

INFORMATION SECURITY AND ASSURANCE, MS

Banner Code: VS-MS-ISA

Academic Advising

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The Department of Computer Science's MS degree in Information Security and Assurance prepares graduates to fill the current and future need for information security and assurance professionals. Graduates work in a wide variety of capacities, protecting the information systems of different types of organizations and supporting the nation's information infrastructure. The Master of Science in Information Security and Assurance provides students with the general and technical knowledge and skills to understand the relationship between information security and advancing information systems technology. The program gives graduates a theoretical understanding of the science and methodologies for ensuring the secrecy and integrity of data, as well as the availability and legitimate use of data and information systems.

Students focus on the technical and management aspects of information security and examine ways to provide secure information processing systems by investigating operating systems security, distributed secure system architectures, database security, software applications security, security policies, secure e-commerce, network and distributed systems security, cryptography, and security protocols. Graduates of the program are actively recruited by federal, state, and local governments, as well as the private sector. Typical employers include Internet-based companies, software companies, banks and insurance companies, and in general any organization that depends heavily on the use of IT. All classes are scheduled in the late afternoon and early evening to accommodate employed students.

Admissions & Policies

Admissions

Eligibility and Application Requirements

Applicants must hold a four-year (120-credit) baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or better in the last 60 credits. Other requirements are as follows:

- Submit the appropriate application with two letters of recommendation from people directly knowledgeable of the applicant's professional and academic competence, a one-page goals statement, and a work résumé.
- Complete the self-evaluation section of the online application. This information is used by the admissions committee to assess an applicant's academic preparation for the MS program. Students with some deficiencies in preparation may be admitted provisionally pending completion of foundation courses required for the program.
- The GRE is only required for those who have not earned a Bachelor's degree from a US Institution.
- International students must submit their English Proficiency scores.

Policies

Foundation Requirements

To ensure that students have an adequate background in mathematical methods and computer science, the program requires the following four foundation courses, or their equivalents: INFS 501 Discrete and Logical Structures for Information Systems, INFS 515 Computer Organization Course and Operating Systems, INFS 519 Program Design and Data Structures, and SWE 510 Object-Oriented Programming in Java.

Prospective students are asked to complete a departmental self evaluation form, indicating whether previously taken courses may satisfy these foundation requirements. On acceptance, students are advised of the necessary foundation courses to be satisfactorily completed to meet this requirement. Foundation courses do not earn credit toward the MS degree; however, they must be successfully completed with a grade of B or better before enrolling in the core curriculum.

Students may test out to indicate that they have the requisite knowledge for those foundations courses. The exams are given before classes begin in January and August, and can only be taken once. Registration is not required; students need only be present at the date, time, and location specified with some form of photographic identification. Detailed information is available on the department web site. Students failing any one of the exams must take the equivalent course before enrolling in the core curriculum courses.

Advising

The department holds orientation meetings each January and August to advise newly admitted and continuing students. Members of the faculty are present to answer questions and offer advice concerning programs of study. Detailed information is available on the department web site.

The department also provides an advising function to students, as outlined in the student advising form available from the department. Each student is assigned a faculty advisor with whom to confer on matters related to degree requirements. A plan of study form for the MS degree should be completed and submitted by the student soon after admission to the program. This serves as a planning guide for the student.

Requirements

Degree Requirements

Total credits: 30

Completion of the degree program requires a minimum of 30 approved graduate credits (10 courses). Students must choose a concentration.

Required Core Courses

These courses provide the necessary background and fundamentals of information systems security and assurance. To continue in the program, students are required to obtain a B- or better grade in the core courses.

Code	Title	Credits
ISA 562	Information Security Theory and Practice	3
ISA 656	Network Security	3
	One of the following:	3

INFS 612	Principles and Practices of Communication Networks	
CS 555	Computer Communications and Networking ¹	
Total Credits		9

¹ Required for students who select the Network and System Security concentration.

Concentration in Applied Cyber Security (ACBS)

Students must take any five courses from the list below. At least three of the five courses must be designated ISA or CS.

Code	Title	Credits
Select five courses from the following:		15
CS 667	Biometrics and Identity Management	
ISA 650	Security Policy	
ISA 652	Security Audit and Compliance Testing	
ISA 681	Secure Software Design and Programming	
ISA 763	Security Protocol Analysis	
ISA 785	Research in Digital Forensics	
CFRS 663	Operations of Intrusion Detection for Forensics	
CFRS 761	Malware Reverse Engineering	
CFRS 780	Advanced Topics in Computer Forensics	
ECE 646	Applied Cryptography	
ECE 746	Advanced Applied Cryptography	
Total Credits		15

Concentration in Network and System Security (NSS)

Code	Title	Credits
ISA 564	Security Laboratory	3
Select four courses from the following:		12
CS 530	Mathematical Foundations of Computer Science	
CS 531	Computer Systems and Fundamentals of Systems Programming	
CS 571	Operating Systems ¹	
CS 779	Topics in Resilient and Secure Computer Systems	
ISA 673	Operating Systems Security	
ISA 674	Intrusion Detection	
ISA 681	Secure Software Design and Programming	
ISA 763	Security Protocol Analysis	
ISA 764	Security Experimentation	
ECE 646	Applied Cryptography	
ECE 746	Advanced Applied Cryptography	
Total Credits		15

¹ Students who elect to take CS 571 Operating Systems but who have not taken CS 367 Computer Systems and Programming or its equivalent are advised to take CS 531 Computer Systems and Fundamentals of Systems Programming first.

Additional Courses

Code	Title	Credits
All students select two remaining courses from any combination of the following: ¹		6
ISA 500, 600, and 700 level courses		
CS 500, 600, and 700 level courses		
Courses from the pre-approved electives list (follows)		
ISA 799	Thesis (must take 6 credits)	
Total Credits		6

¹ Students may choose other graduate electives with the consent of their faculty advisor and the graduate coordinator.

Pre-Approved Electives by Program

- Information Systems (INFS)
- Software Engineering (SWE)
- Computer Forensics (CFRS)
- Electrical and Computer Engineering (ECE)

Information Systems (INFS)

Code	Title	Credits
INFS 623	Web Search Engines and Recommender Systems	3
INFS 740	Database Programming for the World Wide Web	3
INFS 760	Advanced Database Management	3
INFS 772	Intelligent Agents and the Semantic Web	3
INFS 774	Enterprise Architecture	3

Software Engineering (SWE)

Code	Title	Credits
SWE 619	Object-Oriented Software Specification and Construction	3
SWE 620	Software Requirements Analysis and Specification	3
SWE 621	Software Design and Architecture	3
SWE 622	Distributed Software Engineering	3
SWE 632	User Interface Design and Development	3
SWE 637	Software Testing	3
SWE 642	Software Engineering for the World Wide Web	3
SWE 645	Component-Based Software Development	3
SWE 721	Reusable Software Architectures	3

Computer Forensics (CFRS)

Code	Title	Credits
CFRS 761	Malware Reverse Engineering	3
CFRS 780	Advanced Topics in Computer Forensics	3

Electrical and Computer Engineering (ECE)

Code	Title	Credits
ECE 646	Applied Cryptography	3
ECE 746	Advanced Applied Cryptography	3

Accelerated Master's

Applied Computer Science, BS/ Information Security and Assurance, Accelerated MS

Overview

Highly-qualified students in the Applied Computer Science, BS program have the option of obtaining an accelerated Information Security and Assurance, MS program.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees. For policies governing all graduate degrees, see AP.6 Graduate Policies.

Admission Requirements

Students in the Applied Computer Science, BS program can apply for this option if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. Students must have successfully completed:

Code	Title	Credits
CS 310	Data Structures	3
CS 330	Formal Methods and Models	3
CS 367	Computer Systems and Programming	4
Total Credits		10

Accelerated Option Requirements

Students must complete all requirements for the BS and MS programs, with 6 credits overlapping.

Students register for two 500-level computer science core courses (6 credits) in place of the corresponding 400-level computer science courses, as part of the undergraduate degree requirements. Specifically, students must take

Code	Title	Credits
CS 583	Analysis of Algorithms	3
Select one of the following:		3
CS 540	Language Processors	
CS 550	Database Systems	
CS 551	Computer Graphics	
CS 555	Computer Communications and Networking	
CS 571	Operating Systems	
CS 580	Introduction to Artificial Intelligence	
CS 584	Theory and Applications of Data Mining	
Total Credits		6

Note:

Students complete all MS in Information Security and Assurance core courses and apply the two courses from the above list toward the degree requirements.

Degree Conferral

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must

complete a Bachelor's/Accelerated Master's Transition form that is submitted to the Office of the University Registrar and the VSE Graduate Admissions Office. At the completion of MS requirements, a master's degree is conferred.

Computer Science, BS/Information Security and Assurance, Accelerated MS Overview

Highly-qualified students in the Computer Science, BS have the option of obtaining an accelerated Information Security and Assurance, MS.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees. For policies governing all graduate degrees, see AP.6 Graduate Policies.

Admission Requirements

Students in the Computer Science, BS program may apply for this option if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. Students must have successfully completed CS 310 Data Structures, CS 330 Formal Methods and Models and CS 367 Computer Systems and Programming.

Accelerated Option Requirements

Students must complete all requirements for the BS and MS programs, with 6 credits overlap. Students register for 6 credits of CS 500-level basic courses in place of the corresponding CS 400-level courses required for the undergraduate degree requirements. Specifically, students must register for two of the following courses in place of the corresponding 400-level courses:

Code	Title	Credits
CS 540	Language Processors	3
CS 550	Database Systems	3
CS 551	Computer Graphics	3
CS 555	Computer Communications and Networking	3
CS 571	Operating Systems	3
CS 580	Introduction to Artificial Intelligence	3
CS 583	Analysis of Algorithms	3
CS 584	Theory and Applications of Data Mining	3

Note:

Students complete all MS in Information Security and Assurance core courses and apply the two courses from the above list toward the requirements.

Degree Conferral

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must complete a Bachelor's/Accelerated Master's Transition form that is submitted to the Office of the University Registrar and the VSE Graduate Admissions Office. At the completion of MS requirements, a master's degree is conferred.

Information Technology, BS/Information Security and Assurance, Accelerated MS

Overview

Highly-qualified students in the Information Technology, BS have the option of obtaining an accelerated Information Security and Assurance, MS.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees. For policies governing all graduate degrees, see AP.6 Graduate Policies.

Admission Requirements

Students in the Information Technology, BS program may apply to this option if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. Criteria for admission are identical to criteria for admission to the Information Security and Assurance, MS program.

Accelerated Option Requirements

Students must complete all credits that satisfy requirements for the BS and MS programs, with 6 credits overlapping with the two following courses:

Code	Title	Credits
INFS 612	Principles and Practices of Communication Networks (satisfies IT 441 requirement in the BS program)	3
ISA 562	Information Security Theory and Practice (satisfies IT 462 requirement in the BS program)	3

Note:

Students must complete MATH 125 Discrete Mathematics I (Mason Core) as their discrete math requirement and IT 306 Data Structures and Algorithms in Java as part of their concentration requirements in the BS program.

Degree Conferral

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must complete a Bachelor's/Accelerated Master's Transition form that is submitted to the Office of the University Registrar and the VSE Graduate Admissions Office. At the completion of MS requirements, a master's degree is conferred.