The mission of the College of Science and Liberal Arts (CSLA) is to address the complexities of modern life at the intersection of science, technology and human values, and to provide the intellectual foundations necessary to understand and analyze them. CSLA is dedicated to instruction that develops fundamental principles, informed and enriched by research that encourages innovation, enabling students to formulate significant questions, think analytically, offer creative solutions, and communicate them effectively.

CSLA faculty and students are at the forefront of many national research activities, from solar astronomy to mathematical modeling. CSLA provides students with skill sets for professional success that include literacy in the mathematical, physical and biological sciences as well as traditional liberal arts disciplines. CSLA partners with departments throughout the university to explore emerging frontiers and expand interdisciplinary initiatives in such areas as genomics, robotics, mathematical biology, nanotechnology and environmental science.

Programs

- Mathematical Sciences - B.S.

Accelerated Programs (http://catalog.njit.edu/undergraduate/academic-policies-procedures/special-degree-options)

- Chemistry - B.S. for Pre-Professional Students (http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/accelerated-bs)
- Communication and Media - B.S./ Medicine, Dentistry, Physical Therapy, and Optometry (http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities/communication-media-accelerated-bs)
- Communication and Media - B.S./J.D. (http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities/communication-media-bs-jd) (with Seton Hall School of Law)
• Pre-Law - B.A./J.D. (http://catalog.njit.edu/undergraduate/science-liberal-arts/history/prelaw-ba-jd) (with Seton Hall School of Law)

Double Majors (http://catalog.njit.edu/undergraduate/academic-policies-procedures/special-degree-options)

• Computer Science and Applied Mathematics - B.S. (http://catalog.njit.edu/undergraduate/computing-sciences/computer-science/cs-math-bs)

• Applied Physics Minor (http://physics.njit.edu/Minors.php)
• Chemistry Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/chemistry-minor) (not for Chemical Engineering majors)
• Chemistry Minor (http://catalog.njit.edu/undergraduate/newark-college-engineering/chemical-biological-pharmaceutical/chemistry-minor-chemical-engineering-majors) (for Chemical Engineering majors)
• Communication Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities/communication-minor)
• Environmental Studies Sustainability Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/interdisciplinary-programs/environmental-studies-sustainability-minor)
• History Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/history/minor)
• Journalism Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities/journalism-minor)
• Legal Studies Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/history/legal-studies-minor)
• Literature Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities/literature-minor)
• Science, Technology & Society Minor (http://humanities.njit.edu/academics/undergraduate)
• Technology, Gender and Diversity Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities/technology-gender-diversity-minor)
• Theatre Arts and Technology Minor (http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities/theatre-arts-technology-minor)
Programs

• Applied Mathematics - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/mathematical-sciences/applied-mathematics-ms)
• Applied Physics - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/physics/applied-physics-ms)
• Applied Statistics - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/mathematical-sciences/applied-statistics-ms)
• Applied Science - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/humanities/applied-sciences-ms)
• Biology - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/biology/ms)
• BioStatistics - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/mathematical-sciences/biostatistics-ms)
• Chemistry - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/chemistry-ms)
• Environmental Science - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/environmental-science-ms)
• Environmental and Sustainability Policy - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/environmental-sustainability-policy-ms)
• History - M.A. (http://catalog.njit.edu/graduate/science-liberal-arts/history/ms)
• Materials Science and Engineering - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/physics/materials-science-engineering-ms)
• Mathematical and Computational Finance - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/mathematical-sciences/mathematical-computational-finance-ms)
• Pharmaceutical Chemistry - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/pharmaceutical-chemistry-ms)
• Professional and Technical Communication - M.S. (http://catalog.njit.edu/graduate/science-liberal-arts/humanities/professional-technical-communication-ms)

Programs

• Applied Physics - Ph.D. (http://catalog.njit.edu/graduate/science-liberal-arts/physics/applied-physics-phd)
• Biology - Ph.D. (http://catalog.njit.edu/graduate/science-liberal-arts/biology/phd)
• Chemistry - Ph.D. (http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/chemistry-phd)
• Environmental Science - Ph.D. (http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/environmental-science-phd)
• Mathematical Sciences - Ph.D. (http://catalog.njit.edu/graduate/science-liberal-arts/mathematical-sciences/phd)

College of Science and Liberal Arts Courses

AS 111. Foundation of the US Air Force. 1 credit, 2 contact hours (2:0:0).
Explores the mission and organizational structure of the United States Air Force. Introduces the student to Reserve Officer Training Corps by examining air power, customs and courtesies, officership, and core values. Examines Air Force opportunities, benefits, career choices, and installations which provides information needed to determine whether or not to pursue a career as an Air Force officer. An introduction to effective communication is included. One hour of class, and, two hours of Leadership Laboratory per week (not required for those with Special Student status).

AS 112. The Air Force Today II. 1 credit, 1 contact hour (1:0:0).
Prerequisite: AS 111 or approval of the professor of aerospace studies. Continues with the mission and organizational structure of the Air Force. A macro view of U.S. military history is introduced with emphasis on U.S. air power. Air Force communications is developed with emphasis on interpersonal communications, oral communications, and written communications. Leadership abilities are developed through group leadership problems and Leadership Laboratory. One hour of class and two hours of Leadership Laboratory per week (not required for those with Special Student status).

AS 221. Evolution of USAF Air and Space Power. 1 credit, 1 contact hour (1:0:0).
Prerequisite: AS 112 or approval of the professor of aerospace studies. Examines the development of air power from its earliest beginnings to the present, including in-depth examination of World War I, World War II, Korean Conflict, Vietnam War, Cold War, and Desert Storm. Traces the evolution of air power concepts and doctrine and continues to develop leadership abilities through Leadership Laboratory. One hour of class and two hours of Leadership Laboratory per week (not required for those with Special Student status).

AS 222. Air Power Key To Deterence. 1 credit, 1 contact hour (1:0:0).
Prerequisite: AS 221 or approval of the professor of aerospace studies. Emphasizes the concepts and skills required by the Air Force officer including oral communications, Air Force quality, leadership, followership, ethics, and values. Continues to develop leadership abilities through group leadership problems and Leadership Laboratory. One hour of class and two hours of Leadership Laboratory per week (not required for those with Special Student status).
BIOL 250. Biology of Neotropical Habitats: Ecuador and Galapagos Islands. 3 credits, 4 contact hours (2;2;0).
This course is an introduction to tropical biology and evolution held in Ecuador's Highlands, Rain Forest, and in the Galapagos islands. The course uses a hands-on approach to study the flora and fauna of these unique habitats. The course also addresses the history, politics, and culture of Ecuador, with emphasis on how these issues influence the management and sustainability of Ecuadorian natural resources.
BIOL 285. Comparative Vertebrate Anatomy. 4 credits, 4 contact hours (3;1;0).
Prerequisites: R120:201 and 202 (Foundations of Biology: Cell and Molecular Biology); and BIOL 205 and BIOL 206 (Foundations of Biology: Ecology and Evolution), all with grades of C or better. This course introduces students to the groups of vertebrates and explores the anatomical evolution of vertebrates within the context of the functional interrelationships of organs and the changing environments to which vertebrates have adapted. An ideal entry point into the ways living creatures interact with their immediate physical world, we examine how the forms and activities of animals reflect the materials available to nature and consider rules for structural design under environmental forces.

BIOL 310. Work Experience I. 3 credits, 3 contact hours (0;0;3).
Prerequisites: Departmental approval and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments facilitated and approved by the co-op office. Mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

BIOL 315. Principles of Neurobiology. 3 credits, 3 contact hours (3;0;0).
Prerequisite: R120 201 and R120 202 and BIOL 205 and BIOL 206 with a grade of C or better. This course will review neuroscience concepts at a basic level. It will cover basics of cellular physiology, molecular biology and developmental biology of nerve cells, network physiology, behavior, cognition and memory and learning. This course will prepare students who are interested in a neuroscience sequence for their major.

BIOL 320. Discovering Biological Research. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102, BIOL 201, BIOL 202, BIOL 205, BIOL 206 all with a grade of C or better. Success in the constantly evolving field of biology necessitates staying current in scientific literature. This requires competency in skills such as analysis of primary sources, synthesis of information from multiple sources, and oral and written communication skills. This course focuses on these competencies. Students will develop skills need to read and analyze scientific literature, and to communicate science. Each semester the content theme of the course will change depending on the expertise of the faculty member teaching the course.

BIOL 321. Comparative Vertebrate. 4 credits, 4 contact hours (3;1;0).
Prerequisites: R120 201, R120 202, BIOL 205 and BIOL 206, all with grades of C or better. This course introduces students to the groups of vertebrates and explores the anatomical evolution of vertebrates within the context of the functional interrelationships of organs and the changing environments to which vertebrates have adapted. An ideal entry point into the ways living creatures interact with their immediate physical world, we examine how the forms and activities of animals reflect the materials available to nature and consider rules for structural design under environmental forces.

BIOL 337. Collective Intel in Biol Syst. 3 credits, 3 contact hours (3;0;0).
Prerequisite: R120 202, BIOL 205 and BIOL 206 with a grade of C or better. This course will provide an overview of the fundamental principles underlying the organization of animal and human societies. It will include detailed consideration of behavioral, social, and physical processes that are responsible for the coordination of activities in large animal and human groups and social.

BIOL 338. Ecology of the Dining Hall. 3 credits, 3 contact hours (3;0;0).
Prerequisites: R120 201 and R120 202 and BIOL 205 and BIOL 206 with a C or better. This course will use the examination of an on-campus ecosystem, the dining hall, as a framework for learning about a number of applied ecological concepts. We will investigate topics such as food webs, nutrient cycling, microbial ecology, and agroecology as they apply to the organisms and biological processes, present in our dining hall. Course work will involve extensive reading and discussion of scientific and popular literature, supplemented by regular class trips to the dining hall and related on-campus facilities.

BIOL 340. Mammalian Physiology. 4 credits, 6 contact hours (3;3;0).
Prerequisites: R120 201 and R120 202 and BIOL 205 and BIOL 206 with a grade of C or better. This course will review general principles of the function of the human body as a mammal, with emphasis on the function and regulation of neuromuscular, cardiovascular, respiratory, endocrine, digestive, and excretory systems. The goal is to provide students with the basic knowledge to understand how their own bodies operate.

BIOL 341. Introduction to Neurophysiology. 3 credits, 3 contact hours (3;0;0).
Prerequisite: R120 201 and R120 202 with a grade of C or better. This course will examine the physiology of neurons such as excitability, impulse conduction, synaptic communication and neural and synaptic plasticity. The objective is to provide students with a basic understanding of neural signaling and communication.

BIOL 342. Developmental Biology (Embryology). 3 credits, 3 contact hours (3;0;0).
Prerequisite: R120 201 and R120 202 and BIOL 205 and BIOL 206. Descriptive and experimental approaches to molecular, cellular and organismal changes during embryonic development; mechanisms of cell differentiation, organogenesis, morphogenesis, and pattern formation.

BIOL 344. Physiological Mechanisms. 3 credits, 3 contact hours (3;0;0).
Prerequisites: BIOL 340 or R120 340 with a grade of C or better. This course will utilize clinical (pathological) case studies to reinforce physiologic knowledge and provide students a strong basis for future studies in biomedical and health related fields.

BIOL 345. Comparative Physiology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: BIOL 340 or R120 340 or (R120 141 and R120 142) with grades of C or better. We will use a comparative approach to examine the physiology of animals including major physiological systems, with an emphasis on vertebrates. Topics to be covered include metabolic, temperature, osmotic and ionic regulation; respiration and circulatory transport, digestive, muscle, nervous, and locomotor systems; endocrine regulation and biological rhythms. We will further examine how physiological systems are integrated and thus allow animals to respond, physiologically, in different environment.
BIOL 347. Lab Approaches in Neuroscience. 4 credits, 6 contact hours (3;3;0).
Prerequisite: BIOL 315 Students will perform neurophysiological experiments, including assembling neurophysiological equipment, preparing neural tissues, selecting and presenting stimuli, recording, analyzing, and interpreting data. Students will perform experiments of increasing technical complexity. Each will reinforce theoretical and practical concepts related to the amplification and sampling of biopotentials. A lecture part will prepare the students for the concepts relevant to the lab day, and a data discussion meeting will aid the students in analyzing and presenting the data.

BIOL 350. Immunology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: R120 201, R120 202, BIOL 205 and BIOL 206 all with a grade of C or better. The objective of this course is to facilitate an understanding of preliminary knowledge of the immune system in humans and other mammals. Students will be able to translate a basic understanding of the immune system and how that knowledge translates to further understanding medicine, research topics in cell biology, and broad topics in public health policy.

BIOL 352. Genetics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: Biol 200, or R120 201 or Biol 205/206 or R120, 102 or R120 201/202.

BIOL 368. The Ecology and Evolution of Disease. 3 credits, 3 contact hours (3;0;0).
Prerequisite: R120:201, R120:202, BIOL 205, and BIOL 206, and (MATH 111 or MATH 238) with grade of C or better. This course addresses those aspects of ecology and evolutionary biology most relevant to understanding the origin, dynamics and treatment of disease (both infectious and hereditary/genetic). The class will be a mixture of lecture and discussion of case studies. Material covered will include biology, mathematical models, and some aspects of human behavior.

BIOL 375. Conservation Biology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: R120 201 and R120 202 and BIOL 205 and BIOL 206 with a grade of C or better. This course will provide a comprehensive introduction to the field of conservation biology, as well as philosophical and economic concerns.

BIOL 383. Neural Basis of Behavior. 3 credits, 3 contact hours (3;0;0).
Prerequisite: R120 201 and R120 02 and BIOL 205 and BIOL 206 with a grade of C or better. This lecture course explores the neural mechanisms underlying animal behavior. This course is intended for upper-level undergraduate students who have some background in biology, hence the prerequisite for Foundation of Biology. This courses would also be of interest to graduate students interested in neuroscience, such as, students in the Quantitative Neuroscience (QNS) program, students in the Integrative Neuroscience (INS) program, and students at the Center for Molecular and Behavioral Neuroscience (CMB). It is unnecessary for the students to have taken animal behavior or neurobiology; however, these courses would be helpful.

BIOL 385. Evolution of Animal Behavior Laboratory. 3 credits, 4 contact hours (2;2;0).
Prerequisite: BIOL 205, BIOL 206, R120 201 and R120 202 with a grade of C or better. A lab course focusing on research in Animal Behavior. This course will cover foraging, predator avoidance, territoriality, and mate choice. Labs will be inquiry based with students designing experiments to test hypotheses concerning aspects of animal behavior.

BIOL 398. Visualizing Biology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: Junior standing. This course aims to explore points of intersection between art and Biology. We will first explore important concepts of Biology in a lecture format with readings, based on popular science. Teams of students will develop a product based on their biological driven interests and artistic toolkits. Regular individualized meetings will be held between the instructor and each team. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. A final showcase of the products will be held at the end of the semester.

BIOL 400. Biology in Science Fiction. 3 credits, 3 contact hours (3;0;0).
Prerequisite: (R120 340 or BIOL 340 or R120 345) and (R120 355 or R120 356 or R120 352) with a grade of C or better. Popular science fiction media will be utilized to initiate thinking critically and creatively about the biological sciences; from the molecular level to whole organism physiology. Students will explore the potential biology of fictitious organisms, and determine real-life analogues. These topics will be used as a vehicle to improve scientific writing and to apply biological knowledge in a new and unique way.

BIOL 410. Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisite: BIOL 310. Restriction: departmental approval and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments facilitated and approved by the co-op office. Mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

BIOL 432. Intro to Comp Neuroscience. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 222; BIOL 315; BNFO 135 or CS101 or CS100 or CS115 (grade C or better in all prerequisites), or permission by instructor. Introduction to the modeling, computational and analysis techniques for single neurons and small neuronal networks. This course will approach cellular and small network neuroscience beginning with a review and understanding of outstanding problems in neuroscience. The course work will then focus on students developing an independent modeling/computational project around which neuroscience concepts will be discussed. The required knowledge of electric circuits and numerical tools for the solution of differential equations will be introduced as needed.

BIOL 436. Advanced Neuroscience Modeling. 3 credits, 3 contact hours (3;0;0).
Prerequisites: BIOL 432 or MATH 430 or permission by instructor. Modeling and computational analysis of biological neuronal networks. The course consists of lectures, and scientific paper presentations aimed at acquiring a clear understanding of the biological issues in systems neuroscience. Students will work on developing an independent modeling/computational project during the duration of the semester around which biological topics will be discussed.
BIO 440. Cell Biology of Disease: Cells gone Bad!. 3 credits, 3 contact hours (3;0;0).
Prerequisites: (BIOL 340 or R120 340) and (R120 355 or R120 356) with a grade of C or better. This course will briefly review the normal physiology of mammals and humans and will then extensively explore the basis of many human diseases at the cellular level. The goal is to understand how alterations in normal functions of cells affect the function of the whole system by reviewing current research in the field of cell biology abnormalities.

BIO 445. Endocrinology. 3 credits, 3 contact hours (3;0). 0.
Prerequisites: (BIOL 340 or R120 340) and (R120 355 or R120 356) with a grade of C or better. This course will discuss endocrinology from both an anatomical and physiological view. We will discuss synthesis, distribution and regulation of the entire human endocrine system. The goal is to provide students with a basic knowledge of the complex endocrine system.

BIO 447. Systems Neurobiology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: BIOL 315 with a grade of C or better. This course will examine, from a systems perspective, phenomena that relate to neuronal network activity and behavior. Neuronal systems will be studied in detail. The overall goal of the course is to provide students with the basic knowledge of the neurobiological basis of behavior.

BIO 448. Neuropathophysiology: Nervous System Gone Bad!. 3 credits, 3 contact hours (3;0;0).
Prerequisites: BIOL 315 or BIOL 340 or R120 340 or BIOL 341 or R120 444 or BIOL 447 with a grade of C or better. This course will briefly examine the normal physiology of the nervous system and then would extensively explore the basis of many neuronal diseases. The goal is to understand how any alteration in normal functions of the nervous system affects the function of the whole system by reviewing current research in the field of nervous system abnormalities.

BIO 451. Cell Physiology and Imaging. 4 credits, 4 contact hours (1;3;0).
Prerequisites: PHYS 111, PHYS 121 and R120 455. This course will examine cellular phenomena, such as subcellular structure, secretion, intracellular calcium regulation, etc., from a physiological perspective and using imaging techniques as a tool to understand them. Cell biology, and optics and the user of microscopes, will be discussed in detail.

BIO 453. Applied Genetics & Genomics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: BIOL 352. The objective of this course is to offer students an opportunity to explore how the field of Genetics has been shaped after the completion of the sequencing of the genomes of humans and a variety of other organisms. Students will be able to describe new technologies that are available in medicine, diagnostics and agriculture and evaluate the advantages and current obstacles of these technologies. Through the analysis of case studies and primary literature, students will acquire a real-life knowledge of genetic and genomic applications in the 21st century.

BIO 452. Comparative Biomechanics. 3 credits, 3 contact hours (3;0;0).
Prerequisites: R120 201, R120 202, BIOL 205 and BIOL 206 all with a C or better. This course takes a comprehensive look at the mechanical aspects of life. We will examine how the forms and activities of animals and plants reflect the materials available to nature, consider rules for fluid flow and structural design, and explore how organisms contend with environmental forces. Drawing on physics, we look at how animals swim and fly, modes of terrestrial locomotion, organism responses to winds and water currents, circulatory and suspension-feeding systems, the relationship between size and mechanical design, and the links between the properties of biological materials (eg spider silk, jellyfish jelly, and muscle) and their structural and functional roles.

BIO 470. Dynamic Princ in Systems BIOL. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 222, and BNFO 135 or CS100 or CS115 grade C or better, or permission by instructor. Introduction to the dynamic and computational modeling of biological systems, including chemical, biochemical, metabolic and genetic networks. The course includes the description of basic principles and case studies and provides the necessary mathematical and computational tools to understand the mechanisms underlying the dynamics of this type of networks. The necessary knowledge on the biology will be introduced during the course.

BIO 475. Ecological Field Methods and Analysis. 3 credits, 3 contact hours (3;0;0).
Prerequisites: R120 280 or R120 370 with a C or better and permission of instructor. This field-oriented class will study animal and plant communities using a combination of field, laboratory and theory work. The goal of this course is to understand ecological principles and to introduce students to modern methodology for field work, the techniques and instruments used, as well as the theoretical basis for their application. Students will collect data, analyze them and report the results in written and oral format.

BIO 491. Research and Independent Study. 3 credits, 3 contact hours (0;0;3).
Restriction: Departmental approval required. Research in Biology. Each student works under the supervision of a Biology or associated faculty member. A research paper and poster are required.

BIO 492. Research and Independent Study. 3 credits, 3 contact hours (0;0;3).
Restriction: Departmental approval required. Research in Biology. Each student works under the supervision of a Biology or associated faculty member.

BIO 495. Honors Seminar in Biology. 3 credits, 3 contact hours (3;0;0).
Prerequisite: BIOL 320 with a grade of C or better. The honors seminar allows students the opportunity to work closely with an instructor in a specific area of the instructor's expertise. Students will be required to bring together interests and skills developed in previous courses. Students make in-depth oral and written presentations. This course satisfies NJIT's Honors Capstone requirement.

BNFO 135. Programming for Bioinformatics. 3 credits, 3 contact hours (3;0;0).
The ability to use existing programs and to write small programs to access bioinformatics information or to combine and manipulate various existing bioinformatics programs has become a valuable part of the skill set of anyone working with biomolecular or genetic data. This course provides an understanding of the architecture of bioinformatics toolkits and experience in writing small bioinformatics programs using one or more of the scripting ("glue") languages frequently employed for such tasks.
BNFO 236. Programming For Bioinfo II. 3 credits, 3 contact hours (3;0;0).

BNFO 330. Princ of Bioinformatics II. 3 credits, 3 contact hours (3;0;0).

BNFO 340. Data Analysis for Bioinformatics II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: BNFO 240 and R120 101 or equivalent or permission of instructor. Advanced data analysis skills with applications to bioinformatics problems.

BNFO 482. Databases and Data Mining in Bioinformatics. 3 credits, 3 contact hours (3;0;0).
Prerequisites: BNFO 240 or equivalent or permission of instructor. Surveys biological databases and tools for managing them. Covers concepts and principles of data mining in bioinformatics. Hands-on experience for mining genomic data using ORACLE and SQL.

BNFO 488. Independent Study. 3 credits, 3 contact hours (0;0;3).

BNFO 491. Computer Science Project. 3 credits, 3 contact hours (0;0;3).
Prerequisites: CS 490. Restriction: Senior standing in the Honors College and project proposal approval. A course similar to CS 491, with a project of greater depth and scope.

CHEM 105. Applied Chemical Principles. 4 credits, 5 contact hours (3;2;0).
Prerequisite: high school algebra or equivalent. The fundamentals and relation of chemistry to living in today’s society. Suitable laboratory experiments illustrate the course material. Not open to engineering or science students, or students who have completed a college level chemistry course.

CHEM 108. College Chemistry I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: a one-year college prep high school chemistry course, high school math including algebra and trigonometry. Delivered as a telecourse, the course provides the first of a two-semester sequence of college chemistry for high school students and other distance learners seeking college credit and/or preparation for the AP Examination. Matriculated undergraduates may not receive credit for this course.

CHEM 109. College Chemistry II. 3 credits, 4 contact hours (3;1;0).
Prerequisite: CHEM 108. A continuation of CHEM 108.

CHEM 121. Fundamentals of Chemical Principles I. 3 credits, 3 contact hours (3;0;0).
Introduces the basic concepts of chemistry, including chemical reactions, and bonding, electronic and molecular structure, gases and thermochemistry.

CHEM 122. Fundamentals of Chemical Principles II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: Chem 121 with a grade C or better. Continuation of the Chem 121 sequence. Introduces the basic concepts of chemistry, including equilibrium, chemical kinetics, thermodynamics, electrochemistry, and nuclear chemistry.

CHEM 124. General Chemistry Laboratory. 1 credit, 3 contact hours (0;3;0).
Corequisite: CHEM 122 or CHEM 123 or CHEM 126 with a grade of C or better. Chemical principles studied in the CHEM 125 and CHEM 126 or CHEM 121, CHEM 122 and CHEM 123 sequence are illustrated and reinforced by performance of laboratory experiments.

CHEM 125. General Chemistry I. 3 credits, 3 contact hours (3;0;0).
Co-requisite Math 110, or Math 111, or Math 112 with a C or better. The first semester of a two-semester sequence in chemistry. Introduces the basic concepts of chemistry, including chemical reactions and bonding, electronic and molecular structure, gases and thermochemistry. Students majoring in chemistry or biochemistry should also register for lab Chem 125A.

CHEM 125A. General Chemistry Lab I. 1 credit, 3 contact hours (0;3;0).
General Chemistry Lab I is a laboratory course; it is designed to be taken currently with CHEM 125 or CHEM 121. Instructions are in the lab manual and concepts are from the text and lecture of the CHEM 125/121 courses. The experiments are designed to provide undergraduate students with practical experience and train students with laboratory techniques/equipment common to chemistry laboratories.

CHEM 126. General Chemistry II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: Math 110 or higher and Chem 125 with a C or better The second semester of a two-semester sequence in chemistry. Introduces the basic concepts of chemistry, including equilibrium, chemical kinetics, thermodynamics, and electrochemistry. Students majoring in chemistry or biochemistry should also register for lab Chem126A; all others for lab Chem 124.

CHEM 126A. Gen Chemistry Lab II. 1 credit, 3 contact hours (0;3;0).

CHEM 221. Analytical Chemical Methods. 2 credits, 4 contact hours (0;4;0).
Prerequisite: CHEM 222 with grade of C or better. Laboratory introducing quantitative chemical analyses by gravimetry, titration, spectroscopy, chromatography, and potentiometry.

CHEM 222. Analytical Chemistry. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CHEM 123 or CHEM 126, CHEM 124 with grade of C or better. Lecture course introducing concepts of chemical analyses by gravimetry, titration, spectroscopy, chromatography, and potentiometry.

CHEM 231. Physical Chemistry I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: CHEM 122 or CHEM 126, PHYS 111 with a grade of C or better. Corequisite: MATH 211. The topics covered include the properties of ideal and non-ideal gases and liquids, solutions, thermochemistry, thermodynamics, the phase rule, and phase equilibria.

CHEM 235. Physical Chemistry II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CHEM 231 with a grade of C or better. A continuation of CHEM 231. The topics include homogeneous and heterogeneous chemical equilibria, ionic equilibria, electrometry, kinetic theory of gases, transport phenomena, kinetics, and irreversible processes.
CHEM 235A. Physical Chemistry II Laboratory. 2 credits, 4 contact hours (0;4;0).
Prerequisite: CHEM 221, CHEM 235 with a grade of C or better. Corequisite: MATH 225 (special section for chemical engineering and chemistry majors). Laboratory experiments apply and extend the basic knowledge of physical chemistry acquired in the lecture. Reports and presentations are an essential part of the course.

CHEM 236. Physical Chemistry for Chemical Engineers. 4 credits, 5 contact hours (5;0;0).
Prerequisites: (CHEM 122 or CHEM 126) and CHEM 124 and (CHE 230 or CHE 232) with a grade C or better. This course will introduce the chemical engineering students to the concepts of order, disorder, chemical equilibrium and phase equilibrium. Credit for this course will not be given if credit for CHEM 235 has been given.

CHEM 238. Analytical/Organic Chem Lab for Chemical Engineers. 2 credits, 4 contact hours (0;4;0).
Prerequisite: CHEM 124 and CHEM 245 with a grade of C or better. This course will offer the CHE students experience in organic and analytical laboratory experiments. These experiments will reinforce concepts learned in the organic chemistry lecture classes. This laboratory course will also provide exposure to analytical and other techniques useful in the chemistry and chemical engineering laboratories.

CHEM 243. Organic Chemistry I. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CHEM 123 or CHEM 126 with a grade of C or better. This course is a one-semester course (opposed to classic two-semester sequence) to provide chemical engineering students with a basic understanding of organic compounds and their reactions.

CHEM 244. Organic Chemistry II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CHEM 243 with a grade of C or better.

CHEM 244A. Organic Chemistry II Laboratory. 2 credits, 4 contact hours (0;4;0).
Prerequisite: CHEM 124 with a grade C or better. Corequisite: CHEM 244. Synthesis and characterization of organic compounds are performed in a unique multi-scale manner: micro, macro and a kilo scale.

CHEM 245. Organic Chemistry for Chemical Engineers. 4 credits, 5 contact hours (5;0;0).
Prerequisite: CHEM 126 or CHEM 122 with a grade of C or better. This course is a one-semester course (opposed to classic two-semester sequence) to provide chemical engineering students with a basic understanding of organic compounds and their reactions.

CHEM 246A. Organic Chemistry Laboratory. 4 credits, 4 contact hours (0;4;0).
Prerequisite: CHEM 244A with a grade of C or better. This course will cover some common reaction types that are not included in CHEM 244A. The experiments will be carried out in microscale. Students will learn new concepts in organic synthesis, including multi-step synthesis, organometallic reagents, and green chemistry for chemical synthesis, catalytic reactions, protecting groups, and peptide couplings. NMR and IR will be used for compound characterization.

CHEM 301. Chemical Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisite: high school algebra and trigonometry or equivalent with a grade of C or better. Designed for engineering technology majors. Not open to students who have completed a college level chemistry course. Covers principles of chemistry, with a focus on chemical energetics and chemistry of materials. Suitable laboratory experiments illustrate the course material.

CHEM 310. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Restriction: completion of the sophomore year, approval of the department, and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments facilitated and approved by the co-op office. Mandatory participation in seminars and completion of a report. Cannot be used for degree credit. Note: Normal grading applies to this COOP Experience.

CHEM 311. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: CHE 310 with a grade C or better.

CHEM 336. Physical Chemistry III. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CHEM 235 with a grade of C or better. An introduction to quantum mechanics, statistical mechanics, spectroscopy, and solid state.

CHEM 339. Analytical/Physical Chem Lab for Chemical Engineers. 2 credits, 4 contact hours (0;4;0).
Prerequisites: CHEM 236 with grade C or better. Co-requisite: MATH 225 This course will offer students an introduction to physical and analytical chemistry laboratory techniques. The application of principles learned in lecture will be reinforced by the experiments done in this lab. They will also provide exposure to analytical and other techniques used in chemistry and chemical engineering.

CHEM 340. Chemistry and Engineering of Materials. 3 credits, 3 contact hours (3;0;0).
Prerequisites: CHEM 235, CHEM 244 with a grade of C or better. Emphasizes processing/property relationships for a variety of engineering materials, including polymers, metals, ceramics, composites, semiconductors, optical fibers, and biomaterials. Introduces concepts of chemical structure, bonding and crystallinity. Covers important chemical, physical, electrical, and mechanical properties and corrosion and materials degradation. Also includes materials selection in the chemical process industries.
CHEM 360. Environmental Chemistry I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: CHEM 126 or CHEM 122 and CHEM 124 or CHEM 125A and CHEM 126A with a grade of C or better. Chemistry of the environment with emphasis on the atmosphere. Included are an introduction to the composition and chemistry of the natural and polluted atmosphere, thermodynamics and kinetics of atmospheric reactions, indoor and outdoor air pollution, air quality and its impact on human health, air quality regulations, and climate change. Examples of specific environmental issues covered in this course are the stratospheric ozone depletion, classical and photochemical smog, acid rain, and climate change.

CHEM 361. Environmental Chemistry II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: CHEM 360 with a grade of C or better. Chemistry of the environment, including the hydrosphere and geosphere. Principles of physical, inorganic, and organic chemistry are applied to understand the origins of environmental pollutants, their transport, distribution, and decomposition pathways in water and soil environments.

CHEM 391. Research and Independent Study. 3 credits, 3 contact hours (0;0;3).
Restriction: Junior standing in Chemistry. Provides an opportunity to work on a research project under the individual guidance of a member of the department.

CHEM 412. Inorganic Chemistry. 3 credits, 4 contact hours (2;2;0).
Prerequisite: Prerequisite: CHEM 231 with a grade of C or better. A lecture-recitation-laboratory course in practical inorganic chemistry. Covers the chemistry of most of the elements and their compounds. Preparation in the laboratory is followed by purification and characterization.

CHEM 437. Applications of Computational Chemistry and Molecular Modeling. 3 credits, 3 contact hours (3;0;0).
This class introduces students to applications and fundamental aspects of computational chemistry and molecular modeling for application and understanding in organic, bio- or physical chemistry. It is an introductory course involving hands-on applications of computational chemistry and molecular modeling. The course provides training application and computer programs for students to use in determining fundamental thermochemical parameters, elementary reaction paths, and design of molecular structures to try and optimize and/or improve biochemical / pharmaceutical products or industrial chemical processes. Students will use chemical software packages to perform calculations in order to identify optimum interaction structures for pharmaceutical or industrial chemical systems. The course teaches the student to evaluate relative energy of different structures plus chemical species stability, reactivity and equilibrium reactions in chemical environments. The course is relevant to organic, inorganic, physical bio- and pharmaceutical chemistry. It is also relevant to optimization of chemical engineering processes.

CHEM 473. Biochemistry. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CHEM 244 or CHEM 245 with a grade of C or better. Covers the fundamentals of biochemistry including buffers, blood, proteins, enzymes, carbohydrates, fats, and nucleic acids. Emphasis on the relationship of biochemistry to biotechnology and medicine.

CHEM 474. Biochemistry II. 3 credits, 3 contact hours (3;0;0).
Biochemistry II will focus on transducing and storing energy, synthesizing the molecules of life, and responding to environmental changes. Topics include basic concepts of metabolism, glycolysis and gluconeogenesis, citric acid cycle, oxidative phosphorylation, photosynthesis, fatty acid metabolism, protein turnover and amino acid catabolism, biosynthesis of amino acids, DNA replication and recombination, RNA synthesis and processing, protein synthesis, control of gene expression, the immune system, and drug development.

CHEM 475. Biochemistry Lab I. 2 credits, 4 contact hours (0;4;0).
Prerequisites: CHEM 244 or CHEM 473 with a grade of C or better. This course will offer the chemistry and related (chemical engineering, biology, bioinformatics, bioengineering) students fundamental laboratory approaches for biochemistry and biotechnology. These experiments will reinforce concepts learned in biochemistry lecture classes.

CHEM 480. Instrumental Analysis. 2 credits, 4 contact hours (0;4;0).
Prerequisite: CHEM 221, CHEM 222 or equivalent with a grade of C or better. Laboratory exploring the principles of operation of modern instruments for chemical analysis. Ultra-violet and infrared spectroscopy, mass spectrometry, gas chromatography, high performance liquid chromatography, voltametry, and potentiometry are among the instruments utilized. Apply calibration methods, statistical data treatment, and sample preparation techniques are applied.

CHEM 490. Special Topics in Chemistry. 3 credits, 3 contact hours (3;0;0).
Prerequisite: depends upon the nature of the course given. Course is offered in specific areas as interest develops.

CHEM 491. Research and Independent Study I. 3 credits, 3 contact hours (0;0;3).
Prerequisite: senior standing in chemistry or chemical engineering. Provides an opportunity to work on a research project under the individual guidance of a member of the department.

CHEM 492. Research and Independent Study II. 3 credits, 3 contact hours (0;0;3).
Prerequisite: CHEM 491 with a grade of C or better. A continuation of CHEM 491.

COM 266. Foundations of Game Production. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 and IT 201 and IT 265 with grades of C or higher; HUM 102 may be taken concurrently as a co-requisite. This class introduces students to many of the tools and production methodologies needed for electron games. This class will focus heavily on content control and story handling through the use of scripting and game development tools. Students will learn a few scripting languages that are used in the games industry and create a new game experience. This course does not satisfy the three credit 200 GER in History and Humanities.
COM 303. Video Narrative. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Introduces various multimedia resources and environments in order to develop new strategies for both reading and writing within a visually-based, screen-oriented culture. Students will study different historical and theoretical lineages in videography, and learn hands-on techniques and technologies to produce independent media works of their own. This course satisfies the three credit 300 GER in History and Humanities.

COM 310. Interpersonal Communication. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. This course surveys theory and research related to interpersonal communication. The course focuses on effectively managing personal and professional relationships. The course’s format consists of lectures, group discussions, experiential activities, and written assignments that require students’ active involvement. This course satisfies the three credit 300 GER in History and Humanities.

COM 321. Technology & Tactics of Sound. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. The course offers students an effective primer in the science of how sound has been measured and understood historically as a media format. This course satisfies the three credit 300 GER in History and Humanities.

COM 325. Special Topics in Communication. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. The precise topics to be covered, along with prerequisites, are announced in the semester prior to the offering of the course. This course satisfies the three credit 300 GER in History and Humanities.

COM 335. 3-D Modeling and Animation. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, IT 201 and one History and Humanities GER 200 level course with a grade of C or higher. This class introduces students to the concepts of 3D modeling and animation, and putting those concepts into action by working with software. This class will be a hands-on, project focused course, using 3D modeling packages, taking students from design to final render. This course does not satisfy the three credit 300 GER in History and Humanities.

COM 345. Character Modeling and Animation. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, IT 201 and one History and Humanities GER 200 level course with a grade of C or higher. This class builds on the concepts of 3D modeling and animation, applying those techniques to character creation and animation. This class focuses on the considerations and techniques involved in the creation and animation of character in 3D. This course does not satisfy the three credit 300 GER in History and Humanities.

COM 350. Digital Video Production. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Instruction in the creation and editing of non-linear digital video; emphasis on team production of a short film; individual editing skills with Final Cut Pro editing software; development and editing of a variety of graphic formats and digital images; formulation of a script treatment; and development of a storyboard. Topics covered include: digital multi-media production; web-casting; interactive television; data-casting; CD and DVD production. This course satisfies the three credit 300 GER in History and Humanities.

COM 351. Documentary Studies. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. This course will allow students to study the methods by which documentary work is conducted and to complete a documentary project of their own. The course will connect the qualitative methods of the social sciences and the humanistic concerns of the arts by allowing students to study documentary subjects as captured by non-fiction, photography, film, tape recorder, and the World Wide Web. Special emphasis will be placed on narrative and metaphor. This course satisfies the three credit 300 GER in History and Humanities.

COM 352. Photojournalism. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Through hands-on writing and photography supervised by the instructor, students develop competencies in discovering and creating an interdisciplinary viewpoint using a variety of writing methods and photographic viewpoints. Special focus on interpreting architecture and architectural detail, nature's conflict and place in urban and suburban environs, and the human interface with nature and man-made spaces. Particular emphasis is placed on the creative process and critical revision. This course satisfies the three credit 300 GER in History and Humanities.

COM 369. Digital Poetry. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An investigation of activities taken up by poets who integrate computer technology in their works. Students discuss and evaluate virtues of the dynamics presented in an array of titles that include algorithmic programming, graphical artistry, videography, holography, hypermedia, and sonic design in order to build an understanding of the combined values of these disparate forms of expression. This course satisfies the three credit 300 GER in History and Humanities.

COM 376. Game Design Studio. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher, and Com 266, Com 335, and Com 345 with a grade of C or higher. This class challenges students to apply what they have learned in previous courses about game design. Students work in groups to design and create games for various platforms. Groups will work closely with the instructor to get constant feedback and criticism on their work. Students will complete case studies of various game genres. Students will work on one large project and complete it in stages, as a project would in the industry. This course does not satisfy the three credit 300 GER in History and Humanities.
COM 390. Electronic Writing Workshop. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A practice-oriented workshop for creative expression in a variety of electronic formats with the specific goal of facilitating individual writing projects for screen and performance. Topics in literary theory will be combined with current criticism in electronic writing, media and screen studies to produce new cultural works in a variety of digital sub-genres, including soundscapes, hypertext poetry, animation, code poems, interactive games, digital video and wiki poems. This course satisfies the three credit 300 GER in History and Humanities.

ENG 095. General Skills in English as a Second Language. 5 credits, 5 contact hours (5;0;0).
Intended for students in need of extensive practice in speaking, listening, reading, and writing in English prior to enrolling in HSS 099S.

ENG 200. Communicating in Organizations. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken concurrently as a co-requisite. Allows students to understand the need for writing in an information-based corporate culture. Students write intensively in a variety of forms for a variety of audiences. Attention is given to editing, graphic design, communications ethics, and desktop publishing. At the conclusion of the course, students prepare a portfolio of their work. This course satisfies the three credit 200 GER in History and Humanities.

ENG 302. Communication Theory. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. This course will introduce students to communication theory and practice. The course begins with a review of contemporary communication theory. After covering five selected theories - semiotic, visual, cultural, social, and reception, students will be required to apply a selected theory to a computer-mediated case study. Students will also be required to perform a collaborative field study. Through the course, students will be expected to read critically, to research peer-reviewed sources thoroughly, to present effective oral briefings, and to write analytic reports. This course satisfies the three credit 300 GER in History and Humanities.

ENG 333. Cybertext. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Through theoretical readings and electronic research, students explore and compare information structuring in print and digital media, particularly how digital technology influences the dynamics of text. Interactivity, visual communication and developments in the realm of cybertexts are addressed in the course. Materials presented in creative, technical and commercial areas were studied. This course satisfies the three credit 300 GER in History and Humanities.

ENG 336. Advanced Composition. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Involves composing in-depth, persuasive research essays designed to address the aims of discourse (expressive, referential, literary, and persuasive), using current media tools (text, graphics, audio, animation and video) and venues (print and electronic), in several iterations. This course satisfies the three credit 300 GER in History and Humanities.

ENG 339. Practical Journalism. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A descriptive and analytic survey of news systems. Assignments will include practice in writing straight news items, sports writing, feature writing, science writing, interviewing, and editing with emphasis on understanding methods. The survey of printed and broadcast news systems includes the influence of technological, economic, legal, ethical, and historical factors. This course satisfies the three credit 300 GER in History and Humanities.

ENG 340. Oral Presentations. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Instruction and practice in effective oral presentations. Students deliver a wide range of presentations adapted to the needs of a variety of audiences. Topics include voice and diction, presentation skills, the effective use of visual aids, reporting technical material and audience analysis. This course satisfies the three credit 300 GER in History and Humanities.

ENG 346. Journalism in American History. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores how the media - defined as print as well as electronic media (television, radio and online modes of communication) have influenced different events and social movements at various points in time. Topics will include the role of William Randolph Hearst's newspapers in creating support for the Spanish-American War; press coverage of the women's suffrage movement; the role of television in ending the Vietnam War. This course satisfies the three credit 300 GER in History and Humanities.

ENG 347. Technical, Professional and Scientific Writing for Publication. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. The purpose of this course is to acquaint students with samples from significant technical, professional and scientific writing, sharpen skills in identifying theses and the major supporting elements in these works, while making judgments on their contributions. In addition, students will be required to demonstrate their ability to do the necessary research to integrate related sources other than the assigned texts. This course satisfies the three credit 300 GER in History and Humanities.

ENG 348. Literary Journalism. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Students will read and analyze the works of literary journalists from the 18th century to the present day. Close reading and analytical writing as well as some journalistic writing. This course satisfies the three credit 300 GER in History and Humanities.
ENG 349. Advanced Journalism Skills. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Through hands-on writing and reporting supervised by the instructor, students learn competencies needed in various journalistic specialties. Special focus on how to cover science and technology, social issues, culture and the arts, sports, business and consumer news. Particular emphasis on copy-editing. This course satisfies the three credit 300 GER in History and Humanities.

ENG 350. The Newsroom. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. This is an advanced journalism course. Students will work closely with the instructor in order to write news and feature stories, commentaries and critiques, and will be encouraged to publish their work in The Vector and other publications. This course satisfies the three credit 300 GER in History and Humanities.

ENG 351. Online Journalism. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A study of how news is covered on the World Wide Web, and the impact of online news on society and politics. History of news online. Differences between print, broadcast and online—what are the strengths and weaknesses inherent to each medium? Analysis of the websites of different news organizations—from the New York Times to CNN special interest e-zines to blogs. This course satisfies the three credit 300 GER in History and Humanities.

ENG 352. Technical Writing. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An advanced writing course. Combines current theory with actual practice to prepare students as technical writers. Analyze complex communication situations and design appropriate responses through tasks that involve problem solving, rhetorical theory, document design, oral presentations, writing teams, audience awareness, ethical considerations, and gender equity issues. This course satisfies the three credit 300 GER in History and Humanities.

ENG 353. Composing Documents for Print. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores information structuring via print and digital media; how computer technology has influenced the ways in which information is presented in modern culture. Focuses on the optimal ways to prepare and present information for technical and commercial use. Important concepts such as visual literacy and effective design are discussed and addressed. This course satisfies the three credit 300 GER in History and Humanities.

ENG 354. Composing Documents for the Web. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Seminar and laboratory-based course designed for BA/BS majors; open to others with appropriate backgrounds and interests and permission of instructor. Follow up of ENG 353, explores information structuring via digital media, and how computer technology has influenced the ways in which information is presented in contemporary culture. Through guided interactive research, presents information for technical, commercial, and artistic use. Projects involve use of HTML editors, NJIT networks, and graphical and animation software. This course satisfies the three credit 300 GER in History and Humanities.

ENG 355. Television News Writing and Production. 3 credits, 4 contact hours (3;1;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. This course consists of lectures and hands-on practice with the basics of television news writing and production and a field trip to a television station. After learning the fundamentals, the class will then begin its own news production by refining the video taped “packages” and integrating them into a studio newscast they will write and produce while guided by the instructor and with technical support from the staff of Instructional Technology and Media Services. The semester culminates in a final program that can be delivered to the campus community through ITMS’s cable network. This course satisfies the three credit 300 GER in History and Humanities.

ENG 356. Theory of Rhetoric. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines theories of rhetoric from ancient to contemporary times. Special attention is paid to Aristotle, Peter Ramus, James Kinneavy, Walter Ong, and Jurgen Habermas. Focuses on the ways in which theories inform the practice of communication. In the course project, students design and conduct field research based on rhetorical theory. This course satisfies the three credit 300 GER in History and Humanities.

ENG 359. Creative Writing. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Focuses on the complexities of creating literary texts. Analyzes student writing in genres such as fiction, creative non-fiction, poetry, and drama. Considers these genres from theoretical perspectives. Topics include character development, plot, dialogue; meter, rhyme, figurative language; audience analysis, ethos, and narrative theory. Students write, edit and critique their own work with the aim of publication. This course satisfies the three credit 300 GER in History and Humanities.

ENG 490. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Approval of the department, and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments are facilitated and approved by the co-op office. Requires mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

ENG 491. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Approval of the department, and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments are facilitated and approved by the co-op office. Requires mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.
ENG 496. Senior Project-Communication and Media. 3 credits, 3 contact hours (0;0;3).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Intended for Communication and Media majors only. Offers PTC students the opportunity to enhance their understanding of communication through their integration of skills and knowledge gained in prior courses. The resultant research thesis or field project, of substantial length and originality, represents the culmination of the undergraduate disciplinary experience. Utilizing both a seminar and workshop approach, entails intense and sustained collaboration between student and instructor, and cooperation among students.

EPS 202. Society, Technology, and the Environment. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101. Uses case studies to examine the relationships between the creation and use of technologies, the human and natural environment, and the development of social and cultural institutions. Central theme is the manner in which human society structures the environment in which it lives: nature and culture, city and country, civilization and development. This course satisfies 3 credits of the Basic Social Sciences GUR. Honors Note: See HSS 101.

EPS 312. Technology and Policy in Contemporary America. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101, HSS 202 or their equivalents; two from HSS 211, HSS 212, HIST 213 or their equivalents. A study of technology and politics in recent America. Focuses on the role of the federal government in shaping technology, especially through funding technological innovations and applications. Topics will include the origins of technology policy in World War II, the influence of the Cold War, the science and technology policy advisory system, and political and cultural influences on technology policy. Honors Note: See HSS 101.

EPS 313. Environmental History and Policy. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101, HSS 202 or their equivalents; two from HSS 211, HSS 212, HIST 213 or their equivalents. Covers the rise of the modern environmental debate, and examines its current priorities and values, politics and economics, and impacts on industry and society. Students review the role of regulatory agencies, private industry, public interest groups, and the media. Current major issues in New Jersey are considered, as well as environmental debate on a national and global level. Honors Note: See HSS 101.

EPS 360. Ethics and the Environment. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101, HSS 202 or their equivalents; two from HSS 211, HSS 212, HIST 213 or their equivalents. An examination of contemporary environmental problems from the perspective of ethics or moral philosophy. An analysis of the ethical presuppositions and value principles underlying environmental policy. The study of ethical theories and their application to the environmental crisis. Honors Note: See HSS 101.

EPS 362. Environmental Economics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101, HSS 202, SS 201 or their equivalents. Presents a detailed overview of the relationship between political economy and the environment. Draws on diverse case studies including global warming, harvesting of minerals on the ocean's floor, destruction of old growth forests, and contamination of the nation's water, air, and soils. Explores the economic remedies to the fast-changing relationship between society and nature. Honors Note: See HSS 101.

EPS 380. Policy Issues in the Coastal Environment. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101, HSS 202 or their equivalents; two from HSS 211, HSS 212, HIST 213 or their equivalents. An examination of coastal environments from the standpoint of the scientist, the engineer, and the resource manager. Topics include beach and shoreline characteristics, technological innovations to address coastal erosion problems, and current debates in coastal policy and resource management. Case studies are used to illustrate coastal management practices and the scientific, technical, and social constraint to policy formulation.

EPS 381. Field Techniques and Research. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101, HSS 202 or their equivalents; two from HSS 211, HSS 212, Hist 213 or their equivalents. An introduction to research methods. The objectives of the course are to provide opportunity to pursue specialized, in-depth research in a subfield of science, technology and society of the student’s choice; to develop skills in problem identification, research design and problem solving; to increase familiarity with methods of data analysis; to strengthen library research skills; to provide an opportunity to gather original field data in a team-oriented environment; and to improve oral and written communication skills.

ESTS 298. Teaching in Urban Schools. 3 credits, 3 contact hours (3;0;0).
Restriction: Intended for students in Teaching Certificate program or by permission of the STS Director. This course introduces students to critical issues of teaching in urban schools. Readings and seminar discussions will focus on: the urban setting, children's lives in the inner city, urban schools, teachers' experiences in urban schools, the classroom, the curriculum, culturally responsive pedagogy, special education in the urban context, bilingual education, immigrant children in American schools, and Newark as an example of some of the topics studied in the course.

ESTS 337. Obstacle to Understanding Science and Technology. 3 credits, 3 contact hours (3;0;0).
Restriction: Intended for students in Teaching Certificate program or by permission of the STS Director. This course examines how to approach, discuss and debate controversial issues in science and technology in order to facilitate civil discourse and policy-formation in a democratic society. Various types of controversies will be addressed illustrating various aspects of debate and discourse needed to arrive at compromise, understanding, and consensus. Students will learn how to moderate group discussion dealing with current science and technology issues facing society and learn to moderate discussions for themselves and for others.
ESTS 386. Methods of Teaching. 3 credits, 3 contact hours (3;0;0).
Restriction: Intended for students in Teaching Certificate program or by permission of the STS Director. This course investigates the principles of scientific literacy for the general public and how it can be achieved. Particular attention is paid to identifying a personal pedagogy, method of teaching, and how this can be capitalized upon to assist others to become more scientifically literate and aware.

ESTS 388. Curriculum and Instruction for Secondary Schools. 3 credits, 3 contact hours (3;0;0).
Prerequisite: R300 292 and ESTS 298 or R300 298. This course introduces curriculum, its development, and how it influences classroom practice. Guidance documents (national, state & local), tensions between the overt, covert and hidden curricula, use of resources to enact and augment the curriculum, the need for interdisciplinary instruction, differentiated instruction, special education, and the integration of assessment into curriculum planning and implementation are examined general and for each subject-matter discipline.

ESTS 390. Understanding Educational Evaluation. 3 credits, 3 contact hours (3;0;0).
Prerequisites: R300 292 and STS 331 or R300 298, with a grade of C or better. This course examines educational evaluation-methods of data gathering, interpretations of data, as well as understanding and use of findings to inform and improve classroom practice. It provides knowledge and tools of evaluation to be proactive gatherers and users of data to plan and improve instruction. Students will define and understand various types of evaluations, how they are developed, administered, and analyzed, and their appropriate uses for the classroom.

ESTS 410. ICT in Secondary Schools. 3 credits, 3 contact hours (3;0;0).
Restriction: Intended for students in Teaching Certificate program or by permission of the STS Director. This course examines the integration of Information and Communication Technology (ICT) into instruction to foster community, collaboration, conceptual development, and exceptional academic performance. The course pays particular attention to present and potential access and academic uses of ICT in under-resourced urban schools with racially, ethnically, and linguistically diverse students whose families tend not to be participants in the US society’s culture of power.

EVSC 125. Fundamentals of Environmental Sciences. 3 credits, 3 contact hours (3;0;0).
An introductory course that will present freshman EVSC students with general concepts and topics on Environment, including chemistry, ecosystems, geological and soil resources, water quality, agricultural and Environment, atmosphere, noise and ionizing radiation.

EVSC 325. Energy and Environment. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CHEM 125 with a grade C or better and PHYS 111 with grade C or better. An advanced course to instruct EVSC students, topics on energy and environmental issues such as introduction to energy, natural energy conservation, environmental issues of energy production and consumption, regulation and legislation related to energy, public policy development in energy and environment.

EVSC 335. Environmental Law. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 102 with a grade of C or better. The prerequisite is a college ability to communicate competently in the English language including the ability to research and prepare essay compositions and to articulate the major points in a presentation format. The introduction to Environmental Law will cover the regulatory system developed over time that has forged a complex system of environmental rules influencing industrial and other private and public actions that impact the environment. The course will review these rules from the vantage point of the practicing technical environmental engineer and scientist. Students will become familiar with the background and derivation of these laws as well as the major operational features such as environmental permits and enforcement. Several major environmental cases will be analyzed that give definition to the key features of these laws. Each class module will direct itself to the practical application of these laws.

EVSC 375. Environmental Biology. 3 credits, 3 contact hours (3;0;0).
An introductory ecological approach to understanding man’s impact and dependence on the natural environment. Broad topics include ecosystems, nutrient cycles, pollution, pest management, conservation of natural resources, energy, and human population.

EVSC 381. Geomorphology. 3 credits, 3 contact hours (3;0;0).
This is a course in geomorphology, the study of landforms and the contemporary processes that create and modify them. The course will emphasize earth surface processes and quantitative analysis of landform change. Lectures will stress geomorphic principles and two field-based problems will enable students to apply these principles to contemporary geomorphic problems in engineering and management with a focus on the natural environment.

EVSC 385. Environmental Microbiology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: R120 101 and R120 102 with minimum grade of C. The main goals of this course are to present an overview of the important microbes involved in environmental microbiology, to discuss the environments where they are found, to learn how they are detected and monitored, and to describe their effects on humans. Traditional lectures and exams will be supplemented with discussions of experimental design and data interpretation by reading current research articles.

EVSC 391. Research and Independent Study. 3 credits, 3 contact hours (0;0;3).
Provides an opportunity to work on a research project under the individual guidance of a member of the department.

EVSC 416. Environmental Toxicology. 3 credits, 3 contact hours (3;0;0).
The course is intended to explore the general principles of toxicology and apply them to the assessment of acute, subacute and chronic effects of hazardous and toxic chemicals. Qualitative and quantitative measures of toxicity and testing protocols are addressed. The role of toxicology in risk assessment and risk management is discussed.

EVSC 484. Environmental Analysis. 3 credits, 4 contact hours (2;2;0).
The analysis of environmental samples is studied from the acquisition of representative samples, through sample handling, chain of custody, sample storage, analytical method selection, analysis, and data treatment.
FRSC 201. Intro to Forensic Science. 3 credits, 3 contact hours (3;0;0).
This course explores the scientific and legal praxis of forensic science. Forensic science is an integral and important part of the legal system by providing investigators credible science to corroborate or refute statements, and offering factual reports of scientific-based findings to a trial judge and jury. Students will be introduced to the science behind examination techniques used in forensic science labs. Guest lecturers and practitioners will offer insights into their day-to-day investigative and technological challenges and success.

FRSC 307. Crime Scene Investigation & Lab. 4 credits, 5 contact hours (3;2;0).
Prerequisite: FRSC 201. Overview and analysis of the cardinal principles and techniques of crime scene investigation, with an emphasis on a rigorous scientific approach. Students will be introduced to: documentation with notes, sketches, and photography; specialized techniques for the recognition and enhancement of physical evidence; preparation and maintenance of case folders; communication of results and preparation of formal reports; management of resources, including equipment and personnel; and ethics and bias in criminalistics.

FRSC 359. Physical Method of Forensic Ana. 4 credits, 6 contact hours (4;2;0).
Prerequisites: FRSC 201; FRSC 307 (FRSC 307 may be taken as a co-requisite). This course is designed to prepare undergraduate students in the forensic science program for impression, pattern, and trace evidence analysis. Students will learn the principles of criminalistics, proper evaluation and comparison of impression evidence, and the theory and practical application of forensic microscopy to the analysis of unknown materials. There will be an emphasis on the necessity of an objective and rigorous scientific approach to forensic investigations.

FRSC 475. Forensic Chemistry. 4 credits, 6 contact hours (4;2;0).
Prerequisite: CHEM 221. Forensic Chemistry is the application of modern analytical chemistry to matters of law. This course will describe methods of analysis commonly performed in forensic laboratories for the analysis of controlled substances, forensic toxicology, fire debris analysis, trace evidence, and other types of evidence. The laboratory component of the course will prepare students for forensic science careers with practical examples of commonly performed tests and examinations.

FRSC 480. Forensic Microscopy. 4 credits, 6 contact hours (4;2;0).
Prerequisite: CHEM 221. This course provides students with the basic knowledge and skills necessary to explore the application of microscopy to the forensic sciences. This course incorporates lectures, laboratory exercises, and individual research projects, organized in a format to engage each registrant in the analytical and investigative roles of the light microscope in the forensic professions. The general topics and techniques covered in this course include microscope nomenclature, alignment and focus, microscopic sample handling, and photographic documentation of samples.

FRSC 490. Co-op Work Experience. 3 credits, 3 contact hours (3;0;0).
Prerequisites: Senior standing and departmental approval. Students gain major-related work experience and reinforcement of their academic program. Work assignments are facilitated and approved by the co-op office. Requires mandatory participation in seminars and completion of a report. Note: Normal grading applies to this co-op experience.

FRSC 491. Research & Indep Study I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: Senior standing and departmental approval. Research in forensic science. Each student works under the supervision of a forensic science or associated faculty member. A research paper or poster are required.

FRSC 495. Senior Seminar. 3 credits, 3 contact hours (3;0;0).
Prerequisites: Senior standing and departmental approval. Offers forensic science students the opportunity to enhance their understanding of professional practice through their integration of skills and knowledge gained in prior courses. The resultant research paper and presentation represents the culmination of the undergraduate disciplinary experience. Guest speakers will be invited to present on topics relevant to their area of expertise within the field of forensic science.

HIST 2**. History Elective. 3 credits, 3 contact hours (3;0;0).
This designation is used primarily to designate a course transferred from another school, judged to be acceptable, but without a specific NJIT or Rutgers-Newark equivalent. This course satisfies the three credit 200 GER in History and Humanities.

HIST 213. The Twentieth-Century World. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101 with a grade C or better, and pre- or co-requisite HUM 102 with a grade C or better. Uses case studies to provide an interdisciplinary view of the 20th-century world. Selected literary, philosophical, and artistic movements are discussed in the context of the major historical developments of the century. This course satisfies the three credit 200 GER in History and Humanities.

HIST 214. Tech & Cult in Amer History. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 with a grade of C or better, HUM 102 pre- or co-requisite with a grade of C or better. This course examines the relationship between technology and society throughout the history of the United States. We analyze the roles and impacts of major technological innovations within their cultural and historical contexts, seeking to understand how these contexts shaped and were shaped by these technologies. This course satisfies the three credit 200 GER in History and Humanities.

HIST 310. Co-op in Law, Technology, Culture and History I. 3 credits, 3 contact hours (0;0;3).
Prerequisites: HUM 102 and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Students gain work experience related to their major in Law, Technology and Culture. Work assignments are facilitated and approved by the co-op office. Requires mandatory participation in seminars and completion of a report. This course may not be used to satisfy either of the three credit 300 level GER in History and Humanities.
HIST 311. Co-op in Law, Technology, Culture and History II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: HUM 102 and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Students gain work experience related to their major in Law, Technology and Culture. Work assignments are facilitated and approved by the co-op office. Requires mandatory participation in seminars and completion of a report. This course may not be used to satisfy either of the three credit 300 level GER in History and Humanities.

HIST 312. Prof Development in Law. 1 credit, 1 contact hour (1;0;0).
Prerequisite: Sophomore standing. This course is designed to enhance professional development for students who hope to attend law school or another graduate program. It will provide students with the skills necessary to apply to, be accepted into, and succeed in law school or other graduate program. It will meet workshop-style for three hours for five weeks. This course may not be used to satisfy either of the three credit 300 level GER in History and Humanities.

HIST 320. Law and Evidence. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 and a course fulfilling the 200 level History and Humanities GER with a grade of C or better. This course considers the philosophical and technical question of what constitutes evidence in the US legal system. This course may not be used to satisfy either of the three credit 300 level GER in History and Humanities.

HIST 334. Environmental History of North America. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade C or higher and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. The history of interactions between humans and their natural environment on the North American Continent. Considers perceptions of, use of, and alteration of the environment. Traces the cultural, intellectual, economic, political and technological transformations from early colonial times to the late 20th century. Addresses the diverse environmentalisms that have emerged the last several decades. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 341. The American Experience. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade C or higher and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. American history from the colonies to the 20th century, with concentration on several selected themes basic to an understanding of the changing cultural patterns and social values of American civilization. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 343. African-American History I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Introduction to African-American history from pre-colonial West Africa to emancipation in the mid-19th century. Topics include the African slave trade, the economics and politics of slavery, gender and culture in the slave community, and the free black experience in both the north and south. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 344. African-American History II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Introduction to African-American history from the mid-19th century to the present. Covers race relations and the civil rights movement, as well as migration, black social and political thought, gender roles, and class formation. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 345. Communication through the Ages. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Modes of communication, ancient and modern, in their social and cultural context, from cave painting to computers. Topics include literacy and economic development in the West; the technological revolution in media beginning with Daguerre, Samuel Morse, and Alexander Graham Bell; the institutional development of mass media and popular culture; and contemporary trends in world communication and interaction. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 351. Ancient Greece and the Persian Empire. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. The political, institutional, and cultural developments of Ancient Greece and the Persian Empire from the Mycenaean period to the King's Peace (386 B.C.). This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 352. The Hellenistic States and the Roman Republic. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. The political and cultural developments of the Hellenistic states and their influence on the Republic of Rome to 30 B.C. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 354. Communication through the Ages. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Economic development in the West; the technological revolution in media beginning with Daguerre, Samuel Morse, and Alexander Graham Bell; the institutional development of mass media and popular culture; and contemporary trends in world communication and interaction. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 361. The Founding of the American Nation. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. North America in the colonial and revolutionary periods, with emphasis on patterns of cultural and institutional development from early settlement through the ratification of the Constitution. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 362. Sex, Gender, and the Law in American History. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Examines how the US legal system has dealt with the problems of sex and gender. Surveys laws that dictated different roles for men and women as well as seemingly gender-neutral laws that affected men and women differently. Tracks the designation of sexual acts as legal or illegal and the ways that race, class, and nationality complicated these relationships. This course may be used to satisfy a three credit 300 level GER in History and Humanities.
HIST 363. The United States as a World Power. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. American domestic and foreign policy in the 20th century. Topics include imperialism, the Progressive Era, the Depression, the New Deal, World Wars I and II, the Cold War, America and the world today. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 364. American Law in the World. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Concerns the history of American law as a product and catalyst of world politics by considering in global context the transformation of central doctrines of regulation, property rights, and civil liberties from the Declaration of Independence through the War on Terror. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 365. Comparative Colonial History. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. A comparative analysis of the relationship between expanding Western nations and selected regions of Africa, Asia, and South America, from 1500 to 1970. A case study approach illuminates key historical processes, with a special emphasis on economic development and cultural change in colonial settings. Topics include European perceptions of culturally different peoples, race relations in colonial societies, forms of rebellion and resistance to European rule, nationalist movements. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 366. Gender, Race and Identity in American History. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Surveys the social construction of gender in America from the 17th century to the present. Examines the changing gender roles and relations that have characterized and structured the historical experiences of different racial and ethnic groups. In a multicultural framework, covers the impact that colonization, industrialization, slavery, immigration and migration, urbanization, war, and social movements have had on the ways that women and men think of themselves in terms of gender as well as their respective roles in families and larger social networks. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 367. International Law and Diplomacy in History. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Examines the origins, evolution, and application of diplomacy and international law from the 15th century to the present. Topics include the rise of modern diplomacy in Renaissance Italy; the emergence of international law and professionalization of diplomacy in early modern Europe; the development of international law and diplomatic theory in the 18th and 19th centuries; the codification of international law; and adaptation of international law to transnationalism and globalization in the 20th century. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 368. Law and Society in History. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Uses historical case studies to illustrate and evaluate various approaches to the study of law and society. Topics include criminality and the rise of incarceration as a legal penalty in the 19th century; the comparative law of slavery; and the evolution of American Indian law. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 370. Legal issues in the History of Media. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Investigates the development and impact of media law and policy in the United States. Examines how media law and policy affect media content, industry behavior, and consumer rights. Analyzes the values and ideas, as well as political and cultural contexts that have guided continuities and transformations in media law and policy. Topics include indecency and obscenity, copyright and intellectual property, legal protections for children, and media ownership regulation. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 372. Contemporary Europe. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. European society in the 20th century, Nationalism, imperialism, totalitarianism, movements toward European unity, and prominent cultural developments. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 373. The Rise of Modern Science. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Examines the development of modern science in the western world from the origins of the Scientific Revolution to 1900. Explores how science challenged the revealed universe of Christianity, changed the curriculum in schools and universities, and altered the world view of philosophers. This course covers the achievements of Copernicus, Galileo, Newton, Darwin, Einstein, and other leading scientific innovators, but it also weaves the expansion of scientific knowledge into the larger fabric of European intellectual history. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 374. Modern Russian Civilization. 3 credits, 3 contact hours (3;0;0).  
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Russia under the last tsars, the 1917 upheavals, rise of the Soviet state to world power under Lenin, Stalin, and others, until the collapse of the communist dictatorship. This course may be used to satisfy a three credit 300 level GER in History and Humanities.
HIST 375. Legal Issues in Environmental History. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Examines the role of law in the formation of human relationships with the natural world. The course will focus on the management and regulation of the human use of natural resources in a variety of historical contexts, but particularly in the United States from colonial times to the present. Through readings and class discussion, students will explore a number of recurring themes, including the transformation from customary rules governing access to local resources to state enforced laws. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 377. Cities in History. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Examines social, cultural and economic changes in urban areas. Regions and themes vary and may include urbanization in Europe, the rise of cities in Latin America, and urban change in contemporary America. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 378. Medicine and Health Law in Modern America. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Examines the legal and ethical aspects of medical and public health practice in the United States from 1900 to the present. Topics include the rights and responsibilities of physicians and patients, the roles of government in promoting health, the rise of health law and bioethics, the tensions between civil liberties and public health, as well as evolving notions of harm, liability, uncertainty, and proof as they relate to the history of medical and public health practice. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 379. History of Medicine. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Focuses on the evolving institutions, values, concepts, and techniques through which doctors attempted to control the impact of disease and preserve the health of Americans, beginning with the shaman and colonial physician through post-World War II changes in the system of medical care. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 380. History of Public Health. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Attempts to protect the health of human populations from the Black Death in medieval Europe to recent threats from epidemics and chemical and biological terrorism. Shifting patterns of disease and the emergence and growth of public health as a domain of expert knowledge and policy. Topics include: epidemiology and statistical modes of inquiry; the tension between civil liberties and public health; the economics of health and disease; and the relationship between medicine and public health. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 381. Sci & Tech In Modern Medicine. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. Examines how science and technology came to play critical roles in the rise of modern medicine. Readings, lectures, and discussion focus on the specific innovations in ideas, practices, and technologies that helped transform Western medicine in the 19th and 20th centuries. The course also considers how medicine and the biomedical sciences both inform and reflect attitudes about the human body in Western society. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 382. War and Society. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. The evolution of warfare and the impact of war on political, economic, cultural, and social institutions, including the two World Wars and post-1945 conflicts. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 383. The Making of Modern Thought. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. The formation of contemporary images of human nature since the mid-19th century. Emphasis on Marx, Darwin, and Freud and their legacy to 20th century thought. Theories of the family, sexuality, and the changing role of women in society are explored. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 384. Invention and Regulation. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. This course examines how the law has affected technological development in the United States from its founding to today. We cover four broad technical categories: industrialization, transportation, communication, information technology. We analyze the invention of technology within issues of patent and copyright, funding and regulation of technology through legislation, and legal challenges to technology. Our goal is to understand change in law and technology in historical and cultural context. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 385. Technology and Society in European and World History. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher. An introduction to the social history of European and global technology from the Middle Ages to the second Industrial Revolution of the late 19th century. Emphasis on such themes as the process of technological innovation, the nature of technological systems, the diffusion of technology, the interaction of Western and non-Western technology, the changing relations of science and technology, and the role of technology in broader historical movements. This course may be used to satisfy a three credit 300 level GER in History and Humanities.
HIST 386. Technology in American History. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher.
Survey of the history of American technology emphasizing the social and economic environments of technological change. Topics include the transfer of technology in building canals and cities, the rise of the factory system, the emergence of the American system of manufacture, and the development of major technological systems such as the railroad, telegraph, electric light and power, and automobile production and use. Focus on the professionalization of engineering practice, the industrialization of invention, and the growing links between engineers and corporate capitalism in the 20th century. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 387. Computers, Innovators and Hist. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher.
This course traces the development of computer technology from its theoretical origins in the 19th century, through the transformation from analog to digital computers and the emergence of personal computing in the 20th century, up to the present. Topics include the place of computer technology in society, how computers & people shape each other, who & what was involved in innovating computers, the cultural context of such innovation, as well as how the uses and users of computers have evolved. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 388. Britain in the 20th Century. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher.
Survey of British history from the death of Queen Victoria (1901) to that of Diana, Princess of Wales (1997); emphasis on Britain’s social, cultural and political transformation. Topics include causes and impact of the World Wars, the turn from Empire to Europe, rise and critique of the welfare state, and foreign relations. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 390. Historical Problems of the 20th Century through Film. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher.
A study of selected problems in the 20th century using film as a window into history. Such topics as the rise of Nazi Germany, America in the thirties, World War II and American society, the development of cities, and the emergence of the Third World will be considered. In any one semester only two topics will be selected for study. The material for the course will include documentary films, newsreels, TV news films, and theatrical feature films as well as selected readings. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 391. Industrial Revolution in World. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher.
This course covers the Industrial Revolution from its emergence in Britain in the 18th century to its expansion to America, Western Europe, and Japan. Topics include the practical need for new forms of power, links between invention, empire, the impact of technical advance on the labor force, colonialism and slavery, and the 19th century socio-cultural change. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

HIST 401. Independent Study. 3 credits, 3 contact hours (0;0;3).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher in addition to junior or senior standing; and before registering, permission from one of the following: NJIT history department chairperson or history major or minor advisor. Pursuit of special interests in history not covered in a regular elective course. A history faculty member provides guidance and assigns readings and papers. Note: Normal grading applies.

HIST 402. Independent Study. 3 credits, 3 contact hours (0;0;3).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher in addition to junior or senior standing; and before registering, permission from one of the following: NJIT history department chairperson, or history major or minor advisor. Pursuit of special interests in history not covered in a regular elective course. A history faculty member provides guidance and assigns readings and papers.

HIST 489. Seminar-Readings. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher, an upper level History course (3 credits) and senior standing. Intended to combine study of specific topics, which vary each year, with attention to the methods for researching and writing history, these small classes for history majors in their senior year prepare students for the following semester’s research project and culminate in a brief paper describing a proposed topic and the historical documents and sources to be used.

HIST 490. Seminar Research. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and a course fulfilling the History and Humanities GER 200 level course with a grade of C or higher, an upper level history course, R510 315 or R510 316 Perspectives in History, and HSS 404 History Senior Seminar. This one-semester-long seminar allows students to apply the skills they learn in the History major to specific topics that vary semester by semester. In these small classes, students conduct research with attention to historical methods. With close guidance from instructors, students explore local archives, design a paper topic of their individual interest in conjunction with the professor, and write a research paper.

HSS 403. Humanities Senior Seminar - Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and 6 credits at the 300-level History and Humanities GER with a grade of C or higher; 3 credits at the 300-level may be taken concurrently as a co-requisite. The capstone seminars allow students the opportunity to work closely with an instructor in a specific area of the instructor’s expertise. Students are required to bring together interests and skills developed in previous courses. Students make in-depth oral and written presentations. A list of capstone seminars is published each semester in the course registration bulletin.
HSS 404. Humanities Senior Seminar - History. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and 6 credits at the 300-level History and Humanities GER with a grade of C or higher; 3 credits at the 300-level may be taken concurrently as a co-requisite. The capstone seminars allow students the opportunity to work closely with an instructor in a specific area of the instructor's expertise. Students are required to bring together interests and skills developed in previous courses. Students make in-depth oral and written presentations. A list of capstone seminars is published each semester in the course registration bulletin.

HSS 405. Humanities Senior Seminar - Philosophy. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and 6 credits at the 300-level History and Humanities GER with a grade of C or higher; 3 credits at the 300-level may be taken concurrently as a co-requisite. The capstone seminars allow students the opportunity to work closely with an instructor in a specific area of the instructor's expertise. Students are required to bring together interests and skills developed in previous courses. Students make in-depth oral and written presentations. A list of capstone seminars is published each semester in the course registration bulletin.

HSS 406. Humanities Senior Seminar - English. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and 6 credits at the 300-level History and Humanities GER with a grade of C or higher; 3 credits at the 300-level may be taken concurrently as a co-requisite. The capstone seminars allow students the opportunity to work closely with an instructor in a specific area of the instructor's expertise. Students are required to bring together interests and skills developed in previous courses. Students make in-depth oral and written presentations. A list of capstone seminars is published each semester in the course registration bulletin.

HSS 407. Humanities Senior Seminar - Theater. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and 6 credits at the 300-level History and Humanities GER with a grade of C or higher; 3 credits at the 300-level may be taken concurrently as a co-requisite. The capstone seminars allow students the opportunity to work closely with an instructor in a specific area of the instructor's expertise. Students are required to bring together interests and skills developed in previous courses. Students make in-depth oral and written presentations. A list of capstone seminars is published each semester in the course registration bulletin.

HSS 408. Humanities Senior Seminar - Science, Technology, and Society. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and 6 credits at the 300-level History and Humanities GER with a grade of C or higher; 3 credits at the 300-level may be taken concurrently as a co-requisite. The capstone seminars allow students the opportunity to work closely with an instructor in a specific area of the instructor's expertise. Students are required to bring together interests and skills developed in previous courses. Students make in-depth oral and written presentations. A list of capstone seminars is published each semester in the course registration bulletin.

HSS 409. Humanities Senior Seminar - Social Science. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and 6 credits at the 300-level History and Humanities GER with a grade of C or higher; 3 credits at the 300-level may be taken concurrently as a co-requisite. The capstone seminars allow students the opportunity to work closely with an instructor in a specific area of the instructor's expertise. Students are required to bring together interests and skills developed in previous courses. Students make in-depth oral and written presentations. A list of capstone seminars is published each semester in the course registration bulletin.

HSS 491. Honors Sem In Humanities. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and 6 credits at the 300-level History and Humanities GER with a grade of C or higher; 3 credits at the 300-level may be taken concurrently as a co-requisite. The capstone seminars allow students the opportunity to work closely with an instructor in a specific area of the instructor's expertise. Students are required to bring together interests and skills developed in previous courses. These courses satisfy the Senior Seminar in Humanities and Social Science GER for students enrolled in the honors college only.

HUM 099. English Composition: Reading, Writing, Speaking I. 3 credits, 3 contact hours (3;0;0).
Focuses on developing the reading and writing skills necessary for success in a college curriculum. Emphasizes structuring and organizing effective sentences and paragraphs; drafting and revising; preparing summaries; building vocabulary; developing grammatical fluency; formulating a thesis, and other steps toward writing expository essays. Mandatory writing workshops are held in conjunction with the course work.

HUM 099S. English Composition: Reading, Writing, Speaking I. 6 credits, 6 contact hours (6;0;0).
Prerequisites: None, unless placement test result requires ENG 095. The first course of the two-semester composition sequence HUM 099S-HUM 100-SL. Intended for students whose English is a second language. Emphasizes reading strategies, building vocabulary, grammar, developing a thesis, organizing an essay, editing and writing different kinds of expository essays. Frequent oral presentations. Weekly writing labs are held in conjunction with the course work.

HUM 100. English Composition: Reading, Writing, Speaking II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 099S. The second course of the two-semester sequence, HUM 099S-HUM 100SL. Focuses on essay writing strategies, clear expression, correct syntax, grammar and diction; basic organizational principles, researching ideas, documenting reference sources, reading longer, more complex material, determining flaws in an argument, and presenting group oral reports. Mandatory weekly writing labs are held in conjunction with the course work. The sequence HUM 099-HUM 100 satisfies the English GUR.

HUM 101. English Composition: Writing, Speaking, Thinking I. 3 credits, 3 contact hours (3;0;0).
Enterance is determined by placement test score or completion of HUM 099 with a grade of C or better. Focuses on developing written and oral communication skills; emphasizes writing expository and research essays; preparing oral reports; drafting, revising, editing; evaluating and proper documentation of source material; using rhetorical strategies such as narration and argument.

HUM 102. English Composition: Writing, Speaking, Thinking II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101 with a grade of C or better. Focuses on enhanced written and oral communication skills; emphasizes reading and interpretation of literary forms; critical analysis; methods of research using print and on-line sources; report writing and writing about literature.
HUM 2**. Humanities Elective. 3 credits, 3 contact hours (3;0;0).

HUM 211. The Pre-Modern World. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with a grade of C or higher; HUM 102 may be taken concurrently as a co-requisite. Case studies focus on differing forms of material culture, belief systems, aesthetic norms, and artistic productions to develop an understanding of ancient and medieval world views. This course satisfies the three credit 200 GER in History and Humanities.

HUM 212. The Modern World. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with a grade of C or higher; HUM 102 may be taken concurrently as a co-requisite. Uses case studies to examine such key processes as the expansion of global trade and the formation of a global economy, European perceptions of non-Western cultures, and the roots and legacy of imperialism. This course satisfies the three credit 200 GER in History and Humanities.

HUM 230. Introduction to Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with a grade of C or higher; HUM 102 may be taken concurrently as a co-requisite. An introduction to literary studies, this course focuses on close reading and critical writing. Students will investigate and reflect on standard literary genres; make claims about how the content and form of each connect; find and present evidence for such claims. Students will carefully consider their own writing at a slow pace to understand, ultimately, how a literary text operates as a work of art, as well as to learn how to communicate powerfully and persuasively in a variety of settings. This course satisfies the three credit 200 GER in History and Humanities.

HUM 231. Introduction to Literature II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with a grade of C or higher; HUM 102 may be taken concurrently as a co-requisite. Explores the short story and the novel from varied countries and eras. Emphasis is given to narrative methods, representative themes, and global perspectives. This course satisfies the three credit 200 GER in History and Humanities.

HUM 251. Ethical Issues in Business. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with a grade of C or higher; HUM 102 may be taken concurrently as a co-requisite. An examination of the ethical problems and moral foundations of business from the perspective of moral philosophy. Among the questions explored are: What are the rights of employees and employers in the workplace? Do corporations and managers have an obligation to society at large? What is the relationship between personal and business morality? Is there a moral justification for the free market? This course satisfies the three credit 200 GER in History and Humanities.

HUM 252. Ethical Issues in Business II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with a grade of C or higher; HUM 102 may be taken concurrently as a co-requisite. A student may register for no more than two semesters of special topics courses. This course satisfies the three credit 300 GER in History and Humanities.

HUM 320. American Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one 200 -level course with the prefixes COM, ENG, HUM HIST, LIT, PHIL, STS, THTR, R510, or R512, with a grade of C or higher. The study of new and/or advanced topics in an area of the humanities, not regularly covered in any other HUM, LIT, ENG OR HSS course at the 300 - level. The precise topics to be covered, along with prerequisites, are announced in the semester prior to the offering of the course. A student may register for no more than two semesters of special topics courses. This course satisfies the three credit 300 GER in History and Humanities.

HUM 321. British Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A survey of major works of British literature. Provides a foundation for understanding the currents of British thought and experiences. Special emphasis is paid to American literature within a global context. This course satisfies the three credit 300 GER in History and Humanities.

LIT 320. American Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A survey of major works of American literature. Provides a foundation for understanding the currents of American thought and experiences. Special emphasis is paid to American literature within a global context. This course satisfies the three credit 300 GER in History and Humanities.

LIT 321. British Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A survey of the major works of British literature. Provides a foundation for understanding the currents of British thought and experience. Special emphasis is paid to British literature within a global context. This course satisfies the three credit 300 GER in History and Humanities.

LIT 330. World Literature I: North America, Latin America and the Caribbean, Australia and Oceania. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Enhances understanding of other cultures and of past and contemporary global interactions. This course satisfies the three credit 300 GER in History and Humanities.

LIT 331. World Literature II: Africa and the Middle East, Asia, and Europe. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Enhances the understanding of other cultures and of past and contemporary global interactions. This course satisfies the three credit 300 GER in History and Humanities.

LIT 340. Contemporary Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Focuses on the study of literary works published within the last ten years. Considers how contemporary issues and problems are addressed in a variety of literary works. This course satisfies the three credit 300 GER in History and Humanities.

LIT 350. Fiction. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores the short story and the novel from varied countries and eras. Emphasis is given to narrative methods, representative themes, and global perspectives. This course satisfies the three credit 300 GER in History and Humanities.
LIT 352. 20th Century European Fiction. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines themes ranging from war and occupation, revolution, Fascism, and Communism to individual liberation and self-discovery, existentialism, absurdism, and feminism. This course satisfies the three credit 300 GER in History and Humanities.

LIT 355. Poetry. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores the problems, devices, and techniques of poetry's sound, rhythm, meter; diction and tone; connotation, metaphor, and symbol as a means of demystifying the reading of poems. Emphasis is given to the place and purpose of poetry in a technological society. This course satisfies the three credit 300 GER in History and Humanities.

LIT 360. Drama. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Follows the development of play structure from folkloric origins to contemporary theater. Emphasis is on text, history of text development, and the changing purpose of theatrical presentations. This course satisfies the three credit 300 GER in History and Humanities.

LIT 361. 20th Century American Drama. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines the development of 20th century American drama with emphasis on the ways, often experimental, in which the playwrights reflect the spirit of the times. This course satisfies the three credit 300 GER in History and Humanities.

LIT 362. Non-Western Drama. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores classical and contemporary theater and drama in China, Japan, India, Africa, and the Middle East. This course satisfies the three credit 300 GER in History and Humanities.

LIT 363. Ethnic and Minority Drama. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Using contemporary dramas as social, historical, and cultural artifacts, examines the experience of Latinos, Asian Americans, Native Americans, and African Americans. This course satisfies the three credit 300 GER in History and Humanities.

LIT 364. Modern Continental and British Drama. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An examination of some of the dramas from the late nineteenth and twentieth centuries with the purpose of gaining some understanding of how dramatists, in both subject matter and technique, reflect the spirit of the times. Representative playwrights include Ibsen, Shaw, Wilde, Strindberg, Synge, Chekhov, O'Casey, Pirandello, Anouilh, Brecht, Ionesco, and Pinter. This course satisfies the three credit 300 GER in History and Humanities.

LIT 365. Non-Fiction. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines the ways that writers examine cultural issues through the use of literary non-fiction. Emphasis is placed on autobiographical, persuasive, and narrative techniques. This course satisfies the three credit 300 GER in History and Humanities.

LIT 370. Literature and Diversity. 3 credits, 3 contact hours (3;0;0).

LIT 372. African-American Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Allows students to explore themes and styles particular to literary works by and about African-Americans. This course satisfies the three credit 300 GER in History and Humanities.

LIT 374. Women and Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Allows students to explore literature by and about women from around the world. Special attention is paid to autobiographical narratives. This course satisfies the three credit 300 GER in History and Humanities.

LIT 376. Latin American Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines the ways that writers of Latin America and the Caribbean explore their respective culture through techniques such as dream, myth, and legend to achieve an authentic and unique vision. Special emphasis is given to 20th-century authors. This course satisfies the three credit 300 GER in History and Humanities.

LIT 378. Literature and Nature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores and interprets the natural world. Examines the ways that nature has been used in fiction, drama, poetry, and non-fiction. Students learn to describe the natural world in their writing. Co-listed as STS 378. This course satisfies the three credit 300 GER in History and Humanities.

LIT 380. Historical Literature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Sources of fiction and drama are often based on historical personalities and actual incidents. Examines a number of such works. Original historical material is compared with the literary work it inspired, thus providing insights into the nature of the creative process and the purposes of the historian and the creative writer. This course satisfies the three credit 300 GER in History and Humanities.
LIT 382. The Comic Tradition in English and American Literature. 3 credits, 3 contact hours (3:0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Presents great comic works from the 14th century to the present. Students study verse narratives, plays, novels, and essays. Emphasis is given to the classical roots and international connections of the comic tradition in English, the relationship between form and function in comedy, and elucidation of comedy's social and philosophical ends. This course satisfies the three credit 300 GER in History and Humanities.

LIT 384. Musical Theater Adaptations. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. The content of this course is primarily literary. It examines the original texts that are used for theatrical adaptations in contemporary Broadway and Off-Broadway musicals. The origin stories are drawn from literature, graphic novels, and cultural folk stories. Students will attend selected musicals. This course satisfies the three credit 300 GER in History and Humanities.

LIT 386. Science Fiction. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores the distinctive characteristics of science fiction as a literary genre and its function as a social criticism. Special attention is given to the ways in which cultural gender coding surfaces in the text. Films and video are used. This course satisfies the three credit 300 GER in History and Humanities.

LIT 388. The Russian Novel and Short Story. 3 credits, 3 contact hours (3:0:0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Focuses on Russian fiction of the 19th and 20th centuries. Approaches material both as evidence of artistic vision and as social documents of Russian history. This course satisfies the three credit 300 GER in History and Humanities.

MATH 101. Foundations of Mathematics for the Liberal Arts. 3 credits, 3 contact hours (3:0:0).
Intended for students in degree programs offered by HSS and History. This course reviews principles of algebra and the foundations of mathematics. Degree credit awarded for degrees offered by HUM and HIST.

MATH 102. Modern Pre-calculus. 6 credits, 6 contact hours (6:0:0).
This course is an intensive non-traditional approach to pre-calculus employing curriculum innovations for the preparation of students for college calculus. The course infuses calculus techniques into the pre-calculus curriculum. The format includes both regular class and workshop environments with a focus on student problem solving. Course meets on Saturdays in the fall and spring terms and M, T, W, R in the summer, second session. This course is only available to high school students.

MATH 105. Elementary Probability and Statistics. 3 credits, 3 contact hours (3:0:0).
Consider notions of probability. Topics include the binomial and normal distributions, expected value, and variance. The notions of sampling, hypothesis testing, and confidence intervals are applied to elementary situations.

MATH 107. University Mathematics II. 3 credits, 3 contact hours (3:0:0).
Linear functions, equations, inequalities, systems of linear equations, quadratic equations, elementary functions, graphing functions.

MATH 108. University Mathematics I B. 4 credits, 5 contact hours (5:0:0).
Intended for students whose major requires MATH 111. Linear functions, equations, inequalities, systems of linear equations, quadratic equations, polynomials, rational expressions, expressions involving radicals, partial fraction decomposition, conic sections, graphing functions.

MATH 110. University Mathematics B II - Trigonometry. 4 credits, 5 contact hours (4:1:0).
Intended for students whose major requires MATH 111. Prerequisite: MATH 108 or placement by performance on standardized entrance examinations. Trigonometric functions and identities, laws of sines and cosines, logarithmic equations, systems of nonlinear equations, polar coordinates.

MATH 111. Calculus I. 4 credits, 5 contact hours (5:0:0).
Prerequisite: MATH 110 with a grade of C or better or MATH 139 with a grade of B or better, or placement by performance on standardized entrance examinations. Topics include limits, differentiation, applications of differentiation, and integration.

MATH 111H. Honors Mathematics I. 4 credits, 4 contact hours (4:0:0).
Admission to this course is by invitation, based on standardized entrance exams. Topics enhance those of MATH 111 and concepts are studied in detail. Emphasizes science and engineering applications.

MATH 112. Calculus II. 4 credits, 5 contact hours (5:0:0).
Prerequisite: MATH 111 with a grade of C or better or MATH 132 with a grade of C or better. Topics include integration, applications of integration, series, exponential and logarithmic functions, transcendental functions, polar coordinates, and conic sections.

MATH 113. Finite Mathematics and Calculus I. 3 credits, 3 contact hours (3:0:0).
Prerequisite: (Intended for Architecture students.) MATH 107 with a grade of C or better, or MATH 110 with a grade of C or better, or NJIT placement. An introduction to differential and integral calculus. Applications include area, volumes, curve lengths, surface area, centroids, and moments. Focus is on application throughout the course.

MATH 114. Finite Mathematics and Calculus II. 4 credits, 4 contact hours (4:0:0).
Prerequisite: (Intended for Architecture students.) MATH 113 with a grade of C or better. Topics include numerical methods, set theory and counting, series, descriptive statistics and basic probability, matrices, and optimization.
MATH 115. Elements of Geometry. 3 credits, 3 contact hours (3;0;0).
A modern approach to the elements of geometry grounded in real-world applications. Topics included basic axiomatic, Euclidean geometry, non-Euclidean geometry, and transformational geometry. Applications and examples in architecture, engineering and science are integrated throughout the course.

MATH 116. Mathematics of Design. 3 credits, 3 contact hours (3;0;0).
The course is project oriented, covering theories of proportion; tiling, symmetry, symmetry groups, and informal geometry; fractals; theory of graphs and knots; three-dimensional design and polyhedra. The mathematics is oriented towards carrying out designs rather than a systematic development of mathematical theory.

MATH 120. Basic Concepts in Statistics. 1 credit, 1 contact hour (1;0;0).
The course offers an introduction to the basic concepts in statistics. Topics include the role of statistics, data summary, normal distribution, elements of probability, and computation of mean and variance. This course will also include an introduction to statistical estimation and inference.

MATH 131. Calculus A. 4 credits, 5 contact hours (5;0;0).
Prerequisites: MATH 139 with a grade of B or higher and permission of the major advisor or placement. The course covers limits, continuity, differentiation, and related rates, also reviewing the foundations of algebra, precalculus, and trigonometry. MATH 131, MATH 132, and MATH 133 are equivalent to MATH 111 and MATH 112.

MATH 132. Calculus B. 4 credits, 5 contact hours (5;0;0).
Prerequisites: MATH 131 with a grade of C or higher or MATH 111 with a grade of C or higher. The course covers optimization, integration, calculation of arc length, area, volume, and hyperbolic functions (4-1-4) MATH 131, MATH 132, and MATH 133 are equivalent to MATH 111 and MATH 112.

MATH 133. Calculus C. 4 credits, 5 contact hours (5;0;0).
Prerequisites: MATH 132 with a grade of C or higher. The course covers integration, applications of integration, numerical integration, series, and polar coordinates. MATH 131, MATH 132 and MATH 133 are equivalent to MATH 111 and MATH 112.

MATH 135. Calculus for Business. 3 credits, 3 contact hours (3;0;0).
Intended for students with major offered by SOM. Prerequisite: MATH 107 with a grade of C or better or MATH 110 with a grade of C or better or NJIT placement. An introduction to mathematics of business, principles of differential and integral calculus, and optimization.

MATH 138. General Calculus I. 3 credits, 3 contact hours (3;0;0).
Intended for students who are not in Science or in Engineering. Prerequisite: MATH 107 with a grade of C or better, or MATH 110 with a grade of C or better or NJIT placement. An introduction to differential and integral calculus of a single variable.

MATH 139. Trigonometry and Principles of Differential Calculus. 4 credits, 5 contact hours (4;0;1).
Prerequisites: Grade A in MATH 108 or NJIT placement. Comprehensive review of trigonometry and pre-calculus topics integrated into an introduction to differential calculus. Topics covered include: Exponential, logarithmic and trigonometric functions, analytics trigonometry, conic sections, limits, derivatives, applications of differentiation.

MATH 211. Calculus III A. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Topics include vectors, curvature, partial derivatives, multiple integrals, line integrals, and Green's theorem. Students who are considering a major in Mathematical Sciences or who are undecided about their major should take MATH 213.

MATH 213. Calculus III B. 4 credits, 4 contact hours (4;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Topics include vectors, curvature, partial derivatives, multiple integrals, line integrals, and Green's, divergence, and Stokes' theorems.

MATH 222. Differential Equations. 4 credits, 4 contact hours (4;0;0).
Prerequisite: Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Methods for solving ordinary differential equations are studied together with physical applications, Laplace transforms, numerical solutions, and series solutions.

MATH 225. Survey of Probability and Statistics. 1 credit, 1 contact hour (1;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Topics include descriptive statistics, elements of probability, random variables and distributions; mean and variance; introduction to estimation and inference. This course satisfies the Mathematics GUR in probability and statistics. However, degree credit will not be granted for both MATH 225 and any other upper level course in probability and/or statistics.

MATH 225A. Survey of Probability and Statistics. 1 credit, 1 contact hour (1;0;0).
For Chemical Engineering students only. Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Topics include descriptive statistics, elements of probability, random variables and distributions; mean and variance; introduction to estimation and inference. This course satisfies the Mathematics GUR in probability and statistics. However, degree credit will not be granted for both MATH 225 and any other upper level course in probability and/or statistics.

MATH 226. Discrete Analysis. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. An introduction to discrete mathematics. An introduction to discrete mathematics. Topics include elementary set theory, logic, combinatorics, relations, and selections from graphs and trees and algebraic systems.
MATH 227. Mathematical Modeling. 4 credits, 4 contact hours (4;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better and CS 115 with a grade of C or better and CS 113 with a grade of C or better or CS 100 with a grade of C or better or CS 101 with a grade of C or better. An introduction to the theory and practice of mathematical modeling. Techniques include scaling and dimension, fitting of data, linear and exponential models, elementary dynamical systems, probability, optimization, Markov chain modeling. Models are drawn from applications including biology, physics, economics, finance, and chemistry.

MATH 238. General Calculus II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 138 with a grade of C or better or MATH 139 with a grade of C or better or MATH 111 with a grade of C or better or placement. A continuation of MATH 138. Topics include applications of integral calculus and an introduction to ordinary differential equations.

MATH 240. Numerical Mathematics Laboratory. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better, and CS 113 or knowledge of FORTRAN, C, or C++. Introduction to basic concepts and processes of numerical mathematics with emphasis on practical issues of implementation, use of numerical algorithms and software, and interpretation of numerical data. Weekly projects involving writing computer programs, presenting numerical results in tables and graphs, evaluation and approximation of standard numerical functions, round-off errors and loss of significance, basic iterative processes, matrix arithmetic, random number generation, and Monte Carlo methods. Students gain experience using a programming language, such as C, and mathematical software, such as MATLAB.

MATH 244. Introduction to Probability Theory. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Topics include basic probability theory in discrete and continuous sample space, conditional probability and independence, Bayes' theorem and event trees, random variables and their distributions, joint distribution and notion of dependence, expected values and variance, moment generating functions, useful parametric families of distributions including binomial, geometric, hypergeometric, negative binomial, exponential, gamma, normal and their applications, simple case of central limit theorem and its uses.

MATH 246. Introduction to Financial Mathematics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 135 with a grade of C or better or MATH 138 with a grade of C or better or MATH 111 with a grade of C or better. An introduction to the basics of simple interest and discount, compound interest and discount, and simple annuities. This course is primarily intended for students whose major only requires Calculus I. It cannot be used for credit towards major or minor degrees offered by the Department of Mathematical Sciences.

MATH 279. Statistics and Probability for Engineers. 2 credits, 2 contact hours (2;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. This course introduces methods of summarizing and analyzing engineering data and the importance of observing processes over time such as control charts. Descriptive statistics, plots and diagrams are then used to summarize the data. Elements of probability and random variables with their distributions along with mean and variance are taught. All this knowledge is then used as a platform towards covering how to do basic estimation and inference, including confidence intervals and hypothesis testing based on a single sample. Students taking this course cannot receive degree credit for MATH 225, MATH 244, or MATH 333.

MATH 305. Statistics for Technology. 3 credits, 3 contact hours (3;0;0).
Prerequisite: (Intended for students in Engineering Technology.) MATH 111 with a grade of C or better, or MATH 132 with a grade of C or better, or MATH 138 with a grade of C or better. An introduction to the modern concepts of statistics needed by engineering technologists. Topics include organization of data, descriptive statistics, discrete and continuous probability distributions, sampling distribution and designs, estimation -- one and two populations, tests of hypotheses.

MATH 309. Mathematical Analysis for Technology. 4 credits, 4 contact hours (4;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better or MATH 238 with a grade of C or better. Emphasis on partial derivatives; vector calculus, and multiple integrals.

MATH 310. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Prerequisites: Completion of the sophomore year, departmental approval, and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments facilitated and approved by the co-op office. Mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

MATH 321. Introduction to the Finite Element Method. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 222 with a grade of C or better. An elementary introduction to the theory and practice of the finite element method (FEM) is given. The mathematical underpinnings covered in this course include the basics of Sobolev spaces, Galerkin's method and various other weak formulations. Mathematical modeling of different physical problems and their solution techniques are also discussed. Existing finite element programs will be introduced through a course project.

MATH 322. Differential Equations for Applications. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better or MATH 238 with a grade of C or better. An applied science study using differential equations as the vehicle for comprehension of the unknown. Introduction to first-order differential equations and their applications to motion, cooling and electromechanical systems followed by higher order differential equations and their solutions. Study of methods of undetermined coefficients, variation of parameters, and many series and numerical methods. Includes Laplace transforms, matrix methods, and eigenvalue problems.
MATH 326. Discrete Analysis for Computer Engineers. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. An introduction to mathematical logic, Boolean algebra, and Karnaugh maps. Other topics include functions, equivalence relations and partially ordered sets, counting, graph theory and finite state machines. The emphasis is on computation but proofs will be addressed. Students cannot receive credit for both MATH 226 and MATH 326.

MATH 328. Mathematical Methods for Scientists and Engineers. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 211 with a grade of C or better, or MATH 213 with a grade of C or better. Corequisite: MATH 222. The course exposes students to concepts of mathematics encountered throughout the physical science and engineering disciplines. Topics include matrix algebra, vector analysis, complex numbers, and boundary value problems in partial differential equations.

MATH 331. Introduction to Partial Differential Equations. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 211 or MATH 213 and MATH 222 all with a grade of C or better. Partial differential equations in science and engineering. Topics include initial- and boundary-value problems for parabolic, hyperbolic, and elliptic second-order equations. Emphasis is placed on separation of variables, special functions, transform methods, and numerical techniques.

MATH 332. Introduction to Functions of a Complex Variable. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 211 or MATH 213 and MATH 222 all with a grade of C or better. Functions of a complex variable: Cauchy-Riemann equations, Cauchy-Goursat theorem, integration, series, residues, poles, geometrical aspects. Emphasis on techniques.

MATH 333. Probability and Statistics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Descriptive statistics and statistical inference. Topics include discrete and continuous distributions of random variables, statistical inference for the mean and variance of populations, and graphical analysis of data.

MATH 334. Operations Research. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 244 with a grade of C or better or MATH 333 with a grade of C or better. Considers mathematical methods found especially in contemporary fields such as operations research and reliability engineering. Topics include linear programming, graph theory, finite mathematics, differential equations, matrices, and determinants.

MATH 335. Vector Analysis. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 211 with a grade of C or better or MATH 213 with a grade of C or better. Algebra and calculus of vectors. Topics include the theorems of Gauss, Green, and Stokes, and curvilinear coordinates.

MATH 336. Applied Abstract Algebra. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Classical algebra from a modern and constructive viewpoint. Emphasis is on the development of algorithmic and computational skills. Topics include rings, fields, and groups and their applications to science and engineering.

MATH 337. Linear Algebra. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. Matrices, determinants, systems of linear equations, vector spaces, linear transformations, eigenvalues, eigenvectors, and related topics.

MATH 340. Applied Numerical Methods. 3 credits, 4 contact hours (3;1;0).
Prerequisites: MATH 211 with a grade of C or better or MATH 213 with a grade of C or better, and CS 100 with a grade of C or better or CS 101 with a grade of C or better or CS 113 with a grade of C or better or CS 115 with a grade of C or better or MATH 240 with a grade of C or better. Introduction to numerical methods with emphasis on mathematical models. Implements and investigates numerical techniques for the solution of linear and nonlinear systems of equations, eigenvalue problems, interpolation and approximation, techniques of optimization, Monte Carlo methods, and applications to ordinary differential equations and integration.

MATH 341. Statistical Methods II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 244 with a grade of C or better or MATH 333 with a grade of C or better. Covers applications of classical statistical inference. Topics include transformation of variables, moment generating technique for distribution of variables, introduction to sampling distributions, point and interval estimation, maximum likelihood estimators, basic statistical hypotheses and tests of parametric hypotheses about means of normal populations, chi-square tests of homogeneity, independence, goodness-of-fit.

MATH 344. Regression Analysis. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 333 with a grade of C or better or MATH 341 with a grade of C or better. An introduction to statistical data analysis using regression techniques. Topics include least squares estimation, hypothesis testing, prediction, regression diagnostics, residual analysis, variance stabilizing transformations, regression using indicator variables, variable selection, and model building.

MATH 345. Multivariate Distributions. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 244 with a grade of C or better or MATH 333 with a grade of C or better. Topics include discrete and continuous multivariate distributions and their moments, multivariate distributions including multivariate normal and multinomial distributions, order statistics, conditional probability and the use of conditioning, discrete time Markov chains and their examples, discrete time branching processes, homogeneous and nonhomogeneous Poisson processes.

MATH 346. Mathematics of Finance I. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better. The main topics include basic problems in interest, annuities, certain amortization and sinking funds, bonds and related securities.
MATH 347. Mathematics of Finance II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 346 and MATH 244 or MATH 333 all with a grade of C or better. This course introduces mathematical models of bond and stock prices, which lead to arbitrage pricing of options and other derivative securities, and portfolio management. These areas of mathematical finance have a great impact on the way financial markets function. Topics include risk-free, and risky assets, portfolio management, futures, and options.

MATH 371. Physiology and Medicine. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 222 with a grade of C or better. Mathematical models of organs and organ systems: the heart and circulation, gas exchange in the lungs, electrical properties of excitable membranes, neuro-biological clocks, the renal countercurrent mechanism, muscle mechanics. The biology is introduced with each topic. Emphasis is on quantitative problem solving, model building, and numerical simulation.

MATH 372. Population Biology. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 222 with a grade of C or better. Introduction to the mathematics of populations: Malthus' model of geometric population growth, Euler's renewal equations, age structure in human populations, predator satiation, chaos, mathematical models of inheritance, and the theory of epidemics. The ability to weave back and forth between physical concepts and mathematical notation is emphasized as well as the relationships between random and non-random models of similar phenomena.

MATH 373. Introduction to Mathematical Biology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: Math 211 with a grade of C or better or Math 213 with a grade of C or better and Math 222 with a grade of C or better. This course provides an introduction to the use of mathematical techniques applied to problems in biology. Discrete and continuous models of biological phenomena will be discussed. Biological topics discussed range from the subcellular molecular systems and cellular behavior to physiological problems, population biology and developmental biology. Techniques of phase plane analysis for differential equations are introduced in the course. No prior background in biology is necessary.

MATH 388. Introduction to Chaos Theory. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 211 with a grade of C or better or MATH 213 with a grade of C or better. An elementary treatment of chaos theory and its applications concentrating on discrete dynamical systems. Uses theory and applications illustrated by computer experiments to develop such topics as bifurcation, attractors, the logistic map, period-doubling routes to chaos, symbolic dynamics, Sarkovskii's theorem, fractals, and Julia and Mandelbrot sets for complex dynamics.

MATH 391. Numerical Linear Algebra. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 337 with a grade of C or better and CS 113 with a grade of C or better or CS 115 with a grade of C or better or CS 101 with a grade of C or better or CS 100 with a grade of C or better. This course provides an introduction to computational linear algebra. Topics include direct solution of linear systems, iterative methods for linear systems, fast Fourier transforms, least squares problems, singular value decomposition and eigenvalue/eigenvector problems.

MATH 401. Undergraduate Research Seminar. 1 credit, 1 contact hour (0;0;1).
Research seminar intended for students who participate in year-long research projects. Methodologies and techniques needed for summer research projects are discussed. Presentations of current research topics are made by various faculty.

MATH 410. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: MATH 310 with a grade of C or better, departmental approval, and permission of the Office of Cooperative Education and Internships. Provides major-related work experience. Mandatory participation in seminars and completion of requirements that include a report and/or project. Note: Normal grading applies to this COOP Experience.

MATH 426. Advanced Discrete Analysis. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 226 with a grade of C or better or MATH 326 with a grade of C or better. Topics include graphs, trees and their applications, grammars, finite state machines, Turing machines and Petri nets, applied combinatorics -- Stirling, Catalan, and Ramsey numbers, Polya-Burnside counting methods, finite Markov chains and coding theory.

MATH 430. Analytical and Computational Neuroscience. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 211 with a grade of C or better or MATH 213 with a grade of C or better, and MATH 222 with a grade of C or better, and CS 100 with a grade of C or better or CS 113 with a grade of C or better or CS 115 with a grade of C or better or MATH 340 with a grade of C or better. A mathematical and computational introduction to the biophysical mechanisms that underlie physiological functions of single neurons and synapses. Topics include voltage-dependent channel gating mechanisms, the Hodgkin-Huxley model for membrane excitability, repetitive and burst firing, nerve impulse propagation in axons and dendrites, single- and multi-compartmental modeling, synaptic transmission, calcium handling dynamics and calcium dependent currents and processes.

MATH 431. Systems Computational Neuroscience. 3 credits, 0 contact hours (0;0;0).
Prerequisites: MATH 430 with a grade of C or better or departmental approval. This course provides a mathematical and computational introduction to operations of neuronal systems and networks. Topics covered include central pattern generators, neuroethology of sensory systems, sensory-motor transformations, models of various brain regions, models of visual processes, large networks modeling, models of learning and memory, neural coding and mathematics of neural networks.

MATH 432. Mathematics of Financial Derivatives I (Capstone I). 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 222 with a grade of C or better and MATH 346 with a grade of C or better. Mathematical analysis of models encountered in the area of financial derivatives. Topics include modeling and analysis of futures markets, determination of future prices, hedging strategies, swaps, option markets, stock options and their trading strategies.
MATH 433. Mathematics of Financial Derivatives II (Capstone II). 3 credits, 3 contact hours (3;0;0).
Corequisite: MATH 340 with a grade of C or better. MATH 432 with a grade of C or better. Mathematical analysis of models encountered in the area of financial derivatives with emphasis on numerical methods. Topics include: Binomial Trees, Black Scholes Models, Finite Difference Methods.

MATH 440. Advanced Applied Numerical Methods. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 331 with a grade of C or better and MATH 340 with a grade of C or better. A survey of numerical methods for solving ordinary and partial differential equations. Includes initial-value and boundary-value problems for ordinary differential equations and for elliptic, hyperbolic, and parabolic partial differential equations.

MATH 441. Actuarial Mathematics I. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 346 with a grade of C or better. Topics include the economics of insurance, individual risk models for a short term, survival distributions and life tables, life insurance per year, life annuities, and net premiums.

MATH 442. Actuarial Mathematics II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 441 with a grade of C or better. Topics include net premium reserves, insurance models including expenses, nonforfeiture benefits, and dividends.

MATH 444. Applied Sampling Methods and Quality Control. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 333 with a grade of C or better, or MATH 244 with a grade of C or better and MATH 341 with a grade of C or better. An introduction to sample survey and statistical quality control. Topics include sampling from a finite population and different sampling techniques, more detailed study of random sampling and stratification, control charts and acceptance sampling plans in statistical quality control.

MATH 445. Introduction to Experimental Design. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 333 with a grade of C or better, or MATH 244 with a grade of C or better and MATH 341 with a grade of C or better. Basic concepts and principles of designs are covered. Topics include randomized blocks, Latin squares, factorial designs.

MATH 446. Topics in Applied Statistics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 341 with a grade of C or better or MATH 333 with a grade of C or better. Topics may include biostatistics, environmental statistics, statistical consulting.

MATH 447. Applied Time Series Analysis. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 341 with a grade of C or better or MATH 333 with a grade of C or better. An introduction to applied univariate time series analysis. Topics include regression techniques for modeling trends, smoothing techniques (moving average smoothing, exponential smoothing), autocorrelation, partial auto-correlation, moving average, and autoregressive representation of series, Box-Jenkins models, forecasting, model selection, estimation, and diagnostic checking, Fourier analysis, and spectral theory for stationary processes.

MATH 448. Stochastic Simulation. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 341 and either MATH 244 or MATH 333 with a grade of C or better. An introduction in the use of computer simulation to study stochastic models. Topics include the generation of samples of continuous and discrete random variables and processes with applications to stochastic models, statistical analysis of the results, and variance reduction techniques.

MATH 450. Methods Of Applied Math. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 331 with a grade of C or better, Math 337 with a grade of C or better, and MATH 340 with a grade of C or better. Combines mathematical modeling with physical and computational experiments conducted in the Undergraduate Mathematics Computing Laboratory.

MATH 451. Methods Appl Math II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: Math 450 H with a grade of C or better. Small teams of students conduct research projects under the guidance of faculty members who perform applied research.

MATH 453. High-Performance Numerical Computing. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 340 with a grade of C or better and Math 391 with a grade of C or better. The course covers state-of-the-art numerical algorithms for solving large-scale problems accurately and efficiently. Topics include iterative methods for linear systems and eigenvalue computations, introduction to parallel program and parallel numerical algorithms and spectral methods. An instructor-selected advanced topic will be included in the course.

MATH 460. Differential Geometry of Curves and Surfaces. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 222 with a grade of C or better. Curves in the plane and Euclidean space, moving frames, surfaces in Euclidean space, orientability of surfaces, Gaussian and mean curvatures, surfaces of revolution, ruled surfaces, minimal surfaces, special curves on surfaces, Theorema Egregium, the intrinsic geometry of surfaces.

MATH 473. Intermediate Differential Equations. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 222 with a grade of C or better and MATH 337 with a grade of C or better. Topics in the qualitative behavior of solutions of ordinary differential equations with applications to engineering problems. Includes phase plane analysis, stability, dynamical systems, and chaos.

MATH 477. Stochastic Processes. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 244 with a grade of C or better or MATH 333 with a grade of C or better and MATH 337 with a grade of C or better. This course introduces the theory and applications of random processes needed in various disciplines such as mathematical biology, finance, and engineering. Topics include discrete and continuous Markov chains, Poisson processes, as well as topics selected from Brownian motion, renewal theory, and simulation.
MATH 478. Stat Methods in Data Sci. 3 credits, 3 contact hours (3;0;0).
Prerequisites: Math 333 with a grade of C or better or Math 341 with a grade of C or better. This course introduces to students concepts in statistical methods used in data science, including data collection, data visualization and data analysis. Emphasis is on model building and statistical concepts related to data analysis methods. The course provides the basic foundational tools on which to pursue statistics, data analysis and data science in greater depth. Topics include sampling and experimental design, understanding the aims of a study, principles of data analysis, linear and logistic regression, resampling methods, and statistical learning methods. Students will use the R statistical software.

MATH 480. Introductory Mathematical Analysis. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 211 with a grade of C or better or MATH 213 with a grade of C or better. Builds on principles taught in basic calculus courses. Topics discussed include continuity, differentiation, integration, and the limit process of sequences and series.

MATH 481. Advanced Calculus. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 480 with a grade of C or better. Systematic development of partial differentiation, multiple and improper integrals, transformations, inverse and implicit function theorems, and integrals over curves and surfaces.

MATH 491. Independent Study in Mathematics. 3 credits, 3 contact hours (0;0;3).
Prerequisites: Senior standing and departmental approval. Each student works under the direct supervision of a member of the Department of Mathematical Sciences. The work consists primarily of a project applying the student’s mathematical skills to an engineering- or science-oriented project.

MATH 492. Independent Study II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: Senior standing and departmental approval. Each student works under the direct supervision of a member of the Department of Mathematical Sciences. The work consists primarily of a project applying the student’s mathematical skills to an engineering- or science-oriented project.

MATH 495. Topics in Applied Mathematics. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 331 with a grade of C or better, MATH 332 with a grade of C or better, and MATH 340 with a grade of C or better, or departmental approval. A survey of selected areas of applied mathematics. Case histories of problems in applied mathematics from an industrial background.

MATH E. Math Stack Engineers. 3 credits, 3 contact hours (3;0;0).

MATH NE. Math Stack For Non-Engineers. 3 credits, 3 contact hours (3;0;0).

MTSE 301. Principles of Material Science and Engineering. 3 credits, 3 contact hours (3;0;0).
Prerequisites: PHYS 111 and PHYS 121, CHEM 125 and CHEM 126, MATH 111 and MATH 112 or equivalent. Examines the interrelationships among structure, properties, and performance of engineering materials. Topics to be covered include atomic structure, crystallography, solid state imperfections and diffusion. The properties of metals, semiconductors, polymers, ceramics, and composites as well as their behavioral response to mechanical, chemical, optical, electrical, and magnetic stimuli are examined in light of their performance in service.

MTSE 311. Properties of Materials. 3 credits, 3 contact hours (3;0;0).
Prerequisite: two semesters of college physics or equivalent. Intended for engineering technology students and is an introduction to the principal metallic and nonmetallic engineering materials, including their physical properties, response to heat treatment, and corrosion -resistance.

MTSE 318. Engineering Materials. 4 credits, 5 contact hours (3;2;0).
Prerequisites: PHYS 111; CHEM 126. Introduces the student to such engineering materials as metals, viscoelastic materials, ceramics, polymers, and semiconductors. The approach is interdisciplinary with stress upon the structure of materials. Various mechanical and thermal treatments are discussed and related to the stability of the resultant properties. The laboratory sessions implement and emphasize the effects of these mechanical and thermal treatments on the materials.

MTSE 319. Engineering Materials. 3 credits, 3 contact hours (3;0;0).
Prerequisites: PHYS 111; CHEM 126. This course is identical to MtSE 318, with the laboratory omitted.

MTSE 451. X-Ray Diffraction. 3 credits, 4 contact hours (2;2;0).
Prerequisites: PHYS 111; CHEM 126. Combines the lecture and laboratory in introducing the methods of X-ray diffraction. Topics include directions and intensities of diffracted beams, diffractometer methods, Laue methods, power photographs, reciprocal lattice constructions, and the rotating crystal method.

MTSE 452. Materials Science I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: PHYS111; CHEM 126; ME 435 or PHYS 335. Emphasizes the structure and properties of materials and the relationships between them. The primary topics include the thermodynamics of solids, fracture mechanisms, diffusion, elasticity, plasticity, fatigue strength, viscosity, and creep.

MTSE 453. Materials Science II. 5 credits, 7 contact hours (3;4;0).
Prerequisite: MTSE 452. Emphasizes the electronic properties of materials in conjunction with an introduction to ceramics. Topics include semiconductors, thermoelectricity, magnetism, conductivity, dielectric, optical properties, and an introduction to the properties and behavior of ceramics.

OPSE 301. Introduction to Optical Science and Engineering. 3 credits, 3 contact hours (3;0;0).
Prerequisites: PHYS 121. Laboratory and lecture introduces optics and photonics principles with their elementary applications for applied physics, engineering, computer science, or biology majors. Topics include speed at light, reflection, refraction, geometric optics, interference and interferometry, polarization, dispersion, birefringence, fiber-optics, diffraction, introduction to spectroscopy and ray tracing.
OPSE 310. Virtual Instrumentation. 3 credits, 5 contact hours (2;3;0).
Prerequisites: CS 113 or CS 115. Intended for all engineering, computer science, and science majors. Covers the basics of virtual instrumentation including use of IEEE GPIB, RS232 interfaces, and data acquisition boards. Interface a computer to various instruments for data acquisition and instrument control using a state-of-the-art software platform such as National Instrument's LABVIEW. Emphasis is on the practical aspects of interfacing a computer to various instruments including timing issues, real-time data acquisition and instrument control, instrument status, and acquisition speed.

OPSE 402. High Power Laser and Photonics Applications. 3 credits, 4 contact hours (1;3;0).
Prerequisite: PHYS 121. Open to all engineering, computer science, and science majors with junior or senior standing. Advanced combined laboratory and lecture course emphasizing photonics and high power laser applications. Topics include Maxwell's equations, principles of lasers, electro-optics, non-linear optics, absorption and transmission of light, bio-optics, fiber-optic communications, chemiluminescence, scattering from periodic surfaces and colloids, sensors. Topics and experiments change on a semester basis depending on interests of enrolled students.

OPSE 410. Biophotonics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: PHYS 121. An introduction to the interaction of light with biological tissues. Biophotonics for diagnostic and therapeutic applications will be discussed. Topics include propagation of light in turbid tissues, absorption, scattering, laser surgery, and optical rotation.

PE 103. Swim Instruction. 1 credit, 1 contact hour (0;1;0).
Students develop aquatic skills, including various swimming strokes and rescue techniques, according to skill level. Limited to 10 students.

PE 104. Survival Swimming. 1 credit, 1 contact hour (0;1;0).
Designed for the average, weak or non-swimmer and will emphasize survival swimming, basic rescue and water safety techniques, and swimming instruction.

PE 105. Lifesaving/Lifeguard Training. 1 credit, 1 contact hour (0;1;0).
An American Red Cross certification course. The purchase of textbooks is required. Laboratory hours are established at first lecture.

PE 106. Water Safety Instructor. 1 credit, 1 contact hour (0;1;0).
Prerequisite: Valid Advanced Lifesaving certificate. An American Red Cross certification course. The purchase of textbooks is required. Laboratory hours are established at first lecture. Upon successful completion of this course, an individual will be able to teach swimming at all levels as well as emergency water safety.

PE 115. Strength Training and Conditioning. 1 credit, 1 contact hour (0;1;0).
Covers strength and conditioning techniques and programs, goal setting, and record keeping.

PE 117. Jogging. 1 credit, 1 contact hour (0;1;0).
The purpose of this course is to help students improve personal fitness and health through active participation in a safe and effective jogging and conditioning program. Students will learn the lifetime benefits of walking & jogging and the health related components of fitness. Correct biomechanical movements will be emphasized along with fitness and health improvements for all students. Upon completion of the course the students will understand the importance of proper safety techniques and the cardiovascular benefits of activities associated with jogging and conditioning.

PE 118. Walking. 1 credit, 1 contact hour (0;1;0).
An approach to cardiovascular fitness and weight reduction. Walking tours may be offered.

PE 128. Hydrofitness. 1 credit, 1 contact hour (0;1;0).
Water fitness designed to tone major muscle groups, and strengthen the cardiovascular system. Includes exercises for all parts of the body, recipes for staying in shape, and the aerobic way to a strong heart.

PE 129. Individualized Fitness. 1 credit, 1 contact hour (0;1;0).
Specific training to meet the individual student's interest. Areas include techniques of strength training, goal setting and record keeping.

PE 131. Step Aerobics. 1 credit, 1 contact hour (0;1;0).
A high-intensity aerobic workout designed for the moderate to advanced participant using the "Reebok Step" to increase cardiovascular strength and endurance with emphasis on target heart rates, safety, fat reduction, and achieving overall fitness and good health.

PE 132. Aerobics. 1 credit, 1 contact hour (0;1;0).
Designed for cardiovascular conditioning, weight loss, and muscle toning.

PE 133. Swim for Health. 1 credit, 1 contact hour (0;1;0).
Prerequisite: must be able to swim. Designed for those who want to use swimming to improve their health and fitness. Swim for Health is a concentrated program which teaches the techniques and methods used in the development of individualized training programs.?

PE 135. Beginning Swimming. 1 credit, 1 contact hour (1;0;0).
Designed for the non-swimmer. Includes survival techniques and basic rescue.

PE 136. Beginning Karate. 1 credit, 1 contact hour (0;1;0).
An introduction to shotokan karate. Includes basic self-defense. Gi (martial arts uniform) optional.

PE 137. Intermediate Karate. 1 credit, 1 contact hour (0;1;0).
Prerequisite: PE 136 or permission of the instructor. A continuation of PE 136. Includes an introduction to katas, Japanese terms and complex self-defense. Gi (martial arts uniform) required.
PE 139. Individual Fitness II. 1 credit, 1 contact hour (0;1;0).
Prerequisite: PE 129 or permission of the instructor. Designed to increase cardiovascular efficiency, muscular strength, and endurance through specific training that meets a student's continuing goals.

PE 140. Circuit Training. 1 credit, 1 contact hour (0;1;0).
Designed as a low-impact aerobic program utilizing weights to increase flexibility, coordination, muscle tone, and cardiovascular endurance.

PE 141. Introduction to Dance. 1 credit, 1 contact hour (0;1;0).
An introduction to several styles of dance, including ballet, modern, jazz, tap, folk, ethnic, and social.

PE 145. Aerobic Instructor Certification. 1 credit, 1 contact hour (1;0;0).
This Air Force-sponsored physical training course is open to NJIT AFROTC enrolled students only. Course activities include conditioning exercises, calisthenics, a 1.5 mile run, Air Force Sports, Warrior Runs, a Physical Fitness Diagnostic, and a Physical Fitness Assessment.

PE 150. Beginning Yoga. 1 credit, 1 contact hour (0;1;0).
Course introduces the ancient discipline of personal development that balances body, mind, and spirit. Students learn a series of physical postures as well as practical methods for relaxation, proper breathing, meditation, and concentration that promote health, alleviate stress, improve skeletal alignment, and increase muscular strength and flexibility.

PE 151. Intermediate Yoga. 1 credit, 1 contact hour (0;1;0).
In this course students will deepen their study and practice of yoga. Students will master the basic knowledge learned in the Beginning Yoga, while studying advanced poses and breathing techniques. By the end of the course, students will demonstrate and advanced kinesthetic awareness of the body, the ability to perform advanced poses, and a deeper understanding of the philosophy and science of yoga.

PE 170. Modern Dance. 1 credit, 1 contact hour (0;1;0).
This course provides a basis for students to understand and develop an appreciation of dance as an art form. Through active participation students explore fundamental movement principles and modern dance techniques. Incorporated into this course is the study of all the major dance genres and dance history, as well as the study of anatomy. Structured improvisation and choreography allow students to manipulate abstract ideas, and develop their creativity.

PE 171. Latin Dance. 1 credit, 1 contact hour (0;1;0).
This course will focus on training students to understand and perform basic ballroom and Latin steps, turns, and partnering. Students will also learn the rhythms, history, and culture of each style. Students will demonstrate mastery of these styles through choreographed and non-choreographed class performances.

PE 180. Zumba Fitness. 1 credit, 1 contact hour (0;1;0).
This course combines high energy and motivating music with unique moves and combinations that allow participants to exercise with no worries. Zumba combines traditional Latin dance styles including salsa, mambo, cha-cha, cumbia and merengue, as well as hip hop and belly dancing moves. The routines feature aerobic fitness interval training with a combination of fast and slow rhythms that tone and sculpt the body. By focusing on interval training, classes seek to burn calories without exhausting participants with a high impact pace. Zumba is based on the theory that a work out should be fun and easy to do. This allows participants to stick to a fitness program and achieve long-term benefits that are good for both the body and mind.

PE 1XX. PE Exemption. 0 credits, 0 contact hours (0;0;0).

PE 201. Introduction to Lifetime Sports I. 1 credit, 1 contact hour (0;1;0).
Offered only in the fall semester, introduces a variety of the individual, dual, and team sports available at NJIT.

PE 202. Lifetime Sports II. 1 credit, 1 contact hour (0;1;0).
A continuation of PE 101. Participate in a variety of activities or develop an area(s) of concentration.

PE 208. Sports for Women. 1 credit, 1 contact hour (0;1;0).
Designed specifically for women interested in learning and competing in individual, dual and team sports.

PE 210. Skilling. 1 credit, 1 contact hour (0;1;0).
Instruction and practical experience in recreational skiing designed for the novice and intermediate skier. Includes lectures on safety, equipment and clothing, first aid and injuries, tuning and repair; six sessions at Hidden Valley, and possibly one weekend trip to Vermont. Students are responsible for costs of lift tickets and any equipment rentals. Transportation may be provided.

PE 211. Introduction to Bowling and Archery. 1 credit, 1 contact hour (0;1;0).
The rules, techniques and scoring of each sport. Archery equipment is provided. For bowling, students must pay a $1 per class alley fee.

PE 213. Volleyball. 1 credit, 1 contact hour (0;1;0).
Learn current techniques and skills while playing triples (3 on 3) and leading up to competitive team (6 on 6) volleyball.

PE 214. Advanced Volleyball. 1 credit, 1 contact hour (0;1;0).
Prerequisite: PE 113 or approval of the instructor. Advanced methods and techniques of spikes, serves, blocks, sets, team transition, strategy, tournament play, statistics, and videotape analysis.

PE 220. Introduction to Racquet Sports. 1 credit, 1 contact hour (0;1;0).
An introduction to the racquet sports of badminton, paddleball, tennis, and racquetball. Includes rules of play, service, strokes, and playing strategy for singles and doubles.
PHIL 333. Moral Philosophy. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A critical discussion of the history and fundamental elements of ethical thought. Examines topics such as the basic ethical theories, the nature of right and wrong, the significance of moral choice, the structure of the moral life, and the place of reason in ethics. Readings from both classical and modern philosophers. This course satisfies the three credit 300 GER in History and Humanities.

PHIL 334. Engineering Ethics and Technological Practice: Philosophical Perspectives on Engineering. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A philosophical examination of the nature of engineering practice and applied technology. Considers such questions as: How do the societal functions of engineers and the practical application of technologies relate to basic moral and intellectual values? What moral obligations are implied by the uses of technology? What are the ethical duties of engineers in the practice of their careers? How are technological practice and engineering related to questions about knowledge and reality? This course satisfies the three credit 300 GER in History and Humanities.

PHIL 337. World Religions. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An introduction to five world religions which make strong claims to be in some sense universal: Hinduism, Judaism, Buddhism, Christianity, and Islam, with special attention to their impact on contemporary politics, gender, economics, and culture. Study of selected scriptures, major customs, representative figures, and one or two works of art from each religious tradition. This course satisfies the three credit 300 GER in History and Humanities.

PHIL 340. Ethical Issues in Public Policy. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Course premise is the inevitability of ethical issues in public policy decision making. Societal forces such as government, industry, economics, public interest, and science can play various roles in shaping public policy and are related to ethical concerns. Focuses on both historic and current public policy case studies. This course satisfies the three credit 300 GER in History and Humanities.
PHIL 350. Representative Philosophies. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. The ideas of a few great thinkers, from a variety of historical periods. Shows at first-hand how these philosophers accelerated intellectual progress and how their work may contribute to the solution of modern problems. This course satisfies the three credit 300 GER in History and Humanities.

PHIL 351. Biomedical Ethics. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An examination of the ethical problems and moral foundations of medicine. Among the issues explored are the changing nature of the doctor/patient relationship, increased patient autonomy, advance directives, the rationing of care, doctor-assisted suicide, and "the right to die." This course satisfies the three credit 300 GER in History and Humanities.

PHIL 355. The Philosophy of Science. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An investigation into the foundations and implications of modern science, with special emphasis on the influence of philosophy on scientific thought, and on philosophic questions. This course satisfies the three credit 300 GER in History and Humanities.

PHIL 380. Philosophy of Language. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines tradition, formation and change in the ways that language shapes thought. Special attention is paid to the relationships between language and religion, as well as language and science. This course satisfies the three credit 300 GER in History and Humanities.

PHYS 102. General Physics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: None. Intended for students in architecture, computer science (B.A. only), STS and other disciplines requiring laboratory science electives. Elementary statics and dynamics. Subjects discussed are kinematics, Newton's laws of motion, energy, momentum, conservation principles, and mechanical properties of matter. Lab must be taken concurrently.

PHYS 102A. General Physics Laboratory. 1 credit, 2 contact hours (0;2;0).
Prerequisite: None. This course is the laboratory component of PHYS 102 and must be taken concurrently.

PHYS 103. General Physics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: PHYS 102 with grade of C or better. A continuation of PHYS 102 for students in architecture, computer science (B.A. only), STS and other disciplines requiring laboratory science electives. Topics discussed are heat, thermodynamics, sound, wave motion, illumination, geometric and physical optics, and color. Lab must be taken concurrently.

PHYS 103A. General Physics Laboratory. 1 credit, 2 contact hours (0;2;0).
Prerequisite: PHYS 102 with grade of C or better. This course is the laboratory component of PHYS 103 and must be taken concurrently.

PHYS 111. Physics I, 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 131; Corequisite: MATH 111 or MATH 132. Elementary mechanics with an emphasis on the fundamental concepts and laws of mechanics, especially the conservation laws. Topics are scalar and vector quantities of mechanics; rectilinear and circular motion; equilibrium and Newton's laws of motion; work, energy, momentum; the conservation laws. Lab must be taken concurrently. See PHYS 111A.

PHYS 111A. Physics I Laboratory. 1 credit, 2 contact hours (0;2;0).
Corequisite: MATH 111. Laboratory component of PHYS 111. Lab must be taken concurrently with PHYS 111.

PHYS 114. Introduction to Data Reduction with Applications. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MATH 131; Corequisite: MATH 111 or MATH 132. Physics majors only. An introduction to both the theory and application of error analysis and data reduction methodology. Topics include the binomial distribution and its simplification to Gaussian and Poisson probability distribution functions, estimation of moments, and propagation of uncertainty. Forward modeling, including least-squares fitting of linear and polynomial functions are discussed. The course enables students to apply the concepts of the data reduction and error analysis using data analysis software to real data sets found in the physical sciences.

PHYS 121. Physics II, 3 credits, 3 contact hours (3;0;0).
Prerequisites: PHYS 111 with a grade of C or better. MATH 111 or 132. Co-requisite: MATH 112 or MATH 133. This course deals with an introduction to electricity and magnetism. Topics include simple dc circuits, the electric field, the magnetic field, electric potential, capacitance relationships between electric and magnetic fields, inductance, and simple ac circuits. Lab must be taken concurrently. See PHYS 121A.

PHYS 121A. Physics II Laboratory. 1 credit, 2 contact hours (0;2;0).
Prerequisites: PHYS 111 and MATH 111 all with grade of C or better. Corequisite: MATH 112.

PHYS 122. Electricity & Magnetism ECE Appl. 3 credits, 3 contact hours (3;0;0).
Prerequisites: Physics 111 with a grade of C or better. Math 111 with a grade of C or better. Corequisite Math 112. This course emphasizes applications of electricity and magnetism to circuit problems, explores electric fields and magnetic fields of non-trivial charge and current distributions, introduce students to complex variables, and emphasizes methods for solving large linear problems. It provides a strong coupling of the underlying physics with calculus. Lab must be taken concurrently. See PHYS 121A.

PHYS 202. Introductory Astronomy and Cosmology. 3 credits, 3 contact hours (3;0;0).
Prerequisite: None. A non-mathematical presentation of contemporary views of the origin, evolution, and structure of the solar system, stars, galaxies, and the universe. Special topics include neutron stars, black holes, gravitationally strange objects, and the big bang.
PHYS 202A. Astronomy and Cosmology Laboratory. 1 credit, 2 contact hours (0;2;0). 
Corequisite: PHYS 202. Includes demonstration of physical principles applicable to astronomy. Use of telescope for lunar, solar and planetary observations.

PHYS 203. The Earth in Space. 3 credits, 3 contact hours (3;0;0). 
Prerequisite: None. Introduces fundamental phenomena, such as plate tectonics, erosion, volcanism, and glaciation. Studies the interaction between the Earth's four major reservoirs: atmosphere, hydrosphere, biosphere and solid earth; investigates the dependence of the Earth on the Sun; the effect of the Moon on the Earth. Extends knowledge gained from studying the Earth to other planets in this solar system.

PHYS 203A. The Earth in Space Laboratory. 1 credit, 2 contact hours (0;2;0). 
Corequisite: PHYS 203. Optional laboratory course associated with PHYS 203.

PHYS 204. Biophysics of Life. 3 credits, 3 contact hours (3;0;0). 
A non-mathematical view of how living entities work in terms of the basic concepts of physics. The course will discuss how these concepts underline topics ranging from birth to death, from touch to pleasure, from vision to beauty, and from a thought to a heartbeat.

PHYS 231A. Physics III Laboratory. 1 credit, 2 contact hours (0;2;0). 
Prerequisite: PHYS 121 and MATH 112, all with grade of C or better.

PHYS 231H. Physics III Honors. 4 credits, 4 contact hours (4;0;0). 
Prerequisite: PHYS 121 or PHYS 121H and MATH 112 or MATH 112H, all with grade of C or better. Third semester of a three-semester program in Honors Physics. Physical optics is treated in greater detail. Modern physics includes a greater number of topics, with special emphasis on the wave-particle duality in nature. Lab must be taken concurrently. See PHYS 231A.

PHYS 234. Physics III. 3 credits, 3 contact hours (3;0;0). 
Prerequisite: MATH 112. Elements of simple harmonic motion, wave motion, geometric and physical optics are considered. The wave and particle duality of nature is emphasized and made plausible by an examination of the important experiments and theories which lead to the modern concepts of matter and radiation. The conservation laws are broadened to include the equivalence of mass and energy.

PHYS 301. Introduction to Atomic and Nuclear Physics. 3 credits, 3 contact hours (3;0;0). 
Prerequisites: PHYS 234; MATH 222, all with grade of C or better. Selected topics in atomic physics including the Pauli Exclusion Principle and the Atomic Shell Model. In nuclear physics, the two-body problem, nuclear models, alpha, beta, and gamma radiation, accelerators, and nuclear detectors are studied. R750 403 may be substituted for this course.

PHYS 311. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3). 
Prerequisite: Acceptance into the co-op program. Students gain major-related experience and reinforcement of the academic program. Work assignments are facilitated and approved by the Office of Cooperative Education and Internships. Participation in seminars and a final report/project is mandatory. Note: Normal grading applies to this COOP Experience.

PHYS 320. Astronomy and Astrophysics I. 3 credits, 3 contact hours (3;0;0). 
Prerequisites: PHYS 121, with grade of C or better. A quantitative introduction to the astronomy of the sun, earth, and solar system, with an emphasis on the physical principles involved. Includes celestial mechanics, planetary atmospheres and the physics of comets, asteroids and meteorites.

PHYS 321. Astronomy and Astrophysics II. 3 credits, 3 contact hours (3;0;0). 
Prerequisite: PHYS 320, with grade of C or better. A quantitative introduction to the astronomy of the stars, the galaxy, and cosmology, with an emphasis on the physical principles involved. Includes stellar interiors, stellar evolution, galactic dynamics, large-scale structure and early history of the universe.

PHYS 322. Observational Astronomy. 3 credits, 3 contact hours (3;0;0). 
Prerequisite: PHYS 320, with grade of C or better. Most class time is spent in an observatory performing observations of celestial objects such as the Sun, Moon, planets, stars, stellar clusters, and galaxies. Experimental projects include charting the skies, astrophotography (film and CCD), measuring masses of planets, rotational period of the Sun, topography of the Moon, H-R diagrams of stellar clusters, etc.

PHYS 335. Introductory Thermodynamics. 3 credits, 3 contact hours (3;0;0). 
Prerequisites: PHYS 234 or PHYS 231 and MATH 211 or MATH 213, all with grade of C or better. Corequisites: MATH 222, MATH 238 or MATH 335. Introductory thermodynamics, kinetic theory, statistical physics. Topics include equations of state, the three laws of thermodynamics, reversible and irreversible processes. R750 315 may be substituted for this course.

PHYS 350. Biophysics I. 3 credits, 3 contact hours (3;0;0). 
Prerequisite: PHYS 121 with a grade of C or better. This course presents an introduction to general biophysics and a preparation for medical school and biotechnology careers. It features molecules, viruses and cells racing to form enormous electric fields, succumbing to diseases and creating life. It explains how key medical devices preserve life. It assess students' progress using questions just like those on the medical school entrance exams and seeks an understanding of a few, simple principles of life science.

PHYS 390. Selected Topics of Current Interest in Physics. 1 credit, 1 contact hour (1;0;0). 
Prerequisite: PHYS 234 with grade of C or better. Seminar covering topics that are currently in the forefront of physics. The lecture series offers exposure to such topics as nuclear physics, solid state physics, plasma physics, the special and general theories of relativity, and the history and philosophy of science.
PHYS 411. Co-op Work Experience II. 3 credits, 3 contact hours (0:0:3).
Prerequisites: PHYS 311, with grade of C or better, and acceptance into the co-op program. Provides for co-op work assignments which must be approved by the Office of Cooperative Education and Internships. Participation in seminars and a final report/project are mandatory. Note: Normal grading applies to this COOP Experience.

PHYS 418. Fundamentals of Optical Imaging. 3 credits, 4 contact hours (2:2:0).
Prerequisites: PHYS 234 or PHYS 231, with grade of C or better. This is a course with both lectures and experiments and the emphasis is on the hands-on experiences. Upon completion of the course, students should not only grasp the basic concepts involved in imaging science, but also be able to work on simple real world imaging systems. The main content of the lecture part of this course can be summarized as the following: Optical sources, detectors and their working mechanism; Image formation and transmission; Optical imaging system and their characteristics; Imaging processing and algorithms. This course is developed in close collaboration with Edmund Optics Inc.

PHYS 420. Special Relativity. 3 credits, 3 contact hours (3:0:0).
Prerequisites: PHYS 234 and MATH 222, all with grade of C or better. An introduction to Einstein's Special Theory of Relativity at the advanced undergraduate level. Topics include invariance of the speed of light, relativity of time and space, the Lorentz transformations, space-time diagrams, the twin paradox and time travel, relativistic mechanics, rotating reference frames, laser gyroscopes, superluminal motion, phase and group velocities, and applications in high-energy physics, relativistic engineering, nuclear physics, astrophysics, and cosmology.

PHYS 421. General Relativity. 3 credits, 3 contact hours (3:0:0).
Prerequisites: PHYS 234 and MATH 222, all with grade of C or better. An introduction to Einstein's General Theory of Relativity at the advanced undergraduate level. Topics include review of Newton's Theory of Gravitation, review of Einstein's Special Theory of Relativity, tensor calculus on both flat and curved manifolds, the covariant derivative, curvature, Einstein's Gravitational Field Equations, the weak-field limit, gravitational radiation, the black hole solution, Hawking radiation, the No-Hair Theorem, cosmology, and a history of the Universe.

PHYS 430. Classical Mechanics I. 3 credits, 3 contact hours (3:0:0).
Prerequisites: PHYS 234 and MATH 222 and MATH 328 or MATH 335, all with grade of C or better. Newtonian mechanics of particles and systems. Lagrange's and Hamilton's approaches. Continuous systems. R750 361 may be substituted for this course.

PHYS 431. Classical Mechanics II. 3 credits, 3 contact hours (3:0:0).
Prerequisites: PHYS 430, with grade of C or better. Theory of small oscillations and mechanical waves. Rigid bodies. Topics include stability, linearization methods, forced vibrators and perturbation theory, fluids and mechanics of continuous media. 21&62 750 362 may be substituted for this course.

PHYS 432. Electromagnetism I. 3 credits, 3 contact hours (3:0:0).
Prerequisite: Phys 234 or Phys 234H or Phys 231H and Math 222 or Math 222H and Math 328 or Math 335, all with grade of C or better. Electrostatics and magnetostatics, Maxwell's equations with applications, and electrodynamics.

PHYS 433. Electromagnetism II. 3 credits, 3 contact hours (3:0:0).
Prerequisite: PHYS 432, with grade of C or better. Maxwell's equations with applications and electrodynamics.

PHYS 440. Modern Physics. 3 credits, 3 contact hours (3:0:0).
Prerequisites: PHYS 234 or PHYS 231 and MATH 222, all with grade of C or better. Topics include wave-particle duality, wave mechanics, two-state quantum systems, the motion of an electron in a periodic lattice, band theory of solids, electrical, thermal and magnetic properties of solids, and plasmas and super fluid systems. R750 316 may be substituted for this course.

PHYS 441. Quantum Mechanics. 3 credits, 3 contact hours (3:0:0).
Prerequisite: PHYS 430, with grade of C or better. Wave-particle duality, the Schrodinger and Heisenberg formulations of quantum mechanics. The hydrogen atom, perturbation theory, and concepts of degeneracy, composite states and general properties of eigenfunctions. R750 404 may be substituted for this course.

PHYS 443. Modern Optics. 3 credits, 3 contact hours (3:0:0).
Prerequisites: PHYS 234 or PHYS 231 and MATH 222, all with a grade of C or better. Electromagnetic theory of light, interference, diffraction, polarization, absorption, double refraction, scattering, dispersion, aberration, and an introduction to quantum optics. Other topics include holography, lasers, information retrieval, spatial filtering, and character recognition.

PHYS 444. Fluid and Plasma Dynamics. 3 credits, 3 contact hours (3:0:0).
Prerequisites: PHYS 234 or PHYS 231 and MATH 222, all with grade of C or better. Introduces the basics of plasma physics. Covers the following plasma parameters, single particle motions, plasma as fluid, waves, diffusion and resistivity, equilibrium and instability, kinetic theory, nonlinear effects. Applications in three areas: controlled fusion, astrophysics, and interaction between light and plasma.

PHYS 446. Solid State Physics. 3 credits, 3 contact hours (3:0:0).
Prerequisite: MATH 222, with grade of C or better. Corequisite: PHYS 442. An introduction to modern concepts of the solid state. Topics include crystal structure and diffraction, crystal binding and elastic properties, thermal properties, dielectric phenomena, band theory of solids and Fermi surfaces, electrical conductors, semiconductors, magnetism, and super-conductivity. R750 406 may be substituted for this course.

PHYS 450. Advanced Physics Laboratory. 3 credits, 5 contact hours (1:4:0).
Prerequisites: PHYS 335, PHYS 430, PHYS 432, all with grade of C or better. Introduction to electrical measurements; instrumentation; theoretical and applied electronics, solid state electronic devices, digital circuitry; computer design; experiments in modern physics.
PHYS 451. Biophysics II. 3 credits, 3 contact hours (3;0;0).
Prequisites: PHYS 121 with a grade of C or better. An introduction to electrical aspects of biophysics and a preparation for medical school and biotechnology careers. Covering how medical devices work and using active learning with reports on new research.

PHYS 452. Atomic and Nuclear Physics. 3 credits, 3 contact hours (3;0;0).
Prequisites: PHYS 234 or PHYS 231 and MATH 222, all with grade of C or better. Topics include atomic spectra, atomic structure, and nuclear physics.

PHYS 456. Introduction to Solid State Physics. 3 credits, 3 contact hours (3;0;0).
Prequisites: PHYS 234 or PHYS 231 and MATH 222, all with grade of C or better. Treats the same topics as PHYS 446 while introducing the necessary modern physics. Designed for students choosing a minor in applied physics. Students majoring in applied physics are ineligible.

PHYS 461. Mathematical Methods of Theoretical Physics. 3 credits, 3 contact hours (3;0;0).
Prequisites: PHYS 430, PHYS 432, PHYS 433, all with grade of C or better. Topics include vector and tensor analysis, matrix methods, complex variables, Sturm-Liouville theory, special functions, Fourier series and integrals, integral equations, and numerical solutions of differential equations.

PHYS 480. Topics in Applied Physics. 3 credits, 3 contact hours (3;0;0).
Prequisite: Permission of instructor. Current topics and interests in applied physics and physics. Emphasis is on research and scientific development in microelectronics, optoelectronics, optical physics, materials science, surface science, solar physics, and modern physics.

PHYS 481. Applied Solid State Physics: Microelectronics I. 3 credits, 3 contact hours (3;0;0).
Prequisite: PHYS 446, with grade of C or better. Topics include physics of bipolar and field effect devices, Phonon and optical spectra, unipolar devices, and thermal and high field properties of semiconductor devices.

PHYS 482. Applied Solid State Physics: Microelectronics II. 3 credits, 3 contact hours (3;0;0).
Prequisite: PHYS 446, with grade of C or better. Topics include large-scale integrated circuits, device characteristics, charge-coupled devices, LED and semiconductor lasers, photodetectors, and electrical and optical properties of materials.

PHYS 483. Applied Solid State Physics. 3 credits, 6 contact hours (0;6;0).
Prequisite: PHYS 446, with grade of C or better. Introduction to digital concepts; binary circuits and microprocessor architecture. Applications of discrete solid-state devices and integrated circuits are explored both in theory and practice. The laboratory also serves as an introduction to hardware and software components of a typical microcomputer.

PHYS 485. Computer Modeling of Applied Physics Problems. 3 credits, 3 contact hours (3;0;0).
Prequisites: PHYS 234 or PHYS 231 and MATH 222, all with grade of C or better. General computer programming modeling methods and techniques. Numerical solutions to integro-differential equations. Eigenvalues problems. Application of computer-aided-design and other packages. R750 461 may be substituted for this course.

PHYS 490. Independent Study. 3 credits, 3 contact hours (0;0;3).
Prequisite: Departmental approval. Undertake individual research or a project under the supervision of a member of the physics department. 21&62 750 485, 486 may be substituted for this course.
PHYS 491. Independent Study II. 3 credits, 3 contact hours (0;0;3).
R460 101. Intro To The Earth. 3 credits, 3 contact hours (3;0;0).
R460 102. Africa: A Virtual Tour. 3 credits, 0 contact hours (0;0;0).
R460 103. Planet Earth. 3 credits, 3 contact hours (3;0;0).
R460 104. Planet Earth Lab. 1 credit, 1 contact hour (1;0;0).
R460 106. Environ. Geol. 3 credits, 3 contact hours (3;0;0).
R460 107. Environ Geology Lab. 1 credit, 1 contact hour (1;0;0).
R460 114. Earth & Life History. 3 credits, 3 contact hours (3;0;0).
R460 115. Earth & Life Hist Lab. 1 credit, 1 contact hour (1;0;0).
R460 201. Earthquakes - Volcano. 3 credits, 3 contact hours (3;0;0).
R460 203. Natural Disasters. 3 credits, 3 contact hours (3;0;0).
R460 206. Env Geology. 3 credits, 0 contact hours (0;0;0).
R460 207. Env Geology Lab. 1 credit, 1 contact hour (0;1;0).
R460 215. Environmental Disasters. 3 credits, 3 contact hours (3;0;0).
R460 225. Intro Oceanography. 3 credits, 3 contact hours (3;0;0).
R460 230. Weather And Climate. 3 credits, 3 contact hours (3;0;0).
R460 309. Geomorphology. 3 credits, 3 contact hours (3;0;0).
R460 321. Mineralogy. 4 credits, 3 contact hours (3;0;0).
R460 322. Petrology. 3 credits, 3 contact hours (3;0;0).
R460 323. Rocks and Minerals. 4 credits, 4 contact hours (4;0;0).
R460 325. Intro to GIS. 3 credits, 3 contact hours (3;0;0).
R460 331. Oceanography. 3 credits, 3 contact hours (3;0;0).
R460 375. Quant Methods Geosci. 4 credits, 4 contact hours (4;0;0).
R460 400. Intro to Soil Science. 4 credits, 4 contact hours (4;0;0).
R460 401. Intro Geochemistry. 3 credits, 3 contact hours (3;0;0).
R460 406. Applied Geophys. 3 credits, 3 contact hours (3;0;0).
R460 415. Geologic Problems. 3 credits, 3 contact hours (3;0;0).
R460 416. Geologic Problems. 3 credits, 3 contact hours (3;0;0).
R460 427. Hydrogeology. 3 credits, 3 contact hours (3;0;0).
R950 261. Fundamentals Of Speech. 3 credits, 3 contact hours (3;0;0).
R950 281. Public Speaking. 3 credits, 3 contact hours (3;0;0).
R950 289. Princ Of Oral Interp. 3 credits, 0 contact hours (0;0;0).
R950 290. Oral Interpretation. 3 credits, 0 contact hours (0;0;0).
R950 382. Persuasion. 3 credits, 3 contact hours (3;0;0).

STS 100. Social Science and CSLA Research. 3 credits, 3 contact hours (3;0;0).
This course introduces the content and methodologies of CSLA disciplines, provides examples of research problems through the lens of the social sciences and gives students an understanding of each major and an overview of the social, historical, and ethical influences on contemporary sciences, and the changing relationships among science, technology and culture. Each week CSLA researchers lecture on applied approaches to problem solving in their domains.

STS 101. Foundations of Science, Technology and Society. 3 credits, 3 contact hours (3;0;0).
Prerequisite: None. This course introduces students to the multi-disciplinary study of science, technology and society. Through a combination of lectures by the STS teaching staff and external speakers, as well as classic and contemporary readings and case studies that exemplify the field’s core content, students examine the social, aesthetic, environmental, economic and political constructs that contextualize the development and proliferation of mechanical and digital technologies with which we interact.
STS 2**. Science Tech and Society Elect. 3 credits, 3 contact hours (3;0;0).

STS 201. Understanding Technological Society. 3 credits, 3 contact hours (3;0;0).
A problem-centered and task-oriented course that integrates social science theory and practice into the leading public issues of a technological society. Students learn critical thinking through hands-on assignments. The course emphasizes student understanding of social institutions that directly affect technological development and professional careers. This course satisfies the three credit 200 GER in History and Humanities.

STS 205. Intro to Research Methods. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 102 with a grade of C or higher. This course is intended to give second year undergraduate students an understanding of what research is, what it is used for, how it is conducted, and how it is reported. It provides an overview of applying the scientific method to real-life research, including ethical concerns, qualitative and quantitative methods (and how and when they should be used), and how to critically evaluate published research findings. This course satisfies the three credit 200 GER in History and Humanities.

STS 210. General Psychology. 3 credits, 3 contact hours (3;0;0).
Introduction to the study of human behavior. Topics include motivation, perception, learning, cognitive development, personality and emotion, individual difference, and biological basis of behavior, as well as methodology in psychological research. This course satisfies the three credit 200 GER in History and Humanities.

STS 221. Sociology. 3 credits, 3 contact hours (3;0;0).
An examination of modern society and culture, analyzing the forces for stability and change. Topics covered include the individual and society (socialization, conformity, alienation, and class structure), social institutions (religion, law, education, family, and state), social processes (conflicts and harmony, cohesion and dissolution, power, authority, and revolution), urbanization, industrialization, and technological change. This course satisfies the three credit 200 GER in History and Humanities.

STS 257. Technology, Society and Culture: An American View. 3 credits, 3 contact hours (3;0;0).
This course will examine several key cases in the way technology fits into society. The politics, sociology, and ethics of technological development will be investigated. Topics include several significant advances of the twentieth century: nuclear warfare, fast food, the simplicity movement, and futuristic enhancement. What do all these things have to do with one another? This course satisfies the three credit 200 GER in History and Humanities.

STS 258. Technology, Society and Culture: A Global View. 3 credits, 3 contact hours (3;0;0).
This course will investigate the issues and problems inherent in the globalization of technology and culture at the beginning of this new millennium. Countries and economies are becoming more entwined in each other’s identities and economies, and cultural diversity is both threatened and proliferating at one and the same time. How much can the world’s markets continue to grow and connect? How does the spread of information change what we know about one another? Should we be afraid of progress? Does the world understand the United States? Do we understand the world? How can “Growth” or “development” be sustained? How can we guide its change? This course satisfies the three credit 200 GER in History and Humanities.

STS 300. Legal Reasoning, Writing, and Technology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Integrates the process of legal research and fundamentals of legal writing with analysis of law. Focuses upon legal reasoning through analysis of fact and upon the logic of law in judicial opinions, statutory construction, and constitutional interpretation as contemporary issues are analyzed. This course satisfies the three credit 300 GER in History and Humanities.

STS 301. Independent Study. 1 credit, 3 contact hours (0;0;3).
Prerequisites: Junior standing in the STS program and written approval of the program director. Consists of self-paced study on an individual or small group basis in a specific area integral to a student's STS concentration but not available on a regular course basis. This course does not satisfy the three credit 300 GER in History and Humanities.

STS 302. Independent Study. 2 credits, 3 contact hours (3;0;0).
Prerequisites: Junior standing in the STS program and written approval of the program director. See STS 301. This course does not satisfy the three credit 300 GER in History and Humanities.

STS 303. Independent Study. 3 credits, 3 contact hours (0;0;3).
Prerequisites: Junior standing in the STS program and written approval of the program director. See STS 301. This course satisfies the three credit 300 GER in History and Humanities.

STS 304. Writing about Science, Technology and Society. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Develop abilities to write lucidly and speak forcefully about the interrelationship of science, technology and society. Learn to articulate a sense of purpose in order to choose the appropriate methods for reporting issues in a technological society. Effective development and transfer of technical knowledge in a complex world. This course satisfies the three credit 300 GER in History and Humanities.

STS 306. American Mosaic: Understanding Cultural Diversity. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An examination of multiculturalism in the United States. The course provides students with a methodological framework for understanding cultural diversity in the United States and around the world. This course satisfies the three credit 300 GER in History and Humanities.
STS 307. Fundamentals of Research in STS. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Focuses on research methods in the field of science, technology and society. Focuses on the following methods: problem statement and hypothesis formulation; research design in science, technology and society; data sources; and data acquisition and analysis. This course satisfies the three credit 300 GER in History and Humanities.

STS 308. Technology and Global Development: Introduction to STS. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Introduces the important public issues that technology brings to the modern world, such as energy development and environmental pollution. Emphasizes the close connections between science and technology, social institutions, and cultural values. Also analyzes today's "global village", the changing relations between East and West and the Third World, and worldwide development and environmental issues. This course satisfies the three credit 300 GER in History and Humanities.

STS 309. Advocacy and the Law. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Offers opportunities to explore the retrieval and use of legal and law-related materials while developing skills in oral advocacy and in writing persuasive legal documents, such as motion memoranda and briefs. Includes learning to listen to participants in the legal process as well as developing effective styles and forms of speech in the classroom. This course satisfies the three credit 300 GER in History and Humanities.

STS 310. Technology and Human Values. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines the interactions between science, technology and human values. Specifically, explores psychological, moral, and philosophical consequences of, and humanistic responses to, technological change. Readings, essays, fiction, and research articles treat such topics as the philosophical foundations of modern science, scientism, technicism; the impact of technology on images of man found in modern literature; and the moral implications of various kinds of recent technology. This course satisfies the three credit 300 GER in History and Humanities.

STS 311. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Prerequisites: completion of the sophomore year, approval of the department, and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments facilitated and approved by the Co-op Office. Mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

STS 312. Technology and Policy in Contemporary America. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. A study of technology and politics in recent America. Focuses on the role of the federal government in shaping technology, especially through funding technological innovations and applications. Topics will include the origins of technology policy in World War II, the influence of the Cold War, the science and technology policy advisory system, and political and cultural influences on technology policy. This course satisfies the three credit 300 GER in History and Humanities.

STS 313. Environmental History and Policy. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Covers the rise of the modern environmental debate, and examines its current priorities and values, politics and economics, and impacts on industry and society. Students review the role of regulatory agencies, private industry, public interest groups, and the media. Current major issues in New Jersey are considered, as well as environmental debate on a national and global level. This course satisfies the three credit 300 GER in History and Humanities.

STS 316. Mass Communications, Technology and Culture. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Uses the tools of the humanities and social sciences to study the interplay between technology and mass culture. Focuses on motion pictures, electronic music, and television as both technologies and as forms of art. Devotes special attention to the portrayal of science and technology in the media. This course satisfies the three credit 300 GER in History and Humanities.

STS 318. Educational Media Design. 3 credits, 3 contact hours (3;0;0).
Prerequisite: IT 201. Educational Media Design employs the instructional principles of constructivist pedagogy as the process used to develop a solution to develop courseware for K-12 audience. The course builds on the participatory design model of software engineering in order to develop integrated learning environments that support visual and verbal literacy; enables student to be able to plan, organize, and systematically develop instructional materials. This course implements instructional design theory and pedagogy in order to create an actual application for a computer-based environment. Same as IT 380. This course does not satisfy the three credit 300 GER in History and Humanities.

STS 320. Global Evolution of Scientific Thought I: Case Studies from Antiquity through the 19th Century. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Traces the global development of scientific ways of thinking and demonstrates how scientific ideas, methods, and theories both reflect and influence thought in other areas. Special emphasis is on the biographical approach to scientific innovation through analysis of key figures in relation to the societies in which they lived. Attention is paid to the roles of class and gender in scientific practice. Begins with the study of science in the ancient nations of Babylonia, China, and India and ends with an examination of the rise of scientific approaches to social problems in the nineteenth century. This course satisfies the three credit 300 GER in History and Humanities.

STS 324. Topics In Sci Tech & Soc. 3 credits, 3 contact hours (3;0;0).
This course satisfies the three credit 300 GER in History and Humanities.
STS 325. STS:. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An in-depth examination of a current STS issue. A new topic is addressed each time the course is offered. This course satisfies the three credit 300 GER in History and Humanities.

STS 330. The Professional Engineer: History and Context. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An examination of the origins of modern engineering and the context in which engineering has developed. The course includes an analysis of the contemporary engineering culture, its structure and the values which drives it. The student will be expected to confront both the constraints and opportunities presented by the professional world of engineering. This course satisfies the three credit 300 GER in History and Humanities.

STS 339. Philosophy and Psychology of Race and Gender. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Course examines the psychological elements of prejudice, with emphasis on racial cognition and gender bias. Topics covered include the history of essentialism about race and gender; implicit bias; stereotype threat; interventions against biased attitudes; and ethics of race and gender bias. Readings from contemporary philosophy and psychology. This course satisfies the three credit 300 GER in History and Humanities.

STS 340. Multiculturalism in a Technological Society. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores the roles of culture and ethnicity in our increasingly technological and global society. The interplay between scientific developments and the specific sociocultural contexts is addressed. Specific case studies from various countries are explored, covering differing levels of technological achievement. Upon completion of the course, students will be able to competently analyze the interaction between a country's scientific development and its political and sociological climate. Special topics are negotiated with students at the start of each class, with the goal of covering all continents and a variety of scientific fields. At least one case study each semester carefully reviews multiculturalism in the American technological culture. Emphasis also is given to the particular roles and responsibilities of the United States as a technological and political leader. This course satisfies the three credit 300 GER in History and Humanities.

STS 342. Women in Technological Culture. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Takes an interdisciplinary and multicultural approach to issues of gender in science and technology. The issues include the current status and problems of women in non-traditional professions; the historical contributions of women in science and technology; images of women in Western and non-Western cultures; theories of gender difference, past and present; the impact of cultural gender coding on the epistemologies of science and technology; women and Third World development. Course materials include case studies and autobiographical narratives, films, and science fiction as well as historical and sociological analyses. Expressive student writing and group projects are encouraged. This course satisfies the three credit 300 GER in History and Humanities.

STS 344. Communications Policy. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Study of communication environments and developing communications technologies as central elements of evolving political and social systems. Analysis of philosophical, military, economic, and technical premises for communications policy and the process of regulation. This course satisfies the three credit 300 GER in History and Humanities.

STS 346. Pragmatism and Technology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines the relationship between the American philosophy of pragmatism and the role of technology in the contemporary world. How do philosophical ideas affect the development of technology and science? How has pragmatism shaped the current view of the meaning and value of technological progress? Readings from both the traditional authors of American pragmatism--Peirce, James, and Dewey--and contemporary texts. This course satisfies the three credit 300 GER in History and Humanities.

STS 347. Introduction to Music. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. This course is an introduction to the history of music, from ancient to present times, Western, Eastern, folk, world, classical, jazz, rock, and electronic. The class aims to develop in the student an informed and critical ear to make sense of the vast array of music available to our ears today. We also cover how technology has transformed how we experience and create music, from the development of the piano to the computer. The course involves extensive music listening and writing about music. It is a prerequisite for the hands-on electronic music class that NJIT offers, STS 349. This course satisfies the three credit 300 GER in History and Humanities.

STS 348. Esthetics and Modern Technology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 and one from among Hum 211, Hum 212, Hist 213 or Hist 214 or their equivalents, all with a grade of C or better. EPS 202 or its equivalent with a grade of C or better. The central focus of this course is on the changing conception of beauty as influenced by technological development, especially in twentieth-century United States society. The course examines how technology is echoed in art and philosophy, and how they, in turn, influence future technological considerations.
STS 349. Advanced Music Technology. 3 credits, 3 contact hours (3;0;0).
Prerequisite: STS 347. Students will learn the basics of notebook computer-based music composition and production. Emphasis will be on composition and making of music, learning the aesthetics necessary to get the most out of your machine. Course will require extensive work on your own home computer. Computer requirements: A PC or Macintosh system running Ableton Live. This course satisfies the three credit 300 GER in History and Humanities.

STS 350. Computers and Society. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines the historical evolution of computer and information systems and explores their implications in the home, business, government, medicine, and education. Topics include automation and job impact, privacy, and legal and ethical issues. This course satisfies the three credit 300 GER in History and Humanities.

STS 351. Minds and Machines. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An introduction to the philosophy of mind and cognitive science. Topics covered include the computational theory of mind; artificial intelligence; connectionism; embodied theory of mind; and dynamical theories of mind. Readings from recent and contemporary philosophy, psychology and computer science. This course satisfies the three credit 300 GER in History and Humanities.

STS 352. Race and Ethnicity. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Explores the concepts of race and ethnicity in both national and international arenas. Scientific, sociological, political, and global implications are addressed. Upon completion of this course, students will be able to competently address the impact of race on micro and macro levels, from both individual and policy perspectives. Special topics are negotiated with students at the start of each class. Such topics can include immigration, affirmative action, educational curricula, institutional racism, or the impact of multiculturalism on families. Emphasis is on the interaction between race and technology. This course satisfies the three credit 300 GER in History and Humanities.

STS 353. Moral Psychology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An introduction to moral philosophy with emphasis on the biological and psychological mechanisms underlying moral thought, judgment and action. Topics covered include altruism and egoism; utilitarianism, deontology and virtue ethics; the situationist critique of character; and agency and responsibility. Readings draw from classical and contemporary philosophers as well as from current empirical psychology. This course satisfies the three credit 300 GER in History and Humanities.

STS 354. Ethics and the Environment. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. The study of the effects of the internet and cyberspace on the psychology of individuals and groups. Some topics covered include: online identity, online relationships, personality types in cyberspace, transference to computers, addiction to computers and the internet, regressive behavior in cyberspace, online gender-switching, etc. This course satisfies the three credit 300 GER in History and Humanities.

STS 355. Environmental Economics. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Examines the roots of the concept, and explores its role as feature of international politics. Particular attention is devoted to the economically, advanced nations and the challenges of planning for a more sustainable future. The course also considers how the sustainability agenda is likely to evolve in an era of climate change and biophysical constraints. This course satisfies the three credit 300 GER in History and Humanities.

STS 356. Introduction to Sustainability Studies. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. The course introduces students to sustainability studies, examines the roots of the concept, and explores its role as a feature of international politics. Particular attention is devoted to the economically, advanced nations and the challenges of planning for a more sustainable future. The course also considers how the sustainability agenda is likely to evolve in an era of climate change and biophysical constraints. This course satisfies the three credit 300 GER in History and Humanities.

STS 357. Sustainability Policy and Practice. 3 credits, 3 contact hours (3;0;0).
Prerequisites: STS 201, EPS 202 and STS 363, each with a grade of C or better. Formulation of effective sustainability policies requires appreciation of the linkages between conceptual understanding and empirical practice. The course highlights the macroeconomic drivers of contemporary sustainability challenges. Topics discussed include efficiency improvements, economic relocalization, green consumerism, and efforts to build a green economy.
STTS 378. Literature and Nature. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Literature reveals and interprets the natural world. Students examine the ways that nature has been used in non-fiction and fiction. Students also learn the challenge of describing the natural world in their own words. Representative writers include Percy Shelley, Henry David Thoreau, Octavio Paz, Denise Levertov, Gary Snyder, Joyce Carol Oates, and Annie Dillard. Co-listed as LIT 378. This course satisfies the three credit 300 GER in History and Humanities.

STTS 380. Policy Issues in the Coastal Environment. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An examination of coastal environments from the standpoint of the scientist, the engineer, and the resource manager. Topics include beach and shoreline characteristics, technological innovations to address coastal erosion problems, and current debates in coastal policy and resource management. Case studies are used to illustrate coastal management practices and the scientific, technical, and social constraint to policy formulation. This course satisfies the three credit 300 GER in History and Humanities.

STTS 381. Field Techniques and Research Methods. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. An introduction to research methods. The objectives of the course are to provide opportunity to pursue specialized, in-depth research in a subfield of science, technology and society of the student's choice; to develop skills in problem identification, research design and problem solving; to increase familiarity with methods of data analysis; to strengthen library research skills; to provide an opportunity to gather original field data in a team-oriented environment; and to improve oral and written communication skills. This course satisfies the three credit 300 GER in History and Humanities.

STTS 382. Geographical Perspectives on the Environment. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Designed to introduce students to the field of geography. Focuses on the natural processes that sculpt the physical and biological terrain, and the environmental interrelationships between human societies and nature. Combining physical, human and environmental perspectives on the earth's surface, explores, in depth, topics such as famine, societal response to natural and technological hazards, and water issues in the United States. This course satisfies the three credit 300 GER in History and Humanities.

STTS 401. Independent Study. 1 credit, 3 contact hours (0;0;3).

STTS 403. Independent Study. 3 credits, 3 contact hours (0;0;3).
This course satisfies the three credit 300 GER in History and Humanities.

STTS 411. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: STTS 311 or its equivalent with a grade of C or better, approval of the department, and permission of the Office of Cooperative Education and Internships. Provides major-related work experience. Mandatory participation in seminars and completion of requirements that include a report and/or project. Note: Normal grading applies to this COOP Experience.

STTS 490. Project and Seminar I. 3 credits, 3 contact hours (3;0;0).
Prerequisite: senior standing in the STTS program. Each student undertakes a comprehensive study of an issue in science technology and human affairs. The solution requires application of knowledge and skills acquired in course work, self-study, and library research as well as consultation with persons in the academic community, industry, and government. The completed study is submitted as a detailed written report. The seminar meets weekly. Speakers from education, government, and industry address themselves in topics of current interest to STTS students.

STTS 491. Project and Seminar II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: STTS 490. A continuation of STTS 490.

THTR 101. Living Theatre. 3 credits, 3 contact hours (3;0;0).
An introduction to the basic elements of theater through an examination of the roles of the playwright, director, designer, and actor. Attend select current plays and professional productions.

THTR 102. Acting Fundamentals. 3 credits, 3 contact hours (3;0;0).
Developing acting skills in a studio environment. Work with improvisation comedy and drama, scene study based on known contemporary and classical plays, and basic theater exercises that develop physical skills for character development and performance endurance. Emphasis on vocal skills using presentation exercises and theatrical audition techniques will be developed through the class.

THTR 208. Movement for Theatre. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken concurrently as a corequisite. Introduces skill-oriented movement exercises through an exploration of the physical nature of acting and character work. Movement is basic to actor training. The movement exercises used in this course will explore not only the physical age of the characters from plays chosen in class, but also work with the character social movements based on the cultural history of the times the plays were written or the historical period they represent. This course satisfies the three credit 200 GER in History and Humanities.

THTR 209. Voice and Speech for Theatre I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken concurrently as a corequisite. The objective of the course is for students to learn to use voice as a vocal instrument. Beginning with breath control, students learn how to project the voice, the use of resonators, and the placement of the voice in space. This is an essential training for the actor or public speaker. Exercises will be generated from plays from around the world. The character work from these plays will include the study of dialects, sustainability, phonetics, and culturally specific vocals. This course satisfies the three credit 200 GER in History and Humanities.
THTR 210. Voice & Speech for Theater II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken concurrently as a co-requisite. Working with plays, poetry, and narratives, students learn to analyze texts vocally and to explore the relationship between physical and vocal expression. This course satisfies the three credit 200 GER in History and Humanities.

THTR 212. From Page to Stage. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken concurrently as a co-requisite. The course is an introduction to understanding the relationship between the literary nature of plays and how they are produced for the stage. Attendance to current professional productions and on-campus productions will be used as a launching point for class papers, discussions, and exercises. This course satisfies the three credit 200 GER in History and Humanities.

THTR 213. Directing I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken as a corequisite. Students will learn major directorial techniques in the production of short plays and other workshop scenarios. There is an emphasis on the process of synthesizing theatrical elements of direction in order to oversee and orchestrate the mounting of a theater production. The goal of the course is for students to learn what directors do to ensure the quality and completeness of theater production by collaborating with a team of individuals involved in stagecraft, costume design, props, lighting design, acting, set design, stage combat, and sound design for the production. This course satisfies the three credit 200 GER in History and Humanities.

THTR 215. Acting II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken concurrently as a corequisite. Advanced scene study, audition techniques, and ensemble techniques are explored. Interpretation of scenes from selected dramas for stage performance, evaluation of practiced techniques in character portrayal through dialogue and action. Participation in a performance workshop is stressed. This course satisfies the three credit 200 GER in History and Humanities.

THTR 216. Improvisational Theatre Short Form. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken concurrently as a corequisite. THTR 216 introduces the techniques of short-form improvisational performance through in-class practical exercises that promote spontaneity and creative space work. Students work with game structure and short narratives leading to public performances so the student gains insights only the live setting can impart. This course satisfies the three credit 200 GER in History and Humanities.

THTR 217. Improvisational Theatre Long Form. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 101 and HUM 102 with grades of C or higher; HUM 102 may be taken concurrently as a corequisite. This course includes exercises that promote long-form interactive narrative and story development skills. In addition to exploring storytelling this technique is used in other media such as, music, movement, and film. The students will perform multiple times getting feedback only a live show can give. This course satisfies the three credit 200 GER in History and Humanities.

THTR 220. Instr Ensemble Performance I. 1 credit, 3 contact hours (0;3;0).
Prerequisite: permission of course coordinator and conductor. This course involves membership in an instrumental music group led by a professional conductor. The group will meet once a week to rehearse concert pieces. Students must play an instrument with a significant level of accomplishment in order to register for this course. There will be continuous assessment of individual performance by the conductor and a final concert in a campus venue. This is one of three performance courses. Musicians may join one or more of these ensembles, wind, string, jazz, etc. In order to register for this course, contact instructor for permission. This course does not satisfy the three credit 300 GER in History and Humanities.

THTR 221. Instr Ensemble Performance II. 1 credit, 3 contact hours (0;3;0).
Prerequisite: permission of course coordinator and conductor. This course involves membership in an instrumental music group led by a professional conductor. The group will meet once a week to rehearse concert pieces. Students must play an instrument with a significant level of accomplishment in order to register for this course. There will be continuous assessment of individual performance by the conductor and a final concert in a campus venue. This is one of three performance courses. Musicians may join one or more of these ensembles, wind, string, jazz, etc. In order to register for this course, contact instructor for permission. This course does not satisfy the three credit 300 GER in History and Humanities.

THTR 222. Instr Ensemble Performance III. 1 credit, 3 contact hours (0;3;0).
Prerequisite: permission of course coordinator and conductor. This course involves membership in an instrumental music group led by a professional conductor. The group will meet once a week to rehearse concert pieces. Students must play an instrument with a significant level of accomplishment in order to register for this course. There will be continuous assessment of individual performance by the conductor and a final concert in a campus venue. This is one of three performance courses. Musicians may join one or more of these ensembles, wind, string, jazz, etc. In order to register for this course, contact instructor for permission. This course does not satisfy the three credit 300 GER in History and Humanities.

THTR 251. Performance I. 3 credits, 3 contact hours (3;0;0).
Departmental approval required. A lecture/workshop that combines class with a play production. An in-depth study of the author of the play and contemporaries of his/her time will be made throughout the semester. A different style or genre of theater is studied each term the course is offered based on the chosen mainstage production. This course satisfies the three credit 200 GER in History and Humanities.

THTR 252. Performance II. 3 credits, 3 contact hours (3;0;0).
Departmental approval required. A study will be made of the chosen playwright, contemporaries of the writer, and an in-depth study of costume design, music of period, and set design of the play chosen for production. A production team will coordinate the main stage production. This course satisfies the three credit 200 GER in History and Humanities.
THTR 310. Theatre History I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Study of Euro-American theater history from Greece and Rome through early post-Renaissance Europe. The course covers the dramatic literature of the times and how the socioeconomic influences reflect the theatrical style, community interaction, and the technical uses of stage devices. This course satisfies the three credit 300 GER in History and Humanities.

THTR 315. Theatre History II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Study of Euro-American theatre history from post-Renaissance Europe to present. Dramatic literature will be related to the historical events that reflect theatrical style, political movements, and technical advancements in society. This course satisfies the three credit 300 GER in History and Humanities.

THTR 344. American Musical Theater. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Course covers the development of American Musical Theatre decade by decade, starting with the turn of the 20th century until the present day. Examples of music and lyrics are demonstrated in class and students attend contemporary and revival Broadway musicals. This course satisfies the three credit 300 GER in History and Humanities.

THTR 365. Principles of Playwriting. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. The course objective is to write and rewrite three short plays during the semester. These new plays will have a first reading and a staged reading in the classroom, followed by analytical discussions about playwriting and the craft's applied techniques. Students will attend two professional plays and write subsequently one experience paper and one research paper; attend both campus shows for discussion and in-class improvisational playwriting exercises. The original plays developed in class will be submitted by the student for playwriting competitions at the end of the semester. This course satisfies the three credit 300 GER in History and Humanities.

THTR 396. Internship-Theater. 3 credits, 3 contact hours (0;0;3).
Open to junior or senior Theater majors or minors or Communication majors with Theater Specialization. Permission of division director or faculty advisor in conjunction with the instructor directing the course. The internship is with a professional performing or media arts organization. The student is expected to work with the host company for professional experience.

THTR 411. Special Topics in Theatre. 3 credits, 3 contact hours (3;0;0).
Prerequisites: HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. This specialty course will feature a different aspect of theater each semester depending on the area of expertise of the instructor. Some examples: The course could cover playwriting, advanced playwriting, film writing, and musical theater techniques, advanced theater directing, auditioning skills, advanced acting or acting: history and practice.

THTR 414. Directing II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: THTR 213 or departmental approval. Assistant directing main stage production with faculty director or other independent directing project. Intense study of directing style through practice and research.

THTR 465. Performance II. 3 credits, 3 contact hours (3;0;0).
Prerequisites: THTR 261 or THTR 262 and HUM 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. This is an advanced study of one playwright's work leading to a performance of one of his/her plays. A study will be made of the chosen playwright, contemporaries of the writer, and an in depth study of costume design, music of period, and set design of the play chosen for production.

THTR 483. Independent Study in Theater I. 3 credits, 3 contact hours (0;0;3).
By arrangement only through a theater faculty advisor, the student will take on a specialized creative theater project for the semester. This would cover a specific aspect of theatrical production development and cumulate in one of the following depending on the nature of the assignment: a journal or portfolio of completed production work, an original play or screenplay script, or research document.

THTR 484. Independent Study in Theater II. 3 credits, 3 contact hours (0;0;3).
This course is for junior and seniors only by arrangement through a theater faculty advisor. The student will take on a more advanced specialized creative theater project for the semester. As this would cover a specific aspect of theatrical production development, the student will be expected to take on a leadership role in the chosen area of study. Documentation of the project development and completion is required.