EST

Technology and Society

EST 520: Computer Applications and Problem Solving
A problem-solving course for professionals who use applications software to address administrative and managerial problems. Students develop skills in planning, forecasting, and MIS requirements. The major applications software packages used are Excel and Access. Students learn to create advanced-level spreadsheets and data files, and use them to find optimal solutions to problems in all professions.

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EST 530: Internet Electronic Commerce
Topics addressed in this course include: technology infrastructure, business models and concepts, technological skills needed to build an E-Commerce web site, marketing, communications, security and encryption, payment systems in E-Commerce/M-commerce. Financial transactions, advertising models, content ownership and the prospects for E-Commerce are also covered.

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EST 540: Environmental Management
This is an introduction to environmental management, and will focus on the interplay between science and public policy. Concepts include problem identification and definition, collection and analysis of relevant data to produce information, and the roles of public perception and action in ultimately determining outcomes when consensus is not reached. Specific fields to which these concepts will be applied will be solid waste management and coastal management. Current local problems will be used to illustrate the broader conceptual issues. Offered as MAR 514 and HPH 672. Prerequisite: Permission of instructor

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 541: Long Island’s Groundwater

This course will cover basic groundwater concepts in unconsolidated sediments, and examine contamination issues in light of Long Island’s particular hydrogeology, land use, and waste management history. Mathematical principles will be discussed but not stressed; scientific and technical papers discussing particular concepts or problems, including important local examples, will be closely read.

Prerequisite: Permission of instructor. Offered as MAR 521 or HPH 673.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 546: Financing A Low Carbon Society
The sums involved in a shift to a low-carbon society are daunting but not impossible to achieve. The world is planning to invest over $15 trillion in fixed-asset investments in the next 10 years. Rather a problem of capital generation, the key challenge of financing the transition towards a low carbon society is to redirect existing and planned capital flows from traditional high-carbon to low-carbon investments. This course is designed to allow students to: (1) Review a number of public policies, public finance mechanisms and market-based instruments designed to shift investments from fossil fuels to more climate friendly alternatives over the past few years; (2) Gain knowledge of the global commercial, political, innovation and technological challenges and opportunities in the transition to a low-carbon society; (3) Develop and practice professional skills in raising and spending public finance to catalyze capital towards low carbon and climate resilient development; and (4) Develop and practice professional skills in accessing carbon finance and designing innovative financing instruments.

This course is aimed at engineering students who are interested in the energy challenges in a carbon-constrained world and their implications to technology innovation; at business-and public-administration students and at mid-career professionals who want to develop innovative financing solutions to real-world energy and environmental problems.

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EST 550: Introduction to Homeland Security

The course is a combination of lectures and laboratory experience to introduce students to critical issues and assess needs for homeland security. The course includes invited lectures by experts on special topics such as fundamentals of nuclear, chemical, and biological weapons and the associated threat to the transportation of goods and the public. The students will learn about cyber security, devices to safeguard materials from terrorist threats, safety of nuclear power plants and water supply, forensics and emergency preparedness. The students will submit a term paper on a selected topic in lieu of the final exam.

Prerequisites: Undergraduate level biology, chemistry and physics.

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 553: Nuclear Security

The course will familiarize students with the fundamentals of nuclear physics, radiation, mining, weapons and fuel cycle, other than producing electricity, as it pertains to nuclear power plants. Topics include nuclear detection, devices to safeguard nuclear materials from terrorist threats, needed physical protection for safe handling and its relevance to Homeland Security. The course combines lectures with hands-on experience at the newly installed nuclear detection facility located at the nearby United States Department of Energy’s Brookhaven National Laboratory.

Prerequisite: Undergraduate equivalent physics and chemistry.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

EST 554: Chemical & Biological Weapons: Safeguards and Security

This course deals with the fundamentals of chemistry and biochemistry related to chemical weapons (CW) and biological weapons (BW) that could be used by terrorists. Topics include CW and BW history, production, control, detection, identification, and emergency response measures to deal with intended or unintended release and escape, and security measures to protect and control stockpiles.

Prerequisite: Undergraduate equivalent chemistry, biochemistry, and microbiology.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

EST 560: Risk Assessment, Regulation, and Homeland Security

The course focus is on risk assessment associated with nuclear, chemical and biological weapons as it relates to Homeland Security. Topics include air dispersion, uncertainty analysis, exposure measurements, epidemiology, toxicology, regulatory issues,
risk management, risk communication, risk perception, and risk preparedness. The course will also cover laws and regulation, discouraging terrorism, and disaster preparedness, various acts passed by the U.S. Congress to regulate water, air, and controlled substances. Offered as EST 560 or HPH 656.

Prerequisite: Undergraduate or equivalent physics, math and chemistry.
Fall and Spring, 4 credits, Letter graded (A, A-, B+, etc.)
Fall and Spring, 4 credits, Letter graded (A, A-, B+, etc.)

EST 562: Decision Support Systems
A decision support system (DSS) is a computer system that combines, data, analytical tools, and models to support decision making. A DSS may be model-driven or data-driven. A model-driven DSS is a stand-alone system that uses some type of model to perform “what-if” and other kinds of analysis. A data-driven DSS is a system that supports decision making by allowing users to extract and analyze useful information that was previously buried in large databases. In this course, both model-driven and data-driven decision support services will be considered. Students will identify an appropriate engineering or management application. By collecting relevant data, building suitable mathematical models, designing an accessible user interface, and connecting these components via computer code, students will develop a deliverable DSS. Through a series of presentations, they will demonstrate how their DSS addresses the stated engineering or management problem. In doing so, students will gain insight into the interrelationships among information systems, statistics and management science.

Prerequisite: EMP 504 or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 563: Computer Literacy for Educators
This course is an introduction to computer and software basics and was formally listed as EST 583. Students will develop an understanding of the underlying concepts and principles behind computers. Students will gain sufficient knowledge to successfully navigate the digital world. Emphasis will focus on computer literacy areas used in education and other professional environments. Students will leave this course with the ability to grasp the risks and benefits surrounding new and current computer technologies. The following skills will be addressed; electronic communication, application-based projects, information management, assessment, and the societal impacts of computer based technologies. Students having completed EST 563 in a prior semester cannot receive credit for EST 563. EST 563 and EST 565 may be taken in the same semester.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 565: Instructional Technologies
This course examines issues in teaching and learning, especially the use of personal computers and emerging technologies to investigate unique types of learning that are made possible, or may be more efficient, with this technology. Exposure to generic software applications, and an overview of commercial software titles and applications are provided. Students have the opportunity to work collaboratively with others in this field, and will develop a working application that could be used in an educational environment.

Prerequisite: EST 563 or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 567: The Internet and Networking for E-Learning
Students will learn the basic design concepts behind the Internet, as well as wired and wireless communication networks. Students learn effective use of the Internet and networks for active learning. Discussion topics include: the role of the Internet as a 21st century global communication tool, ethical and societal issues as they relate to educational standards, and how to judge the benefits and risks associated with these networks. This course was formerly listed as EST 572. Not for credit if you have already taken EST 572.

Prerequisite: Computer experience.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 568: Networked Communication Technologies
EST 568 Network Communication Wired and Wireless
This course examines the range of technologies used in teaching, learning, and communication. Instructional technologies both stand-alone and networked are surveyed with a focus on how they can be used effectively to enhance learning. Students will learn fundamental hardware and software principles underlying the development of the Internet and other networked communications tools. Emphasis will be placed on assessment of these technologies in terms of societal impacts and learning outcomes. This course combines topics from EST 565 and EST 567.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 569: Technology in the City
Will technology transform our cities, making them more livable, efficient, and desirable? Will technology erode our cities, making them more dangerous, chaotic, and insurable? This course is at the intersection of two trends. First, the world is undergoing a wave of urban growth. Second, the pace of technological change is quickening and, with it, the pace of social change and even social transformation. Course modules will cover technology and society in urban contexts with particular attention to: 1) energy, 2) environments, 3) transportation, and 4) health and human safety (including security). This class will involve trips to sites in New York City, and will involve the use of IT technologies in creative ways to advance our learning.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 570: Design of Courseware
Principles of designing courseware modules for K-12 schools, universities, and industry. Educational technologies used in courseware. Theories of learning and educational policy making. Courseware design specification. Each student will develop a courseware design specification that can be implemented for his/her master's project.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 571: Research Methodologies for Educational Technologies
This course evaluates the educational uses of computer technology. Course goals include understanding research methodology and literature, conducting a research study of educational technology, developing professional leadership skills and exploring micro-worlds and constructivism. The course includes class discussions to assess the quality of research articles on educational technology.

Prerequisite: EST 565
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 573: Design of Multimedia Courseware

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin
This course was designed for school teachers, corporate trainers, and multimedia specialists who are interested in the use of multimedia design techniques as a teaching tool. The class is half lecture and half hands-on training in multimedia production tools. Students have a term project for which they have to create a courseware program.

Prerequisite: EST 565 or permission of instructor. Co-requisite: EST 570 or permission of instructor.  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 574: Distance Education  
Web-based distance learning applications are quickly growing within Higher Education institutions, K-12 schools, and corporate environments. This course is designed for higher education faculty, K-12 administrators and teachers, educational computing coordinators, and corporate training personnel who would like to investigate ways to enhance their educational systems through the development and implementation of E-learning applications. The focus of this course is on the design and implementation of effective modes of E-learning.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 575: Developing Grants and Managing Projects  
This course will develop the skills necessary to take a program proposal from idea through reality with an emphasis on new technological resources available to help with this process. Topics include: techniques for successful fundraising, grant writing, program design, staffing, publicity and outreach, and reporting and evaluation. It is designed for current educators and administrators as well as students about to enter the education, social service and health fields.

3 credits, Letter graded (A, A-, B+, etc.)

3 credits, Letter graded (A, A-, B+, etc.)

EST 576: Geographic Information Systems in Education and Research  
Students use Geographic Information Systems (GIS) software to create, manipulate and interpret layers of interactive maps and databases. Students collect and modify geographical materials from the Internet, satellite and aerial imagery, and field data. They design and test scientific inquiry-driven educational modules and/or visualizations for research and analysis on global and local geography, for use in economics, earth science, politics and civic action, history and sociology, global studies, and environmental planning and assessment. Prerequisite: EST 565 or EST 595 or permission of instructor.  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 577: Environmental Information Systems (EIS)  
Due to the complex nature of environmental and spatial data, these systems require state-of-the-art computer technology to achieve environmental science and information technology. This course will address the technical and conceptual bases of data capture, data storage, data analysis and decision support, and metadata management. This course will address the technical and conceptual bases of data capture, data storage, data analysis and decision support, and metadata management. Environmental Information Systems are concerned with the management of data about the rock of soil, the water, the air, and the species around us.  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 578: Human-Computer Interaction Design for Construction  
Principles of human-computer interaction applied to the design of educational courseware. Usability engineering, with a focus on the audience and learning objectives. Interface design principles. Human computer dialogs. Multimedia as a communication tool, using images, audio and video. Multimodal input devices and strategies. Students will use a multimedia authoring tool to create a prototype of an educational application or learning tool.

3 credits, Letter graded (A, A-, B+, etc.)

3 credits, Letter graded (A, A-, B+, etc.)

EST 579: Educational Games  
Simulations and computer games as a learning tool. Traditional game and simulation genres, and their appropriate uses in education. Gameplay design. Game development process, from storyboarding to delivery. Assessing games as learning tools. Students will use a multimedia tool to prototype an educational game or simulation of their own design.

3 credits, Letter graded (A, A-, B+, etc.)

3 credits, Letter graded (A, A-, B+, etc.)

EST 580: Advanced Technology Assessment: Business, Government and Strategy  
This course has a two-fold objective: (1) to help students develop strong conceptual foundations for understanding and addressing issues at the intersection of science, technology, public policy, and business strategy; and (2) to provide students with knowledge of analytical frameworks and tools that are essential to technology assessment in business, government, and government, and other organizations with understanding of their strengths, limitations, and underlying assumptions. Topics covered include utility/profit maximization theory, its limitations and alternative theories, business and government interactions, technology innovation and management, technology forecasting, impact assessment, technology valuation, and basic tools for technology assessment (monitoring, simulation, expert opinion, scenario analysis, cost-benefit analysis, AHP method, etc.).

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EST 581: Methods of Socio-Technological Decision Making  
Focus is on the application of decision-making techniques to analyze problems involving technology, particularly its social impacts. Areas of study include decision making under uncertainty, decision making in a passive vs. active environment, sequential decisions, estimating payoffs, forecasting, and technology assessment. These systems-analysis techniques are used to formulate and solve a variety of socio-technological problems, especially those that arise in educational, industrial, and environmental professions.

Prerequisite: Graduate standing in department or permission of instructor.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 582: Systems Approach to Human-Machine Systems  
Systems concepts (feedback, stability, chaos, ergonomics) and analytical tools applied to dynamic systems in which technologies and/or natural environments interact with human users, regulators, or designers. Examples: ecological systems, nuclear power plant operations, space shuttle missions, computer/web educational technologies, regional planning. Students prepare a systems design study of an industrial, educational, or environmental device, technology, or...
EST 584: Air Pollution and Air Quality Management
The effects of air pollution on the environment and public health are explored. Primary pollutants, such as particulates, oxides of sulfur, nitrogen and carbon, hydrocarbons, lead and CFCs are considered, as are secondary pollutants, such as sulfuric acid, PAN, and surface ozone. The effect of atmospheric conditions on the dilution and dispersion of pollutants and the impact of pollution on the global atmosphere are explained. Air pollution disasters and the impacts and ramifications of the Clean Air Act of 1970, its 1990 amendments, and recent international accords are discussed. Case studies of air pollution reduction, management, and regulation in local industry are included. Other contemporary topics include the loss of stratospheric ozone and global warming due to human activities.

Cross-listed as EST 584 or HPH 683.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 585: Technology in Learning Systems
This course is designed to provide educators with an overview of uses of technology to improve instruction. Standard and innovative, nonconventional modes of learning are considered. Specific areas of study include a systems-based analysis of the design and function of learning environments, individual applications related to the student's area of professional practice, and assessment of educational uses of technology today and tomorrow. Students are exposed to various educational technologies and make a formal presentation applying a technology to an educational system.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

EST 586: Environmental and Waste Management in Business and Industry
Environmental and waste management practices in industrial and other institutional settings. Technologies of hazardous waste prevention, treatment, storage, transportation, and disposal are considered. Topics include information systems and software tools for environmental audits, regulatory monitoring and compliance, cost estimation, recycling programs, air, land and water emissions controls and permits. Employee health, safety, and education and quality management and examined. Field trips to several Long Island institutions.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

EST 587: Today's Technology: Impact on Education and Economics
This course involves the student in studies of the science, technology, and economics of four selected areas: electronics, transportation, energy, and health sciences. Classoom time is supplemented by visits to appropriate facilities in each area; individuals and groups also plan for the use of the information in their specific areas of responsibility. For example, teachers are responsible for developing teaching strategies for use of the information in their classes and for student career advice and preparation. Those from commerce and industry learn of the powerful influence of technological development on regional economics. This knowledge is helpful in carrying out strategic planning and forecasting within the student's organization.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

EST 588: Technical Communication for Management and Engineering
The ability to communicate technical ideas clearly and effectively is critical to success in management and engineering. Hours and money are wasted when confused, distorted writing and speaking obscure the information they are intended to convey. This course will provide managers, engineers, and other technical professionals with practical methods for making their memos, reports, and correspondence clear, comprehensible, and persuasive. Students learn strategies for communicating with both nonspecialist and technical audiences, stating their purpose clearly, organizing points most effectively, and expressing ideas concisely and precisely. Special attention is given to technical presentations and to communicating in meetings.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

EST 589: Technology-Enhanced Decision Making
This course examines the use of technological devices, especially computers, as aids in decision making. A treatment is given of the cognitive science and artificial intelligence methods used in the structure and operation of some systems that support human decision making. Medical diagnosis systems, business and industrial planning systems, and computer-aided dispatch systems are discussed. In addition, the application of high technology in air traffic control systems is examined.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

EST 590: Seminar for MS, TSM Students
A forum for the discussion of research methods, project ideas, and proposal preparation. A final product of this seminar is an approved master's project proposal. Each student also leads a discussion of an important technology-society problem, such as censorship of the Internet, scientific decision making, or environmental regulations. Each student works with a faculty advisor on background research and preparation of the master's project proposal.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 591: Independent Study in Technology and Society
The primary objective of independent study is to provide a student with opportunities to interact with faculty members who can be of assistance in his or her master's project. Students should consult individually with faculty members on workload and credit(s).

1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

1-3 credits, Letter graded (A, A-, B+, etc.)

The ample supply and appropriate use of energy is critical to the well being of human society. Energy plays an enormous role in environmental degradation, national insecurity, international conflict, and in solutions to these problems. This course aims to introduce the major energy issues to students in engineering, business, and public policy areas. It discusses the energy choices to meet regional and global energy needs. Major renewable and conventional energy sources, energy supply technologies, and end-use efficiency options will be assessed in the context of political, social, economic, and environmental goals.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

EST 593: Risk Assessment and Hazard Management
A case-study approach to the assessment of risk and the management of natural and technological hazards, with emphasis on those
that can harm the environment. The course focuses on technological hazards involving energy, transportation, agriculture, natural resources, chemical technology, nuclear technology, and biotechnology, and on natural hazards such as climatic changes, droughts, floods, and earthquakes. The first part of the course consists of readings on risk assessment and hazard management and discussions of published case studies. During the second part of the course, students conduct Offered as EST 593 or HPH 686.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

**EST 594: Diagnosis of Environmental Disputes**

Diagnosis of disagreements about environmental and waste problems. Tools for evaluating disputes about (a) scientific theories and environmental models, (b) definitions and analytical methodologies for estimating risk, "real" cost, net energy use, and life-cycle environmental impact, (c) regulatory and legal policy, (d) siting of controversial environmental facilities, and (e) fairness and other ethical issues. These diagnostic tools are brought to bear upon case studies of pollution prevention, recycling, nuclear waste disposal, and climate change.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

**EST 595: Principles of Environmental Systems Analysis**

This course is intended for students interested in learning systems engineering principles relevant to solving environmental and waste management problems. Concepts include compartmental models, state variables, optimization, and numerical and analytical solutions to differential equations.

Prerequisites: MAT 132 and one year of quantitative science such as physics, chemistry, or geology; or permission of instructor. Offered as EST 595 or HPH 688.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 596: Simulation Models for Environmental and Waste Management**

This course is intended for students interested in developing computer models for technology assessment and for environmental and waste management. Concepts developed in EST 595 Environmental Systems Engineering and Analysis are applied to real-world problems. Techniques in model development are presented in the context of applications in surface and groundwater management, acid rain, and health risks from environmental contamination. Offered as EST 596 or HPH 689.

Prerequisite: EST 595 or permission of instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 597: Waste Management: Systems and Principles**

Students will learn about the technologies and policy options in waste management, emphasizing recycling, incineration, landfilling, and source reduction options for municipal solid waste on Long Island. Problems concerning paper, glass, plastic, organic materials, and other waste stream components will be explored. Environmental impacts and economics of landfills, materials recovery facilities, and waste-to-energy systems are examined. The institutional and regulatory climate, current and planned practices in the region, and hazardous waste will be discussed.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

**EST 598: Teaching Practicum**

Designed to give graduate students teaching experience.

3 credits, S/U grading
3 credits, S/U grading

**EST 599: Special Projects and Topics**

A technology assessment laboratory for emerging problems and focused research. May be run as a hands-on, group research study of an important educational, environmental or waste problem (perhaps to provide an assessment to a regulatory agency or administrative system).

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 600: Technology, Policy, and Innovation: Theory and Practice**

This course provides students with frameworks and models for analysis of issues at the intersection of science, technology and public policy, and business strategy; and helps students develop skills to work on policy issues that require deep understanding of the technical details. Topics include utility/ profit maximization theory, its limitations and alternative theories, business and government interactions, technology innovation and manages, policy process (agenda setting, problem definition, framing the terms of debate, formulation and analysis of options, evaluation of policy outcomes). Cases drawn from energy and environmental policy, educational technology, STEM education will be used to illustrate stakeholders and their value structures, high levels of uncertainty, multiple levels of complexity, and their influence on policy intervention. This course emphasizes quantitative policy analysis methods, and critical thinking.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

**EST 610: Data Analysis for Technology, Policy and Innovation**

Common empirical tools used for research in Technology, Policy, and Innovation. Topics include: data collection and sampling techniques, descriptive statistics, probability concepts, estimation, formulating and testing hypotheses, and simple and multiple regression analysis. Discussion of assumptions, strengths and weaknesses of various statistical tools and methodologies. Emphasizes the analysis and presentation of information through visual and numerical means. Use of modern statistical software to analyze real data sets involving socio-technological applications.

Prerequisites: Admission to PhD program or permission of instructor

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 620: Decision Making in Socio-Technological and Global Contexts**

Methodologies and applications to enhance students' abilities to use qualitative and quantitative approaches to examine decision problems within socio-technological and global contexts. Psychological, social and cultural influences on decision making in organizations. Power and limitations of the theories, models and tools of decision analysis. Applications to decision problems in a variety of areas, including energy and environmental systems, educational technology and education in science and engineering, technology management, and science and technology policy.

3 credits, Letter graded (A, A-, B+, etc.)
3 credits, Letter graded (A, A-, B+, etc.)

**EST 650: Directed Study**

Individual studies under the guidance of a faculty member. Subject matter varies according to the needs of the student. May be repeated for credit.

1-9 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.
1-9 credits, Letter graded (A, A-, B+, etc.)

**EST 690: Seminar in Theory Building**
Science is about discovering facts as well as explaining what the facts mean. Theories provide explanations and interpretations of empirical phenomena and building and modifying theories are at the heart of core scientific activities. Good theory is essential to many new fields for several reasons. First, good theory provides guidance for practical action and therefore should be at the foundation of curricula. Second, without good theory in any particular field, researchers must borrow theories from other academic disciplines. While this can be useful, sometimes these theories might not fit our subject matter well. For example social theories based on behavioral assumptions stemming from non-digital communications do not fully address substantive features of social behavior in a digital age.

Research courses commonly emphasize empirical research methods and formal modeling approaches to theory development. There is much less guidance for those who want to build a theory for managerial and behavioral studies—yet every researcher must do so to develop a good research proposal. This seminar aims to fill that gap by focusing on theory types and evaluation criteria, theory development processes, and theoretical writing.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 691: Seminar on Innovation, Invention, and Diffusion

Innovation is viewed as central to progress for any individual, organization, nation or global effort. In this seminar we will discuss invention, the two main phases of innovation, exploration and exploitation, the notion of diffusion of innovation and finally innovation policy as well as policy innovation. We will explore a number of types of innovation including radical versus incremental, technological versus administrative, product versus process and more. Using relevant case studies and selected readings from the most influential voices on innovation, including those in academia, corporate America as well as policy-making organizations, we will explore the many different sides of innovation, why it is one of the most critical issues of our time and how seminar participants can contribute to overall innovative efforts.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 698: Practicum in Teaching

This course enables graduate students to gain experience in teaching and interacting with students enrolled in Technology, Policy, and Innovation courses. Students enrolled in EST 698 are expected to perform various teaching duties required by the course instructor, such as attending lectures, providing office hours, holding review/recitation session, proctoring exams, grading, etc...

Fall, 1-3 credits, S/U grading
May be repeated for credit.

EST 800: SUMMER RESEARCH

May be repeated for credit.