies. Prerequisite: AIT 610.

AIT 608 SOFTWARE ENGINEERING FUNDAMENTALS (3)
Introduction to software engineering concepts, including software development methodologies, project management, and quality assurance. Prerequisite: AIT 610.

AIT 610 SYSTEMS DEVELOPMENT PROCESS (3)
Structured and object-oriented analysis, design and implementation of information systems; distributed information systems; information systems life cycle models, platforms and security. Discussions of requirements definition, modeling quality assurance and development environments. Prerequisite: AIT 600; may be taken concurrently with AIT 600.

AIT 612 INFORMATION SYSTEMS VULNERABILITY AND RISK ANALYSIS (3)
The identification of vulnerabilities and risks inherent in the operation of information systems will be explored. Countermeasures will be discussed and documented in an effort to counter identified vulnerabilities. Prerequisite: AIT 610. May take concurrently with AIT 610.

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A study of security concepts in software. This course discusses design principles for secure software development, and some of the security issues in current applications, database systems, and web systems. It provides the foundation for identifying vulnerabilities, their impact, and solutions to securing them. Prerequisite: AIT 610.

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Network security, hacker attacks, Web security, e-mail security, e-commerce security, systems and operation environment security, database security, algorithms for making data communications secure, encryption and coding techniques and IP security. Prerequisite: AIT 612.

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AIT 620 BUSINESS DATA COMMUNICATIONS (3)
Business data communications, distributed data processing, fundamental data transmission, network types, distributed applications, client/server architecture, network management and security, and Internet /intranet, extranet. Prerequisite: AIT 610; may be taken concurrently with AIT 610.

AIT 622 NETWORKS ARCHITECTURE AND PROTOCOLS (3)
Review of fundamentals of network technology, Internet protocols, multicasting, subnet and supernet addressing, routing algorithms, client-server, socket interface, bootstrap and auto configuration, file transfer, e-mail, and Internet security. Prerequisite: AIT 620.
A.I.T. 624 SOFTWARE ENGINEERING FUNDAMENTALS (3)
Application of formal software engineering principles and practices to the development of information systems, application software and embedded, computer-based systems. A comprehensive description of the software engineering process will be presented along with a discussion of the approaches, methodologies and tools available to the practicing software engineer. Prerequisite: AIT 610.

A.I.T. 628 INFORMATION TECHNOLOGY AND BUSINESS STRATEGY (3)
Design and evolution of technology strategy; the development of the firm’s innovative capabilities and implementing a development strategy; changes in business strategies due to the emergence of the Internet and e-business; new business models that have emerged, the components of such models, the dynamics and appraisal of the models, and the new value configurations. Prerequisite: AIT 610; may be taken concurrently with AIT 610.

A.I.T. 630 INFORMATION TECHNOLOGY PROJECT MANAGEMENT (3)
Tools and techniques for the successful management of information technology projects. Topics include project selection and approval, planning, estimation techniques, scheduling methods, budgeting, IT project organizations, and project control and assessment. Prerequisite: AIT 628.

A.I.T. 632 DATABASE MANAGEMENT SYSTEMS (3)
Study of database management system fundamentals, data models, design, implementation and processing. Most popular database management systems such as Oracle, SQL Server, and Access are used throughout the course to illustrate design and implementation of real-world database applications and processing. Prerequisite: AIT 610; may be taken concurrently with AIT 610.

A.I.T. 641 SOFTWARE REQUIREMENTS ENGINEERING (3)
Introduces the basic concepts and principles of software requirements engineering. Designed to expose student to common tools and techniques, established methods for modeling software systems and various approaches to requirements engineering (structured, object oriented, and formal). In essence, the course intends to cover in its entirety the process of requirements engineering. Prerequisites: AIT 610, AIT 624/COSC 612, Software Engineering.

A.I.T. 642 SOFTWARE TESTING AND MAINTENANCE (3)
A comprehensive survey of software maintenance and testing, principles, methodologies, management strategies, techniques and tools. Software testing at the unit, subsystem levels using various test design techniques, as well as integration, regression, and system testing methods, and software testing tools. Designing and implementing software technologies to increase maintainability and testability, evaluating software for change and validating software changes. Prerequisites: AIT 610, AIT 624/ COSC 612.

A.I.T. 643 ENTERPRISE ARCHITECTURE (3)
Provides a set of latest approaches in designing IT infrastructures aligning them with enterprise business activities at the architectural level, including business architecture, information architecture, solution architecture, and technology architecture. Institutionalization of enterprise architecture frameworks and standards will be discussed. Topics include the fundamentals of business functions and IT infrastructure of an enterprise including definitions frameworks, business process modeling process institutionalization using CMMI, EA implementation through service-oriented architecture (SOA), and the various networking technologies in LAN/MAN/WAN as the enablers for EA. Prerequisites: AIT 610, AIT 624/COSC 612.

A.I.T. 650 COMPUTER & NETWORK FORENSICS AND INCIDENT RESPONSE (3)
Traditional computer forensic analysis and network forensics are rapidly converging disciplines. And depending on one’s objectives, incident response can be an active, real-time forensic analysis. At the very least, the process of incident response will have a significant impact on any later forensic analysis, so knowledge of all of these disciplines. This course is a core component of an Information Assurance curriculum.

A.I.T. 652 ETHICS, LAW AND POLICY IN CYBERSPACE (3)
This is a course for technical managers and is designed to create an awareness of the ethical issues, legal resources and recourses, and policy implications inherent in our evolving on-line society. The course provides an overview of the ethical challenges faced by individuals and organizations in the information age and introduces the complex and dynamic state of the law as it applies to behavior in cyberspace. It is intended to sensitize managers and professionals to the pitfalls and dangers of doing business in an interconnected world, and to familiarize the student with various organizations and materials that can be turned to for assistance in understanding how to ethically and legally operate and use modern computer systems and networks.

A.I.T. 655 MANAGING INFORMATION SECURITY (3)
This is an advanced study course in information assurance. The focus is on applying the various specific information assurance concepts, understandings, methods, processes and tools for the previous IA, Telecommunication and IT courses taken by the student to formulate the basis for sound business decisions. Prerequisites: AIT 600, AIT 610 and AIT 614.

A.I.T. 660 MOBILE DEVICE FORENSICS (3)
Presents a digital forensic analysis methodology applied to modern mobile devices such as cell phones, smartphones, GPS devices, tablet computers, and many other "embedded devices." Prerequisite: AIT 650.

A.I.T. 670 SPECIAL TOPICS IN APPLIED INFORMATION TECHNOLOGY (3)
Selected topics in applied information technology. Emphasis on new and emerging applications in information technology. Prerequisites: 6 units of graduate work in AIT and consent of instructor.

A.I.T. 695 INDEPENDENT STUDY IN APPLIED INFORMATION TECHNOLOGY (3)
Independent supervised study in selected areas of information technology and its application in a variety of fields. Prerequisites: 6 units of graduate work in AIT and consent of AIT graduate program director.

A.I.T. 710 CASE STUDIES IN INFORMATION SECURITY (3)
Consists of a real-world project dealing with information security in distributed information systems including applications of theory and techniques in information security. This is a capstone course for the Information Security and Assurance certificate. Prerequisites: AIT 612, AIT 614 and consent of AIT graduate program director.

A.I.T. 715 CASE STUDIES IN INTERNET APPLICATIONS (3)
Real-world project dealing with the development of information systems for Internet applications; emphasis on distributed information systems for Web deployment. This is a capstone course for the Internet Application Development certificate. Prerequisites: AIT 616, AIT 618 and consent of AIT graduate program director.
AIT 720 CASE STUDIES IN NETWORKING TECHNOLOGY (3)
Real-world projects dealing with the development, installation, and management of application systems or a variety of networks environment; emphasis is on distributed applications for LAN, WAN, Internet and intranet. This is a capstone course for the Networking Technologies certificate. Prerequisites: AIT 620, AIT 622 and consent of AIT graduate program director.

AIT 725 CASE STUDIES IN SOFTWARE ENGINEERING (3)
Real-world project dealing with design and development of large-scale information systems including applications of theory and techniques in software engineering. This is a capstone course for the Software Engineering certificate. Prerequisites: AIT 624 and AIT 626 and consent of AIT graduate program director.

AIT 730 CASE STUDIES IN INFORMATION SYSTEMS (3)
Real-world projects dealing with issues related to development, management and maintenance of large-scaled information systems; emphasis is on business information systems for a distributed environment. This is a capstone course for the Information Systems Management certificate. Prerequisites: AIT 628, AIT 630 and consent of AIT graduate program director.

AIT 732 ADVANCED DATABASE MANAGEMENT SYSTEMS (3)
Emphasizes advanced topics in database management systems. Topics include: query processing, concurrency and recovery techniques, advanced database models, object-oriented databases, relational databases and Web databases, distributed databases, data warehousing and OLAP. Prerequisite: AIT 632.

AIT 735 CASE STUDIES IN DATABASE MANAGEMENT SYSTEMS (3)
Real-world projects dealing with issues related to development, management and maintenance of large-scaled information systems; emphasis is on the distributed database systems and related security issues. This is a capstone course for the Database Management Systems certificate. Prerequisites: AIT 632, AIT 732 and consent of AIT graduate program director.

AIT 880 GRADUATION PROJECT (3)
Students conduct a study in an advanced IT related topic or undertake the analysis, design and implementation of real-world application. The application may be related to an industrial project sponsored by a company or it may be a mutual interest to the student and the supervising faculty. Prerequisites: Completion of at least 18 units toward M.S. in AIT or COSC.

AIT 885 PROJECT CONTINUUM (1)
Continuation of graduate project. Prerequisite: previous registration for project work.

AIT 895 DOCTORAL INDEPENDENT STUDY (3-6)
Independent guided study for doctoral students to prepare for qualifying exams in preparation for dissertation work. May be repeated up to a total of 9 units. Registration by special permit as authorized by doctoral program director or chair of the department. S/U grading.

AIT 997 DISSERTATION (3-6)
Independent guided research leading to the dissertation. May be repeated up to a total of 24 units. Registration by special permit as authorized by doctoral program director or chair of the department. Graded S/U.

AIT 999 DISSERTATION CONTINUUM (1)
Continuing work toward the completion of the dissertation. Registration by special permit as authorized by doctoral program director or chair of the department.