

# MS in Software Engineering

Software engineering is the application of engineering design principles to the development of software. It includes the design, testing, implementation, and maintenance of software.

The Master of Science in Software Engineering requires 33 credits of graduate work, consisting of four core courses, five specialization courses, and two elective courses. The curriculum features substantial choice of specialization and elective courses, thereby enabling students to tailor the program to meet their specific needs and fulfill their particular aspirations. The advanced portion of the curriculum remains open-ended, to encourage students to take advantage of new courses that concentrate on the latest developments in the field.

Completion of the curriculum requires approximately one-and-a-half years of full-time graduate study. Part-time students enrolled through NTU, whose work schedules preclude full-time study, should expect to fulfill the requirements in five years by registering for at least two three-credit courses each academic year.

## Admissions Requirements

Students must meet the following eligibility requirements for regular admission into the Software Engineering program:

- BS degree in computer science or computer engineering or a BS degree in an ABET-accredited engineering program with a minor in computing systems.
- Cumulative undergraduate G.P.A. of at least 2.9 on a 4.0 scale.
- Evidence of knowledge of the key topic materials relevant to the program.

Students who do not meet these requirements may be granted provisional admission into the program, depending on academic background and experience. For additional information about provisional admission status, see the Admission section of this bulletin.

## Curriculum Overview

Students must complete a minimum of 33 credits for graduation. These courses must satisfy the following distribution requirement: four core courses, five specialization courses, and two elective courses.

### Core Curriculum (12 credits)

The core curriculum consists of four courses and allows students to develop knowledge across a broad spectrum of topics related to computer engineering. Students select courses from a specified set of courses covering software engineering processes, software specification, analysis and design, testing, and project management. Students should complete the core courses prior to pursuing specialization and elective courses.

### Specializations (15 credits)

Students select at least five courses from an area of specialization that represents the technical emphasis most compatible with their educational and career goals. Areas of specialization for Software Engineering include architecture and design, programming and implementation, testing and reliability, and software management. Students should consult an advisor or visit the NTU Web site for information about currently offered specialization areas and courses available in those areas.

### Electives (6 credits)

Students may select their two elective courses from any of NTU's graduate-level courses to meet the elective requirement and to bring their total credits to a minimum of 33. Elective credits are designed to give students the opportunity to tailor the program to their individual and organizational goals and needs. Students are encouraged to consult with an NTU advisor to select appropriate elective courses.

### Thesis Option

Most students are expected to pursue a non-thesis Master of Science degree program. However, when desirable and appropriate, as determined by the student in consultation with his or her academic NTU advisor, a thesis option, constituting a maximum of six credits, is available and may be substituted for the elective courses. For additional information about the thesis option and guidelines, see the Academic Information section of this bulletin.

## Program of Study Plan

Admitted students should submit a Program of Study Plan (PSP) to NTU prior to completion of six semester credit hours. Failure to submit a PSP increases the possibility of students completing

duplicate courses or courses that are not applicable to their degree programs. Although NTU cannot guarantee preferred course availability in any given term, the PSP documents do guide course selection from partner universities. It may be necessary for a student to revise an approved PSP when course availability does not comply with the student's needs. The PSP form should be submitted through the NTU Web site.

The following list of courses illustrates the choice of academic material available to students wishing to obtain an MS in Software Engineering. Individual course descriptions may be found on the NTU Web site at [www.ntu.edu](http://www.ntu.edu). Specific courses and course requirements may change. Updates will be posted on the NTU Web site.

### Core Courses (12 credits)

Students must select four of the following courses to satisfy the core requirement:

SE 710	Software Engineering
SE 730	Object-Oriented Analysis and Design
SE 750	Software Testing and Verification
SE 770	Software Specification
SE 780	Software Project, Process, and Quality Management
CS 550	Information Systems
CS 740	Operating Systems Principles

### Specialization Courses (15 credits)

Students select five courses from one specialization area to satisfy this requirement. Courses for several specialization areas are listed below. Students should consult an advisor or visit the NTU Web site for information about other specialization areas and courses available in those areas.

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#### Architecture and Design

SE 720	Software Measurement
SE 725	Advanced Topics in Software Engineering
SE 735	Design of Interface Systems
SE 746	Embedded Systems Software Development
SE 762	Software Metrics and Quality Engineering
SE 767	Software Performance Engineering
CS 720	Programming Language Principles
CS 755	Distributed Database Design
CS 760	Client/Server Computing
CS 765	Distributed Computing Systems
CS 780	Advanced WWW Technologies
ST 720	Realtime Systems Analysis and Design
ST 760	Information System Security

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#### Programming and Implementation

SE 531	Advanced Java Programming
SE 538	XML, Java, and the Enterprise
SE 540	Java Distributed Enterprise Computing
SE 720	Software Measurement

SE 725	Advanced Topics in Software Engineering
SE 736	Enterprise Software Development
SE 746	Embedded Systems Software Development
SE 752	Software Reliability and Safety
SE 754	Object-Oriented Testing and Reliability
SE 760	Software Quality Assurance
SE 762	Software Metrics and Quality Engineering
SE 767	Software Performance Engineering
CS 720	Programming Language Principles
CS 760	Client/Server Computing
CS 780	Advanced WWW Technologies
ST 760	Information System Security

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#### Testing and Reliability

SE 555	Software Engineering: Analysis and Evaluation
SE 725	Advanced Topics in Software Engineering
SE 746	Embedded Systems Software Development
SE 752	Software Reliability and Safety
SE 754	Object-Oriented Testing and Reliability
SE 760	Software Quality Assurance
SE 762	Software Metrics and Quality Engineering
SE 767	Software Performance Engineering
ST 760	Information System Security

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#### Software Management

SE 760	Software Quality Assurance
SE 762	Software Metrics and Quality Engineering
SE 770	Software Specification
SE 785	Software Management and Economics
SE 786	Business Process Innovation
SE 787	Management of Computer and Information Systems
SE 792	Software Acquisition Practices, Legal and Economic Issues

### Elective Courses (6 credits)

Students may select their two elective courses from any of NTU's graduate-level courses, provided they have the appropriate prerequisite knowledge.

### Foundation Courses

Foundation courses are available for those students who do not have an adequate preparation to begin a master's program in Software Engineering. Undergraduate Foundation courses for students entering graduate study in Software Engineering are available in the topical areas given below. Foundation courses cannot be taken for graduate credit. Please see the NTU Web site for a current set of Foundation courses.

AD 310-319	Data Structures (formerly BC 30-39 Data Structures)
CA 310-319	Computer Architecture (formerly BC 60-69 Digital System Design—Computer Architecture)
CA 360-369	Microcomputers and Embedded Computer Systems (formerly BC 40-49 Microprocessors and Assembly Level Programming)

- CM 310-319 Mathematical Logic and Automata Theory  
(formerly BC 80-89 Discrete Structures)
- CS 340-349 Operating Systems (formerly BC 50-59  
Operating System Principles)
- DS 360-369 Digital Hardware Design (formerly BC 20-29  
Digital Logic Design)
- SE 330-339 Analysis and Design Techniques (formerly BC  
10-19 Fundamentals of Computer Engineering)