

# MS in Systems Engineering

Systems Engineering represents an interdisciplinary approach to sound system design. It differs from other branches of engineering in that it deals with methods for analysis, synthesis, and design of complex multidisciplinary problems as opposed to solving specific disciplinary problems. Systems engineers in the 21st century can be found in many traditional engineering fields such as communications, aerospace, defense, manufacturing, and information technology, as well as nontraditional fields such as transportation logistics, medical devices, agriculture, and even criminal justice. The processes and tools enable engineers to define and validate system requirements, develop effective designs, and ensure that those designs are safe and meet customer requirements.

NTU's Systems Engineering master's degree program is designed to enable engineers from various disciplinary backgrounds to either focus completely on systems engineering or pursue a systems engineering approach from within a specific engineering discipline perspective.

Completion of the curriculum will take approximately one-and-a-half years of full-time graduate study. Part-time students enrolled through NTU, whose work schedules preclude full-time study, can expect to fulfill the requirements within 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 Systems Engineering program:

- BS degree in an engineering discipline from an ABET-accredited engineering program in the United States or a CEAB-accredited program in Canada; or the equivalent from a foreign institution.
- Cumulative undergraduate G.P.A. of at least 2.9 on a 4.0 scale.

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. Students will complete five core courses, four specialization courses, and two elective courses.

### Core Curriculum (15 credits)

Five courses comprise the Systems Engineering core and provide a foundation in systems concepts and methods. Students will complete courses in the following topic areas:

- Accounting and Finance
- Systems Engineering Principles and Processes
- Systems Management
- Systems Modeling, Analysis, and Optimization
- Systems Reliability

Students should complete the core courses prior to pursuing specialization and elective courses.

### Specializations (12 credits)

Beyond the core curriculum, students pursue specializations, completing four courses identified by NTU as appropriate to provide depth in a particular area of specialization. Specializations include the following:

- Information Systems
- Software Systems
- Systems Engineering
- Systems Engineering Management
- Systems Quality and Reliability

### Electives (6 credits)

Students select two additional courses from the NTU graduate catalog to meet the elective requirement and 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 confirm they have the appropriate prerequisite knowledge.

## 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 stu-

dent's needs. The PSP form should be submitted through the NTU Web site.

*Specific courses and course requirements may change. Updates will be posted on the NTU Web site.*

### **Core Courses (15 credits)**

Students must take the following courses to satisfy the core requirement:

SY 720	Systems Engineering and Analysis
SY 540	Systems Optimization and Analysis
SY 560	Systems Engineering Management
NB 750	Accounting and Finance—Measurement and Flow Control for the Economic Engine
SY 580	Systems Engineering Design

### **Specialization Courses (12 credits)**

Students select four courses from one specialization area to satisfy this requirement:

#### **Information Systems**

This specialization provides students with the opportunity to focus on information systems management.

TO 710	Information Systems
CS 750	Database Management Systems
SE 786	Business Process Innovation
SE 787	Management of Computer and Information Systems
SE 780	Evaluation of Information Systems

#### **Software Systems**

This specialization provides students with the opportunity to focus on software development and management.

SE 710	Software Engineering
SE 786	Business Process Innovation
SE 787	Management of Computer and Information Systems
SE 792	Software Acquisition Practices, Legal and Economic Issues
SE 760	Software Quality Assurance

#### **Systems Engineering**

This specialization provides students with the opportunity to focus on systems concepts, methods, and tools more in depth.

SY 521	Systems Analysis Methods
SY 562	Systems Integration and Test
SY 563	Integrated Risk Management
SY 570	Logistics Systems Engineering
SY 750	Systems Reliability Engineering

#### **Systems Engineering Management**

This specialization provides students with the opportunity to emphasize management.

SY 563	Integrated Risk Management
MB 710	Introduction to Engineering Management

NB 721	Leadership and Teamwork—Accomplishing Momentum Transfer Using Authority, Power, and Influence
NB 720	Organizational Behavior—Working Within the Equations of State
TO 760	Introduction to Project Management
NB 710	Technology and Operations—Moore's Law and Other Business Accelerators

#### **Systems Quality and Reliability**

This specialization provides students with the opportunity to focus on quality management and improvement, statistical methods, systems testing, and reliability.

SY 750	Systems Reliability Engineering
SY 562	Systems Integration and Test
TO 771	Reliability Engineering
TO 750	Total Quality Management
MA 520	Probability and Statistics for Engineers
MA 731	Design and Statistical Analysis of Experiments for Engineers

### **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.