

## **Technological Systems Management (TSM)**

### **Major and Minor in Technological Systems Management**

#### **Department of Technology and Society, College of Engineering and Applied Sciences**

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## **Technological Systems Management (TSM)**

The Department of Technology and Society offers the major in Technological Systems Management leading to the Bachelor of Science degree. The program integrates a foundation in the natural sciences, engineering, applied sciences, or environmental studies with applications in technology systems, assessment, and management. The Department also offers a minor in Technological Systems Management.

The major prepares students for careers in government, industry, or education in positions such as manager of computer network systems, manager of information systems, quality control specialist, systems or environmental analyst, technical sales representative, or technology trainer/educator-in short, all professions and business ventures that are dependent on technological applications and implementation and in which project management is key to success. Students are also prepared for advanced study in areas such as business, law, education, policy analysis, and industrial or environmental management.

The Department's focus is on technological advances that shape every facet of modern life. Students develop understanding of the characteristics, capabilities, and limitations of current and emerging technologies. Successful practices in government, industry, education, and personal life depend on such understanding. The Department applies engineering concepts that underlie technological change and that form the bridge from engineering to other disciplines. In this multidisciplinary approach, the Department provides one of the vehicles by which Stony Brook interacts with other universities and colleges, pre-college institutions, professional schools, government, and industry. Effective management of modern technologies requires use of tools from many domains: science and engineering, information technologies, economics, legal and regulatory practice, psychology and sociology, design and assessment.

### **Requirements for the Major and Minor in Technological Systems Management (TSM)**

#### Acceptance into the Major in Technological Systems Management

Qualified freshman and transfer students who have indicated their interest in the major on their applications may be admitted directly as a degree major or as a pre-major. Pre-majors are placed into the Area of Interest (AOI) program and to be eligible for the degree, they must be admitted to and declare the major. The requirements and application process for matriculation are detailed below. Students admitted to other programs within the College of Engineering and Applied Science (CEAS) follow the same admissions process as students in the AOI program. Students in programs outside of CEAS (non-CEAS students) and double major applicants may apply for admission to the degree program following a separate process, outlined below.

Intellectual honesty and academic integrity are cornerstones of academic and scholarly work. The department may table any applications for major/minor admission until academic judiciary matters are resolved. An academic judiciary matter will be identified by a grade of "Q" in the instance of a first offense.

#### Area of Interest and Other CEAS Students (excluding double major applicants)

Applications for major admission from AOI and other CEAS students are reviewed twice per year and must be received by January 5 for Spring admission and June 5 for Fall admission. Students who submit their application on time will be admitted if they meet the following requirements:

- Completed AMS 161 and the second course in a natural sciences sequence, or their equivalents;
- Earned a cumulative grade point average of 2.50;
- Received completed course evaluations for all transferred courses that are to be used to meet requirements for the major.

Students must complete these requirements no later than one year after they enroll in the first course that applies towards major entry. Students must apply for admission by the application deadline immediately following completion of the above requirements, but no later than the one year limit. Admission of AOI students and other CEAS students who apply late will follow the process of Non-CEAS Students and Double Major Applicants below.

#### Non-CEAS Students and Double Major Applicants

Applications for major admission from non-CEAS students and double major applicants are reviewed twice per year and must be received by January 5 for Spring admission and June 5 for Fall admission. Students who do not meet the requirements for AOI admission above will not be considered. Fulfilling the requirements does not guarantee acceptance. Admission is competitive and contingent upon program capacity.

#### Requirements for the Major in Technological Systems Management (TSM)

Students must complete a specialization. Specializations are drawn from programs in natural science, engineering and applied science, environmental studies or may be defined by the department. (For those students who have a major in one of those areas and who pursue Technological Systems Management as a second major, the first major will serve as the specialization.)

Completion of the major requires approximately 79 credits.

#### A. Mathematics

- AMS 151, AMS 161 Applied Calculus I, II

Note: The following alternate calculus course sequences may be substituted for AMS 151, AMS 161: MAT 125, MAT 126, MAT 127 or MAT 131, MAT 132 or MAT 141, MAT 142 or MAT 171

#### B. Natural Sciences

One of the following sequences:

##### 1. PHY 131 and PHY 132 Classical Physics I, II

Note: One of the following alternate physics course sequences may be substituted for PHY 131 and PHY 132:

PHY 121 and PHY 122 or PHY 125, PHY 126, PHY 127 or PHY 141, PHY 142

2. BIO 201, 202, 204 or BIO 201, 203, 204 or BIO 202, 203, 204 Fundamentals of Biology

3. CHE 131, CHE 132 General Chemistry I, II

4. GEO 102, GEO 112 The Earth/Physical Geology Lab and one of the following:

GEO 304 Energy, Mineral Resources and the Environment

GEO 311 Geoscience and Global Concerns

Note: This sequence will not fulfill the University D.E.C. E requirement.

5. BIO 201 Principles of Biology: Organisms to Ecosystems and one of the following:

GEO 101 Environmental Geology

MAR 104 Oceanography

EST/ATM 102 Weather and Climate

ENS 101 Prospects for Planet Earth

or any other natural science course with permission of the department.

#### C. Study in Related Areas: Specialization

A cluster of seven related courses, totaling at least 21 credits<sup>\*</sup>, in one area of natural science, engineering, applied science, or environmental studies from a single department or program, or in the department defined specialization of Information and Communication Technologies for Development. At least three courses, totaling at least nine credits, must be at the 300 or 400 level. Specializations in the areas of Computer Science and Information Systems are slightly different. (See "Prescribed Areas of Specialization" below for the specializations with course options.)

\*Note: All 21 credits must be unique without any overlap in requirements: A, B, D or E.

#### D. Technological Systems Management

##### 1. Required courses (11)

1. EST 194 Decision-making

2. EST 202 Introduction to Science, Technology, and Society Studies

3. EST 304 Communication for Engineers and Scientists

4. EST 331 Engineering Ethics

5. EST 391 Technology Assessment

6. EST 392 Engineering Economics

7. EST 393 Project Management

8. EST 440 Interdisciplinary Research Methods

9. EST 441 Interdisciplinary Senior Project

10. One skills-information course:

EST 240 Visual Rhetoric

EST 291 Energy, Environment and People

EST 305 Applications Software for Information Management

EST 325 Technology in the Workplace

EST 326 Management for Engineers

EST 339 Benevolent Computing  
 EST 344 Technical Writing  
 EST 364 How to Build a Startup

11. One design course:

EST 205 Introduction to Technological Design: Innovation and Design Thinking  
 EST 207 Interaction Design  
 EST 209 Introduction to Italian Design: Theory and Practice  
 EST 310 Design of Computer Games  
 EST 323 Human-Computer Interaction

2. Electives (3)

- EST 205 Introduction to Technological Design: Innovation and Design Thinking
- EST 207 Interaction Design
- EST 221 Multimedia for Online Content Platforms
- EST 240 Visual Rhetoric and Information Technology
- EST 280 Fundamentals of Industrial Engineering
- EST 291 Energy, Environment, and People
- EST 304 Communication for Engineers and Scientists
- EST 305 Applications Software for Information Management
- EST 310 Design of Computer Games
- EST 320 Comm Technology Systems
- EST 323 Human Computer Interactions
- EST 325 Technology in the Workplace
- EST 327 Systems Engineering Management, Elements of Product Design and Development
- EST 339 Benevolent Computing
- EST 342 Industrial Engineering, Intro to Operations Research I
- EST 364 How to Build a Startup
- EST 475 UG TA
- EST 488 Internship in TSM
- EST 499 Research in TSM
- Other 300/400 level courses in the area of specialization are allowed upon the approval of the TSM advisor

Please note:

- At most 3 credits of the 3 electives can be counted from the following courses: EST 475, EST 488 and EST 499.
- Only two, 200-level courses may be used in the major elective category unless permission is received from the department.
- Students may take other 300 or 400 level courses in their area of specialization with the approval of the undergraduate program director/ advisor.

E. Upper-Division Writing Requirement

All degree candidates must demonstrate skill in written English at a level acceptable for Technological Systems Management majors. To satisfy this requirement, Technological Systems Management majors must complete EST 440 and EST 441 with a grade of C or higher. Successful completion of these two courses also satisfies the university WRD requirement.

Grading

All courses taken to satisfy requirements A through D above must be taken for a letter grade. A grade of C or higher is required in all.

**Prescribed Areas of Specialization**

**Specialization in Computer Science**

A specialization in the area of Computer Science also requires completing at least 21 credits (nominally, seven courses). Four introductory courses are required; this rigorous sequence of courses will provide students with a good background to complete the upper division courses for the specialization. Students who specialize in Computer Science may not specialize in Information Systems.

Students specializing in Computer Science must take the following four courses:

1. CSE 101 Computer Science Principles
2. CSE 114 Introduction to Object-Oriented Programming
3. CSE 214 Data Structures
4. ISE 218 Fundamentals of Information Technology

\*Students with demonstrated programming experience may substitute a course from the special topics sequence CSE 190-191-192 for CSE 101, with permission of the Computer Science Department Undergraduate Committee.

Students must also select three courses from the following list:

- ISE 305 Database Design and Practice
- One of: CSE 310 Computer Networks or ISE 316 Introduction to Networking
- CSE 337 Scripting Languages
- CSE 373 Analysis of Algorithms
- Up to two courses from CSE 390-CSE 391-CSE 392 Special Topics

### Specialization in Information Systems

A specialization in Information Systems also requires completing at least 21 credits (nominally, seven courses). Four introductory courses are required; this rigorous sequence of courses will provide students with a good background to complete the upper division courses for the specialization. Students who specialize in Information Systems may not specialize in Computer Science.

Students specializing in Information Systems must take the following four courses:

1. CSE 101 Computer Science Principles
2. CSE 114 Introduction to Object-Oriented Programming
3. CSE 214 Data Structures
4. ISE 218 Fundamentals of Information Technology

\*Students with demonstrated programming experience may substitute a course from the special topics sequence CSE 190-191-192 for CSE 101, with permission of the Computer Science Department Undergraduate Committee.

Students must also select three courses from the following list:

- ISE 305 Database Design and Practice
- One of: CSE 310 Computer Networks or ISE 316 Introduction to Networking
- ISE 321 Introduction to Network Administration
- ISE 331 Fundamentals of Computer Security
- Up to two courses from CSE 390-CSE 391-CSE 392 Special Topics

### Requirements for the Minor in Technological Systems Management (TSM)

All students must complete six or more of the following EST electives (minimum 18 credits) with a g.p.a. of 2.50 or higher. No grade less than C may be used to meet the requirements for the minor. EST courses counted toward the requirements for a student's major may not be counted towards the requirements for the TSM minor. Please note: only two, 200-level courses may be used for the minor unless permission is received from the department. Students must complete Calculus I and II or their equivalents (AMS 151 & 161 or MAT 125, 126 & 127 or MAT 141 & 142 or MAT 171) with a grade of C or better before applying for the minor.

At least one design course:

- EST 205 Introduction to Technological Design : Innovation and Design Thinking
- EST 207 Interaction Design
- EST 310 Design of Computer Games

At least one skills-information course:

- EST 106 The Digital Generation: Creating a Professional Web Presence
- EST 194 Decision-making
- EST 305 Applications Software for Information Management
- EST 325 Technology in the Workplace

Other courses in the minor:

- EST 201 Introduction to Tech Design
- EST 240 Visual Rhetoric and Information Technology
- EST 280 Fundamentals of Industrial Engineering
- EST 291 Energy, Environment, and People
- EST 320 Comm Technology Systems
- EST 342 Industrial Engineering, Intro to Operations Research I
- EST 391 Technology Assessment
- EST 393 Project Management

### Sample Course Sequence for the Major in Technological Systems Management

For more information about SBC courses that fulfill major requirements, [click here](#).

#### FRESHMAN

<b>FALL</b>	<b>Credits</b>
First Year Seminar 101	1
WRT 101	3
EST 202 (TECH)	3
AMS 151 (QPS)	3
Natural Science 1 (SNW)	4
Total	14

<b>SPRING</b>	<b>Credits</b>
First Year Seminar 102	1
WRT 102	3
EST 194	3
AMS 161	3
Natural Science 2 (SNW)	4
Total	14

**SOPHOMORE**

<b>FALL</b>	<b>Credits</b>
EST Design	3
EST 304	3
Specialization course	3
Elective	3
SBC course	3
Total	15

<b>SPRING</b>	<b>Credits</b>
EST Skills - Info	3
EST Spec. Elective	3
Specialization course	3
SBC course	3
SBC course	3
Total	15

**JUNIOR**

<b>FALL</b>	<b>Credits</b>
EST 331	3
EST 391 (STAS)	3
EST Spec. Elective	3
Specialization course	3
Elective	3
Elective	3
Total	18

<b>SPRING</b>	<b>Credits</b>
EST 392 (SBS)	3
EST 393	3
Specialization course	3
Specialization course (300-400)	3
Elective	3
<b>Total</b>	<b>15</b>

**SENIOR**

<b>FALL</b>	<b>Credits</b>
EST 440*	3
EST Spec. Elective	3
Specialization course (300-400)	3
SBC course	3
Elective	3
<b>Total</b>	<b>15</b>

<b>SPRING</b>	<b>Credits</b>
EST 441*	3
Specialization course (300-400)	3
Elective	3
Elective	3
Elective	3
<b>Total</b>	<b>15</b>

\*This course partially satisfies the following: ESI, CER, SPK, WRTD, SBS+, STEM+, EXP+. For more information contact the CEAS Undergraduate Student Office.

*NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.*