ESL 191 Intermediate Oral/Aural Skills
Students improve skills necessary for speaking and understanding English with special emphasis on developing communication capabilities. Class work includes pronunciation modification, presentation skills and cultural awareness in the classroom. Language and listening laboratories required. A diagnostic test during the first week of classes determines placement in the course.
3 credits

ESL 192 Intermediate Composition
A course for students who have attained a degree of fluency in speaking English but need additional training in reading and writing skills. Beginning with basic sentence patterns and working toward paragraph development and eventually essays, each student has the opportunity to practice many different varieties of writing. May be repeated but counts only once toward graduation. Writing placement examination score determines placement in the course. A through C/Unsatisfactory grading only. The Pass/No Credit option may not be used.
Prerequisite: Level 1 on the writing placement examination.
3 credits, ABC/U grading

ESL 193 Advanced Composition
Advanced training in writing for ESL students who need to concentrate on paragraph and essay development. The course deals with the development of a variety of essay genres, including the personal narrative, summary/response and argumentation/persuasion. Key grammar points are reviewed and are expected to be mastered. May be repeated but counts only once toward graduation. Writing placement score or successful completion of ESL 192 determines placement in the course. A through C/Unsatisfactory grading only. The Pass/No Credit option may not be used.
Prerequisite: Level 2 on the writing placement examination or ESL 192
3 credits, ABC/U grading

ESL 194 Academic English Skills for U.S. Residents
The study of spoken and written English for students who are graduates of American high schools but are non-native speakers of English. The focus of the course is on helping students to speak, write, and understand English in academic contexts. Particular attention is paid to understanding lectures, increasing vocabulary, and improving knowledge of English sentence structure. Open to first semester English enrichment program students only. A through F grading only. The Pass/No Credit option may not be used. Only for students in the English Enrichment Program.
3 credits

ESL 198 Advanced Oral/Aural Skills and Accent Improvement
An advanced course in speaking and listening skills for non-native speakers of English. Work is done with individual problem sounds, stress, and intonation in order to help students modify their accents and make their speech more intelligible. Techniques of speaking before a group are taught to enable non-native speakers to feel more confident in participating in their other classes. Advanced work in American idioms and grammar is usually included. Language laboratory work may be required by individual instructors. Especially useful for undergraduate and graduate students who need to make seminar presentations and for graduate students with teaching assistants.
3 credits

ESM 221 Introduction to Chemistry of Solids
Introduction to the synthesis, structure, properties, and applications of solid materials. Topics include preparation and characterization of solids (introduction to X-ray diffraction), thermal decomposition, crystal structure, crystal defects, and solid-state properties that influence chemical reactivity. This course is offered as both CHE 221 and ESM 221.
Prerequisites: CHE 132 or 142 or 198, and CHE 133 or 143 or 199, and ESG 111 or CSE 114 or MEC 111 or MEC 112 or MAT 125 or 127 or 142 or 171 or AMS 101; PHY 126 or 131/133 or 141
3 credits

ESM 299 Directed Research in Materials Science
A directed research project with faculty supervision or as part of a research team. Intended for freshman or sophomore students to develop research skills in a closely mentored environment. A final report and oral presentation are required at the end of the project. ESM 199 is a recommended prerequisite.
Prerequisite: Permission of the Undergraduate Program Director
0-3 credits

ESM 325 Diffraction Techniques and Structure of Solids
X-ray diffraction techniques are emphasized. Topics include coherent and incoherent scattering of radiation, structure of crystalline and amorphous solids, stereographic projection, and crystal orientation determination. The concept of reciprocal vector space is introduced early in the course and is used as a means of interpreting diffraction patterns. Laboratory work in X-ray diffraction patterns is also included to illustrate the methods.
Prerequisite: ESG 332
3 credits

ESM 334 Materials Engineering
Practical application of basic material and engineering concepts to fundamental and advanced material utilization. To that end, the course is divided into three sections: (1) “Tough stuff,” (2) “Hot stuff,” and (3) “Smart stuff.” Combined, these address issues of material operation and failure under normal and harsh conditions, high-temperature electrochemical devices (e.g., solid oxide fuel cells), thermal barrier coatings, electromagnetic devices and shape memory alloys.
Prerequisite: ESG 352
3 credits

ESM 335 Strength of Materials
The mechanical behavior of materials, assuming a basic knowledge of elasticity, plasticity, fracture and creep. Provides treatment of these topics across size scales. Continuum mechanics, advanced phenomena in mechanics of materials, and case studies and measurement techniques.
Prerequisites: ESM 334; AMS 261 or MAT 203; ESG 392
3 credits

ESM 336 Electronic Materials
The properties of intrinsic and extrinsic semiconductors are discussed with particular attention first to the equilibrium distribution of electrons in the bands and then to the nonequilibrium transport of charge carriers. The principles and applications of photodectors and of luminescent materials are then described. The concept of stimulated emission is introduced, laser operation explained, and laser materials discussed in relation to their applications in science and technology. Other topics considered are the properties of magnetic materials, of dielectric materials, and of superconductors.
Prerequisites: ESM 333
3 credits

ESM 350 Advanced Engineering Laboratory
Students work in teams to perform advanced laboratory projects that emphasize the structure-property relationship. Emphasis on statistical analysis, multivariate fitting of data, and technical manuscript preparation.
Prerequisite: ESG 312
Pre-or Corequisite: ESG 333
3 credits

ESM 353 Biomaterials: Manufacture, Properties, and Applications
The engineering characteristics of materials, including metals, ceramics, polymers, composites, coatings, and adhesives, that are used in the human body. Emphasizes the need of materials that are considered for implants to meet the material requirements specified for device application (e.g., strength, modulus, fatigue and corrosion resistance, conductivity) and to be compatible with the biological environment (e.g., nontoxic, noncarcinogenic, resistant to blood clotting in the cardiovascular system). This course is offered as both ESM 353 and BME 533.
Prerequisite: ESG 332
3 credits
ESM 355 Materials and Processes in Manufacturing Design

The design of mechanical and electrical systems, materials selection, and fabrication processes are surveyed and shown to be essential components of manufacturing engineering. The mechanical and thermal processing of a wide range of metallic and nonmetallic materials is reviewed. Modern computer-based materials selection, advanced processing methods, and automation are explored.

Prerequisite: ESM 332 or 333

3 credits

ESM 369 Polymers

An introductory survey of the physics, chemistry, and technology of polymers. Topics covered include classification of polymers, molecular forces and bonds, structure of polymers, measurement of molecular weight and size, rheology and mechanical properties, thermodynamics of crystallization, polymerization mechanisms, and commercial polymer production and processing.

Prerequisite: ESG 332

3 credits

ESM 450 Engineering Systems Laboratory

A systems approach will be taken to understand the fundamental properties of materials and their implications on engineering design and applications. The advanced gas turbine engine is used as the main testbed for this laboratory class. Results from mechanical testing and phase analysis will be analyzed in the context of real-world system construction, operation and reliability.

Prerequisite: ESG 332

3 credits

ESM 475 Undergraduate Teaching Practicum

May be used as an open elective only and repeated once.

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

3 credits

ESM 488 Cooperative Industrial Practice

A design engineering course oriented toward both research/development and manufacturing technology. Students work in actual industrial programs carried out cooperatively with companies established as university incubators or with regionally located organizations. Supervised by a committee of faculty and industry representatives to which students report.

Prerequisite: Permission of department

6-3 credits

ESM 499 Research in Materials Science

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, BME 499, CSE 487, ESE 498, ESM 499, EST 499, ESE 487, MEC 499) may be counted toward technical elective requirements. Prerequisite: B average in all engineering courses and the agreement of a faculty member to supervise the research

6-3 credits

EST Technology and Society

EST 100 Computer Literacy in a Digital Era

Introduces computer applications and selection of computer-based tools and the skills necessary to be successful in an era of digital revolution including: electronic communication; application-based projects; information management and assessment; and the societal impacts of digital literacy. Emphasizes computer literacy skills used in education, industry, and other professional environments. Participation in weekly computer labs is required.

3 credits

EST 102-E 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.

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.

Prerequisite: Permission of department

1 credit

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.

3 credits

EST 194-C 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.

Prerequisite: Satisfaction of entry skill in mathematics requirement (Skill 1) or satisfactory completion of D.E.C. C

3 credits

EST 201-H 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. category E course

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.

Prerequisite: EST 192

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 291-H 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.

Prerequisites: Two D.E.C. category E courses (except those designated AN); any AMS or MAT course

3 credits

EST 300 Computer Modeling and Experiments in Mathematics and Science Education

Focus on computer-based experimentation and modeling to enhance mathematics and science education. Students construct their own computer-enhanced experiments using probe/software systems to study the behavior of real-world systems and computer simulation software packages to model the behavior of those systems.

Prerequisites: EST 100 or CSE 101

3 credits

EST 302 Assessment of Computer-Based Technologies

Methodologies for assessing the impact of computer-based technologies on education, decision making, division of labor, and societal issues such as privacy and ethics. Frameworks for assessing technologies, as well as applications of standard approaches such as benefits-cost analysis. Case studies drawn from robotics, banking, automation in the U.S. postal system, and other areas.

Prerequisite: EST 100 or any CSE course

3 credits

EST 303 Crisis Communications

Explores the emerging fields of crisis and risk communications through case studies. Oil spills, cyber crimes, medical device malfunctions, product tampering, and recalls are among the types of crises studied. Also examines crisis prevention, crisis plan development, media management, and the way organizations struggle to speak truthfully about risks that arouse public fears.

Prerequisite: U5 or U4 standing

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 communication.

www.stonybrook.edu/ugbulletin

393