

# Jordan Hu College of Science and Liberal Arts

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The mission of the Jordan Hu College of Science and Liberal Arts (JHCSLA) 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. JHCSLA 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.

JHCSLA faculty and students are at the forefront of many national research activities, from solar astronomy to mathematical modeling. JHCSLA 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. JHCSLA 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

- Applied Physics - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/physics/applied-bs/>)
- Biochemistry - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/biochemistry-bs/>)
- Biology - B.A. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/biology/ba/>)
- Biology - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/biology/bs/>)
- Chemistry - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/chemistry-bs/>)
- Communication and Media - B.A. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/communication-media-ba/>)
- Communication and Media - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/communication-media-bs/>)
- Psychology - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/psychology-bs/>)
- Data Science - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/data-science-bs/>)
- Environmental Science - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/environmental-science-bs/>)
- Forensic Science - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/forensic-science-bs/>)
- History - B.A. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/ba/>)
- Law, Technology and Culture - B.A. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/law-technology-culture-ba/>)
  - Law, Technology and Culture (Patent Law Concentration) - B.A. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/ltc-patent-law/>)
- Mathematical Sciences - B.S.
  - with Applied Mathematics Concentration (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/applied-mathematics/>)
  - with Applied Statistics Concentration (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/applied-statistics/>)
  - with Computational Mathematics Concentration (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/computational-mathematics/>)
  - with Mathematical Biology Concentration (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/mathematical-biology/>)
  - with Mathematics of Finance and Actuarial Science Concentration (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/mathematics-finance-actuarial-science/>)
- Science, Technology and Society - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/science-technology-society-bs/>)
- Theatre Arts and Technology - B.A. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/theatre-arts-technology-ba/>)

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

- Biology - B.A. / M.D. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/biology/ba-md-dmd-dds-od/>)
- Biology - B.A./D.M.D., O.D. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/biology/md/>)
- Biology - B.A. in Biology/Doctor in Physical Therapy (DPT) - Ph.D. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/biology/ba-physical-therapy-phd/>)
- Biology - B.A. / Physician Assistant (<http://catalog.njit.edu/undergraduate/science-liberal-arts/biology/biology-physician-assistant-ba/>)
- History - B.A. /D.P.T. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/ba-dpt/>) (with RBHS)
- History - B.A./J.D. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/ba-honors-jd/>) (with Seton Hall School of Law)
- History - B.A./M.D. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/ba-md/>)
- History - B.A./ D.M.D., D.D.S., O.D. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/ba-md-dmd-dds-od/>)

- Mathematical Sciences - B.S./M.D., D.M.D., D.D.S., O.D (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/accelerated-bs-md-dmd-dds-od/>)
- Law, Technology and Culture -B.A./J.D .(with Seton Hall School of Law)

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

- Applied Physics & Mathematical Sciences with Applied Mathematics Concentration - B.S (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/applied-mathematics-applied-physics-bs/>).
- Biology & Law, Technology and Culture - B.A (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/biology-ltc/>)
- Biology & Mathematical Sciences - B.S.
- Biochemistry & Forensic Science (Forensic Biology option) - B.S (<http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/biochemistry-forensic-science-bs/>).
- Chemistry & Law, Technology and Culture - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/chemistry-ltc/>)
- Computer Science & Applied Mathematics - B.S. (<http://catalog.njit.edu/undergraduate/computing-sciences/computer-science/cs-math-bs/>)
- Computer Science & Applied Physics - B.S. (<http://catalog.njit.edu/undergraduate/computing-sciences/computer-science/cs-applied-physics-bs/>)
- Computer Science & Mathematical Sciences with Computational Mathematics Concentration - B.S (<http://catalog.njit.edu/undergraduate/computing-sciences/computer-science/cs-math-bs-comp/>).
- Forensic Science & Law, Technology and Culture - B.S (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/frsc-ltc/>)
- Physics & Law, Technology and Culture - Astronomy Option - B.S (<http://catalog.njit.edu/undergraduate/science-liberal-arts/physics/physics-ltc-double-major/>).
- Physics & Law, Technology and Culture - Optical Science & Engineering Option - B.S. (<http://catalog.njit.edu/undergraduate/science-liberal-arts/physics/physics-ltc-double-op-major/>)
- Science, Technology and Society & Business and Information Systems - B.S. (<http://catalog.njit.edu/undergraduate/computing-sciences/informatics/science-technology-society-business-information-systems-bs/>)
- Applied Mathematics Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/applied-mathematics-minor/>)
- Applied Physics Minor (<http://physics.njit.edu/Minor.php>)
- Applied Statistics Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/applied-statistics-minor/>)
- Biological Sciences Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/biology/biological-sciences-minor/>)
- Chemistry Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/chemistry-minor/>) (not for Chemical Engineering majors)
- Communication Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/communication-minor/>)
- Computational Mathematics Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/computational-mathematics-minor/>)
- Electronic Creative Writing Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/electronic-creative-writing-minor/>)
- Environmental Science and Policy Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/environmental-science-policy-minor/>)
- Environmental Studies and Sustainability Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/interdisciplinary-programs/environmental-studies-sustainability-minor/>)
- Forensic Science Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/chemistry-environmental-science/forensic-science-minor/>)
- Global Studies Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/global-studies-minor/>)
- History Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/history/minor/>)
- Journalism Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/journalism-minor/>)
- Leadership and Aerospace Studies Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/aerospace-studies/leadership-aerospace-studies-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-and-social-sciences/literature-minor/>)
- Mathematical Biology Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/mathematical-biology-minor/>)
- Mathematics of Finance and Actuarial Science Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/mathematical-sciences/mathematics-finance-actuarial-science-minor/>)
- Philosophy and Applied Ethics Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/philosophy-applied-ethics-minor/>)
- Psychology Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/psychology-minor/>)
- Science, Technology and Society Minor (<http://humanities.njit.edu/academics/undergraduate/>)

- Technology, Gender and Diversity Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/technology-gender-diversity-minor/>)
- Theatre Arts and Technology Minor (<http://catalog.njit.edu/undergraduate/science-liberal-arts/humanities-and-social-sciences/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/>)
- Biology - M.S. (<http://catalog.njit.edu/graduate/science-liberal-arts/biology/ms/>)
- Biology of Health - M.S. (<http://catalog.njit.edu/graduate/science-liberal-arts/biology/biology-of-health-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/>)
- Data Science - M.S. - Statistics Track (<http://catalog.njit.edu/graduate/science-liberal-arts/mathematical-sciences/data-science-ms/>)
- Environmental Science - M.S. (<http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/environmental-science-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/>)
- Pharmaceutical Chemistry - M.S. (<http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/pharmaceutical-chemistry-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/>)
- Data Science - Ph.D. (<http://catalog.njit.edu/graduate/science-liberal-arts/mathematical-sciences/data-science-phd/>)
- Environmental Science - Ph.D. (<http://catalog.njit.edu/graduate/science-liberal-arts/chemistry-environmental-science/environmental-science-phd/>)
- Materials Science & Engineering - Ph.D. (<http://catalog.njit.edu/graduate/science-liberal-arts/physics/materials-science-engineering-phd/>)
- Mathematical Sciences - Ph.D. (<http://catalog.njit.edu/graduate/science-liberal-arts/mathematical-sciences/phd/>)

## Jordan Hu College of Science and Liberal Arts Courses

### AS 111. Department of the Air Force Heritage and Values I. 1 credit, 1 contact hour (1;0;0).

A survey course designed to introduce students to the Department of the Air Force (DAF) and provide students an overview of the basic characteristics, missions, communications and organization of the Air and Space Forces.

### AS 112. Department of the Air Force Heritage and Values II. 1 credit, 1 contact hour (1;0;0).

Prerequisite: AS 111 or approval of the Professor of Aerospace Studies. A survey course designed to introduce students to the Department of the Air Force (DAF) and provide an overview of the basic characteristics, missions, communications and organization of the Air and Space Forces.

### AS 221. Team and Leadership Fundamentals I. 1 credit, 1 contact hour (1;0;0).

Prerequisite: AS 112 or approval of the Professor of Aerospace Studies. Provides a fundamental understanding of both leadership and team building. The lessons and course flow are designed to prepare students for AFROTC field training and leadership positions in the NJIT ROTC detachment.

### AS 222. Team and Leadership Fundamentals II. 1 credit, 1 contact hour (1;0;0).

Prerequisite: AS 221 or approval of the Professor of Aerospace Studies. Provides a fundamental understanding of both leadership and team building. The lessons and course flow are designed to prepare students for AFROTC field training and leadership positions in the NJIT ROTC detachment.

### AS 301. Aerospace Independent Study. 3 credits, 3 contact hours (0;0;3).

### AS 333. Leading People & Effective Com. 3 credits, 3 contact hours (3;0;0).

Prerequisite: AS 222 or approval of the Professor of Aerospace Studies. This course teaches cadets advanced skills and knowledge in management and leadership. Special emphasis is placed on enhancing leadership skills and communication. Cadets have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors.

### AS 334. Leading Peo & Effective Com II. 3 credits, 3 contact hours (3;0;0).

Prerequisite: AS 333 or approval of the Professor of Aerospace Studies. This course continues to teach cadets advanced skills and knowledge in management and leadership. Special emphasis is placed on enhancing leadership skills and communication. Cadets have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors.

**AS 335. Leadership Lab. 0 credits, 0 contact hours (0;0;0).**

**AS 336. POC Leadership Lab. 0 credits, 0 contact hours (0;0;0).**

**AS 401. Aerospace Independent Study. 3 credits, 0 contact hours (0;0;0).**

**AS 443. National Security Affairs/Prep Act. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: AS 334 or approval of the Professor of Aerospace Studies. This course is designed for college seniors and gives them the foundation to understand their role as military officers in American society. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level.

**AS 444. Preparation for Active Duty. 3 credits, 3 contact hours (0;0;3).**

Prerequisite: AS 443 or approval of the Professor of Aerospace Studies. This course is designed for college seniors and continues to give them the foundation to understand their role as military officers in American society. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level.

**BIOL 115. Evolution and Biology of Sex. 3 credits, 3 contact hours (3;0;0).**

This course will examine the biological basis of sex determination and resultant gendered behavior in all animals, including humans. We will discuss how and why sex evolved, how different organisms express (& often change) their gender, and what selection pressures shape mating systems and mate selection. In addition, we will examine how gender-specific selection influences offspring care and attachment, aggression and friendship. Throughout the course, we will evaluate which principals can and cannot be extrapolated to human behavior as well as how we as humans project our ideas of gender onto our study of the natural world. We will critically discuss contemporary articles concerning gender in the popular media.

**BIOL 150. Living in a Variable Universe. 4 credits, 6 contact hours (3;3;0).**

This laboratory course uses real-world case studies and dramatic experimental examples from across the natural sciences to explore the origin, structure, perception and regulation of variability in the world. Why do we so often misunderstand the nature and consequences of variability? Why do our efforts to manage environment variability often fail? What are the benefits of variability? How can we plan more effectively for an uncertain future? Students will leave the course with a better understanding of how variability affects both themselves as individuals, and society at large. They will also be exposed to a broad sampling of different disciplines within the natural sciences, including physics, statistics, neuroscience, psychology, ecology, and geography.

**BIOL 200. Concepts in Biology. 4 credits, 4 contact hours (4;0;0).**

Prerequisites: MATH 107 or MATH 108 or Co-requisites: MATH 110, or MATH 111 or MATH 138. This course will introduce student to the study of biology at the beginning of their course of study. Central ideas in the biological sciences will be highlighted, with an emphasis on the process of scientific discovery and investigation. The course will provide the basis for more advanced coursework and learning experiences in the biological sciences as students delve into the curriculum of study.

**BIOL 201. Found of Biol: Cell & Molecula. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: BIOL 200 or R120 200 and CHEM 121 or CHEM 125. This course will expose students to an in-depth examination of the structure and function of cells; methods of study; thermodynamics and metabolism; membrane biology, energy utilization and transfer; protein and nucleic acid structure and function; transcription, translation, and genetic regulation. The laboratory course BIOL 202 must be taken concurrently, although they are separate courses.

**BIOL 202. Found of Biol: Cell & Molecula. 1 credit, 3 contact hours (0;3;0).**

Prerequisites: BIOL 200 or R120 200 and CHEM 121 or CHEM 125. Corequisite: BIOL 201. This course is a complement to the corresponding lecture course BIOL 201. The laboratory course will give students the opportunity to apply, in an experimental setting, the concepts that they are exploring in the accompanying lecture course and will offer them a hands-on experience that will enhance their learning of the Cellular and Molecular Biology content. Both courses (BIOL 201 and BIOL 202) must be taken concurrently.

**BIOL 205. Foundations of Biology: Ecology and Evolution Lecture. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: BIOL 200 with a C or better, co-requisite BIOL 206. This introductory course considers the population level of biological organizations. Topics include Mendelian and population genetics, evolution, and ecology of populations and communities.

**BIOL 206. Foundations of Biology: Ecology and Evolution Lab. 1 credit, 3 contact hours (0;3;0).**

Prerequisite: BIOL 200 with a C or better, Co-requisite BIOL 205. The laboratory reinforces the topics covered in Foundations of Ecology and Evolution Lecture (Biol 205) lecture with hands-on activities and exposes students to current methods of research and analysis in these areas.

**BIOL 222. Evolution. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with grade of C or better. This course will provide a comprehensive introduction to the field of evolutionary biology. Topics will include: the development of evolutionary theory, the history of the evolution of life on Earth, the genetic basis of variation and heredity, natural selection, evolution and development, and speciation.

**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 280. Ecology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: BIOL 205 and BIOL 201. Overview of the science of ecology, which aims to understand interactions among biological species and among species and the abiotic environment. Topics include population ecology, species interactions, communities, and ecosystems. Topics will be addressed in light of global change including climate change, biodiversity loss, and impacts on human health and wellbeing.

**BIOL 3\*\*. Biology Elective. 3 credits, 3 contact hours (3;0;0).****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).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with 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: ENGL 102, (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with 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 328. Ornithology - The Life of Birds. 3 credits, 4 contact hours (2;2;0).**

Prerequisites: BIOL 205, BIOL 201. Ornithology is the study of birds and bird biology. Topics include bird observation and identification, evolutionary origins and biodiversity, form and function, behavior, reproduction, ecology, and conservation. This field/lab course will include numerous field trips to natural areas in New Jersey.

**BIOL 335. General Microbiology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) and (CHEM 126 or R160 115). A comprehensive overview of the microbial world with a focus on its impact on human health and disease. Students will study the genetics, physiology, morphology, evolution, reproduction, and pathophysiology of microbes. They will explore how microbes impact our ecology, agriculture, pharmaceutical landscape, industrial manufacturing, and health, and in particular how modern biotechnology may be used to combat the spread of microbial diseases.

**BIOL 336. Food for a Hot Planet. 3 credits, 3 contact hours (3;0;0).**

Restrictions: Sophomore standing. Human food systems have profound effects on our planet's ecosystems. The climate changes that result from those ecosystem effects will shape the food systems of the future. This course will focus on the intersections between climate change and food and involve extensive reading and discussions on these topics. Informed by those discussions, students will work throughout the course to predict how climate change will influence the way we eat, contribute to an urban agriculture service-learning project, and develop a plan to communicate their vision for the future of food to the campus community.

**BIOL 337. Collective Intel in Biol Syst. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with 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: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with grade of 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: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with 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 340A. Mammalian Physiology Lab. 1 credit, 3 contact hours (0;3;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with grade of C or better. Corequisites: BIOL 340. This course will use simulations and practical lab experiments to demonstrate 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 342. Developmental Biology (Embryology). 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with grade of C or better. Descriptive and experimental approaches to molecular, cellular and organismal changes during embryonic development; mechanisms of cell differentiation, organogenesis, morphogenesis, and pattern formation.

**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: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with 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).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with grade of C or better.

**BIOL 355. Cell Biology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) and CHEM 126 or R160 115. A study of eukaryotic cell structure and function, including cytoskeletal function, membrane properties and transmembrane transport, cell communication and signaling, cell cycle regulation, and cancer. Emphasis will be placed on reading primary literature in order to understand current findings in biological and biomedical research.

**BIOL 356. Molecular Biology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) and CHEM 126 or R160 115. This course covers topics focused on gene expression and regulation in eukaryotic cells. Specific areas of focus include: gene organization and chromosome structure, mechanisms of replication, mutations, mechanisms of DNA damage and repair, transcription and regulation of RNA synthesis, post-transcriptional processes, translation and post-translational modifications, molecular techniques, structure and roles of noncoding RNA, epigenetic regulation, and genomics and databases. Emphasis will be placed on reading primary literature in order to understand current findings in biological and biomedical research.

**BIOL 375. Conservation Biology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with 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 376. Biological Applications of Geographic Information Systems. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: BIOL 205, BIOL 201. This course offers an introduction to concepts underlying geographic information systems (GIS) and methods of managing and processing geographic information. The course is designed for students who have little background but want to learn the fundamentals and applications of GIS. The nature of geographic information, data models and structures for geographic information, geographic data input, data manipulation and data storage, spatial analytic and modeling techniques will be discussed. Students will be exposed to both theoretical knowledge and technical skills in this course. Assignments and a course project will promote students' application of concepts and skills in solving real-world problems.

**BIOL 382. Animal Behavior. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 205 and BIOL 206 or R120 205 and R120 206) and (BIOL 201 and BIOL 202 or R120 201 and R120 202). The objective of this course is to expose students to the broad field of animal behavior. The course will include the historical underpinnings of the field as well as the contemporary theories for a wide variety of behaviors. Behavioral ecology and the evolution of animal behaviors as adaptations will be intertwined throughout the course, as well potential applications of knowledge about animal behavior. Students will be able to analyze existing evidence and investigate modern practices in order to evaluate existing theories and consider potential future directions of animal behavior. Using current scientific literature, as well as case-studies, students will be able to come up with their own hypotheses and determine how different hypotheses related to animal behavior can be tested experimentally. Students will also gain hands-on experience in trying out some of the fundamental techniques.

**BIOL 383. Neural Basis of Behavior. 3 credits, 3 contact hours (3;0;0).**

Prerequisite (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with 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 400. Biology in Science Fiction. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (R120 340 or BIOL 340) and (R120 355 or R120 356 or BIOL 352 or R120 352). 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 421. Comparative Vertebrate Anatomy. 4 credits, 6 contact hours (3;3;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) and (PHYS 102 and PHYS 102A, or PHYS 111 and PHYS 111A), with a grade of C or better. This course builds upon foundational knowledge of anatomy, physiology, and evolution to explore the morphological evolution of vertebrates within the context of the functional interrelationships of organs and the changing environments to which vertebrates have adapted. Through an advanced investigation into the mechanics of how living creatures interact with their immediate physical world, we examine how the forms and activities of animals reflect the materials available to evolution and consider rules for structural design under environmental forces. In addition to the prerequisites, it is recommended that a student have at least two of the following courses: Evolution (BIOL 222); Mammalian Physiology (BIOL 340); Developmental Biology (BIOL 342); Genetics (BIOL 352).

**BIOL 423. 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 424. 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 432. Intro to Comp Neuroscience. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: MATH 222; BIOL 315; BNFO 135 or CS 101 or CS 100 or CS 115 (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.

**BIOL 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.

**BIOL 441. Neurophysiology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: BIOL 315. 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 443. Biology of Addiction. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: BIOL 201 and BIOL 202 (or R120 201 and R120 202), and BIOL 205 and BIOL 206 (or R120 205 and R120 206) with grade of C or better, or Permission of Instructor. This course will explore Substance Use Disorder from a biological viewpoint. The psychological, epidemiological, social and economical aspects of addiction will be touched upon as needed. The course will consist of several Modules that would be taught in parallel. The Modules include: 'Psychopharmacology', 'The Structure and Function of the Nervous System', 'Neurotransmitters and Neuromodulators', 'Substances of Abuse', and 'What is Addiction?' The goal is to provide students with a comprehensive understanding of biological mechanisms, both in the body and in the brain, that lead to and underlie Substance Use Disorder.

**BIOL 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 physiologic 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.

**BIOL 447. Systems Neurobiology. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: 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.

**BIOL 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.

**BIOL 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.

**BIOL 453. Applied Genetics & Genomics. 3 credits, 4 contact hours (3;1;0).**

Prerequisites: BIOL 352 or R120 352. This is an advanced course in modern genetics and genomics. It offers students a class that presents a modern understanding of Genetic and genomic applications, given the ongoing explosion of technological developments in this field. An understanding of state-of-the-art genetics and genomics is indispensable for continuing education in fields that include but are not limited to: cell and molecular biology, clinical lab science, bio-mechanical engineering, biotechnology, agriculture, and medicine.

**BIOL 462. 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.

**BIOL 468. Disease Ecology & Evolution. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 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 470. Dynamic Princ in Systems BIOL. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: MATH 222, and BNFO 135 or CS 100 or CS 115 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.

**BIOL 475. Ecological Field Methods and Analysis. 3 credits, 4 contact hours (2;2;0).**

Prerequisites: R120 280 or R120 370 with a C or better and permission of instructor. This field-orientated 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.

**BIOL 484. Evolution of Animal Behavior Laboratory. 3 credits, 4 contact hours (2;2;0).**

Prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with 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 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.

**BIOL 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.

**BIOL 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.

**BIOL 498. Special Topics in Biology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: Permission by instructor. This course explores a special topic in biology.

**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. Students requiring lab should also register for lab CHEM 125A.

**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 125. General Chemistry I. 3 credits, 3 contact hours (3;0;0).**

Co-requisite: MATH 110 or higher. 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 requiring lab should also register for lab CHEM 125A.

**CHEM 125A. General Chemistry Lab I. 1 credit, 3 contact hours (0;3;0).**

Corequisites: CHEM 125 or CHEM 121. 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/CHEM 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).**

Prerequisites: MATH 110 or higher and CHEM 125 or CHEM 121 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 requiring 2 semesters of Chemistry lab should also register for lab CHEM 126A.

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

Prerequisites: CHEM 125A with a grade of C or better. Corequisites: CHEM 126 or CHEM 122. This new course is designed to be taken concurrently with CHEM 126. Instructions are in the lab manual and concepts are from the text and lecture of the CHEM 126. The experiments are designed to provide undergraduate students with practical experience and techniques in the chemistry laboratory. Also they will help students understand the underlying concepts covered in the lecture course.

**CHEM 210. Frontiers in Chemistry. 1 credit, 1 contact hour (1;0;0).**

Prerequisites: CHEM 125 or CHEM 121. Restrictions: Sophomore standing. Offers CES students to come together and learn about the different subdisciplines within the department. This course will give them an opportunity to learn about the research projects of various CES faculty. The course will provide students with opportunities to enhance their understanding of classroom knowledge through research presentation from internal and external invited speakers. Through exposure to research methods, the course will also introduce them to pathways for students to engage in undergraduate research.

**CHEM 221. Analytical Chemical Methods. 2 credits, 4 contact hours (0;4;0).**

Corequisite: CHEM 222. Laboratory introducing quantitative chemical analyses by gravimetry, titration, spectroscopy, chromatography, and potentiometry.

**CHEM 222. Analytical Chemistry. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: (CHEM 122 or CHEM 126), CHEM 124 or (CHEM 125A and CHEM 126A) 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, 4 contact hours (3;0;1).**

Prerequisites: CHEM 122 or CHEM 126, PHYS 111 and MATH 211 or MATH 213 or MATH 309 with a grade of C or better. 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, 4 contact hours (3;0;1).**

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, electrochemistry, kinetic theory of gases, transport phenomena, kinetics, and irreversible processes.

**CHEM 235A. Physical Chemistry II Laboratory. 2 credits, 4 contact hours (0;4;0).**

Prerequisites: 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 (4;0;1).**

Prerequisites: (CHEM 122 or CHEM 126) and CHEM 125A 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).**

Prerequisites: 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).**

Prerequisites: CHEM 122 or CHEM 126 with a grade of C or better. Systematic study of the theories, principles and applications of Organic Chemistry. This course covers topics such as bonding theories and structure, conformations and stereochemistry, and functional groups like alkanes, alkenes, and alkynes. This course will also cover topics such as spectroscopy and mass spectrometry.

**CHEM 244. Organic Chemistry II. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: CHEM 243 with a grade of C or better. The second semester in the two-semester Organic Chemistry sequence. Systematic study of the theories, principles, applications and techniques of Organic Chemistry. The course will cover topics such as alcohols, conjugated and aromatic compounds, carbonyl derivatives and amines.

**CHEM 244A. Organic Chemistry I Laboratory. 2 credits, 4 contact hours (0;4;0).**

Prerequisites: CHEM 125A or CHEM 124 with a grade C or better. Corequisites: CHEM 245 or CHEM 243. Synthesis, purification and characterization of organic compounds are performed. Students will learn techniques such as multi-step synthesis, distillation, crystallization, separation and chromatography. Techniques such as UV, IR, NMR and mass spectrometry will be used for compound characterization.

**CHEM 245. Organic Chemistry for Chemical Engineers. 4 credits, 5 contact hours (4;0;1).**

Prerequisites: 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).**

Prerequisites: 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).**

Prerequisite: CHEM 310 with a grade C or better.

**CHEM 336. Quantum Chemistry. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: MATH 222 and CHEM 126 with a grade of C or better. An introduction to quantum mechanics, statistical mechanics, spectroscopy, and solid state.

**CHEM 339. Physical Chemistry Laboratory. 2 credits, 4 contact hours (0;4;0).**

Prerequisites: CHEM 231 or CHEM 236 with grade C or better. Corequisites: MATH 225 or MATH 279 or MATH 333 or IE 331. Pre or Corequisites: Students who have taken CHEM 231 as a prerequisite must register for CHEM 235 as a corequisite. The application of principles learned in lecture will be reinforced by the experiments done in this lab. They will also provide exposure to physical chemistry techniques used in chemistry and chemical engineering.

**CHEM 340. Chemistry of Materials. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: CHEM 243 with a grade of C or better. Covers chemistry of materials and introduces relevant concepts of bonding and structure. Topics covered include the crystalline solid state, bonding and thermodynamics, semiconductors/electronic materials, nanoscale materials, biomaterials, chemistry at interfaces, characterization techniques, and application of materials in devices.

**CHEM 360. Environmental Chemistry of Air Pollution and Climate Change. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: CHEM 126 or CHEM 122 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 of Water and Soil Pollution. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: CHEM 360 or one of the following courses (CHEM 222, CHEM 231, CHEM 236, CHEM 243, CHEM 245) 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, 3 contact hours (3;0;0).**

Prerequisite: CHEM 244 with a grade of C or better. The course covers structure, bonding, properties, and reactivity in inorganic chemistry. Topics covered will include inorganic structure/bonding, molecular orbitals, coordination chemistry, organometallic chemistry, catalysis, symmetry, and group theory.

**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 ratios 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).**

Prerequisite: CHEM 473 with grade of C or better. This course focuses on transducing and storing energy, synthesizing the molecules of life, and responding to environmental changes. Topics include concepts of metabolism, glycolysis, gluconeogenesis, citric acid cycle, oxidative phosphorylation, photosynthesis, fatty acid metabolism, protein turnover, amino acid catabolism, biosynthesis of amino acids, DNA replication and recombination, RNA synthesis and processing, protein synthesis, gene expression control, immune system, and drug development.

**CHEM 475. Biochemistry Lab I. 2 credits, 4 contact hours (0;4;0).**

Prerequisites: CHEM 244 with a grade of C or better. Corequisites: CHEM 473. 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).**

Prerequisites: 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, voltammetry, 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 1\*\*. Communication Elective. 3 credits, 3 contact hours (3;0;0).****COM 200. Communicating in Organizations. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 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.

**COM 201. Introduction to Communication and Media. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a grade of C or higher. Corequisites: ENGL 102 may be taken as a corequisite. This course provides an overview of the history, theory, and practice of communication and media in various media contexts. Students will explore the role of communication and media in society and develop critical thinking skills to evaluate and analyze media messages and their psychological, attitudinal, and behavioral effects. Topics covered will include digital media landscapes, communication theories and media research, emotions and group portrayal in media, political and strategic communication, participatory and convergence culture, as well as media literacy and media ethics.

**COM 225. Special Topics in Communication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101. This course engages students in the study of new or advanced topics in an area of communications. The precise topics are announced in the semester prior to the offering of the course.

**COM 230. Introduction to Film. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 with a C or higher. Corequisites: ENGL 102 with a C or higher, ENGL 102 may be taken concurrently as a co-requisite. An introduction to film studies, this course focuses on close verbal and visual analysis, and on critical writing. Students will consider a number of culturally and aesthetically significant films; make claims about how a film's content and form connect; and find and present evidence for such claims, becoming familiar with essential cinematographic techniques. Students will carefully consider their own writing at a slow pace, thereby refining their ability to communicate persuasively in a variety of settings.

**COM 240. New Media Technologies. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a grade of C or higher; COM 201 with grade of C or higher. Corequisites: ENGL 102 may be taken as a co-requisite. This course introduces students to a variety of new and emerging media technologies including social media platforms, artificial agents and robots, virtual and augmented reality, and algorithmic systems. Students consider in particular the socio-psychological effects of utilizing those new media technologies and identify the perceptual, attitudinal, and behavioral impacts of these cutting-edge media technologies in various communication contexts from personal to professional.

**COM 241. Sound Communication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: COM 240 with a grade of C or higher; ENGL 101 and ENGL 102 with a grade of C or higher. Corequisites: ENGL 102 may be taken as a corequisite. The course offers students an effective, practice-oriented introduction into the science, technology, and cultural influence of how sound has been theorized and reproduced in a rapidly evolving variety of different media formats. We pay specific attention to recent digital enhancements in how sound media is reproduced and utilized to build new learning experiences beyond traditional disciplinary boundaries, while including instruction in the use of new sound-studio software and audio-recording devices.

**COM 303. Video Narrative. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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. Organizational and Group Communication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 311. Collaborative Leadership and Communication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 theories and research about interpersonal communication in organizational and group settings. The course focuses on comprehensively understanding and effectively managing communication behaviors and social relationships in organizational and group activities.

**COM 312. Effective Communication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 pre-professional course is designed to provide students with the knowledge and skills necessary to intentionally and effectively communicate across an array of real-world contexts. Through a mixture of instruction and practical application, students will learn to identify the conventions and needs of audiences across modalities and rhetorical situations such as oral presentation, collaborative discussion, and one-on-one interviews, and apply appropriate approaches leveraging organizational, vocal, physical, and visual strategies to achieve their predetermined goals. This course satisfies the three credit 300 GER in History and Humanities.

**COM 313. Writing in the Workplace. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 writing course that combines theory with practice and instructs students on how to turn complex knowledge into usable and familiar content for audiences with varying levels of expertise. The course sharpens capabilities to communicate information strategically, ethically, and authentically through varying workplace genres. Students analyze complex communication situations and appropriately adapt their problem-solving skills using technical research methods, data-visualization techniques, and document-design principles. Projects in this course include a data-analysis report, a presentation and pitch deck, and a real-world funding or research proposal aimed to advance students in their career paths.. This course satisfies the three credit 300 GER in History and Humanities.

**COM 314. Theory of Rhetoric. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**COM 315. Environmental Communication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. COM 315 (Environmental Communication) concentrates on effective communication through a close study of contemporary writing and film about the environment. To refine and strengthen students' abilities as sharp observers and effective communicators, the course will examine rhetorical decisions made across a variety of genres—including recent journalism, personal essays, documentaries, and digital works—centered on issues surrounding the environmental crisis. This course satisfies the three credit 300 GER in History and Humanities.



**COM 316. Creative Writing. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**COM 317. Advanced Composition. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**COM 318. Communication Theory and Practice. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Understanding communication in terms of both conceptual formulations and practical applications is fundamental to nearly all contemporary activities. This course provides students with an opportunity to discover and critically employ communication theories through a wide variety of formats related to both professional and everyday environments including language, visual media, advertising, cultural issues, and social progress. Students gain experience conducting theoretically rigorous computer-mediated case studies and live field investigations to develop their understanding of how communication and media contribute to all sectors of society. This course satisfies the three credit 300 GER in History and Humanities.

**COM 319. Technical, Professional and Scientific Writing for Publication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**COM 321. Technology & Tactics of Sound. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 323. Mobile Media Making. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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, interviewing, videography, and photography supervised by the instructor, students develop competencies in discovering, developing and using a variety of skills using their cell phone for information gathering, archiving, and presentation to present publishable narratives. Special focus on using cell phone based technologies to document, record, create and produce narratives in a variety of media. Particular emphasis is placed on the creative process, planning, revision and editing to a completed product. This course satisfies the three credit 300 GER in History and Humanities.

**COM 324. Podcast Practicum. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a grade of C or better. In recent years, the digital media/network communications practice known as podcasting has gained much attention and popularity. This primary objective of this course is to guide students through the practice of preparing, organizing, and producing a series of thematically orchestrated podcasts, specifically focusing on teaching students to use the hardware and software that enables them to compose, edit, and publish online podcasts on subjects corresponding to their own interests and research. As a practicum, the bulk of the course emphasizes, and is dedicated to, applying the multiple compositional processes and audio engineering necessary to complete the tasks involved with creating works in this particular media format.

**COM 325. Special Topics in Communication and Media. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 examines varying themes in communication and media. The course satisfies the three credit 300-level GER in History and Humanities.

**COM 336. Multimedia Journalism. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: COM 240, ENGL 101 and ENGL 102 with a grade of C or higher. This course trains students in the skills of interviewing and reporting which are essential to a career in communication and media. Class sessions are a combination of lectures and workshops and students receive detailed feedback as they develop their projects in the same way as an editor interacts with reporters in a professional setting. While the primary emphasis of the course is on producing written content, students enhance their work with infographics, photographs, audio, and video.

**COM 337. Photojournalism. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 photography and writing supervised by the instructor, students develop competencies in discovering and creating interdisciplinary stories using a variety of photographic techniques and writing methods. Special focus on creating photographic narratives, supported by prose.

**COM 338. The Newsroom. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.



**COM 339. Practical Journalism. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 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.

**COM 341. Documentary Film and Media. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or better, and one 200-level Cultural Literacy GER course with a grade of C or higher. This course explores the evolution of documentary filmmaking and investigates a broad range of genre-expanding contemporary work. As we look critically at the truth-promises that surround non-fiction media, we will engage with questions of ethics, power, representation, and the border between reality and fiction. We will also examine the emergence of new documentary forms on the internet and in museum/gallery spaces. Students will have the opportunity to develop their own documentary projects.

**COM 342. Media and the Body. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or better, and one 200-level Cultural Literacy GER course with a grade of C or higher. This course is grounded in forms of audio-visual media — especially moving images — that represent and impact human bodies, those of both its subjects and its spectators. But at the same time, our field of inquiry will be broadened by thinking through the ways that the body is itself a mediating force. Medium, by definition, refers to something that's "in a middle position" or "facilitates transmission" — a reminder that the study of media is, at heart, the study of states of between-ness, and can help us think through embodiment and representation in essential ways. The course probes the creative and theoretical possibilities that emerge when we move our bodies — as thinkers, readers, writers, media-makers and spectators — into the foreground.

**COM 343. Social Media Analytics and Management. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a grade of C or higher; COM 201 or PSY 201 with a grade of C or higher; COM 201 or PSY 201 provides necessary background for the course. Corequisites: College level oral and written communication skills are required for success. This course surveys the theoretical foundations and technical skills of social media analytics and management. Students will develop a comprehensive understanding of the principles and strategies for analyzing and managing social media in the social and behavioral sciences.

**COM 344. Creative Writing and the Moving Image. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: COM 240 with a grade of C or higher; ENGL 101 and ENGL 102 with a grade of C or higher. This workshop-based course will focus on the rich crossroads between creative writing and moving images. As we learn from visiting practitioners, explore the model of a hybrid (writer/media-maker) practice, and examine the ways in which disparate media establish dialogue and trade places, students will produce their own screen-writing experiments in poetic, essayistic, and narrative modes.

**COM 346. Race, Gender, and Media. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher; PSY 210 or COM 201. This course considers media practices that critique, disrupt, and reimagine dominant narratives about race, gender, class, and sexuality in the United States. Students examine the intersections of representation, power, aesthetics and politics across a broad range of media forms including film, video, performance, television, and online media. An exploration of our own roles and voices as spectators, scholars and media-makers will accompany our critical analysis of individual media objects and forms.

**COM 350. Digital Video Production. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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 353. Applied Visual Communication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 explores information structuring using traditional and contemporary techniques and introduces students to the principles of visual communication and provides hands-on practice in document design. The focus is on preparing and presenting information in both professional and popular contexts. Students learn about and work with concepts that enable effective use of graphics and text. This course satisfies the three credit 300 GER in History and Humanities.

**COM 354. Designing Digital Media. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 explores how computer technology has influenced the presentation of information and the ways in which it is structured via digital media. Students learn how various web-based media platforms and tools are used to present familiar topics in ways that are both dynamic and that align with contemporary culture. Through guided interactive activities, the course develops techniques for presenting information for technical, commercial, and artistic use. Projects involve the use of HTML editors, NJIT networks, and graphical and animation software. This course satisfies the three credit 300 GER in History and Humanities.

**COM 355. Digital Media Futures. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 provides students with opportunities to explore past, current, and possible future directions pertaining to information theories and practices as they continue to advance in both print and digital media formats. Beginning with early approaches in this area like cybernetics, the course then focuses on how digital technology is continuing to transform the fields of communication and media, especially in terms of user interactivity, game design, storytelling, web-application development, marketing, and many social and cultural political movements. Course assignments cover a wide array of formats and skills, ranging from research papers to digital narrative production as well as new and creative approaches to video and audio production. This course satisfies the three credit 300 GER in History and Humanities.

**COM 356. Visual Storytelling and Graphic Media. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 a process-based course that addresses the relationship between text and image in contemporary visual narratives and asks students to reflect on visual culture by evaluating advertisements, sequential art, prose, poetry, and film. To demonstrate their learning, students will develop compositions in graphic and written mediums and analyze how graphic narratives serve as powerful tools for both aesthetic based and analytical arguments. In addition, students will reflect on how their compositions reshape their ideas about authorship, digital communications, narrative, and consider the ways in which visual composition transfers to other disciplines and professions. The course is built on the idea that composing graphic narratives improves rhetorical awareness, media fluency, and likewise provides opportunities to reevaluate the writing process.

**COM 369. Digital Poetry. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 370. Strategic Communication. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 and COM 318; COM 318 provides necessary background for the course. Corequisites: College-level writing, speaking, and research skills needed for course success. This course introduces the principles and practices of strategic communication, which is a critical aspect of contemporary business and organizational operations. Students develop an understanding of the role of strategic communication in achieving managerial objectives, building relationships with stakeholders, and protecting organizational reputation. Topics covered include audience analysis, message development, content creation and curation, as well as media evaluation across various mass and social media platforms.

**COM 371. Social Network Theory and Analysis. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a grade of C or higher, one 200-level Cultural Literacy GER, STS 304, STS 307. This course develops theoretical, conceptual, and analytic issues associated with social network perspectives. It examines research on the science of networks in communication across a wide array of applications and offers detailed insights into theories, methods, and tools used to examine the structure and dynamics of networks. Students conduct social network research and analytics using computational tools and statistical models, as well as visualize, present, and interpret findings derived from data based on networks and network analysis.

**COM 380. Music and Society. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and one Cultural Literacy GER 200 level course with a grade of C or higher. This course is an overview of the role music has played in society, from ancient to present times, and considers various types: Western, Eastern, folk, world, classical, jazz, rock, and electronic. The course enables students to develop an informed and critical appreciation of the vast array of music available today and its importance in political and social discourse and influence. Also covered is the role that technology has played in transforming how we experience and create music, from the development of the earliest musical instruments to the Internet. Students will have extensive opportunities to listen to and write about music. This course satisfies the three credit 300-level GER in Cultural Literacy.

**COM 381. Electronic Music in Practice. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 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 laptop computer. Computer requirements: A PC or Macintosh system running Ableton Live. This course satisfies the three credit 300 GER in History and Humanities.

**COM 382. Music and Politics. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 explores the nature of music as an instrument for personal, cultural, and political change. We will discuss the power of music to influence political attitudes in liberation movements throughout history and around the world, as well as in fascist regimes and political campaigns. This course also discusses the co-optation of art by capitalism and through modern technology. Genres to be analyzed include indigenous musics, slave songs, the blues, folk, rock and roll, punk, hip hop, jazz, afro-beat, latin music (e.g., nueva canción), and a variety of experimental genres. Course materials are derived from philosophy, history, aesthetics, anthropology, and political theory.

**COM 390. Electronic Writing Workshop. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**COM 399. Studies in Communication and Media. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 explores themes and issues within the broad landscape of communication and media studies. Each section will focus on a specific area of inquiry or relevant skill, offering understanding of key concepts, theories, and real-world applications. Topics may encompass digital media, journalism, public relations, advertising, film studies, or interpersonal communication.

**COM 490. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).**

Prerequisites: ENGL 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.

**COM 491. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).**

Prerequisites: ENGL 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.

**COM 496. Senior Project-Communication and Media. 3 credits, 6 contact hours (0;0;6).**

Prerequisites: ENGL 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. For professional and technical communication majors only. Provides students with a capstone experience. 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.

**ENGL 090. General Skills in the English Language. 5 credits, 5 contact hours (5;0;0).**

Prerequisites: None. Intended for students whose native language is not English and who need practice in speaking, listening, reading, and writing in English prior to enrolling in ENGL 096. Extensive activities to develop grammar and expand vocabulary. Frequent speaking practice in small groups and oral presentations. Practice in understanding and taking notes on academic lectures. Small class size and weekly individual tutoring sessions ensure students receive individualized attention.

**ENGL 096. Reading, Writing, Critical Thinking. 6 credits, 6 contact hours (6;0;0).**

Prerequisites: None, unless placement test result requires ENGL 090. The first course of the two-semester composition sequence ENGL 096 - ENGL 100. Intended for students for whom 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.

**ENGL 099. Reading, Writing, Language. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: None. Focuses on developing the reading and writing skills necessary for success in a college curriculum, including structuring and organizing effective sentences and paragraphs; preparing summaries; expanding vocabulary; developing grammatical fluency; formulating a thesis, and other steps toward writing expository essays. Students develop skills in evaluating, editing, and proofreading their writing. Intensive work in developing college-level reading skills. Gives attention to specific needs of students whose native language is not English as well as of native speakers of English. Small class size ensures students receive individualized attention.

**ENGL 100. English Composition: Introduction to Academic Reading and Writing. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: Entrance is determined by placement test or completion of ENGL 096 with a grade of C or higher. Intended for students whose first language is not English but who have advanced level English language skills. Emphasizes writing college-level text-based essays, reading strategies, and advanced critical thinking. Special attention to strengthening skills in analysis and argumentation. Advanced vocabulary and grammar. Extensive practice in editing (proofreading) and revision skills. Frequent oral presentations. Some attention to rhetorical analysis and basic documentation. Small class size and weekly individual tutoring sessions ensure students receive individualized attention. Passing this course with a grade of C or higher satisfies the ENGL 101 General Education Requirement (GER).

**ENGL 101. English Composition: Introduction to Academic Writing. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: Entrance is determined by placement-test score. This course provides an introduction to college-level writing, particularly the rhetorical dimensions of composition, including purpose, audience, occasion, and genre. The course also focuses on the writing process, asking students to brainstorm topics, to write drafts, and to revise their writing based on reflection and peer feedback. Activities in the course involve reading challenging articles, essays, and prose and considering paintings, films, and other visual compositions. Additionally, students work to analyze claims, to formulate independent arguments, and to communicate ideas through clear, well-organized writing.

**ENGL 102. English Composition: Introduction to Writing for Research. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 100 with a grade of C or higher or ENGL 101 with a grade of C or higher. This course builds on the skills students learned and practiced in ENGL 101 and provides an introduction to writing using both primary and secondary sources. Emphasis is on developing research questions, finding and citing sources, conducting primary research, and synthesizing elements of research into persuasive arguments. Students also complete this course knowing how to correctly document and attribute sources.

**EPS 202. Society, Technology, and the Environment. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: ENGL 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. Its 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 GER.

**EPS 312. Technology and Policy in Contemporary America. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: 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).**

Prerequisites: 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 362. Environmental Economics. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: 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).**

Prerequisites: 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).**

Prerequisites: HUM 101, HSS 202 or their equivalents; two from HSS 211, HSS 212, Hist 213 or their equivalents.; STS 307. 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.

**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).**

Prerequisites: 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: ENGL 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 340. Environmental Health and Safety. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: CHEM 126. This course includes an interdisciplinary review of fundamental scientific principles necessary to understand basic environmental health science. Basic science and engineering knowledge is applied to the recognition, evaluation and control of physical, chemical and biological processes that influence human health and welfare. The impact of contaminants ranging from industrial pollutants to biological agents and environmental disease vectors will be analyzed. This course is based on the premise that exposures to the environmental stressors that cause harm can be recognized through the observation of environmental quality parameters and mitigated by source controls and pollution prevention.



**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, or BIOL 205 and BIOL 206, with grade of C or better. 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. 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. Principles of Toxicology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: CHEM 122 or CHEM 126 with a C or higher. 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.

**EVSC 490. Special Topics in Environmental Science. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: This will depend upon the course given. The course will be offered in specific areas as interest develops.

**FRSC 2\*\*. Forensic Science Electives. 3 credits, 3 contact hours (3;0;0).****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 Methods of Forensic Analysis & Lab. 4 credits, 6 contact hours (2;4;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 360. The Science of Fingerprints. 4 credits, 6 contact hours (2;4;0).**

Prerequisites: FRSC 201. This course provides the technical foundation necessary to properly examine fingerprints as a method of identification. Students will gain insight into the science of fingerprints, learn about techniques for acquiring known exemplars, recovering and documenting unknown impressions, classifying and comparing impressions, and utilizing the ACE-V methodology to render conclusions. This course will also provide an opportunity for students to train on equipment utilized by practicing professionals and culminate with presenting their case work at a moot courtroom testimony.

**FRSC 365. Mobile Device Forensics. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: FRSC 201. Mobile Device Forensics is a branch of digital forensics relating to recovery of digital evidence or data from a mobile device under forensically sound conditions. Duties in this area include the forensic seizure and preservation of mobile devices, extraction of data, analysis of data, and the creation of reports for use in legal proceedings. This course will introduce students to the acquisition and analysis of data that can be retrieved from mobile devices, focusing on applying industry best practices to evidence collection and analysis with hands-on exercises using current tools.



**FRSC 370. Forensic Photography. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: FRSC 201. This course is designed to prepare students for the technical foundation necessary to properly capture digital images. It will teach students the application of photographic principles to legal and scientific matters and focus on specialized areas of photography, such as crime scene, aerial, underwater, low-light, videography, multi-spectral imaging, and macro photography. This course will Utilize Fuji digital IR/UV cameras, Alternate Light Source, drone, Photoshop software, and Faro 3D scanning station. Additionally, more current topics of LiDAR, and scene mapping topics associated with crime scenes will included. Students will master the fundamental skills pertaining to the capture of documentation-type and evidentiary-type images and explore their usefulness within the justice system and legal admissibility.

**FRSC 405. Forensic Anthropology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: FRSC 201. Forensic Anthropology is an applied area of biological anthropology that focuses on the identification of human remains and the interpretation of what happened to them in a medicolegal context. This course will provide an overview of forensic anthropology. Students will be introduced to the history of the discipline, key theoretical issues, and standard methods used in each of the major topic areas, as well as, the role of forensic anthropology in different forensic scenarios. This class is mostly lecture-based, however, some practical exercises will be included leading to a better understanding of the complex process of human identification.

**FRSC 410. Forensic Medicine. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: FRSC 201. This course introduces students to the field of forensic pathology and the process of medicolegal death investigation within the criminal justice system, highlighting the intersection between forensic pathology and other forensic disciplines. Broad concepts covering the range of cases seen in forensic pathology practice will be discussed with examples of day-to-day casework. Topics covered include the role of the forensic pathologist, postmortem changes, autopsies, causes of death, classification and documentation of injuries, and toxicology.

**FRSC 475. Forensic Chemistry & Lab. 4 credits, 6 contact hours (2;4;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 479. Forensic Biology & Lab. 4 credits, 6 contact hours (2;4;0).**

Prerequisite: BIOL 352. Forensic Biology will expose students to Forensic Serology and Forensic DNA. It covers the different types of analyses that are performed in forensic biology sections of crime laboratories. The course will introduce students to human identity testing, focusing on the theory, methods, procedures and statistics associated with this forensic science. The course also contains a weekly laboratory component.

**FRSC 480. Forensic Microscopy & Lab. 4 credits, 6 contact hours (2;4;0).**

Prerequisite: CHEM 126A. 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 and laboratory exercises 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.

**FRSC 498. Special Topics in Forensic Science. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: Permission of instructor. Special topics course in 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: ENGL 101 with a grade C or better, and pre- or co-requisite ENGL 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: ENGL 101 with a grade of C or better, ENGL 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: ENGL 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: ENGL 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: ENGL 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. This course considers the philosophical and technical question of what constitutes evidence in the US legal system. This course satisfies the three credit 300 GER in History and Humanities.

**HIST 325. Special Topics in History. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101, ENGL 102, and one 200-level Cultural Literacy GER with grades of C or higher. This course engages students in the study of new or advanced topics in an area of history not regularly covered in any other NJIT history course at the 300-level. The precise topic to be covered are announced in the semester prior to the offering of the course. This course satisfies the three credit 300 GER in History and Humanities.

**HIST 328. Early Modern Rome: Urbanism and Reform. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 Rome from 1350 to 1750. This transformative period of Reformation, Renaissance and plague gave rise to the nation-state and still shapes our world today. Students will be introduced to the broad cultural and social issues of the period, with a focus on the city of Rome. The city and its physical transformation under the Renaissance popes are central to the major events of the period and European identity. This is a digital history course and students will construct and analyze a geographic database. This course satisfies the three credit 300 GER in History and Humanities.

**HIST 329. Dante: Hell, Heaven, and Medieval Florence. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 work of Dante Alighieri in the cultural context (intellectual, religious, literary, social, political, and artistic) of his contemporary Florence. Students will read a range of primary source materials, including the "Divine Comedy." This is a digital history course and students will construct and analyze a geographic database. This course satisfies the three credit 300 GER in History and Humanities.

**HIST 334. Environmental History of North America. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 338. Environmental Justice and Climate Change in America. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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. Examines the history of environmental inequality within the United States, especially in poor and minority communities, as well as the rise of the environmental justice movement during the post-World War II period. Considers the numerous historical causes of environmental discrimination along with the strategies undertaken by local communities to alleviate such inequality. Topics include analysis of grassroots organizing, legal strategies, and policy implementation focused on fostering a more environmentally just society. 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: ENGL 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 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 342. Civil Rights Revolution and Law. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 will examine what historians have been identifying as the civil rights revolution—the moment in the twentieth century when a host of interest groups began pursuing rights through the court system. We will begin by examining African Americans' campaign to gain civil rights through the courts and how political action supported and sometimes even exceeded this process. We will then examine how African Americans' success inspired or shored up the claims of other groups—including women, Chicanos, Asian Americans, Native Americans, LGBTQ people, disabled people, and others—to pursue their rights in courts as well. 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: ENGL 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 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: ENGL 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: ENGL 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. Modes of communication, ancient and modern, in their social and cultural context, from cave paintings 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: ENGL 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: ENGL 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 361. The Founding of the American Nation. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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: ENGL 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: ENGL 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. Science and Technology in the Global South. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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: ENGL 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 globalism in the 20th century. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

**HIST 369. Law and Society in History. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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, the 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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 discussions 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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 19th century socio-cultural change. This course may be used to satisfy a three credit 300 level GER in History and Humanities.

**HIST 395. Research Methods in Law and Society. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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. Law threads through every aspect of society: it permits and prohibits human behaviors, it enables and invalidates official actions, and it protects and prosecutes citizens. This course explores the social complexity of law through original research. Students will learn how to trace the connections between law and society using interdisciplinary humanities and social science approaches. Readings span several theoretical, disciplinary, and interdisciplinary perspectives that include history, sociology, anthropology, political science, economics, psychology, and cultural studies. The readings will guide the student's original research on what law is and how it operates in relation to society. The course facilitates student understanding of the relationships between social, cultural, political, and economic forces on the one hand, and legal rules, practices, and outcomes, on the other. 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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, or with instructor permission. 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 404. Humanities, History and Social Sciences Senior Seminar. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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. Restrictions: Registration requires senior standing. 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: ENGL 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. Restrictions: Registration requires senior standing. The capstone seminars allow 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. A list of capstone seminars is published each semester in the course registration bulletin.

**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.

**LIT 2\*\*. Literature Elective. 3 credits, 3 contact hours (3;0;0).****LIT 230. Introduction to Literature. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a C or higher; ENGL 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.

**LIT 320. American Literature. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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 325. Special Topics in Literature. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101, ENGL 102, and one 200-level Cultural Literacy GER with grades of C or higher. This course engages students in the study of new and/or advanced topics in an area of literature not regularly covered in any other Humanities course at the 300-level. The precise topics to be covered are announced in the semester prior to the offering of the course. 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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: ENGL 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 361. 20th Century American Drama. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 364. Modern Continental and British Drama. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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: ENGL 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: ENGL 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 America through Art and Literature. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 explores Latin American cultures through literature, film, music, and other art forms. It examines how twentieth and twenty-first century writers and artists responded to major social and political changes. Special attention is given to involvement of the United States in Latin America, immigration narratives, and issues involving individual and group identity. Knowledge of Spanish is not required; the course is taught in English. 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: ENGL 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 as it reveals 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: ENGL 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: ENGL 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 386. Science Fiction. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 videos 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: ENGL 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 A. 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 B. 4 credits, 5 contact hours (4;0;1).**

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;0;1).**

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 (4;0;1).**

Prerequisites: MATH 110 with a grade of C or better or placement by performance on standardized entrance examinations. Topics include limits, differentiation, applications of differentiation, and integration.

**MATH 112. Calculus II. 4 credits, 5 contact hours (4;0;1).**

Prerequisite: MATH 111 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 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 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 161. Calculus I for Computing. 4 credits, 5 contact hours (4;0;1).**

Prerequisites: MATH 110 with a grade of C or placement by performance on standardized entrance examinations. Corequisite: CS 100. A calculus course with the same core content as MATH 111 but with an emphasis on building foundations for computing rather than differential equations. The course is characterized by an emphasis on symbolic computing over numerical computing. Topics include limits, differentiation, applications of differentiation, and integration. Student can not receive credit for both MATH 161 and MATH 111.

**MATH 211. Calculus III A. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: MATH 112 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. 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: MATH 112 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. 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).**

Prerequisite: MATH 112 with a grade of C or better. Restriction: For Chemical Engineering students only. 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. 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. 3 credits, 4 contact hours (3;1;0).**

Prerequisites: MATH 112 with a grade of C or better and CS 115 with a grade of C or better or 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).**

Prerequisites: MATH 138 with a grade of C or better or MATH 111 with a grade of C or better. A continuation of MATH 138. Topics include applications of integral calculus and an introduction to ordinary differential equations.

**MATH 244. Introduction to Probability Theory. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: MATH 112 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 279. Statistics and Probability for Engineers. 2 credits, 2 contact hours (2;0;0).**

Prerequisite: MATH 112 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).**

Prerequisites: MATH 111 with a grade of C or better or MATH 138 with a grade of C or better. (Intended for students in Engineering Technology) 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 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 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 238 with a grade 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. 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).**

Prerequisites: 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).**

Prerequisites: 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. 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. 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. 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. 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. 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 356. Loss Models. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: MATH 341 with a grade of C or better. This course will introduce a variety of frequency, severity, and aggregate models that are useful for actuarial applications. This will include analyzing data from applications, determining a suitable model, providing measures of confidence for decisions based on the model, and estimating losses.

**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 374. Stochastic and Discrete Models in Biology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: MATH 244 or MATH 333 with a grade of C or better. This course provides an introduction to stochastic and discrete models in biology with a focus on applications in structured populations, molecular evolution, phylogenetics, genetics, and infectious disease modeling. No prior background in biology is needed; the emphasis of this course is on the underlying mathematical models and theory, quantitative problem solving, and computer explorations.

**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 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, 3 contact hours (3;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).**

Prerequisites: 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 340 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 of Applied Math II. 3 credits, 11 contact hours (3;1;0).**

Prerequisite: MATH 450 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 337 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 programming and parallel numerical algorithms, and spectral methods. An instructor-selected advanced topic will be included in the course.

**MATH 461. Introduction to Statistical Computing with SAS and R. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: MATH 341 with a grade of C or better or MATH 344 with a grade of C or better or MATH 447 with a grade of C or better. In this course, SAS and R statistical software will be studied from a programming language perspective. It will emphasize SAS and R data steps including getting data into SAS and R environments, working and combining data using control flows, merge and subsets. SAS and R mathematical, statistical, and data functions are discussed, as well as learning to write SAS Macro and generate high resolution graphics using SAS/Graph. The concentration is on SAS and R programming issues rather than on statistical procedures or functions; however, several SAS and R statistical procedures or functions are discussed and illustrated. Finally, interactive statistical software JMP and Minitab are briefly introduced.

**MATH 462. Statistics and Statistical Learning (Capstone I). 3 credits, 3 contact hours (3;0;0).**

Prerequisites: MATH 461, MATH 478 with a grade of C or better. This is the first semester of a two-semester undergraduate-level statistical learning capstone course. The course provides an opportunity for students to synthesize knowledge gained during their undergraduate study by applying modern statistical tools to solve real-world projects. In this first semester course, the following basic statistical learning objects will be reviewed: statistical decision theory, linear/logistic regression, discriminant analysis, principle component analysis, high-dimensional data analysis, nearest neighbor methods, multiclass classification. The course will also select important papers on the above topics for students to read and present. Capstone research topics will be selected approaching the end of the semester.

**MATH 463. Statistics and Statistical Learning (Capstone II). 3 credits, 3 contact hours (1;2;0).**

Prerequisites: MATH 462 with a grade of C or better. This course is the continuation of MATH 462. In this course, the following basic statistical learning objects will be reviewed: variable/model selection, support vector machine, tree-based methods, cluster analysis. Students will work in teams on real-world projects which will require extensive use of statistical software. Each group will produce a written report and give an oral presentation of their findings. present their work in a research talk. Successful completion of this course will equip students with the modern statistical learning, teamwork, and presentation skills necessary to conduct advanced research or enter the professional world.

**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 234; CHEM 126; MATH 112; CS 100, CS 101, CS 115 or BNFO 135. Course combines lecture and laboratory work in introducing methods of X-ray diffraction. Simple sample synthesis will be conducted to initiate experiments. Topics include fundamentals of x-ray scattering, powder and single crystal diffraction techniques and data modeling methods. Local and national laboratory facilities will be utilized for experiments.

**MTSE 452. Materials Science I. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: PHYS 111; 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).**

Prerequisite: 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 of 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 103 or PHYS 121. An introduction to the interaction of light with biological tissues. Biophotonics for diagnostic and therapeutic applications will be discussed. Topics include a series of studio-style, hands-on experiments measuring the optical properties of real or simulated tissues using reflection, polarization, absorption and scattering, with discussions of related subjects including laser surgery and mutations by radiation exposure. The course is designed for Biophysics majors, but is also geared to Biomedical Engineers, Biologists and Chemists.

**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. Life Saving/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. Individualized 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. Air Force Physical Training I. 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. Skiing. 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.

**PE 221. Badminton. 1 credit, 1 contact hour (0;1;0).**

Includes the rules, skills, strokes, and strategies of badminton, and provides an opportunity for competition.

**PE 223. Tennis for Beginners. 1 credit, 1 contact hour (0;1;0).**

Introduces students to the rules and basic techniques and strategies of tennis.

**PE 224. Intermediate Tennis. 1 credit, 1 contact hour (0;1;0).**

Prerequisite: PE 223 or permission of the instructor. Emphasizes correcting problem strokes, strategies, drills, and tournament play.

**PE 225. Golf. 1 credit, 1 contact hour (0;1;0).**

Designed for the beginner. Areas covered are grip, stance, swing, strokes, and use of clubs, progressing towards actual course play. Students pay green and range fees.

**PE 226. Intermediate Golf. 1 credit, 1 contact hour (0;1;0).**

Prerequisite: PE 225 or permission of the instructor. Designed to strengthen and advance the skills and theory learned in PE 125.

**PE 234. Beginning Fencing. 1 credit, 1 contact hour (0;1;0).**

Introduces fencing as both a lifetime and intercollegiate sport. Basic equipment is provided.

**PE 242. Introduction to Racquetball. 1 credit, 1 contact hour (0;1;0).**

An introduction to rules, skill development, strategies and tournament play.

**PE 243. Introduction to Volleyball. 1 credit, 1 contact hour (0;1;0).**

An introduction to rules, skill development, strategies, and tournament play.

**PE 244. Advanced Racquetball. 1 credit, 1 contact hour (0;1;0).**

Prerequisite: PE 242 or permission of the instructor. Advanced methods and techniques of various serves; passing, and kill shots; advanced strategy; tournament play focusing on singles and doubles play.

**PE 245. Air Force Physical Training II. 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 2XX. PE Exemption. 0 credits, 0 contact hours (0;0;0).****PHIL 2\*\*. Philosophy Elective. 3 credits, 3 contact hours (3;0;0).****PHIL 310. Logic. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Logic. Teaches students how to reason critically, identify issues, construct and evaluate arguments. Improves students' ability to communicate effectively, both orally and in writing. Examines topics such as meaning and definition; explanations and arguments; informal logic and fallacies; and formal logic, including modern symbolic logic, truth tables, formal fallacies, proofs, and quantification. This course satisfies the three credit 300 GER in History and Humanities.

**PHIL 331. Problems in 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. An examination of problems of a social, ethical, esthetic, religious, and scientific nature, and a study of the related principles and methods of philosophy. Readings are chosen from a wide range of periods and schools from the Greeks to the present, with some application of philosophical analysis to individual and societal problems. This course satisfies the three credit 300 GER in History and Humanities.

**PHIL 333. Moral Philosophy. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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 335. Ethical Issues in Business. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a grade of C or higher; ENGL 102 may be taken concurrently as a corequisite. 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?.

**PHIL 337. World Religions. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 350. Representative Philosophies. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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: ENGL 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: ENGL 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 I. 3 credits, 3 contact hours (3;0;0).**

Corequisite: PHYS 102A. 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 I Lab. 1 credit, 2 contact hours (0;2;0).**

Corequisite: PHYS 102. This course is the laboratory component of PHYS 102 and must be taken concurrently.

**PHYS 103. General Physics II. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: PHYS 102/PHYS 102A or PHYS 111/PHYS 111A all with grade of C or better. Corequisite: PHYS 103A. 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 II Lab. 1 credit, 2 contact hours (0;2;0).**

Prerequisites: PHYS 102/PHYS 102A or PHYS 111/PHYS 111A all with grade of C or better. Corequisite: PHYS 103. 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).**

Corequisites: PHYS 111A and MATH 111. 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 Lab. 1 credit, 2 contact hours (0;2;0).**

Corequisite: PHYS 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).**

Corequisite: MATH 111. 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/PHYS 111A and MATH 111 all with a grade of C or better. Corequisites: PHYS 121A and MATH 112 with grade of C or better. 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 Lab. 1 credit, 2 contact hours (0;2;0).**

Prerequisites: PHYS 111/PHYS 111A and MATH 111 all with grade of C or better. Corequisites: PHYS 121 or PHYS 122. Lab must be taken concurrently with PHYS 121 or PHYS 122. Laboratory component of PHYS 121 and PHYS 122.

**PHYS 122. Electricity & Magnetism ECE Appl. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: PHYS 111/PHYS 111A and MATH 111 all with a grade of C or better. Corequisites: PHYS 121A and MATH 112 with grade of C or better. 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).**

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).**

Includes demonstration of physical principles applicable to astronomy. Use of telescope for lunar, solar and planetary observations. Optional laboratory course associated with PHYS 202.

**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 Lab. 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 quantitative, but non-mathematical, view of how living entities work in terms of the basic concepts of physics and biology. We will use active, studio learning to explore how the nervous system, the heart and the lungs work and how the blood pressure results. We will discuss how these concepts underlie topics ranging from birth to death, from touch to pleasure, from vision to beauty, and from a thought to a heartbeat. The course is geared to all majors.

**PHYS 231A. Physics III Lab. 1 credit, 2 contact hours (0;2;0).**

Prerequisites: PHYS 111/PHYS 111A; PHYS 121/PHYS 121A and MATH 112, all with grade of C or better. Corequisites: PHYS 231H or PHYS 234. Optional course associated with PHYS 234 and PHYS 231H.

**PHYS 231H. Physics III Honors. 4 credits, 4 contact hours (4;0;0).**

Prerequisites: PHYS 111/PHYS 111A; PHYS 121/PHYS 121A; MATH 111; MATH 112; 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).**

Prerequisites: PHYS 121/PHYS 121A or PHYS 122/PHYS 121A and MATH 112 with a grade of C or better. 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 310. 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. Students will learn the basic principles behind cells, thermodynamics and statistical mechanics applied to cellular environments forces affecting conformation of biological molecules, protein and nucleic acid biophysics, membrane biophysics, and basic physics principles behind nerve impulses and heart and lung function and malfunction. Demonstrations and measurements using basic medical measurements will be used when feasible.

**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. R750 362 may be substituted for this course.

**PHYS 432. Electromagnetism I. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: 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 441. 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 442. Introduction to 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 Lab. 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 of Electricity and Radiation. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: PHYS 103 or PHYS 121 with a grade of C or better. This course will survey the basic principles of biophysics using electromagnetic waves as our theme. We will learn the basic therapeutic and destructive aspects of radiation from electrical fields at frequencies from below 60 cps to x-rays and beyond. We will also use active learning and prepare reports on research projects in class. In a general sense, the biophysical properties of radiation are important in the human nervous systems, in cancer treatment and in carcinogenesis. During this course, we will explore how nuclear radiation is unnecessarily feared in some cases and appropriately feared in others. The course is designed for Biophysics and Biology majors, but is also geared to Biomedical Engineers and Chemists.

**PHYS 452. Atomic and Nuclear 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 atomic spectra, atomic structure, and nuclear physics.

**PHYS 456. Introduction to Solid State 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. 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).**

Prerequisites: 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).**

Prerequisite: 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).**

Prerequisite: 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).**

Prerequisite: 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).**

Prerequisite: 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).**

Prerequisites: 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).**

Prerequisite: 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).****PSY 2\*\*. Psychology Elective. 3 credits, 3 contact hours (3;0;0).****PSY 201. Orientation to Psychology as a Behavioral Science. 3 credits, 3 contact hours (3;0;0).**

This course will serve as an orientation to psychology in general and cyberpsychology in particular. Students will examine theories and research related to career and professional development. Topics include the utility of career development theory, the nature of the world of work, evaluation of career information, and the role of empirical research in career development theory and practice. Students will also use self-assessments of interests, goals, and strengths as they relate to career and vocational opportunities.

**PSY 210. Introduction to 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 can be used to satisfy either the three credit 200 GER in History and Humanities or the three credit GER in Social Sciences, but not both.

**PSY 215. Biology of Behavior. 3 credits, 3 contact hours (3;0;0).**

Pre or Corequisite: PSY 210. This course provides a general introduction to the underlying biological principles and mechanisms that give rise to complex human behaviors. Topics include neurons, neural communication, brain structure and function, processing in sensory systems, cognitive neuroscience, and neural and hormonal influences on health and emotion. This course focuses on emerging methods and approaches to an integrated understanding of complex behavior, with an emphasis on applications for STEM professional practice.

**PSY 3\*\*. Psychology Elective. 3 credits, 3 contact hours (3;0;0).****PSY 304. Social Science Research Methods I. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher. Corequisites: PSY 304A. This course introduces students to inquiry and empirical research in the social sciences. Students will learn about the role of theory in research and will investigate how researchers formulate and operationalize viable questions. Students will also have an opportunity to critically evaluate research findings and consider the efficacy of various methods used to gather data and solve problems through social research. This course culminates in the development of a hands-on project allowing students to sample several data-collection techniques used in research across several social science fields.

**PSY 304A. Social Science Research Methods I Lab. 1 credit, 2 contact hours (0;2;0).**

Prerequisites: ENGL 102 with a grade of C or higher. Corequisites: PSY 304. This course is the laboratory component of PSY 304 and must be taken concurrently.

**PSY 307. Social Science Research Methods II. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher. Corequisites: PSY 307A. This course provides students with an introduction to quantitative research methods and data-analysis techniques commonly used in the social and behavioral sciences. Students will gain experience in graphical representations, descriptive and inferential statistics, hypothesis-testing methods, design of experiments, and modeling of behavioral data. The course provides hands-on experience with data collection and analysis using statistical software.

**PSY 307A. Social Science Research Methods II Lab. 1 credit, 2 contact hours (0;2;0).**

Prerequisites: ENGL 102 with a grade of C or higher. Corequisites: PSY 307. This course is the laboratory component of PSY 307 and the two courses must be taken concurrently.

**PSY 321. Social Psychology. 3 credits, 3 contact hours (3;0;0).**

Pre or Corequisites: PSY 210. Social psychology is the study of how individuals affect and are affected by other people and by their social and physical environments. Social psychology helps us to understand and explain how our thoughts, feelings, and behaviors are influenced by the actual, imagined, and implied presence of others. Social psychology is the recognition that human responses are influenced by social situations, in addition to, the products of our individual personalities. Social psychologists study interpersonal and group dynamics and social challenges, such as prejudice, implicit bias, bullying, criminal activity and substance abuse. They research social interactions and the factors that influence them, such as group behavior, attitudes, public perceptions and leadership. This course will provide students an introduction and overview of research and theory in social psychology. This course does not satisfy the three credit 300 GER in History and Humanities.

**PSY 325. Special Topic in Psychology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101, ENGL 102, and one 200-level Cultural Literacy GER with grades of C or higher. This course engages students in the study of new or advanced topics in an area of Psychology not regularly covered in any other NJIT Psychology course at the 300-level. The precise topics to be covered are announced in the semester prior to the offering of the course. This course satisfies the three credit 300 GER in History and Humanities.

**PSY 333. Principles of Psychometrics. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: PSY 210. Corequisites: PSY 307A. This course exposes students to the scientific methods by which psychologists strive to conceptualize, operationalize, and measure human behavior in such areas as skills, aptitudes, attitudes, values, personality, and intelligence. The course emphasizes an epistemological approach to psychometric theories in order to develop a critical language as well as to define the limitations of psychological measurement. Topics include reliability, validity, scale development, and applications of psychometric assessment in applied, clinical, and research contexts.

**PSY 339. Psychology of Diversity. 3 credits, 3 contact hours (3;0;0).**

Pre or Corequisites: PSY 210. This course will provide a comprehensive introduction to psychological theories and research related to identity, group dynamics, and diversity. This course explores the relationship between psychology and identity, including group and identity formation, stereotyping, prejudice, stigma, intergroup contact, and multiculturalism. Students will examine diversity as constituted through intersections of social categories such as race, gender, ethnicity, nationality, age, language, citizenship, religion, class, sexual orientation, physical ability, etc. with an emphasis on structural agency, power, and privilege. This course does not satisfy the three credit 300 GER in History and Humanities.

**PSY 340. User Experience for the Humanities and Social Sciences. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: COM 201 or PSY 201 with a grade of C or higher; ENGL 101 and ENGL 102 with a grade of C or higher. This course explores methodologies for understanding the user experience (UX) across various platforms that are essential for daily activities involving e-commerce, social media, and smart/automated systems. Research and practice in recent years has given rise to new user-centric approaches and the UX field now relies on an increasing array of intensive and advanced social science techniques including in-depth interviews and observational procedures. The course provides students with opportunities to envision, plan, and execute first-hand user-based research.



**PSY 341. Computational Thinking in the Humanities and Social Sciences. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a grade of C or higher; MATH 101 and MATH 105 with a grade of C or higher. Corequisites: ENGL 102 may be taken as a corequisite. This course surveys theoretical foundations and technical skills related to computational thinking. The course focuses on comprehensively understanding the principles and logic of computational processing, programming, and problem solving in the Humanities and Social Sciences.

**PSY 358. Moral Psychology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**PSY 359. Foundations of Cyberpsychology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Introduction to 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, and online gender-switching. This course satisfies the three credit 300 GER in History and Humanities.

**PSY 361. Found of Cyberpsychology II. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: PSY 359. Pre or Corequisites: PSY 210. This course applies the behavioral and psychological sciences to study of the effects of the internet and contemporary information and communication technologies (ICTs) on individuals and groups. Topics include artificial intelligence, robotics, big data and machine learning, artificial and virtual realities, telepsychology, health applications of ICTs, distance learning and professional development, online assessment and evaluation, online research, and data analytics.

**PSY 389. Psychopathology. 3 credits, 3 contact hours (3;0;0).**

Pre or Corequisites: PSY 210. This course addresses psychopathology from multiple frames including biological, developmental, cultural, and interactional. Students will study psychopathology from an individual descriptive, symptom logic perspective, as well as from a contextual, systemic perspective including developmental hallmarks, familial patterns, and sociocultural contributors. Readings about traditional diagnostic approaches and alternative approaches to assessment will be examined. Students will critically examine assessment, diagnosis, treatment, and evaluation of success.

**PSY 399. Studies in Psychology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and PSY 210 with a grade of C or higher. This course offers an in-depth exploration of advanced topics in psychology. Each section will focus on a specific area of psychological study, incorporating theoretical frameworks, research findings, and practical applications. Topics may include cognitive psychology, social behavior, developmental psychology, mental health, or psychological ethics. Students will critically examine the intersections of psychological theories with real-world contexts, exploring the societal and individual implications of psychological phenomena.

**PSY 490. Co-op Work Experience. 3 credits, 3 contact hours (3;0;0).**

Restrictions: 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.

**PSY 491. Research and Independent Study. 3 credits, 3 contact hours (3;0;0).**

Restrictions: 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.

**PSY 495. Senior Seminar. 3 credits, 3 contact hours (3;0;0).**

Restrictions: Senior standing and departmental approval. Offers cyberpsychology 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 the behavioral and psychological sciences.

R460 100. PLANET EARTH. 3 credits, 3 contact hours (3;0;0).  
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 311. Geologic Field Problems. 3 credits, 3 contact hours (3;0;0).  
R460 314. Stratigraphy. 4 credits, 4 contact hours (4;0;0).  
R460 320. Structural Geology. 4 credits, 0 contact hours (0;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).  
R460 429. ST:. 3 credits, 3 contact hours (3;0;0).  
R460 486. Seminar in Geology. 1 credit, 1 contact hour (1;0;0).  
R830 101. Principles Of Psychology I. 3 credits, 3 contact hours (3;0;0).  
R830 102. Prin Of Psychology. 3 credits, 0 contact hours (0;0;0).  
R830 103. Cognitive Science. 3 credits, 3 contact hours (3;0;0).  
R830 104. Cognitive Science II. 3 credits, 3 contact hours (3;0;0).  
R830 131. Intermediate Russian. 3 credits, 3 contact hours (3;0;0).  
R830 204. Cognitive Proce. 3 credits, 0 contact hours (0;0;0).  
R830 209. Principle Of Psychology. 3 credits, 3 contact hours (3;0;0).  
R830 229. Prin Of Psychology. 3 credits, 0 contact hours (0;0;0).  
R830 246. Abnormal Psyc. 3 credits, 0 contact hours (0;0;0).  
R830 251. Business & Prof Ethics. 3 credits, 3 contact hours (3;0;0).  
R830 255. Meth & Theory Psych. 3 credits, 3 contact hours (3;0;0).  
R830 290. Principle Of Psychology. 3 credits, 0 contact hours (0;0;0).  
R830 300. Research Methods Psyc. 3 credits, 3 contact hours (3;0;0).  
R830 301. Stat Meth Cog & Beh. 4 credits, 4 contact hours (4;0;0).

**STS 205. Intro to Research Methods. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: ENGL 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 can be used to satisfy either the three credit 200 GER in History and Humanities or the three credit GER in Social Sciences, but not both.

**STS 221. Introduction to 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 can be used to satisfy either the three credit 200 GER in History and Humanities or the three credit GER in Social Sciences, but not both.

**STS 230. Introduction to Anthropology. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with a grade of C or higher. Corequisites: ENGL 102 may be taken concurrently as a co-requisite. This course is an introduction to the discipline of Anthropology, to include the subfields of Cultural Anthropology, Physical Anthropology, Archeology, and Linguistic Anthropology. Anthropology is the study of the human species with the subfields united in their focus on culture. Physical (or Biological) Anthropology studies the evolution of the species that has resulted in its capacity for having culture. Archeology studies the preserved artifacts from past human societies to discover the cultures of prehistoric times. Linguistic Anthropology studies the development and use of languages, and how language is related to other aspects of culture. Cultural Anthropology studies the systems of culture in contemporary social groups, analyzing their similarities and difference. This course satisfies the three credit GER in Social Sciences.

**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: ENGL 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. Qualitative Research Methods in the Social and Behavioral Sciences. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 skills for collecting and evaluating social scientific data using qualitative research methods including content analysis, case study techniques, participant observation, ethnographies, interviews, survey design, and focus groups. The course also highlights essential issues pertaining to recruitment of research respondents and ethical fieldwork practices. This course satisfies the three credit 300 GER in History and Humanities.

**STS 304A. Qualitative Research Methods Lab. 1 credit, 2 contact hours (0;2;0).**

Corequisite: STS 304. This course is the laboratory component of STS 304 and must be taken concurrently.

**STS 306. American Mosaic: Understanding Cultural Diversity. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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. Quantitative Research Methods in the Social and Behavioral Sciences. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 quantitative research methods in the field of science, technology and society including basic statistical techniques for empirical data analysis. The course provides instruction in hypothesis testing, data collection, selection of appropriate instruments and techniques, experimental design, and quantitative modeling using statistical software. This course satisfies the three credit 300 GER in History and Humanities.

**STS 307A. Quantitative Research Methods Lab. 1 credit, 2 contact hours (0;2;0).**

Corequisite: STS 307. This course is the laboratory component of STS 307 and must be taken concurrently.

**STS 308. Globalization. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 investigate the issues and problems inherent in the globalization of technology, economics, and culture in this new century. Introduces the important public issues that technology brings to the modern world, such as global trade, new energy technologies, and climate change. Emphasizes the close connections between science and technology, social institutions, and cultural values. Also analyzes today's "global village", the changing relations in culture and trade between East and West, North and South. 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: ENGL 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: ENGL 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 humans 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: ENGL 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 315. Sports, Technology and Society. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 addresses philosophical and sociological issues surrounding sports, especially questions that arise with advances in technology. For instance: How do advances in technology affect sports? Should sports limit technology, or should they adapt and change with advances in technology? Should performance-enhancing drugs be allowed in sports? What about other forms of technological enhancement? How should we judge sports performance, and how could technology help? Can technology make sports safer? How do various media affect sports? 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: ENGL 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 325. Special Topics in STS. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 examines varying themes connecting science, technology, and their social, ethical, and political contexts. This course satisfies the three credit 300 GER in History and Humanities.



**STS 342. Gender, Technology and Society. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 uses an interdisciplinary and intersectional approach to analyze how gender identities are constructed and contested in the world today, with special emphasis on gender issues in the high-tech workplace. Course topics include: essentialist and social constructionist theories of gender identity; transgender identities; the interrelationship between sexism, homophobia and racism; the historical contributions of women and underrepresented minorities in science, technology, architecture and design; issues facing women in technologically-developing countries; and communication in the workplace between people of different cultures and identities. Course materials include case studies and autobiographical narratives, films, novels, and short stories as well as historical and sociological research work. 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: ENGL 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: ENGL 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 350. Computers and Society. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 societal diffusion of computing and the role of computers in processes of social change. Special consideration is given to how computers have contributed to the emergence of new work routines, social practices, and mobility patterns. 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: ENGL 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: ENGL 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 360. Ethics and the Environment. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 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. This course satisfies the three credit 300 GER in History and Humanities.

**STS 362. Environmental Economics. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 ECON 201 with a grade of C or higher. 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. This course does not satisfy the three credit 300 GER in History and Humanities.

**STS 363. Sustainability Studies. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 roles 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 364. Sustainability Policy and Practice. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: STS 363 with a grade of C or higher. 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.

**STS 365. Animal Intelligence and Ethics. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 offers a detailed look into contemporary debates in Animal Ethics and the Philosophy of Animal Minds. These debates are inherently multi-disciplinary, ranging from questions in evolutionary biology, ethology, cognitive science, developmental psychology, and artificial intelligence. This course investigates and demythologizes the concept of "human nature" by drawing cognitive and moral similarities between species. This course satisfies the three credit 300 GER in History and Humanities.

**STS 375. AI and the Human Mind. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. What does it mean for a machine to know? What does this say about the possibility of human knowledge? In this course, we will explore what artificial intelligence (or, AI) is, how it works, how the field has developed, how the specific technical implementations of AI influence and are influenced by sociocultural factors, what barriers exist to AI research, what threats AI development may pose, and what AI can tell us about ourselves. This is not a programming course, and although some attention will be paid to AI technologies and algorithms, no coding will be involved. This course is appropriate for students at any level of previous AI experience. This course satisfies the three credit 300 GER in History and Humanities.

**STS 376. Cyborg Society. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher and one 200-level Social Science or Cultural Literacy GER course with a grade of C or higher. A cyborg, short for cybernetic organism, is a human being with technological enhancement or augmentation that improves the human body beyond its natural state. This course looks at ourselves as cyborgs and human enhancements from prosthetic, biological, nano-technological, informational, and computational technologies. Cyborg theory requires us to reevaluate the boundaries of the self such as differences between humans and machines, humans and animals, male and female. Topics include cyborg theory's impact on politics, gender, race and ethnicity, space travel, war, the prescience of science fiction, and the exponential growth of future cyborg technology. This course can be used to satisfy either the three credit 300 GER in History and Humanities or the three credit GER in Social Sciences, but not both.

**STS 378. Literature and Environment. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**STS 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.

**STS 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.

**STS 390. Story Structure for Game Development. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and three credits at the 200-level History and Humanities GER with a grade of C or higher. In this course, you will be exploring the structure of linear and branching stories for interactive reading / play. This course will present you with some of the story structures and writing tools used in linear and branching storytelling and give you the opportunity to develop your own branching story. Additionally, you will be introduced to some considerations of videogame writing as a profession, and you will learn some basic steps in providing and receiving feedback on creative writing. This course satisfies the three credit 300 GER in History and Humanities.

**STS 401. Independent Study. 1 credit, 3 contact hours (0;0;3).****STS 403. Independent Study. 3 credits, 3 contact hours (0;0;3).**

This course satisfies the three credit 300 GER in History and Humanities.

**STS 411. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).**

Prerequisites: STS 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.

**STS 490. Project and Seminar I. 3 credits, 3 contact hours (3;0;0).**

Prerequisite: senior standing in the STS 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 STS students.

**STS 491. Project & Seminar II. 2 credits, 4 contact hours (0;0;4).**

Prerequisite: STS 490. A continuation of STS 490.

**STS 492. Technology and the Future of Work. 2 credits, 3 contact hours (2;0;1).**

Prerequisites: Senior status and permission of the program director. The course examines and evaluates our digital society, computerization, automation, artificial intelligence, and emerging technologies and explores how they are changing the nature of work, the societal understanding of work and the workplace, and the anticipated impacts on individuals, communities, culture, economics, and society. The course introduces ideas and theories and evaluates the relationship between technology, automation, society, and work.

**THTR 1\*\*. Theatre Elective Lowe Div. 3 credits, 3 contact hours (3;0;0).****THTR 2\*\*. Theatre Elective Lower Div. 3 credits, 3 contact hours (3;0;0).****THTR 201. Introduction to 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 202. 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 and Voice for Theatre. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 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 and to introduce skill-oriented movement exercises through an exploration of the physical nature of acting and character work. . 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 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. 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 209. Voice and Speech for Theatre I. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 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: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 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. Play Analysis. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 102 may be taken concurrently as a co-requisite. This course equips the student with an understanding of dramatic literature and its analysis. The work in this class will involve reading of plays and its analysis, readings and lectures on the 'how-to' of play analysis and theatrical process, discussion on plays and readings in class, and attending performances outside of class. This course will also examine how play analysis gets applied in all areas and jobs in theatremaking. This satisfies the three credit 200 GER in History and Humanities.

**THTR 213. Theatre Directing. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 102 may be taken as a corequisite. Students will learn major directoral 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 216. Improvisational Theatre Short Form. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 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: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 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;0;3).**

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;0;3).**

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 250. Theatrical Design Fundamentals. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 with grade of C or higher. Pre or Corequisites: ENGL 102. This introductory course provides a comprehensive overview of the theatrical design process, exploring the essential skills and techniques involved in creating the visual world of a production. Students will gain a solid understanding of the roles of various design disciplines, including scenic, lighting, costume, sound, and properties design. Through theoretical discussions, practical exercises, and case studies, students will develop an informed response to the text, a critical eye for design elements, and learn how to effectively communicate their design ideas to collaborators.

**THTR 252. Theatrical Sound Design. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101. Pre or Corequisites: ENGL 102. This course introduces the process of developing sound design through analyzing a text and exploring how sound can shape the emotional landscape, enhance storytelling, and deepen audience engagement. Students will engage in practicing multiple foundational techniques focusing on research, sourcing of recordings, sound editing, manipulation, and composition. Students will then utilize these techniques through small class projects. Emphasis will be placed on the synergy of sound with the other design elements and how it serves the artistic vision of a production. The course covers the entire sound design process—from analysis to implementing the technical requirements for a production. Through practical exercises and design projects, students will gain hands-on experience in crafting sound for live theatre.

**THTR 253. Props, Puppetry, and Projection. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101. Pre or Corequisites: ENGL 102. This course invites students to unlock their expectations of props, puppetry, and projection (PPP), and explore how these elements, individually and in harmony, create moments of pure magic on stage. These are not the only elements of theatre that do this, but this course is an opportunity to focus on these specialties often overlooked and uses the foundation and making of PPP to learn digital, physical, interpersonal, and playful skills needed to tell stories in unexpected ways. The history, craft, and techniques of PPP are vast, and students will gain an exposure to this knowledge while engaging in class workshops, research, and continuous prototyping. Along with their skills in text analysis and collaboration, students will be challenged to use just these three elements to enhance a story and create cohesive, transformative, theatrical moments.

**THTR 254. Theatrical Lighting Design. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101. Pre or Corequisites: ENGL 102. This course introduces students to the art and technique of lighting design for theatre. Through a blend of personal research, theory, and hands-on practice, students will develop a trained eye for how light affects us in everyday life, visual art, and live performance. The course includes reading plays, observing light outside of class, studying paintings and photographs, and hands-on practical workshops. Students will learn how to read a play like a lighting designer, and translate their ideas into a functional lighting design by drafting light plots, programming lighting consoles, and working with stage electrics equipment. By the end of the course, students will understand the foundational tools to create dynamic, evocative lighting designs that bring a play's world to life.

**THTR 256. Theatrical Set Design. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 with a grade of C or higher. This course is an introduction to the basic components of set, scenic art, and lighting design for the theatre. The students will create scale models of the set of plays chosen by the instructor. Research on the theatre spaces, concepts of the visual movement of the characters throughout the story, and a conceptual evaluation of the scripts will be examined to create the designs.



**THTR 257. Stage Management. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher. This is an introduction to the basic components of stage management which includes the understanding of the rehearsal procedures, organizational methods, working with directors, designers, actors, and technicians. There will be hands-on experience of a theatre production from pre-production through production strike.

**THTR 258. Stagecraft I. 3 credits, 4 contact hours (2;2;0).**

This lecture/workshop trains students in the technical aspects of mounting theatre productions and events. Participants will learn stagecraft using equipment such as shop tools, lighting instruments, audio and video design as required. The training curriculum is adapted to meet the needs of each semester's specific productions. The course can be taken to fulfill a Theatre Core requirement or as an elective.

**THTR 259. Stagecraft II. 3 credits, 4 contact hours (2;2;0).**

This lecture/workshop trains students in the technical aspects of mounting theatre productions and events. Participants will learn stagecraft using equipment such as shop tools, lighting instruments, audio and video design as required. The training curriculum is adapted to meet the needs of each semester's specific productions. The course can be taken to fulfill a Theatre Core requirement or as an elective.

**THTR 261. 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 262. 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 263. Performance III. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: THTR 261 or THTR 262 and ENGL 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 280. Theatre Fundamentals Practicum. 3 credits, 6 contact hours (0;0;6).**

Prerequisites: ENGL 101. Pre or Corequisites: ENGL 102. The core of this course is a supervised and assigned independent involvement in a main stage production, which is pre-approved by an instructor. The student will take a role in the production appropriate to their current skill level and capabilities and participate in pre-production activities all the way through to the conclusion of production of the show. An ongoing journal of activities is required to be submitted at the end of the production process. The production work will be in one of the following areas: performance, dramaturge, directing, stage management, design, props, audio engineering, marketing, or other areas related directly to the designated main stage production.

**THTR 281. Stories, Us, and Everything. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101, one History and Humanities 200-level GER. Pre or Corequisites: ENGL 102. Ever wondered why we love a good story? Or how stories can shape our worldviews, our emotions, and even our actions? This class is your ticket to a wild ride through the world of storytelling. We'll dive deep into the psychology of storytelling, exploring why we're drawn to narratives and how they can influence our lives. From ancient myths to modern-day memes, we'll examine how stories are woven into the fabric of our culture. We'll also explore the power of storytelling to inspire, challenge, and connect us. This course will use readings, discussions, hands-on projects, and both theoretical and practical explorations to uncover the hidden stories that shape our lives and give the student the agency and tools to question those premises and recreate their own narratives.

**THTR 3\*\*. Theater Electives. 3 credits, 3 contact hours (3;0;0).****THTR 302. Acting Scene Study. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and ENGL 102 with grades of C or higher; ENGL 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.

**THTR 310. Theatre History I. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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 311. Period Styles of Theatre. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 and one 200-level Humanities GER course. Pre or Corequisites: ENGL 102. Every play is an artistic opportunity to immerse in the details of a specific time and place, expanding one's understanding of who we were as a society, who we are today, and where we might go. Through the study of historical design styles, students will delve into the ways architecture, fashion, and cultural aesthetics reflect, as well as influence, the values, politics, and social conditions of different eras. This course will use readings, discussions, and small research projects in order to develop a framework for using "primary" research to uncover the meaning we attach to visual details that help an audience place a theater production within a specific cultural framework. While gathering this knowledge is a lifelong pursuit, this course covers the more prominent milestones in history to help develop the students' discerning eye, and is useful to anyone who is interested in how the cultures and events of the past influence the very design and function of our world today.



**THTR 315. Theatre History II. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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: ENGL 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 Theater 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 351. Creativity and Collaboration. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 with grade of C or higher and one History and Humanities GER 200 level course with a grade of C or higher. Pre or Corequisites: ENGL 102 with grade of C or higher. Ever wondered how a bunch of mismatched individuals can come together to create something truly magical? This class is all about the dynamic duo of creativity and collaboration. We'll explore the power of teamwork, the importance of diverse perspectives, and the art of navigating creative differences. From brainstorming sessions to final product launches, we'll dive deep into the collaborative process. We'll also examine the role of creativity in problem-solving, innovation, and personal growth. So, if you're ready to unlock the secrets of successful collaboration and unleash your inner creative genius, join us for this enlightening journey.

**THTR 360. Drama. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**THTR 362. Non-Western Drama. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**THTR 363. Ethnic and Minority Drama. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**THTR 364. Technology in Performance. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher. Interdisciplinary course in a theatre area (e.g., acting, improvisation, writing, design, audio, lighting, etc.) to work with another department or program using an enhanced technology component (e.g., CGI, motion capture, electronic circuitry, media, etc.) to explore and develop alternative ways of presenting performances in a live setting. 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: ENGL 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 370. Design Thinking: Problem Solving for Performance. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 101 with a grade of C or higher and one 200-level History and Humanities GER course. Pre or Corequisites: ENGL 102 with grade of C or higher. Design Thinking is more than just a process—it's a mindset for listening to and approaching the world. This course is a beginning in a lifelong pursuit of discovering meaning in the components of the material world, rummaging for metaphors and symbols in the images that bombard us incessantly. In this hands-on course, students will explore the principles and impact of patterns, building a metaphysical knowledge of how to distinguish signal from noise, sense from senselessness, and play with our brains' trained pattern recognition mechanisms to communicate, affect, and solve complex problems. The course fosters empathy, constant questioning, paying close attention, learning through failure and response, abstracting the parameters of the situation, and offering the next possible manifestation.

**THTR 384. Musical Theater Adaptations. 3 credits, 3 contact hours (3;0;0).**

Prerequisites: ENGL 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.

**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: ENGL 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 480. Independent Theatre Practicum. 2 credits, 4 contact hours (0;0;4).**

Prerequisites: ENGL 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 core of this course is a supervised and assigned independent involvement in a main stage production, which is pre-approved by an instructor. The student will take a leadership role and participate in pre-production activities all the way through to the conclusion of production of the show. An ongoing journal of activities is required to be submitted at the end of the production process. The production work will be in one of the following areas: performance, dramaturge, stage management, design, props, public relations or other areas related directly to the designated main stage 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.