Technology and Society

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Advanced Graduate Certificate Awarded
Advanced Graduate Certificate in Educational Computing; Advanced Graduate Certificate in Industrial Management

Degrees Awarded
M.S. in Technological Systems Management; Ph.D. in Technology, Policy, and Innovation

Technology and Society

Technology shapes every facet of modern life. Familiarity with the characteristics, capabilities, and limitations of current and emerging technologies is indispensable to wise and effective decisions and practices in government, business and personal life. At all levels and in all disciplines, careers in industry, government and education ever more turn on the ability to see and seize the opportunities, and address the problems, that technology often presents. Technological developments are indeed re-defining these very careers, and changing the workplace itself.

Managing modern technologies calls upon a synthesis of tools drawn from many areas: science and engineering, computers and information, economics and regulation, psychology and community values, design and assessment. The Master’s Degree in Technological Systems Management provides professionals in all fields, and persons planning such careers, with state-of-the-art concepts, analytical tools and practical skills for managing specific technological systems and improving their performance. Students may opt to pursue one of these four areas of focus areas: Educational Technology, Energy and Environmental Systems, Global Technology Management, or Energy, Technology, and Policy. Students must take a common core of six credits, and an additional 24 elective credits. It is strongly recommended that elective credits be specific to the selected focus area.

The Technology, Policy, and Innovation (TPI) Ph.D. program has a four-part mission:

- To develop a cadre of scholars who will be engines of national leadership in charting and gauging the future course of technologies;
- To carry out policy and design/planning research in intersecting socio-technological areas: energy and environmental systems; and engineering & technology workforce policy;
- To establish a new model for doctoral education that promotes highly intensive collaborations and uses advanced educational technologies in a fertile, diverse, globally networked laboratory environment that transcends disciplinary boundaries; and,
- To serve as an exemplary resource for regional and national industry and government, as well as for schools, colleges/universities, and other educational institutions in both implementing technological innovation and carrying out policy studies.

Students in the Technology, Policy, and Innovation (TPI) Ph.D. program will work in one or more areas of faculty research strength, including: 1) energy and environmental systems; 2) Engineering Education, Management, and Policy. In addition to drawing on the expertise of faculty in the Department of Technology and Society, the Ph.D. program is supported by more than 20 affiliated faculty members from throughout the Stony Brook campus.

The Advanced Graduate Certificate in Educational Computing prepares current and prospective teachers to use advanced technologies in learning and teaching, and helps business and industrial trainers and educators to develop and teach computer applications, multimedia technologies, and computer-based documentation. Students elect either the school track or the business/industry track. The Advanced Graduate Certificate in Industrial Management helps managers develop their abilities to use advanced technologies in their companies, understand their business processes, reduce waste and inefficiencies, and improve the bottom line of their companies.

Admission requirements for the Department of Technology and Society

Admission to the M.S. and Ph.D. programs is handled separately by the Departmental admissions committee. The requirements for admission to graduate study in this department include:

A. A bachelors degree in engineering, natural sciences, social sciences, mathematics, or a closely related area from an accredited college or university. For admission to the M.S., students who elect to take a block of elective courses within the Energy and Environmental Systems and the Energy, Technology, and Policy focus areas will need to have completed prerequisite courses of one year of calculus (MAT 131, 132 or equivalent).

B. A minimum undergraduate grade point average of 3.00.

C. Three letters of recommendation.

D. Graduate Record Examination (GRE) General Test scores.
E. Acceptance by the Department of Technology and Society and the Graduate School.

F. If your native or primary language is not English, a test to measure your English proficiency is required. The department and Graduate School accept TOEFL and IELTS examination scores. English proficiency requirements for the master’s and the Ph.D. programs are different. For the master’s program, the minimum score for TOEFL is 85 and an overall score of 6.5 with no subsection below 6 for IELTS. For the Ph.D. program, the minimum score for TOEFL is 90 and the overall score of 7.5 with no subsection below 6.5 for IELTS.

G. A Statement of Purpose describing the applicant’s relevant past experience and immediate and long-term goals. For the master’s program, your statement of purpose must include your focus area: Educational Technology, Energy and Environmental Systems, Global Technology Management, or Energy, Technology, and Policy. (Please state your focus area at the top of the personal statement page.) For the Ph.D. program, the statement of purpose should describe how the type of research that students expect to conduct while in the program relates to one of the department’s research areas, energy and environmental systems and/or Engineering Education, Management, and Policy.

H. All official transcripts, recommendation letters (those not uploaded in the Graduate School’s online application system), etc. must be sent to the Department of Technology and Society, Stony Brook University, Stony Brook, N.Y. 11794-4404. In special cases, applicants who do not satisfy requirement a or b may be admitted on a conditional basis and may be subject to additional course requirements. Appropriate courses taken in non-matriculated status may be applied towards the M.S. degree in Technological Systems Management and the Ph.D. degree in Technology, Policy, and Innovation; however, no more than 12 credits taken in non-matriculated status can be applied to the credit requirements for the M.S. and Ph.D. degrees.

For admission to the Advanced Graduate Certificate program, students must have a bachelor’s degree and an undergraduate GPA of at least 3.0. Students with lower averages may be admitted in non-matriculated status that may be changed upon earning six or more graduate credits applicable to the Certificate with a GPA of 3.0 or higher.

Credits for Certificate program courses may be applied to requirements for the M.S. degree in Technological Systems Management, subject to Graduate School rules and limitations; however, no more than 12 credits may be transferred.

Facilities of the Department of Technology and Society

Graduate students enrolled in the Department of Technology and Society have access to several computing facilities. The University maintains a wide range of mainframe facilities and personal computing laboratories. However, the department uses its two in-house, state-of-the-art computer laboratories as hands-on enhancements of the graduate student’s experience. The first lab has 20 Pentium Desktop computers that operate as stand-alones or within a basic network environment. The lab is integrated into the campus WAN, with full Internet access and a wide array of educational, academic, and professional software. Video cameras, scanners, printers, laptops, and a projection system are available for student use within the lab. The second computer laboratory is used for research and teaching related to computer-supported collaboration, E-learning technologies, and emerging educational technologies. The lab, available for faculty and students, consists of 20 laptop computers on a cart. Both labs are designed for student work and as open laboratories to give students the broadest, in-depth exposure to information technologies. The Department of Technology and Society is also a major contributor to three research centers at Stony Brook (the Advanced Energy Research and Technology Center (AERTC), the Center for Excellence in Wireless and Information Technology (CEWIT), and the Center for Interdisciplinary Environment Research) and collaborates with scientists at Brookhaven National Laboratory (BNL). Students working on research projects will have access to the facilities as appropriate for their project.

Requirements for the M.S. Degree in Technological Systems Management

Typically, students in the master's program choose one of four focus areas and take all 24 elective courses within the selected focus area. Students are required to complete two courses (EST 581 and EST 582) for six credits and 24 additional elective credits. Suggested additional credits for each of the 4 areas of focus are indicated below. Consult with the Graduate Program Director for more guidance.

Required Courses (6 credits): EST 581, EST 582

Note: Entering students are presumed to have essential communications, computer, and mathematical skills. Otherwise, prerequisite study in these areas will be required.

Elective Courses

Educational Technology Focus Area
Additional Courses: EST 521, EST 522, EST 523, EST 524, EST 525, EST 527, EST 528, EST 565, EST 567, EST 570, Est 571, EST 573, EST 574, EST 575, EST 576, EST 578, EST 579, EST 585, EST 590, EST 591, EST 599.

Energy and Environmental Systems Focus Area
Additional Courses: EST 592, EST 593, EST 594, EST 595, EST 590, EST 502, EST 540, EST 541, EST 553, EST 576, EST 580, EST 584, EST 586, EST 588, EST 591, EST 597, EST 599, Master’s Project

Courses from other departments with permission from the Graduate Program Director: AMS 520, AMS 571, BEE 550, CEY 501, CEY 509, GEO 564, ESM 513, MAR 512, MBA 570, MEC 502, POL 531, POL 543, SOC 511.

Global Technology Management Focus Area
Additional Courses: EMP 502, EMP 504, EMP 506, EMP 507, EMP 517, EMP 518, EST 508, EMP 511, EMP 521, EMP 522, EMP 523, EMP 524, EMP 525, EMP 530, EMP 531, EMP 532, EMP 530, EST 599.

Energy, Technology, and Policy Focus Area
Courses:
Students must complete eight additional courses. It is suggested that students take at least one course from each of the Groups A - E below and the keystone project (Group F). The following are partial lists of courses in each group. They will be regularly updated to add new courses that are appropriate to this course of study.

**Group A: science and engineering approach to energy systems**
- EST 592 - Sustainable Energy: Technology, System, Market, & Policy (*highly recommended*)
- EST 535 - Electric Power Systems (*highly recommended*)
- MEC 506 - Energy Management in Commercial Buildings
- MEC 515 - Emerging Energy Technologies
- MEC 520 - Energy Technologies Thermodynamics
- MEC 522 - Building Energy Dynamics and Technology

**Group B: environmental sciences and tools**
- EST 592 - Sustainable Energy: Technology, System, Market, & Policy (*highly recommended*)
- EST 535 - Electric Power Systems (*highly recommended*)
- EST 584 - Air pollution and air quality management
- EST 593 - Risk assessment and hazard management
- EST 594 - Diagnosis of environmental disputes
- EST 595 - Principles of environmental systems analysis
- MAR 566 - Atmospheric air pollution and its control
- MAR 587 - GIS: display and analysis of environmental data

**Group C: quantitative methods and tools**
- EST 592 - Sustainable Energy: Technology, System, Market, & Policy (*highly recommended*)
- EST 535 - Electric Power Systems (*highly recommended*)
- EMP 504 - Quantitative Methods in Management
- POL 501 - Introduction to statistics for public policy
- POL 502 - Intermediate statistics for public policy
- MBA 503 - Data Analysis and Decision Making
- MEC 507 - Mathematical Methods in Engineering Analysis I
- AMS 507 - Introduction to Probability
- AMS 510 - Analytical Methods for Applied Mathematics and Statistics
- AMS 540 - Linear Programming
- AMS 550 - Stochastic Models
- AMS 553 - Simulation and Modeling
- AMS 556 - Dynamic Programming
- AMS 572 - Exploratory Data Analysis

**Group D: economics, business, and management**
- EST 592 - Sustainable Energy: Technology, System, Market, & Policy (*highly recommended*)
- EST 535 - Electric Power Systems (*highly recommended*)
- EST 546 - Financing the Transition to a Low-Carbon Society
- EMP 501 - Behavioral and organizational aspects of management
- EMP 502 - Management accounting and finance
- EMP 518 - Technology Projects
- POL 509 - Public budgeting and finance
- MBA 501 - Managerial economics
- MBA 502 - Finance
- MBA 504 - Financial Accounting
- MBA 570 - Entrepreneurship

**Group E: social sciences and public policy**
- EST 592 - Sustainable Energy: Technology, System, Market, & Policy (*highly recommended*)
- EST 535 - Electric Power Systems (*highly recommended*)
- EST 583 - National Energy Decision Making
- EST 600 - Introduction to Technology, Policy, & Innovation (*special permission*)
- POL 531 - Topics in public affairs: planning
- POL 535 - Public policy analysis and evaluation
- POL 540 - Data applications in public policy
- POL 542 - Regional planning
Requirements for the Advanced Graduate Certificate in Educational Computing

(See course titles and descriptions below.)

A total of 18 credits (four core courses and two electives) are required.

Core Courses: EST 565, EST 567, EST 570, EST 571

School Track
Choose one of three: EST 563, EST 573, EST 585
Choose one of three: EST 591, CEI 511, CEN 580

Business Track
Choose one of three: EST 509, EST 520, EST 530
Choose one of three: EST 573, EST 591, EST 596

Requirements for the Advanced Graduate Certificate in Industrial Management

The AGC in Industrial Management consists of 18 graduate credits:

Core Courses (9 credits). All three courses must be taken.

EMP 502 Engineering Economics (formerly Management Accounting and Financial Decision Analysis)
EMP 506 Strategic Technology Analysis (formerly Engineering Enterprise Management)
EMP 509 Management Information Systems

Required Courses (6 credits). Two of the five courses must be taken.

EMP 501 Behavioral and Organizational Aspects of Management
EMP 503 Legal and Regulatory Aspects of Management
EMP 504 Quantitative Methods of Management
EMP 511 Starting the High Technology Venture
EMP 517 Quality Management

Elective Course (3 credits). Select one of the required courses or one course from the following list.

EST 520 Computer Applications and Problem Solving
EST 530 Internet Electronic Commerce
EST 581 Heuristics and Quantitative Decision Making (formally Methods of Socio-Technological Decision Making)
EST 582 Introduction to Systems Concepts (formally Systems Approach to Human-Machine Systems)

Requirements for the Ph.D. Degree in Technology, Policy, and Innovation

Please refer to our web site for the application deadline: www.stonybrook.edu/est. Applications are only accepted for the Fall semester.

A. Residence
The student must complete two consecutive semesters of full-time graduate study. Full-time study is 12 credits per semester until 24 graduate credits have been earned. Students who have earned 24 graduate credits at another school may be assigned advanced status and are required to take only nine credits per semester for full-time status.

B. Qualifying Examination
The qualifying examination must be taken by all students, regardless of whether they enter the program holding a master’s degree or a bachelor’s degree only. Students are expected to take the qualifying examination in the fourth semester, preferably after having completed 34 credits in the program. The qualifying exam has three parts to it.

Part A: The student conducts an original research project, starting in the first semester in the program, and presents the results to the department during the fourth semester. The purpose of this is to ascertain the student’s preparation to conduct independent original research in a TPI area.

The student is expected to conduct an independent research project under the guidance of a faculty advisor, and present the results. We expect that the quality of the methodology and results should be sufficient for a poster presentation at a leading academic conference.

The Part A exam may be presented at any time that is convenient for the student and the student’s Part A committee. For full-time students, this should occur sometime during the 4th semester; part-time students may take the exam up to one year later. The student’s advisor and the student consult to make a recommendation to the Chair of the Department regarding the composition of the Part A Committee. Typically, the
The student’s Part A Committee will be comprised of four faculty members, and include at least one faculty member from outside of the Department of Technology and Society. The student’s advisor does not serve on the student’s Part A committee.

The Part A committee will evaluate the exam in terms of its 3 components:

1. **Written report** – typically, 15-30 pages, and, typically, 50-100 citations. The report must a) identify a research question of interest to a research community; b) provide an overview of related background research; c) describe a reasonable approach to addressing the research question; and d) present the results of the research project.

2. **Presentation** - approximately 45 minutes. The presentation must a) provide a motivation for conducting this line of research; b) summarize the background material, emphasizing only the most important related work; c) give an overview of the methodology, emphasizing why this approach was taken; and d) give results.

3. **Questions** - posed by members of the committee following the presentation. Questions may be related to any aspect of the presentation or the written report.

**Part B:** The student achieves an average GPA of 3.7 or higher on three social sciences-related courses:

- Research Methods I – from a social sciences department
- Research Methods II – from a social sciences department
- EST 610 (Advanced Statistics)—within Department of Technology and Society

**C. Course Requirements**

1. For students who entered the Ph.D. Program prior to Fall, 2014, course requirements are as follows:

   - EST 600 (Technology and Policy)
   - EST 610 (Data Analysis, or equivalent approved course)
   - EST 620 (Decision Making)
   - 3 courses from Social Sciences Departments (Research Method I, Research Methods II, and Advanced Statistics)
   - 15 credits of technical electives (foundation for technical/technology dimension of planned research)

1. For students who entered the Ph.D. program in Fall, 2014 or later, course requirements are as follows:

   - EST 600 (Technology and Policy)
   - EST 610 Revised (Advanced Statistics)
   - EST 625 (Advanced Technology and Policy)
   - 2 courses from social sciences departments (Research Methods I, and Research Methods II)
   - 15 credits of technical electives (foundation for technical/technology dimension of planned research)

The following courses have been designated as “highly recommended”, and advisors ensure that nearly all students take the courses:

- EST 605 and EST 606 (Economics)
- EST 692 (Research Seminar)
- EST 601 (Grand Challenges in Energy—for students in energy area only)

In addition to regular course requirements, University policy requires that all doctoral students participate in an appropriately structured teaching practicum. This can be accomplished with a Practicum in Teaching course, in conjunction with T.A. responsibilities.

**D. Thesis Proposal and Preliminary Examination**

Students who pass all three parts of the qualifying examination are expected to develop a thesis proposal within one semester for full-time students, and two semesters for part-time students. This thesis proposal must then be presented and defended in an oral preliminary examination.
Failure to fulfill this requirement within 18 months of passing the qualifying examination, and without a formal extension, may be considered evidence of unsatisfactory progress toward the Ph.D. degree.

The major requirements of the thesis proposal are as follows: (1) the student must be thoroughly familiar with the background and current status of the intended research area; (2) the student must have clear and well-defined plans for pursuing the research objectives; and (3) the student must offer evidence of progress in achieving these objectives.

The student will present the thesis proposal to the thesis committee in a seminar presentation. It is limited to members of the committee. The committee for the student’s preliminary examination, dissertation and defense will include at least one faculty member who does not have a primary or joint appointment in Department of Technology and Society. Students will be strongly encouraged to have at least one faculty member from another university on their committee. As part of the preliminary examination, faculty members are free to question the student on any topics they feel are in any way relevant to the student’s objectives and career preparation. Most questions, however, will be directed toward verifying the student’s grasp of the intended specialty in depth. The student will be expected to show complete familiarity with the current and past literature of this area.

The findings of the committee will be communicated to the student as soon as possible and to the Graduate School within one week of the presentation of the proposal. A student who does not pass the preliminary examination on the first attempt will be given a second chance. If the preliminary is failed on the second attempt, the student will be dismissed from the program.

Having passed the preliminary examination, the student is advanced to candidacy. This status, called G5, is conferred by the Dean of the Graduate School upon recommendation of the Department. Note that unlike the change from G3 to G4, the change from G4 to G5 is not automatic—the student must request to be advanced to candidacy by notifying the Technology and Society Graduate Program Coordinator. Students must advance to candidacy at least one year before defending their dissertations. The Graduate School requires G5 students to register for nine credits, which can be research or other graduate courses relevant to their dissertation. Courses outside of the major require the approval of the dissertation advisor and Graduate Program Director. Failure to complete the preliminary examination within the specified timeframe and obtain the G5 status is considered evidence of unsatisfactory progress.

E. Dissertation
An important requirement of the Ph.D. program is the completion of a dissertation which must be an original scholarly investigation. The dissertation shall represent a significant contribution to the scientific literature, and its quality shall be compatible with the publication standards of appropriate reputable scholarly journals.

F. Approval and Defense of Dissertation
The dissertation must be orally defended before a dissertation examination committee, and the candidate must obtain approval of the dissertation from this committee. The oral defense of the dissertation is open to all interested faculty members and graduate students. The final draft of the dissertation must be submitted to the committee no later than three weeks prior to the date of the defense.

G. Satisfactory Progress and Time Limit
Students are expected to finish all the requirements, including thesis research and defense, in four to five full-time-equivalent years. A student who does not meet the target dates for the Qualifying Examination, Thesis Proposal, and Preliminary Examination, or who does not make satisfactory progress toward completing thesis research, may lose financial support. The candidate must satisfy all requirements for the Ph.D. degree within seven years after completing 24 credit hours of graduate courses in the Department of Technology and Society at Stony Brook. In rare instances, the Dean of the Graduate School will entertain a petition to extend this time limit, provided it bears the endorsement of the Department’s Graduate Program Director. A petition for extension must be submitted before the time limit has been exceeded. The Dean or the Department may require evidence that the student is still properly prepared for the completion of work.

H. Part-Time Students
Students admitted into the Ph.D. program for part-time study are bound by all the rules set out henceforth. In particular, part-time students should adhere to the schedule for the Qualifying Examination, Thesis Proposal, and Preliminary Examination unless a different schedule has been approved in writing by the Graduate Program Director.

I. Switching Between the M.S. and Ph.D. Programs
A Ph.D. student who has passed the Qualifying Examination can complete the requirements for an M.S. degree by satisfying the proficiency requirements and completing 30 credits of coursework. Passing the Qualifying Examination is considered to have satisfied the proficiency requirements. (Another way to satisfy these requirements is, of course, to take the required courses and do the masters project.)

Faculty of the Department of Technology and Society Distinguished Service Professors
Ferguson, David L., Chairperson. Ph.D., 1980, University of California, Berkeley: Quantitative methods; computer applications (especially intelligent tutoring systems and decision support systems); mathematics, science, and engineering education.
Paldy, Lester G., M.S., 1966, Hofstra University: Nuclear arms control; science policy.

**Distinguished Teaching Professor**


**Professors**

Braun, Ludwig, Emeritus, Professor, DEE, Polytechnic Institute of Brooklyn (now Polytechnic University of New York); Biomedical engineering, computers in education, science education.

Hogan, Joseph S., Emeritus, Professor, Ph.D., 1968, New York University: Planetary atmospheres; environmental satellites; climate change.

Htun, Nay, Visiting Research Professor, Ph.D., Imperial College London; Environmental governance; sustainable development; pathways to low-carbon society.

Fred Y. Phillips, Research Professor, Ph.D., University of Texas at Austin Business Administration, Mathematics


Pittinsky, Todd L.; Professor, Ph.D., 2001, Harvard University. Models intergroup relations in their ecosystems of society, technology, and policy.

Schafer, Wolf; Professor, Director of the Institute for Global Studies, M.A., University of Munich, Ph.D., University of Bremen Science, technology, and society (STS); history and management of big technoscience projects; geography and cartography; energy transitions and population growth; global history and global studies

Stokes, Gerry, Research Professor, Ph.D., 1977, University of Chicago, Energy Technology and policy, emphasizing climate, carbon emissions mitigation and smart grid

Teng, Tian-Lih, Research Professor, Ph.D., 1969, University Of Pittsburgh, Pittsburgh: Electrical engineering, computer science, management of information systems, and electronic commerce.

**Associate Professors**

Sabatini Dwyer, Debra, Research Associate Professor, Ph.D., 1995 Cornell University: Health Economics and Public Policy; Social Security Policy

Reaven, Sheldon J., Associate Professor, Ph.D., 1975, University of California, Berkeley: Science and technology policy; energy and environmental problems and issues; environmental and waste management, recycling and pollution prevention; risk analysis and life-cycle analysis; nuclear, chemical, and biological threats; technology assessment; homeland security and the war on terrorism.

Scarlatos, Lori L., Associate Professor, Ph.D. 1993, Stony Brook University: Educational technology; tangible, physical, multi-modal, and collaborative human- computer interfaces; serious games; computer graphics; multimedia.

Tonjes, David J., Research Associate Professor, Ph.D., 1998, Stony Brook University: Environmental management (salt marshes, mosquito control, alternative energy sources), contamination (groundwater, pesticides), and monitoring (groundwater, surface water, estuaries) public policy and communication (risk assessment, environmental impact analyses, environmental justice).

**Assistant Professors**

Araujo, Kathleen, Ph.D., 2013 MIT, National planning and policy; energy-environmental systems; energy transitions, history of science & technology; international development, globalization of R&D, safety, security and disaster preparedness; institutional design and management*

He, Gang, Ph.D. 2015, University of California, Berkeley, Energy modeling, energy economics, energy and climate policy, energy and environment, domestic coal and power sectors and their key role in both the global energy supply and in international climate policy framework.

Hewitt, Elizabeth, L, Ph.D., 2015, Rutgers University, Building occupant behavior; social science and behavioral energy research; organizational energy issues; green building design and technology; environmental economics

Sobel-Lojeski, Karen Ph.D., 2006, Stevens Institute of Technology: Societal impact of technology on human cognition, emotion, and overall well-being; Effects of networked technologies on education and business performance drivers such as leadership, innovation, and student achievement.

Sun, Guodong, Ph.D., Visiting Research Assistant Professor, 2001. Carnegie Mellon University: Energy and environmental policy; technology assessment; technology innovation management.

Woodson, Thomas, Ph.D., 2014, Georgia Institute of Technology, Innovation Systems, bibliometrics, science and technology policy, international development

Number of teaching, graduate, and research assistants, Fall 2016: 18
NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.