

# EST

## Technology and Society

### EST 100: Designing, Producing & Presenting Multimedia Projects

This course introduces computer applications and a selection of multimedia tools and the skills necessary to be successful in today's digital world including the creation of digital graphics, animations, and the production of audio and video using multimedia tools like: Dreamweaver, Flash, Photoshop, and Jing. Students will learn effective information presentation skills using Microsoft Office Suite and Wikis, blogs and other social media tools. The course emphasizes the use of multimedia research, application, design and presentation skills. Participation in weekly computer labs are required.

**SBC:** TECH

3 credits

### EST 102: Weather and Climate

Introduces the nature and causes of common meteorological phenomena, severe weather occurrences, and climatic patterns. Topics include formation and movement of air masses and large-scale storms; techniques for weather prediction; weather satellites; hurricanes, tornadoes, and thunderstorms; cloud and precipitation types; the climatic history of the earth; and actual and potential effect of human activities on weather and climate, and of weather and climate on humans. This course is offered as both ATM 102 and EST 102.

**DEC:** E

**SBC:** SNW

3 credits

### EST 104: Projects in Technology and Society

Introduces students to technological issues in society. A new topic is presented each semester. Explores underlying scientific and engineering concepts, ethical issues, and technological risks. Students complete a project with faculty supervision. May be repeated for up to a limit of 6 credits but only 3 credits of EST 104 may be used for major credit.

*Prerequisite: Permission of department*

1-3 credits

### EST 105: The Digital Generation: Leveraging Technology to Build 21st Century Skills

Students today face many challenges keeping up with technology trends and the skills

necessary to be successful in the digital world. In this course students will develop the 21st century skills necessary to become effective lifelong learners leading to a successful career. We will explore a number of topics including information literacy, digital citizenship, understanding social media, collaborative environments and cloud based applications as we as organizing your digital world. The culminating activity for this course is the creation of a personal technology learning and management plan showcasing the tools and skills learned throughout the course.

**SBC:** TECH

3 credits

### EST 106: The Digital Generation: Creating a Professional Web Presence

Creating a positive digital profile can be a challenging task for the 21st century student. In this course, learn how to utilize the power of the Internet and social media to enhance your web presence and digital profile. We will explore a number of topics including building a strong web presence, leveraging social media, creating and uploading video content, blended and distance learning as well as mobile devices as a learning tool. The culminating activity for this course is the creation of a positive and sustainable web presence and digital profile.

**SBC:** TECH

3 credits

### EST 192: Introduction to Modern Engineering

Familiarizes students with systems and decision-making concepts of modern engineering and technology. The conceptual areas to be studied include an engineering approach to problem solving and design, modeling of dynamic systems, and technology assessment. The artificial heart program, solar energy technology, and building access for the handicapped are some of the socio-technological case studies that are used.

*Prerequisites: Course is for students without prior engineering experience, permission of the department required*

3 credits

### EST 194: Patterns of Problem Solving

A survey of techniques and methods of problem solving as developed by the engineer and applied scientist. Applications drawn from a broad range of fields. Intended for non-engineering majors.

*Prerequisites: Course is for students without prior engineering or natural science*

*experience, permission of the department required*

**DEC:** C

**SBC:** QPS

3 credits

### EST 200: Cultural Technologies and Society

This course will explore how cultural technologies influence and change many aspects of society including religious views, politics, war, economic development, science, art, music and other dimensions of the world's civilization. We will examine human history punctuated by major breakthroughs in cultural technologies including ideographic/syllabic writing, alphabetic writing, printing, photography, telegraph, telephone, sound recording, motion pictures, radio, television, computers, the internet, smart phones, robotics and beyond. The culminating activity for this course is a project designed to showcase how current and future technology is likely changing our global civilization in one of the thematic societal areas discussed.

*Prerequisites: One DEC E or SNW course; WRT 102*

**DEC:** H

**SBC:** STAS

3 credits

### EST 201: Technological Trends in Society

Explores the impact of technology and engineering design on society past, present, and future. The main themes as they relate to changing technology are: industry and the economy; the environment; social, educational, and psychological implications of computers; energy and society; warfare; and 21st-century emerging technologies.

*Prerequisite: one D.E.C. E or SNW course*

**DEC:** H

**SBC:** STAS

3 credits

### EST 202: Introduction to Science, Technology, and Society Studies

An introduction to the interrelationship between science and technology as dynamic and inseparable. Discusses the concepts, framework, and context of science-technology studies. Includes ethical issues, social influences, and public policies as they influence and interact with the social management of science and technology.

3 credits

### EST 203: Technology in the City

This course covers the intersection of technology and society. Topics include, how different technologies play an essential element of urban society such as transportation systems, energy, and financial systems. It examines the changes in technology which causes changes in society.

3 credits

#### **EST 204: Modern Digital Technology and Innovation**

This course helps students develop an understanding of innovation, digital technology and design through the use of social networks, innovation, software, and new technology. Visualization tools such as Virtual Reality and Augmented Reality as well as other techniques will be discussed to understand how they are used to evaluate the goals. Students will learn to assess the value of these systems and improve organizations productivity related to innovation and customer engagement, all focused on a cross discipline approach to a team. Students will analyze and build a technological project from idea to creation to ensure they understand all aspects.

**SBC:** TECH

3 credits

#### **EST 205: Introduction to Technological Design**

This course is a broad introduction to technological design. Design is treated as a universal human activity comprised of learnable principles, processes and skills. Specific topic areas will include: creativity and innovation in design, human need - finding and problem identification, design specifications, using research on design processes, and design concept generation and development (using 2D/3D visualization and animation.)

**SBC:** TECH

3 credits

#### **EST 207: Interaction Design**

The design of interactive user experiences. Human perception, motivations, and how people interact with devices. User-centered design. Rapid prototyping and iterative design/development with digital toolsets.

**SBC:** TECH

3 credits

#### **EST 208: Virtual Distance Foundations: Collaborating Across Boundaries in the Digital Age**

Today's digital, "smart" technologies have changed the very fundamentals around which

human beings interact, understand each other and collaborate; creating many opportunities but also posing major challenges especially when it comes to effective collaboration across boundaries. In this course students will learn how to overcome these barriers and become exceptional collaborators (and leaders) under any circumstance enhancing their competitiveness in the job market as well as other life situations. Leveraging the strong foundations of Virtual Distance - a multi-dimensional model that's been used by thousands worldwide to enhance collaboration across industry, government, non-profits, and more- students will get hands-on experience in mastering and honing collaboration skills across different organizational and cultural settings.

**SBC:** TECH

3 credits

#### **EST 209: Introduction to Italian Design: Theory and Practice**

Italian material and aesthetic culture as a source for design and technology. Lectures and design in CAD practice especially for engineering students. The work of the American, global and Italian design practitioners, in a study abroad class in Rome. This is a series of practices in traditional, modern, and transmedia Italian design with the focus on automobile design as a capstone. The student will apply the aesthetic and engineering concepts from the Italian national culture and use written essay, hand drawing, and CAD drawing in open source software, in order to understand the links between the application of any design technology and the general aesthetics of the Italian culture. The student will synthesize quantitative and/or technical information in the design of products, and auto design and make informed judgments about the origin and reciprocal relationship between the technology of commodities, design in general, and the Italian humanities.

**SBC:** STAS

3 credits

#### **EST 210: Learning to Learn New Technologies**

Developing processes for learning new technology that continues to change at an increasing rate. The key issues covered are: learning new software tools, the problem solving process, applying tools, debugging, choosing a tool, helping others to learn new software packages, how networks change the use of tools, ethical issues, Internet and the information explosion. Classes are held in computer laboratories. Students are required

to work in campus computer consulting situations.

3 credits

#### **EST 230: Information and Communications Technology for Sustainable Development**

The Internet is the largest engineered construction project in human history and it is generating sweeping social, political and economic change. Coinciding with this digital network revolution is a growing awareness of the challenge of environmental sustainability. Although the digital transformation is still in its early stages, the shape of certain technological tools and skills required for the hyper connected digital era are already apparent. The overarching theme of this course is to introduce the relationship of the emerging digital communication ecosystem, on the one hand, and possibilities for global environmental sustainability on the other. In the process, it introduces students to key digital literacies and technological skills.

**SBC:** TECH

3 credits

#### **EST 240: Visual Rhetoric and Information Technology**

Seeing comes before words. The focus of this survey course is on the visual communication code, and on implementation of effective presentation design. Students will explore the theories of information visualization as well as the underlying scientific phenomena. We will examine and discuss the impact of such technologies as photography, cinema, Internet, mobile, and virtual reality on democratization of visual culture. Students will learn and apply the skills, techniques, and resources of the course in order to create a state-of-the-art term project presentation.

**DEC:** H

**SBC:** STAS

3 credits

#### **EST 291: Energy, Environment, and People**

Case studies selected from topics such as radioactive wastes; Long Island's toxic wastes; Shoreham, Chernobyl, and nuclear safety; agriculture and the environment; and global resources. The course emphasizes the interplay between scientific and engineering considerations and human values and institutions.

*Prerequisite: one D.E.C. E or SNW course (except those designated ANP); any AMS or MAT course*

**DEC:** H

**SBC:** STAS

3 credits

### EST 304: Communication for Engineers and Scientists

Students learn how to write about technical concepts that make sense not only to other technologists and scientists, but also to audiences ranging from high school students to technical consumers in the world marketplace. Examines issues of rhetorical persuasion, ethical presentation, and emotional engagement (logos, ethos, pathos), and the basics of information design and use. Students work on polishing their prose voice and learn how to apply different technical communications styles to different audiences and for different applications.

*Prerequisite:* Level 5 on the writing placement examination or WRT 102

3 credits

### EST 305: Applications Software for Information Management

Introduction to the role of applications software in various types of organizations with emphasis on methods of formulating the requisite information flows to engender adequate communications, operation, and control. The importance of audit ability, maintainability, and recoverability in systems design is stressed. Provides students with knowledge of basic techniques and elementary skills in representing system structure with application of the principles in practical case studies using spreadsheet and database software. Extensive interaction with applications software reinforces concepts presented.

*Prerequisite:* EST 100 or CSE 101

3 credits

### EST 306: Cloud Computing Applications

This course will examine the applications of cloud computing. It covers the introduction of cloud computing and its applications, cloud computing security, assessment of cloud computing, BPM, Scrum methodology, Big Data and business transformation, and IBM Smartcloud. It also includes a survey of applications or business models in cloud applications such as Facebook and Amazon.

*Prerequisite:* EST 305

3 credits

### EST 310: Design of Computer Games

Fundamental ideas underlying the design of games, which occurs before the programming stage. How games function to create experiences, including rule design, play

mechanics, game balancing, social game interaction and the integration of visual, audio, tactile and textual elements into the total game experience. Game design documentation and play testing. Students will design their own game during the semester. This course is offered as both EST 310 and ISE 340.

*Advisory Prerequisite:* Basic Computer Skills

**SBC:** TECH

3 credits

### EST 320: Communication Technology Systems

Emphasizes basic science and engineering concepts underlying design and usage of modern telecommunications systems. Considers effects of human factors and societal constraints on design and development of nascent technological systems. Includes the electromagnetic spectrum, analog and digital signals and resonance as well as societal considerations of government regulations, international competition, and environment.

*Prerequisite:* MAT 123; one D.E.C. E or SNW course

**DEC:** H

**SBC:** STAS

3 credits

### EST 323: Human-Computer Interaction

A survey course designed to introduce students to Human-Computer Interaction and prepare them for further study in the specialized topics of their choice. Students will have the opportunity to delve deeper in the course through a course project, and through a two-three week special topic selected at the instructor's discretion. Course is cross-listed as CSE 323, EST 323 and ISE 323.

*Prerequisites:* CSE 214 or CSE 230 or CSE 260 or ISE 208

3 credits

### EST 325: Technology in the Workplace

A study of automation and information technologies in both manufacturing and service industries. Considers how technology is changing the work and lives of everyone from production workers to executives. Case studies are used to understand how technology can improve quality and productivity and how incorrect use produces disappointing results.

*Prerequisite:* one D.E.C. category E or SNW course

**DEC:** H

**SBC:** STAS

3 credits

### EST 326: Management for Engineers

This course will introduce all the principals and theories in the area of operation management and quality control. The important issues relating to management of innovation and project management will also be included.

3 credits

### EST 327: Marketing for Engineers

This course will introduce the important principles and theories of marketing, especially for new product design and development, for technical and eCommerce industries. The preparation and evaluation of a marketing plan will also be covered.

3 credits

### EST 330: Natural Disasters: Societal Impacts and Technological Solutions

A study of the physical causes of natural disasters; their societal impacts in developed and developing nations; the use of engineering, architecture, and regional planning to reduce vulnerability and loss; and the institutional mechanisms, both domestic and international, for providing cross-cultural technology transfer and post-disaster assistance. Case studies of disasters in a number of countries are included.

*Prerequisite:* U3 or U4 standing; one D.E.C. E or SNW course

**DEC:** H

**SBC:** STAS

3 credits

### EST 331: Engineering Ethics

Individuals and organizations must make ethical decisions in the course of scientific and engineering endeavors. Various concepts have been developed related to moral conduct, character, ideals and relationships between people, organizations and societies, and these concepts relate to how we resolve our ethical issues. Formal framework for ethical decision making will be presented, and tested through careful examination of case studies drawn from engineering and industry.

**SBC:** STAS

3 credits

### EST 341: Waste Treatment Technologies

Anthropogenic impacts can be mitigated by treating wastes prior to their discharge to the environment. Human health should also be protected from the impacts of waste disposal. This course will examine technologies such as wastewater management, solid waste practices, and drinking water treatments that minimize the effects of human wastes through a close

examination of a public health controversy in Baltimore using "active learner" principles. Field trips (4) and group work are essential elements of the course.

*Prerequisite: EST 202 or MAT 123 and one D.E.C. E or SNW course*

**SBC:** TECH

3 credits

### **EST 355: Preventing Weapons Proliferation**

The student will learn: what some of the key international tools to STEM weapons proliferation are, how they have developed over the last 50 years, and how they work; the kinds of technologies used to develop nuclear, chemical, or biological weapons & missile delivery systems; and the complexities & methods of controlling these technologies. The student will also learn about the use of UN Security Council sanctions, and about multilateral (e.g., EU, ECOWAS) and national sanctions; and about how interdicting illicit transfers does or does not work. The course will emphasize how technology, international law, and international and domestic politics all play important roles in the evolution, current practice, and effectiveness of the international nonproliferation regime.

*Prerequisites: Completion of DEC Category E or SNW; U3 or U4 standing.*

**DEC:** H

**SBC:** STAS

3 credits

### **EST 356: Nuclear Nonproliferation & International Safeguards**

The student will learn the history of the nuclear nonproliferation regime since 1946, with emphasis on the evolution of concepts and practice. The student will also learn the variety and complexity of motivations for governments to seek nuclear weapons, and in many cases, to forswear nuclear weapons. The course will emphasize how nuclear energy technologies, verification technologies, international legal practice, and politics all play important roles in the evolution, current practice and effectiveness of the international nuclear nonproliferation regime.

*Prerequisite: WRT 102*

3 credits

### **EST 361: Technologies of Mass Destruction: The Gathering Storm**

Threats posed by nuclear, biological, chemical, and cyber weapons technologies, especially outright global or regional warfare, attacks by rogue nations or their terrorist proxies, and proliferation of nuclear, biological, chemical,

and cyber weaponry. These risks are growing markedly. All pose enormous predicaments for science, technology, and society worldwide. We study the technological, scientific, geographic, environmental, historical, cultural, social, and moral factors in play. We'll closely track news developments. The class will have an opportunity to visit one or two regional sites working on the latest homeland security technologies.

*Prerequisites: MAT 127 or 132 or 142 or 171 or AMS 161; PHY 127 or 132, or CHE 132, or BIO 201 or 202 or 203; U3 or U4 standing*

**SBC:** STAS

3 credits

### **EST 364: How to Build a Startup**

Interactive hands-on course immerses students in real-world experience of business startup. Collaborating in interdisciplinary teams, formed before or in class, they learn structured methodology for testing assumptions underlying business ideas to determine viability of profit/not-for-profit business opportunities. Instructors and mentors guide teams to contact prospective customers and others, presenting conclusions each week. Mastery of methodology is key measure; teams forming companies receive post-class support, may compete for cash awards.

*Prerequisite: completion of WRT 102; DEC Category C or QPS; U3 or U4 standing*

**SBC:** EXP+

3 credits

### **EST 371: Data Science Management**

The concepts of big data, data science, cloud computing, and data visualization for technology management are introduced. They are explored in the context of the digital network revolution, characterized by social media, Internet of Things (IoT), and mobile devices as sources of big data. Services that use large amounts of data and the statistical and software tools that enable them are emphasized. The underlying networking infrastructure is explained as a function of cloud computing. The case studies focus on information and communications technologies for sustainable development (ICT4D).

*Prerequisites: AMS 161 or MAT 132 or MAT 127; CSE 114; U3 or U4 standing*

3 credits

### **EST 372: The Mobile Revolution in Development**

This course will explore three themes: [1] current and future trends of digital formation technology toward mobility, [2] combined with many other technologies increasingly

repurposed and adapted toward mobility and sustainability (wearable, IOT), [3] along with skills required for employing such arrangements effectively toward advancing social and economic development.

*Prerequisites: AMS 161 or MAT 132 or MAT 127; CSE 114; EST 320; U3 or U4 standing*

3 credits

### **EST 388: Special Topics in Technological Systems Management**

A lecture or seminar course on a current topic in technology and society. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated as topic changes.

*Prerequisite: TSM major or permission of instructor or department.*

1 credit

### **EST 389: Special Topics in Technological Systems Management**

A lecture or seminar course on a current topic in technology and society. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated as topic changes.

*Prerequisite: TSM major or permission of instructor or department.*

3 credits

### **EST 391: Technology Assessment**

A multidisciplinary analysis of the environmental, economic, scientific, engineering, social, and ethical impacts of a technology and of policies for controlling them. Each class, often working with research teams and visiting area facilities, concentrates on topics such as plastics recycling, the future of the automobile, nuclear power, nanotechnology, space stations, virtual reality, biotechnology, smart weapons, and the Internet.

*Prerequisites: PHY 132/134 or CHE 132 or BIO 201 or 202 or 203; MAT 127 or 132 or 142 or 171 or AMS 161*

**DEC:** H

**SBC:** STAS

3 credits

### **EST 392: Engineering and Managerial Economics**

Applications of fundamental economics principles and systems analysis to problems of planning and design in manufacturing or service sectors of industry. Includes the time value of money, analysis of various types of cash flows, development of rate of return, and benefit-to-cost ratios in their use to evaluate competing investment programs. The role of

depreciation and investment tax credits on the level of corporate taxation leading to the determination of after-tax rates of return.

*Prerequisite: AMS 151 or MAT 125*

**DEC:** F

**SBC:** SBS

3 credits

### **EST 393: Project Management**

Lays the foundation for an understanding of project management principles. Project initiation, implementation, and conclusion are explored, and the software tools for implementation of project management are studied. Case studies are presented and discussed in each part of the course.

*Prerequisite: EST 391*

3 credits

### **EST 440: Interdisciplinary Research Methods**

Uses scientific research and related engineering technology problem-solving as a framework for the synthesis of diverse disciplines studied by students in the first three undergraduate years. Provides students with experience in team problem-solving. Students develop a proposal for interdisciplinary research or project to be carried out in the final semester of study.

*Prerequisites: EST 393 and TSM major*

3 credits

### **EST 441: Interdisciplinary Senior Project**

Students carry through to completion their own research, development or product evaluation project based on the proposal submitted and approved in EST 440. Requires practical steps including garnering faculty mentorship, creating a schedule, assembling resources, conducting research or working on prototype, and a final paper and presentation.

*Prerequisite: EST 440*

3 credits

### **EST 475: Undergraduate Teaching Practicum**

Students assist the faculty in teaching by conducting recitation or laboratory sections that supplement a lecture course. The student receives regularly scheduled supervision from the faculty instructor. May be used as an open elective only and repeated once.

*Prerequisites: U4 standing; a minimum g.p.a. of 3.00 in all Stony Brook courses and a grade of B or better in the course in which the student is to assist; permission of department*

**SBC:** EXP+

3 credits

### **EST 488: Internship in Technology and Society**

Participation in a private enterprise, public agency, or nonprofit institution. Students are required to submit a proposal to the department at the time of registration that included the location, immediate supervisor, nature of the project and hours per week for the project. One mid-semester report and one end of semester report are required. May be repeated up to a limit of 12 credits but only 3 credits of EST 488 may be used for either TSM major credit or specialization credit.

*Prerequisite: EST Major: Permission of the department*

**SBC:** EXP+

1-3 credits

### **EST 499: Research in Technology and Society**

An independent research project with faculty supervision. Permission to register requires a B average in all engineering courses and the agreement of a faculty member to supervise the research. May be repeated, but only three credits of research electives (AMS 487, CSE 487, ESE 499, EMS 499, EST 499, ISE 487, MEC 499) may be counted toward engineering technical elective requirements.

*Prerequisite: Permission of instructor*

**SBC:** EXP+

0-3 credits