

# BIOLOGY

Chair	Secretary	Location	Department Phone
Dr. Stacy Hrizo	Melissa Barber	300 Vincent Science Center	724-738-2023

Department Web Site URL (<https://www.sru.edu/academics/colleges-and-departments/ces/departments/biology/>)

Department Fact Sheet URL (<https://www.sru.edu/documents/programs/factsheets/undergraduate/biology-fs.pdf>)

Parks and Conservation Director: Dr. John Lisco

## Faculty

### Simon Beeching

Professor  
Biology  
Ph.D., Indiana University  
B.A., University of Maine

### Martin Buckley

Associate Professor  
Biology  
Ph.D., Michigan State University  
M.S., Saint Louis University  
B.A., Saint Louis University

### Jennifer Carben

Assistant Professor  
Biology  
M.S., Slippery Rock University  
B.A., Slippery Rock University

### Shawn Davis

Associate Professor  
Biology  
Ph.D., Colorado State University  
M.S., Colorado State University  
B.S., University of Delaware

### Dean Denicola

Professor  
Biology  
Ph.D., Oregon State University  
M.S., University of Maine  
B.A., University of Vermont

### Amber Eade

Assistant Professor  
Biology  
Ph.D., State University New York Upstate Medical University  
M.S., Lake Erie College of Osteopathic Medicine  
M.A., Chicago School of Professional Psychology  
B.S., Millikin University

### Paul Falso

Associate Professor  
Biology  
Ph.D., University of California  
B.S., Allegheny College

### Miranda Falso

Associate Professor  
Biology  
Ph.D., University of Pittsburgh  
B.S., Allegheny College

### Wayne Forbes

Associate Professor  
Biology  
Ph.D., University of West Indies  
B.S., University of West Indies

### Evan Guiney

Assistant Professor  
Biology  
Ph.D., Stanford University  
B.A., Amherst College

### Stacy Hrizo

Professor  
Biology  
Ph.D., University of Pittsburgh  
B.S., West Chester University

### David Krayesky

Professor  
Biology  
Ph.D., University of Louisiana  
M.S., Southern Illinois University  
B.S., Johnson State College

### Christopher Leininger

Instructor  
Biology  
B.A., Iowa State University

### John Lisco

Associate Professor  
Biology  
Ed.D., University of Memphis  
M.S., University of Memphis  
B.S., Mesa State College

### Christopher Maltman

Assistant Professor  
Biology  
Ph.D., University of Manitoba  
M.S., University of Manitoba  
B.S., University of Manitoba

### Jennifer Piechowski

Assistant Professor  
Biology  
B.S., Baldwin Wallace University  
M.S., Case Western Reserve University  
Ph.D., University of Akron

### Susan Rehorek

Professor  
Biology  
Ph.D., University of Adelaide (Australia)  
B.S., University of Adelaide (Australia)

### Cory Shoemaker

Assistant Professor  
Biology  
Ph.D., Mississippi State University  
M.S., Mississippi State University  
B.S., Wittenberg University

#### Mark Shotwell

Associate Professor  
Biology  
Ph.D., University of Michigan  
B.S., Ohio University

#### Joy Strain

Instructor  
Biology

#### Steven Strain

Professor  
Biology  
Ph.D., Oregon State University  
B.S., Memphis State University

#### Rebecca Thomas

Associate Professor  
Biology  
M.S., Colorado State University  
B.S., Pennsylvania State University

## Programs

### Majors

- Biology, Bachelor of Arts (BA) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-ba/>)
- Biology, Bachelor of Arts (BA) - Pre-Master of Education (7-12) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-ba-pre-master-education/>)
- Biology, Bachelor of Science (BS) - Concentration in Cellular and Molecular Biology (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-cellular-molecular-biology/>)
- Biology, Bachelor of Science (BS) - Concentration in Cellular and Molecular Biology - Concentration in Bioinformatics (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-cellular-molecular-biology-bioinformatics/>)
- Biology, Bachelor of Science (BS) - Concentration in Integrative Biology (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-integrative-biology/>)
- Biology, Bachelor of Science (BS) - Concentration in Integrative Biology / Pre-Master of Education (7-12) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-integrative-biology-pre-master-education/>)
- Biology, Bachelor of Science (BS) - Concentration in Medical Technology (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-medical-technology/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Antigua Medicine (4+4) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-antigua-medicine-4-4/>)

- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Pre-Chiropractic (Logan) (3+3) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-chiropractic-logan/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Pre-Chiropractic (Palmer) (3+3) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-chiropractic-palmer/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Pre-Dental (LECOM) (4+4) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-dental/>)
- Biology, Bachelor of Science (BS) - Concentration In Pre-Health Professions / Pre-Dental (WVU) (4+4) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-dental-wvu/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Pre-Osteopathy (LECOM) (4+4) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-osteopathy-4-4/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Pre-Physical Therapy (SRU) (3+3) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-physical-therapy/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Pre-Physical Therapy (SRU) (Traditional) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-physical-therapy-traditional/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Pre-Physician Assistant (SRU) (3+2) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-physician-assistant/>)
- Biology, Bachelor of Science (BS) - Concentration in Pre-Health Professions / Pre-Physician Assistant (SRU) (Traditional) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-pre-health-professions-pre-physician-assistant-traditional/>)
- Biology, Pre-Pharmacy (LECOM) (2+3) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-bs-concentration-professional-pre-pharmacy/>)
- Park & Resource Management, Bachelor of Science (BS) (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/park-resource-management-bs/>)

### Minors

- Biology, Minor (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/biology-minor/>)
- Environmental Communication and Heritage Interpretation, Minor (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/environmental-communication-heritage-interpretation-minor/>)
- Marine Science, Minor (<https://catalog.sru.edu/undergraduate/engineering-and-science/biology/marine-science-minor/>)

## BIOL Courses

### BIOL 100 - Introductory Biology Laboratory

This laboratory activity course is designed to introduce the non-biology major to science as a process. Basic biological concepts and principles are the focal points for the laboratory activities. The scientific process is used throughout the hands on exercises to facilitate the learning experience.

Credits: 1

Term(s) Typically Offered: Offered Fall & Spring Terms

### BIOL 101 - General Biology

A principles course in biology, designed for non-biology majors, which emphasizes cellular structure and function, Mendelian and molecular genetics, reproduction, and classic and modern concepts of ecology and evolution.

Credits: 3

Term(s) Typically Offered: Offered Fall & Spring Terms

### BIOL 105 - Environmental Biology

A non-biology majors course which provides an introduction to ecological principles and concepts with an examination of the biological basis of contemporary environmental problems.

Credits: 3

Term(s) Typically Offered: Offered Fall & Spring Terms

Thematic Thread(s): Conservation, Technology & Imagination, Institutions & Human Innovations, Transfer Thread Completion Course, United States in Global Context

### BIOL 110 - The Human Body: Fundamentals of Structure and Physiology

This one semester lecture course is designed for non-biology majors and provides a basic introduction to the human body and the fundamental anatomy and physiology of each organ system.

Credits: 3

Thematic Thread(s): Conservation, Technology & Imagination, Human Diversity & Well-Being, Transfer Thread Completion Course

### BIOL 113 - Biology I: Foundations of Ecology, Evolution and Diversity with Lab

A laboratory and lecture course that covers the principles of evolution, ecology and organismal diversity to prepare students for subsequent courses required of biology majors. BIOL113 and BIOL114 can be completed in any order.

Credits: 4

Enrollment limited to students with department of Biology.

### BIOL 114 - Biology II: Foundations of Molecules, Genes and Cells with Lab

A laboratory and lecture course that emphasizes the foundational biological principles in molecular biology, cellular biology and genetics to prepare students for subsequent courses required of biology majors. BIOL113 and BIOL114 can be completed in any order.

Credits: 4

Enrollment limited to students with department of Biology.

### BIOL 120 - Plants and Society

Basic structures, functions, and uses of plants. This course, for the non-biology major, will stress many of the economic and practical aspects of plants. It will also offer historical insights concerning the impact plants have had on world exploration, colonization, etc.

Credits: 3

Term(s) Typically Offered: Offerings Vary

Thematic Thread(s): Transfer Thread Completion Course

### BIOL 139 - Foundations of Academic Discovery

Foundations of Academic Discovery serves as the entry point to the Rock Integrated Studies Program. With its strong faculty-student interaction, the course promotes intellectual inquiry, critical and creative thinking, and academic excellence. Through varied content, the course introduces students to academic discourse and information literacy while exploring topics such as diversity and inclusion and global awareness. This course will set students along the path to becoming engaged with issues and scholarship important to a 21st century education while they learn about themselves and their place in the world.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with a semester level of Freshman 1 or Freshman 2.

Enrollment limited to students with the ROCK STUDIES 2 STUDENT or ROCK STUDIES STUDENT attributes.

### BIOL 190 - Experimental

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with department of Biology.

### BIOL 195 - Workshop

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with department of Biology.

### BIOL 198 - Selected Topics

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with department of Biology.

### BIOL 201 - General Botany with Lab

Basic biochemical, morphological, and physiological aspects of plant biology as they relate to evolution. Includes a lab.

Prerequisites: (BIOL 101<sup>C</sup> and BIOL 100<sup>C</sup>) or BIOL 104<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 4

Term(s) Typically Offered: Offered Fall & Spring Terms

Enrollment limited to students with department of Biology.

**BIOL 207 - Land Plants and Their Environment/Lab**

This course for non-biology majors surveys the common plants native to Pennsylvania. Includes a lab.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**BIOL 208 - Introduction to Wildlife Management/Lab**

For non-biology majors, this course covers basic ecological principles with emphasis on the taxonomy and life histories of vertebrate animals. Includes a lab.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**BIOL 209 - Human Anatomy and Physiology I**

The first of a two-course lecture and laboratory series that surveys the structure and function of the human body. This course will provide an orientation to the human body, as well as an overview of the chemistry, cell biology, and tissue structure needed to understand anatomy and physiology. The course will also cover the integumentary, skeletal, muscular, and nervous systems. It is strongly recommended to take CHEM 104 or CHEM 107 prior to this course.

Credits: 4

**BIOL 210 - Medical Microbiology with Lab**

The study of pathogenic microorganisms to include taxonomy, structure, biological activities, host defense mechanisms, disease transmission, and disease states. Includes a lab.

Prerequisites: BIOL 110<sup>C</sup> or BIOL 114<sup>C</sup> or BIOL 209<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall & Spring Terms

Enrollment is limited to students with a major in Biology, Biology (Pre MEd) (7-12), Biology, Biology-Prof (Pre MEd)(7-12), Health Science - Public Health, Hlth Sci-P Hlth-Pre PT-SRU 3+3, Hlth Sci-P Hlth-Pre PA-SRU 3+2, Cytotechnology, Histotechnology, Medical Technology or Professional.

**BIOL 216 - Anatomy and Physiology I with Lab**

The first of two lecture and laboratory courses for non-biology majors which surveys the normal structure and function of the human body. It is recommended that 216 be taken prior to 217. This course includes a lab.

Credits: 3

Term(s) Typically Offered: Offered Every Term

Enrollment is limited to students with a major in Music Therapy, Biology, Biology (Pre MEd) (7-12), Biology, Biology-Prof (Pre MEd)(7-12), Health Science - Public Health, Hlth Sci-P Hlth-Pre PT-SRU 3+3, Therapeutic Recreation Serv, Rec Therapy- Pre PT-SRU 3+3, Rec Therapy-Pre OT-SRU 3+3, Hlth Sci-P Hlth-Pre PA-SRU 3+2, Cytotechnology, Histotechnology, Medical Technology or Professional.

**BIOL 217 - Anatomy and Physiology II with Lab**

The second of two lecture and laboratory courses for non-biology majors which surveys the normal structure and function of the human body. It is recommended that 216 be taken prior to 217. Includes a lab.

Credits: 3

Term(s) Typically Offered: Offered Every Term

Enrollment is limited to students with a major in Music Therapy, Biology, Biology (Pre MEd) (7-12), Biology, Biology-Prof (Pre MEd) (7-12), Therapeutic Recreation Serv, Rec Therapy- Pre PT-SRU 3+3, Rec Therapy-Pre OT-SRU 3+3, Cytotechnology, Histotechnology, Medical Technology or Professional.

**BIOL 250 - Genetics with Lab**

An introductory course that covers transmission genetics, molecular genetics, and population genetics, with an emphasis on problem-solving. Examples in both plants and animals (including humans) are considered. Includes a lab.

Prerequisite: BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 4

Term(s) Typically Offered: Offered Fall & Spring Terms

Enrollment limited to students with department of Chemistry or Biology.

**BIOL 290 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with department of Biology.

**BIOL 295 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with department of Biology.

**BIOL 298 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with department of Biology.

**BIOL 300 - Social and Ethical Issues in Genetics**

Advances in genetics have the potential to do much good, but they may also create difficult social and ethical issues that we are unprepared for. This course seeks to provide students of all majors with the necessary framework for arriving at their own conclusions about the proper role of genetic technology, for themselves, their families, and society at large.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Thematic Thread(s): Citizenship & Social Problems, Conservation, Technology & Imagination, Human Diversity & Well-Being, Institutions & Human Innovations, Transfer Thread Completion Course, United States in Global Context

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**BIOL 301 - Forest Ecology**

This course is offered as part of the Pymatuning Laboratory in conjunction with the University of Pittsburgh. For more information, please contact the Biology department, 724-738-2023.

Prerequisites: BIOL 201<sup>C</sup> and (BIOL 100<sup>C</sup> and BIOL 101<sup>C</sup>) or BIOL 104<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 302 - Ecology of Amphibians & Reptiles/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 303 - Behavioral Ecology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 305 - Wetlands and Aquatic Plants/Lab**

This course deals with the identification and quantification of phytoplankton and vascular hydrophytes, with emphasis placed on the productivity of aquatic plants and their importance as indicator organisms. Includes a lab.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup> and CHEM 108<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms Even

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment is limited to students with a program in Biology, Biology (Pre MED) (7-12), Environmental Geoscience, Envir Geosci (Pre MED) (7-12), Biology, Biology-Prof (Pre MED)(7-12), Environmental Geoscience, Cytotechnology, Environmental Science, Environmental Chemistry, Geology, Histotechnology, Medical Technology or Professional.

**BIOL 306 - Freshwater Biomonitoring/Lab**

This course covers the identification and quantification of fish, zooplankton, and benthos organisms, with emphasis placed on the productivity of aquatic animals and their importance as indicator organisms. Includes a lab.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup> and CHEM 108<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**BIOL 307 - Vertebrate Ecology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 308 - Aquatic Ecosystem Management / Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.



**BIOL 309 - Human Anatomy and Physiology II**

The second of a two-course lecture and laboratory series that surveys the structure and function of the human body. This course covers the blood, endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems. Additionally, nutrition, metabolism, and energy balance and fluid, electrolyte, and acid-base balance will be covered.

Prerequisite: BIOL 209<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 4

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**BIOL 310 - Plant Diversity with Lab**

A lecture and laboratory course that emphasizes both morphology and molecular data to explain the diversity of botanical organisms throughout the different environments of our world, and to explain how this life has evolved over time. Topics covered will include taxonomic philosophy, the processes of classification, the species concepts, past and present day systematists, data collection and analysis, pollination biology, floristic terminology, origin and evolution of the angiosperms, nomenclature and typification, and additional topics that may enhance course content. Evolutionary trends in floristic morphology will be used to examine family relationships in the angiosperms.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 311 - Entomology/Lab**

Insects, including their taxonomy, structure, function, ecology, and economic importance.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offerings Vary

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 312 - Zoology with Lab**

The anatomy, physiology, ecology, and economic importance of representative animals with emphasis on the understanding of development and the evolutionary blueprint of the animal kingdom. Includes a lab.

Prerequisites: (BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>)

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 313 - Herpetology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 314 - Parasitology with Lab**

This is a lecture and laboratory course for biology majors, which emphasizes the protozoan and metazoan organisms of medical importance. The overall goal for the course is to make students become aware of various aspects of medically important parasites, including their morphology, modes of transmission, mechanisms of host entry and infection, niche selection, life cycles, pathogenesis (associated diseases), diagnosis, treatment, and control of infections.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 316 - Immunology with Lab**

The is course will discuss the function and regulation of the immune system in detail. Students will gain an appreciation of how the system recognizes pathogens, generates specificity and memory in it's responses and induces physiological changes that help the body fight infection. Students will gain experience with a variety of immunological techniques including but not limited to: blood typing, assessing antigen-antibody interactions, applications of antibody-antigen interactions in medical testing.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and CHEM 201<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 317 - Ecology and Fungi**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms Even

**BIOL 320 - Ornithology/Lab**

Anatomy, physiology, taxonomy, ecology, and behavior of birds. Two weekend field trips are required. Includes a lab.

Prerequisites: (BIOL 100<sup>C</sup> and BIOL 101<sup>C</sup>) or BIOL 104<sup>C</sup> and BIOL 212<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 321 - Wildlife Management/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 322 - Conservation Biology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

Thematic Thread(s): Transfer Thread Completion Course

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 323 - Stream Ecology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offerings Vary

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 325 - Biostatistics and Experimental Design with Lab**

An introduction to statistical techniques and experimental design as applied to biological problems. Descriptive methods, tests of significance, linear regression, correlation, analysis of variance and covariance, and non-parametric techniques are included. Use of PC and/or mainframe computer is required. Includes a lab.

Prerequisites: (BIOL 113<sup>C</sup> or BIOL 114<sup>C</sup>) and MATH 120<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment is limited to students with a major in Geography - Envir Studies Educ, Biology, Biology (Pre MEd) (7-12), Environmental Geoscience, Envir Geosci (Pre MEd) (7-12), Biology, Biology-Prof (Pre MEd)(7-12), Environmental Geoscience, Biology-Logan Chiropractic 3+3, Environmental Science, Geology or Professional.

**BIOL 326 - Field Methods in Biogeography/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 327 - Limnology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 330 - Microbiology/Lab**

A consideration of the structure, metabolism, growth, and genetics of microorganisms with emphasis placed on the bacteria and viruses. Includes a lab.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and CHEM 108<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Chemistry or Biology.

**BIOL 331 - Mammology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 335 - Cell Biology**

This is a course for majors in the Biology programs. As such, this course will consider the biology of eukaryotic cells in a detailed fashion. Students should work to understand the vocabulary and concepts associated with the topics covered in the course. Students should be able to recall specific facts from the course material as well as bring together information from multiple lectures in synthesizing answers to problems ranging from simple to complex. Students should complete the course with a firm foundation in the biological processes which make up eukaryotic cells.

Prerequisites: BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and CHEM 201<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Chemistry or Biology.

**BIOL 340 - Vertebrate Anatomy with Lab**

A comparative study of the adult structure of the organs and systems of representative vertebrates. Includes a lab.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 343 - Embryology with Lab**

Developmental processes of vertebrate embryology. A comparative study of gaetogenesis, fertilization, cleavage, gastrulation, organogenesis, and embronic adaptations. Includes a lab.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and BIOL 340<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms Even

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 350 - Evolution**

Stresses evolution as a process. Evidence of early theories, population genetics and ecology, modern synthetic theory, speciation, phylogeny, and the major features characteristic of organic evolution are included.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 356 - Field Ecology / Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 357 - Environmental Microbiology with Lab**

The interactions of microorganisms with their environment and with other organisms in nutrient cycles and environmental bioremediation, and the effects of microbial activity on plants and animals. Includes a lab.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup> and CHEM 108<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 4

Term(s) Typically Offered: Offered Fall Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment is limited to students with a major in Biology, Biology (Pre MEd) (7-12), Environmental Geoscience, Envir Geosci (Pre MEd) (7-12), Biology, Biology-Prof (Pre MEd)(7-12), Environmental Geoscience, Cytotechnology, Environmental Science, Geology, Histotechnology, Medical Technology or Professional.

**BIOL 360 - Field Botany**

A field course covering the flora of western Pennsylvania. Students will be expected to identify in the field approximately 225 vascular plants.

Prerequisites: (BIOL 100<sup>C</sup> and BIOL 101<sup>C</sup>) or BIOL 104<sup>C</sup> and BIOL 201<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offerings Vary

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.



**BIOL 361 - Flora of Western Pennsylvania**

A field class with a lecture component. The primary focus of the class is to enhance student understanding of the taxonomy and ecology of species that compose our flora in western Pennsylvania. Organisms that will be covered include: flowering plants (woody angiosperms and common wildflowers), conifers, ferns & fern allies, bryophytes, lichens, and some representative fungi and macroalgae in our flora. Terminology associated with general plant/fungal/algal structure as well as life cycles of these aforementioned organisms will be described. Students will be introduced to both terrestrial and aquatic ecosystems and the habitats that select species require.

Prerequisites: (BIOL 100<sup>C</sup> and BIOL 101<sup>C</sup>) or BIOL 104<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offerings Vary

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**BIOL 370 - Molecular Biology**

A lecture course that focuses on the structure and function of biological macromolecules and of the functions of living cells at the molecular level. Topics include macromolecular structures, gene expression and regulation, and manipulations of genetic material.

Prerequisites: BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and CHEM 201<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Chemistry or Biology.

**BIOL 371 - Vertebrate Field Zoology**

Taxonomy, life histories, and ecological relationships of representative vertebrates are stressed. Several field trips are required.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 373 - Ichthyology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offerings Vary

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 375 - Ecology of Fish / Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 100<sup>C</sup> and BIOL 101<sup>C</sup>) or BIOL 104<sup>C</sup> and BIOL 212<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offerings Vary

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 380 - Endocrinology**

This course will focus on the role of chemical communication in animals, with emphasis on humans. The mechanisms of control and action of hormones will be investigated throughout levels of organization from the molecular to organismal level. The homeostatic role of hormones within and between organ systems will be emphasized in both normal and pathophysiological states (e.g. diabetes, thyroid disorders, reproductive pathologies, and cancer).

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and CHEM 108<sup>C</sup>  
<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms Even

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 390 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 395 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 398 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 400 - Disease Ecology**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

**BIOL 401 - Ecology with Lab**

Emphasis is placed on the structure, composition, and dynamics of ecosystems. Lab work primarily consists of field studies.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup> and CHEM 108<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall & Summer Terms

Thematic Thread(s): Transfer Thread Completion Course

Students with a semester level of Freshman 1, Freshman 2, Sophomore 1 or Sophomore 2 may **not** enroll.

Enrollment is limited to students with a major in Biology, Biology (Pre MED) (7-12), Environmental Geoscience, Envir Geosci (Pre MED) (7-12), Biology, Biology-Prof (Pre MED)(7-12), Environmental Geoscience, Cytotechnology, Environmental Science, Environmental Chemistry, Geology, Histotechnology, Medical Technology or Professional.

**BIOL 402 - Biogeography/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**BIOL 405 - Animal Physiological Ecology with Lab**

The adaptations of animals to deal with specialized environmental situations are studied at levels ranging from biochemical to organismal. Includes a lab.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and BIOL 325<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 4

Term(s) Typically Offered: Offered Spring Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 409 - Pathophysiology**

This course will focus on abnormal physiology, providing an in-depth examination of the cellular and molecular origins of disease and disease related processes. The aim of this course is to provide students with an approach for relating microscopic processes to macroscopic disease presentation, diagnostic methods, and treatment options. This course will focus on the Etiology of pathologies, including: infectious, degenerative, neoplastic, metabolic, genetic/congenital, and trauma/environmental. Pathophysiologic underpinnings of common diseases related to the major body systems will be utilized as examples in discussion etiology and disease progression.

Prerequisites: ((BIOL 209<sup>C</sup> and BIOL 309<sup>C</sup>) or BIOL 410<sup>C</sup>) and CHEM 107<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms Even

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**BIOL 410 - Animal Physiology with Lab**

Basic animal physiological processes, including a synthesis that begins at the molecular level and moves to the more complex cellular and organismal levels. Includes a lab.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and BIOL 325<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 411 - Population Biology/Lab**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 412 - Population Biology**

This field course is offered by the University of Pittsburgh to Slippery Rock University students who enroll in the summer program at the Pymatuning Laboratory of Ecology. For more information, please contact the Biology Department, 724-738-2023.

Prerequisites: (BIOL 113<sup>C</sup> or EGEO 202<sup>C</sup>) and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**BIOL 430 - Pathogenic Microbiology**

This course examines the role of bacteria in disease processes with emphasis on host-pathogen interactions and mechanisms by which pathogenic bacteria cause disease. General topics to be discussed include pathogenesis, epidemiology, and characteristics of the major pathogenic bacteria, which allow them to produce a disease state in the host.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and BIOL 330<sup>C</sup> and CHEM 108<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 435 - Cellular and Molecular Analysis Laboratory**

A laboratory course where students will gain hands on training in research techniques related to molecular and cellular biology. Students will complete a hypothesis driven research project that will culminate in a journal style research report.

Prerequisites: (BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and BIOL 325<sup>C</sup> and CHEM 201<sup>C</sup>) and (BIOL 335 (may be taken concurrently)<sup>C</sup> or BIOL 370<sup>\*C</sup>) (may be taken concurrently).

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 450 - Biology Internship**

This course will permit the biology major to obtain credit for on-the-job experience in such areas as hospitals, greenhouses, nurseries, sewage plants, fish, and game commissions, park service, plant breeders, and seed producers, veterinary medicine, etc.

Prerequisites: (BIOL 100<sup>C</sup> and BIOL 101<sup>C</sup>) or BIOL 104<sup>C</sup> and BIOL 201<sup>C</sup> and BIOL 212<sup>C</sup> and BIOL 250<sup>C</sup> and CHEM 107<sup>D</sup> and CHEM 108<sup>D</sup> and CHEM 111<sup>D</sup> and CHEM 112<sup>D</sup> and CHEM 201<sup>D</sup> and CHEM 211<sup>D</sup> and CHEM 202<sup>D</sup> and CHEM 212<sup>D</sup>

<sup>C</sup> Requires minimum grade of C.

<sup>D</sup> Requires minimum grade of D.

Credits: 1-6

Term(s) Typically Offered: Offered Every Term

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 451 - Plant Physiology/Lab**

A lecture-laboratory study of the functional relationships of the plant body including such topics as nutrition, water relations, photosynthesis, photo-periodism, hormones, and growth processes.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup> and BIOL 250<sup>C</sup> and BIOL 325<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms Odd

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 470 - Histology with Lab**

Microscopic structure and arrangement of tissues in multicellular organisms. Prepared microscopic slides of representative animal organs are studied. Includes a lab.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms Even

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 490 - Independent Study**

Independent research under the guidance of a faculty member.

Prerequisite: Permission of the instructor, departmental chairperson, and dean of the college where the study will be conducted. (repeatable up to 6 credits) Independent Study courses give students the opportunity to pursue research and/or studies that are not part of the university's traditional course offerings. Students work one on one or in small groups with faculty guidance and are typically required to submit a final paper or project as determined by the supervising professor.

Credits: 1-3

Term(s) Typically Offered: Offered Fall & Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 492 - Biology Seminar**

For junior and senior biology majors. Each semester a different area of current research interest is chosen for study.

Prerequisites: (BIOL 100<sup>C</sup> and BIOL 101<sup>C</sup>) or BIOL 104<sup>C</sup> and BIOL 201<sup>C</sup> and BIOL 212<sup>C</sup> and BIOL 250<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 1

Term(s) Typically Offered: Offered Fall & Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 495 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

**BIOL 498 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Prerequisites: (BIOL 100<sup>C</sup> and BIOL 101<sup>C</sup>) or BIOL 104<sup>C</sup> and BIOL 201<sup>C</sup> and BIOL 212<sup>C</sup> and BIOL 250<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

Enrollment limited to students with department of Biology.

## MARS Courses

### MARS 110 - Introduction to Oceanography

An introduction to marine sciences with emphasis on physiography of the ocean basins, waves, tides, near-shore processes, the physical and chemical nature of seawater, circulation, characteristics of marine plant and animal communities, history of oceanography, and law of the sea.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 190 - Experimental

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

### MARS 195 - Workshop

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

### MARS 198 - Selected Topics

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

### MARS 200 - Art Workshop-Painting of the Coastal Area

This workshop is to be an intensive involvement with the esthetic qualities of the seashore and its environs. Paintings using various media (watercolor, oils, acrylics) according to personal preference will be created. Slides and other reproductions of relevant paintings by artists of historical importance will be examined and discussed.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 201 - Art Workshop-Pewter and Marine Jewelry

This workshop will explore pewter and objects found in the near-shore environment as materials for making jewelry and body ornaments. Participants will learn techniques of casting, fabricating, soldering, tinning and bezel setting for the purpose of creating unique pieces.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 204 - Writing about the Sea

A survey of literature from several genre, both fiction and nonfiction, which focuses on maritime themes and topics.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 211 - Field Methods in Oceanography

A course to familiarize students with the dynamic marine environment and field work on board small research vessels, to instruct in the use and application of standard oceanographic instruments and sampling devices and to promote and encourage independent research through the initial stages of scientific projects.

Prerequisites: MARS 110<sup>D</sup> or EGEO 131<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 212 - Navigation

This course covers navigation, i.e. the art and science of safely bringing a boat from one position to another in a body of water. Topics covered are piloting, navigation within sight of land, electronic navigation, radio bearings by radio direction finder, LORAN, OMEGA, radar, celestial navigation, circles of equal altitude, navigational triangle, celestial lines of position, celestial fix, Greenwich Mean Time, Greenwich Hour Angle.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 215 - Marine Wildlife Photography

This class includes an in-depth study of the science of photography and how this relates to the field work of marine biology. The student will develop skills in micro- and macrophotography and an understanding of the science of optics, filter and camera techniques, and darkroom procedures and techniques. The class will learn various chemical processes for color and black/white photography. Specific articles on marine science photography will be used to develop an understanding both within the marine science laboratory and in the field.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 221 - Marine Invertebrates

A study of the invertebrate phyla with emphasis on development, reproduction, structure, function and classification of selected marine organisms. Laboratory field experience will be given in collection, preservation and classification of the phyla.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 241 - Marine Biology

A study of plant and animal life in the marine environment. Emphasis will be on physical and chemical environmental factors affecting the biota in the inter-tidal, open water, and benthic habitats. Common biota characteristic of each habitat will be investigated in terms of their natural history, morphology, and ecological relationships.

Credits: 3

Term(s) Typically Offered: Offered as Needed

### MARS 250 - Wetland Ecology

The ecology and management of wetland wildlife with emphasis on the management of wetlands as ecological systems.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**MARS 260 - Marine Ecology**

A study of the ecology of marine organisms, the relationship of plants and animals to physical, chemical and bio-logical factors and their zonation and communities.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**MARS 270 - Coastal Vegetation**

In-depth examination of vegetation falling under the marine influence. Identification of same and determination of factors limiting and controlling their distribution.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**MARS 280 - Field Biology**

An introduction to basic principles of ecology and natural history of selected plants and animals in terrestrial, freshwater, and marine environments. Course is suitable for non-science majors.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**MARS 285 - Recreation Management/Development in the Coastal Zone**

This course focuses on the recreation component of coastal zone management. The nature, extent, location, and value of coastal recreation behavior will be probed and related to the overall coastal management framework.

Credits: 3

Term(s) Typically Offered: Offered as Needed

**MARS 290 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

**MARS 295 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

**MARS 298 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

**MARS 300 - Behavior of Marine Organisms**

Concepts of ethology; discussion and observation of the influences of external and internal factors on the regulation and control of behavior of organisms living in the marine coastal environment.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 310 - The Mammals of Coastal Ecosystems**

Distribution, behavior, physiology, adaptations, and ecological relationships of mammals with special emphasis on the mammals of the Delmarva Peninsula. In addition to the lectures and seminars, the laboratory and field work will deal with the productivity, population dynamics, species diversity, ecoenergetics, and behavior of local mammals.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 320 - Marine Microbiology**

A survey of methods and concepts of marine microbiology. Attention will be given to technical aspects of sample collection, microbial ecology of the marine environment, enrichment culturing, methods of enumeration and identification with emphasis on marine bacteria.

Prerequisite: BIOL 330<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 330 - Tropical Invertebrates**

An introduction to tropical invertebrates. A variety of collection and observation methods will be used to sample near-shore and reef areas. Emphasis will be on systematics and ecology using the communities approach. One week at Wallops will be intensive review of general systematics and ecology of marine invertebrates. The last two weeks in Florida will involve sampling and identifying species and describing ecological communities.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 331 - Chemical Oceanography**

Treatment of a wide range of oceanic chemical phenomena, including salinity and age of the oceans, sources and residence times of chemical constituents in seawater, geochemical cycles of mineral resources and trace elements. Sampling and laboratory analysis techniques.

Prerequisites: MARS 110<sup>D</sup> or EGEO 131<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.



**MARS 342 - Marine Botany**

A study of marine and marine fringe plants of the Middle Atlantic Coast, their taxonomy, ecology, distribution, life histories, physiology, and economic status. Techniques of collecting, preserving, identifying and herbarium cataloging will be stressed. Exercises in plant ecology and marine microbiology will be included.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 343 - Marine Ichthyology**

A study of the fishes. Specimens collected along the eastern seaboard by the students will be used to illustrate the anatomy, physiology and systematics of this major vertebrate group. Field collections will also give students the opportunity to observe the relationships of these animals to their biotic and physical environment.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 344 - Anatomy of Marine Chordates**

A course designed to familiarize the students with the qualitative aspects of the speciation process; to lay ground work for understanding the basic and specialized structure of marine chordates; to trace the most obvious or important trends (and their functional significance) in the evolution of this basic structure in various vertebrate lines. The laboratories will be devoted primarily to dissection of representative marine vertebrates, particularly those collected live on field trips.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 345 - Ornithology**

Introduces the student to avian fauna of the seacoast and at the same time enables comparison with inland species. In addition to the field work providing visual and vocal identification, lecture material will include information on the distribution, behavior, physiology, and anatomy of birds.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 350 - Physiology of Marine Invertebrates**

Mechanisms and regulation of organ function in marine invertebrates with emphasis on homeostasis. Invertebrate examples of fundamental principles and of unique physiological mechanisms.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 362 - Marine Geology**

Structure and sedimentology of the ocean basins and shores; methods of exploration, general feature of the ocean basins, and theory of ocean basin evolution.

Prerequisites: MARS 110<sup>D</sup> or EGE0 131<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 364 - Physical Oceanography**

A study of the physical properties of the oceans to include: mass and energy budgets; theory of distribution of variables; cause, nature, measurement, analysis and prediction of tides, currents and waves; basic instrumentation in field work.

Prerequisites: MARS 110<sup>D</sup> or EGE0 131<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 390 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 394 - Comparative Physiology of Marine Organisms**

This course will provide an introduction to the physiology of marine organisms utilizing a comparative approach. The lecture will introduce the topics of respiration, circulation, metabolism, osmoregulation, thermoregulation, locomotion and sensory systems by drawing comparisons between the mechanisms and strategies utilized by a wide range of marine organisms. Laboratory and field work will focus on the physiological responses of marine plants and animals to common environmental stresses such as salt load, temperature variation, depletion of dissolved oxygen, and tidal flux. This will be accomplished through measurements and observations in the field, as well as through experimental manipulations in a laboratory setting.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 395 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 398 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Prerequisites: BIOL 113<sup>C</sup> and BIOL 114<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 420 - Marine Micropaleontology**

Designed for students majoring in either biological or geological sciences, the course will deal with modern, living representatives of micro-organisms important in the fossil record. Particular emphasis will be on the taxonomy, morphology, evolution and ecological affinities of the Foraminifera (Sarcodina), but other groups, including the Radiolaria, Diatoms and Ostracoda, will also be considered. Laboratory and field aspects will include sample collecting, preparation and analysis.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 431 - Ecology of Marine Plankton**

Study of the phytoplankton and zooplankton in marine and brackish environments. Qualitative and quantitative comparisons will be made between the planktonic populations of various types of habitats in relation to primary and secondary productivity.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 432 - Marine Evolutionary**

The study of the ecological mechanisms underlying evolutionary processes. This course is broad in scope and requires that students synthesize both evolutionary and ecological concepts and theory into an understanding of how organisms adapt to their environment. Marine, estuarine, and maritime organisms will be used as model systems and processes, which affect marine populations, will be emphasized.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 441 - Biology of Molluscs**

The Mollusca is the second largest group of animals and perhaps the most diverse in terms of morphological, ecological and behavioral variations. This course offers an evolutionary, functional, and ecologic approach to studying this important group of organisms.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 451 - Coastal Environmental Oceanography**

This course examines the interaction of biological, chemical, physical, geological and ecological ocean processes as applied to coastal environments. Emphasis is placed on environmental management issues of the coastal zone. Topics include water quality analysis, barrier island geology and ecology, estuarine pollution, beach defense and biological implications in areas of coastal up welling and coastal fronts. Specific cases in coastal pollution will be examined from coastal environments around the U.S., including Kepone in the James River, VA, DDT on the Palos Verde Shelf, CA., Eutrophication on the North Carolina Coast, The Exxon-Valdez Oil spill and Pfsteria in the coastal waters of N.C. and VA. Cross listed as MARS551.

Prerequisites: MARS 110<sup>D</sup> or EGEO 131<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 457 - Marine Geophysics**

A study of the basic geophysical theories about the transmission of shock waves, and gravity and magnetic fields to the understanding and exploration of the continental shelves and marine basins. The student is introduced to the use and limitations of the portable seismic refraction seismograph, gravity meter, and magnetometer.

Prerequisites: MARS 110<sup>D</sup> or EGEO 131<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 458 - Exploration Methods in Marine Geology**

A study of geophysical and geologic instruments and techniques used to penetrate the water layer obscuring the ocean bottom topography and geology and the results of some of that effort. Emphasis is on laboratory and field assignments using basic geophysical and geological instruments. The students are introduced to the use, limitations and results of these instruments.

Prerequisite: EGEO 101<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 459 - Coastal Geomorphology**

A study of coastal environments with an emphasis on understanding the inter-relationship among land forms, processes and materials. The student will participate in field studies conducted along high and low wave energy environments.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 464 - Biological Oceanography**

Interdisciplinary study of the interactions between biological communities and the ocean environment as seen by distributions of coastal plankton, fish, and benthic invertebrates. Projects will involve boat trips to sample populations and to quantitatively document environmental variables with state of the art equipment, laboratory and field experiments to determine rate processes, and visits to nearby field and government laboratories. Examples of project topics include transport of plankton at barrier island passes, effect of submarine banks on fish populations, ground truth data for satellite imagery, and other current topics in biological oceanography.

Prerequisites: MARS 110<sup>D</sup> or EGEO 131<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 490 - Independent Study**

Independent research under the guidance of a faculty member. Prerequisite: Permission of the instructor, departmental chairperson, and dean of the college where the study will be conducted. (repeatable up to 6 credits) Independent Study courses give students the opportunity to pursue research and/or studies that are not part of the university's traditional course offerings. Students work one on one or in small groups with faculty guidance and are typically required to submit a final paper or project as determined by the supervising professor.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

**MARS 491 - Coral Reef Ecology**

A study of coral reef structure, formation, types, and the relationships of reef organisms to their environment. Emphasis is given to species diversity, identification, symbioses, and effects of temperature, salinity, light, nutrient concentration, predation, and competition on the abundance and the distribution of coral reef organisms.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 492 - Marine Mammals**

A study of the distribution, population ecology, behavior, physiology and adaptations of marine mammals. Student projects will entail collecting physiological and behavioral data at field sites and at facilities studying marine mammals.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 493 - Behavioral Ecology**

Designed to present animal behavior within an ecological and evolutionary context. Presents mathematical and theoretical framework of behavioral ecology. An in-depth exploration of the ways in which the behavior of animals is influenced by the environment, especially with regard to resource distribution.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 494 - Marine Aquaculture**

This course will include the theory and practice of raising organisms for food and for the aquarium trade. Techniques for raising economically important organisms from the egg stage to marketable size and their food supplies will be studied.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 495 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**MARS 498 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

## PCRM Courses

**PCRM 104 - Foundations in Sustainability**

This course will provide a foundation of basic concepts associated with environmental and its associated cultural sustainability. Emphasis will be placed on the interdependence of our natural resources to achieve sustainability in a cultural context. Course development will move from individual environmental ethics and personal actions to civic responsibility and global perceptions.

Credits: 3

Thematic Thread(s): Conservation, Technology & Imagination, Transfer Thread Completion Course, United States in Global Context

**PCRM 105 - Leisure-Centered Living**

The constructive use of leisure and education for leisure are essential tools for a person's successful growth and development. Leisure-centered living is designed to help students investigate, evaluate, and plan leisure/play as a basic human need and necessity for well-being.

Credits: 3

**PCRM 110 - Foundations of Parks and Outdoor Recreation**

This course is designed to provide the student with the conceptual foundations of outdoor recreation as it relates to park resources management, environmental education/interpretation, and outdoor leadership. The course examines the history and philosophy of outdoor recreation and where it fits in the broad field of leisure. Students will be introduced to the roles of government and the private sector in parks and outdoor recreation. In addition, an overview of national resources as well as the interaction of humans with our natural resources will be reviewed. Students will also explore career opportunities and identify needed skills of outdoor recreation professionals.

Credits: 3

**PCRM 111 - Introduction to Park and Resource Management**

This course is a sequel to Foundations of Parks and Recreation I and will continue to examine the historical and philosophical background of the leisure movement with regard to recreation organizations and services. Professional preparation in relation to perceived and actual needs concerning risk management, research and evaluation, information technology, ecological considerations and sustainable planning and management practices in the parks and recreation field will also be explored.

Credits: 3

**PCRM 139 - Foundations of Academic Discovery**

Foundations of Academic Discovery serves as the entry point to the Rock Integrated Studies Program. With its strong faculty-student interaction, the course promotes intellectual inquiry, critical and creative thinking, and academic excellence. Through varied content, the course introduces students to academic discourse and information literacy while exploring topics such as diversity and inclusion and global awareness. This course will set students along the path to becoming engaged with issues and scholarship important to a 21st century education while they learn about themselves and their place in the world.

Credits: 3

Enrollment limited to students with a semester level of Freshman 1 or Freshman 2.

Enrollment limited to students with the ROCK STUDIES 2 STUDENT or ROCK STUDIES STUDENT attributes.

**PCRM 190 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

**PCRM 195 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

**PCRM 198 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

**PCRM 204 - Environmental Communication**

In this course, students will learn about the theoretical and applied concepts that guide the discipline of environmental communication including rhetoric & discourse, media, public participation, social marketing, collaboration & conflict resolution, risk communication, and popculture. Students will demonstrate understanding and show application of materials for successful environmental communication in a variety of protected areas and conservation settings.

Credits: 3

**PCRM 210 - Resources for Outdoor Programming**

The outdoors was the first classroom and many lessons are still taught in and for the outdoors. This course is designed to provide anyone working in a recreational or park setting with methods and materials to use to achieve a variety of educational and recreational goals. Emphasis will be placed on identifying and using existing instructional materials, in addition to developing personal materials and lessons for outdoor programming.

Credits: 3

**PCRM 211 - Outdoor Leadership**

This course is a study of the principles and practices essential for outdoor leaders with emphasis on the development of KSAs to lead groups into the wild outdoors.

Credits: 3

Thematic Thread(s): Institutions & Human Innovations, Transfer Thread Completion Course

**PCRM 214 - Parks and Recreation Planning**

This course provides a comprehensive introduction to the field of recreation planning. Class sessions will focus on a variety of planning approaches and tools, which are utilized throughout the field of recreation. Students will gain familiarity with these planning tools as they engage in an abbreviated campus-wide study focused on the availability of recreational resources to SRU students.

Prerequisites: PREE 110<sup>D</sup> or PCRM 110<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

**PCRM 251 - Field Experience**

Opportunities for basic practical experience in a variety of park and recreation/environmental education settings. May be repeated up to 3 times.

Credits: 1

**PCRM 271 - Law Enforcement Firearms**

This course provides basic orientation to and qualification with the approved handgun and familiarization with the 12 gauge shotgun including safety and "shoot-no shoot situations.

Credits: 3

**PCRM 290 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

**PCRM 295 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

**PCRM 298 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

**PCRM 304 - Search and Rescue/Wilderness Medicine**

This course will provide basic and intermediate instruction in search and rescue techniques and emergency medical procedures in wilderness settings. Students will be introduced to the various evacuation and stabilization procedures that are commonly implemented in emergency situations.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 315 - Recreation Resource Planning and Analysis**

This course is designed specifically for student in the Park and Resource Management track. It is designed to provide the student with application of the planning process, from site and program analysis into planning recreational facilities. Students will use a variety of planning tools and on-line analysis resources, as well as a variety of professional recreation planning frameworks.

Prerequisites: PREE 214<sup>D</sup> or PCRM 214<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 318 - Administrative Strategies for Resource Managers**

The organization and administration of parks and recreation services, including organizational management, personnel practices and labor relations, financial and business procedures and legal aspects.

Credits: 3

Enrollment limited to students with a semester level of Freshman 1, Freshman 2 or Sophomore 1.

**PCRM 342 - Group Facilitation and Leadership**

This course will cover the concepts related to working with groups as a facilitator. Hands-on approaches to program design, sequencing activities and processing experiences will be examined. Students will facilitate their classmates through a group development experience making use of SRU's low and high challenge courses and the Leadership Reaction Center.

Credits: 3

Thematic Thread(s): Human Diversity & Well-Being, Institutions & Human Innovations, Transfer Thread Completion Course

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 347 - Interpretive Methods and Programming**

A study of the principles and methods to interpret natural and cultural history in parks and other outdoor settings.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 348 - Natural History of Ecosystems I**

This course provides basic ecology and natural history information and skills for the purpose of environmental and resource management as well as interpretation and environmental education. Local animal identification, interactions of species with their environment, and species interactions are among the topics covered.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 349 - Natural History of Ecosystems II**

This field-oriented course is designed to integrate basic scientific inquiry and ecological field techniques to develop skills of analysis, synthesis and evaluation of scientific information for the purpose of environmental and resource management. Results of field investigations are applied to relevant ecological problems and management objectives for the purpose of environmental decision making. Topics include local plant and fungi identification, community ecology, ecosystem ecology, and ecological biogeography.

Prerequisites: PREE 260<sup>D</sup> or PREE 348<sup>D</sup> or PCRM 348<sup>D</sup>

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 351 - Parks & Conservation Practicum**

Observation and participation in parks and recreation or environmental education activities. Cross listed as RCTH352.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 371 - Fundamentals of National Park Service Law Enforcement**

This course covers the legal and administrative fundamentals of National Park Service law enforcement including federal law and NPS policies and guidelines.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 372 - Visitor Services Management**

A study of visitor services including information, safety, rescue and law enforcement services.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.



**PCRM 374 - Federal Law & Park Policy**

This course is designed to provide students with advanced knowledge of federal law, policies, and procedures. Students will develop an in-depth understanding of Federal policy for various land management agencies with emphasis on National Park Service policy. The course will also cover legal updates in park law enforcement.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 377 - Cultural Resources Management**

This course provides a comprehensive introduction to the management of cultural and historic resources. The course examines the goals, legislation, and methodologies related to cultural resources management, research and programming.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 390 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 395 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 398 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 405 - Social Ecological Systems**

This course uses a social-ecological systems framework in order to advance an interdisciplinary approach to conservation of biological diversity and natural resources. Students will be exposed to contemporary conservation and natural resource management challenges and will learn how those issues can be addressed through an integrated understanding of social and natural systems. Case studies will be presented and discussed in class in order to connect theoretical frameworks to on the ground conservation problems and to consider opposing and controversial viewpoints. Students will develop practical skills in understanding and discussing cross-cultural and interdisciplinary natural resource management issues.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2, Sophomore 1 or Sophomore 2 may **not** enroll.

**PCRM 415 - Challenges and Trends in Parks and Conservation**

An integrative course for detailed study of current issues in parks and recreation with emphasis on unique and imaginative solutions to the challenges facing the recreation/parks profession. Must be a senior to enroll.

Credits: 3

Enrollment limited to students with a semester level of Senior 1 or Senior 2.

**PCRM 450 - Internship**

A supervised off-campus work experience in an appropriate aspect of parks and recreation or environmental education work. Open only to PCRT majors with advanced standing.

Credits: 1-12

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 471 - NPS Law Enforcement**

This course provides an overview of NPS law enforcement policies and procedures, relevant federal laws, Titles 36 and 50, CFR, and courtroom procedures.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 472 - Park Law Enforcement**

This course provides basic law enforcement skills essential for the park law enforcement ranger.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 475 - Park and Resource Management**

The principles and practices of recreational land and water management. Field trips required.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 477 - Wildlife & Wildlands Field Methods and Management**

Course will cover the application of natural history and ecological concepts as it related to parks, other public lands and environmental education. Emphasis is placed on project development, problem solving and critical thinking skills as they relate to resource management.

Prerequisites: (PREE 348<sup>D</sup> or PCRM 348<sup>D</sup>) and (PREE 349<sup>D</sup> or PCRM 349<sup>D</sup>)

<sup>D</sup> Requires minimum grade of D.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 490 - Independent Study**

A special study opportunity for students to investigate in-depth, approved topics in recreation or environmental studies. Topic and credit established by student and supervising instructor. Independent Study courses give students the opportunity to pursue research and/or studies that are not part of the university's traditional course offerings. Students work one on one or in small groups with faculty guidance and are typically required to submit a final paper or project as determined by the supervising professor.

Credits: 1-3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 491 - Professional Seminar**

This course is designed to assist students in preparing for entry into the environmental education profession. Topics will include career planning, employment opportunities, employment seeking skills, and discussions centering on areas of interest to the student.

Credits: 1

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 495 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

**PCRM 498 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PCRM 541 - Design Graphics and Problem Solving**

The application of design and graphic fundamentals to sustainable systems.

Credits: 3

Enrollment limited to students with a semester level of Graduate or Post Baccalaureate.

**PCRM 590 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Enrollment limited to students with a semester level of Graduate.

**PCRM 595 - Recreation Workshops**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Enrollment limited to students with a semester level of Graduate or Post Baccalaureate.

**PCRM 598 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Enrollment limited to students with a semester level of Graduate or Post Baccalaureate.

**PCRM 612 - Open Space Planning**

The fundamentals of open space planning, including feasibility studies, site analysis, resource analysis, and planning consideration.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 613 - Analysis of Professional Literature**

A "how to" course in understanding and using statistical analysis for reading and research and techniques for analyzing research publications and writing literature reviews. Offered only as an on-line course.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 615 - Issues in Parks and Recreation/Resource Management**

An integrative course for detailed study of current and future challenges facing the parks and recreation professional.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 616 - Aquatic Systems**

Using aquatic environments as a thematic focus, this course provides foundational information and teaching techniques related to aquatic systems. The course will cover resource related information, as well as formal and non-formal teaching techniques about amphibians, reptiles, aquatic macro invertebrates and fish. This course includes training in Aquatic Wild.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 617 - Terrestrial Systems**

This course focuses on resource management, sustainability and educational teaching techniques as they apply to terrestrial systems. Emphasis will be placed on forests, endangered systems, and the development of associated natural history skills. The course includes training in Project Learning Tree.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 618 - Wildlife Education**

This course provides an overview of wildlife and associated teaching techniques. Emphasis will be placed on current issues in conservation, management and identification. Topics will include ornithology and mammalogy. Students will utilize field studies and hands-on, problem solving activities. This course will include training in Project Wild and other associated teaching aids.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 621 - Green Schools**

This course provides an overview of specific practices and technologies used in green school facilities and grounds. Course participants will investigate the role that school facilities play in shaping the student's awareness of the natural environment and ways of living sustainably. Through conducting case studies of existing schools, course participants will learn how to evaluate school facilities. Course participants will develop proposals recommending changes to the structure or operation of school facilities, which would create more environmentally-focused educational settings.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 631 - Design for Sustainable Landscapes**

Focuses on sustainable and regenerative design/spec projects at residential and homestead scales. Selected assignments require students to research and develop creative solutions that span the boundary between house and garden, and reflect the interrelationships among human and natural systems. The course is founded on permaculture principles, including zoning and stacking functions, but it is expanded to provide practical tools for planning, detailing and implementing small site design projects. Projects may be chosen in urban and rural settings.

Prerequisites: PREE 541<sup>C</sup> or PCRM 541<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 632 - Group Facilitation and Leadership**

This course will cover the concepts related to working with groups as a facilitator. Hands-on approaches to program design, sequencing activities, and processing experiences will be examined. Students will facilitate their classmates as well as possible REACH Program participants through a group development experience making use of SRU's low and high challenge courses and the Leadership Reaction Course. Students will participate in course/equipment set-up and risk management practices

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 642 - Sustainable Agriculture Techniques**

This course presents the concepts of agroecology and applies them to on-farm practices. Integrates principles of crop, animal, weed, and insect biology with whole farm management practices, such as use of crop rotation, agroforestry, cover-cropping and conservation techniques.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 643 - Sustainable Agricultural Practices in Plant and Animal Husbandry**

This course provides an overview of biology as it applies to sustainable crop management, with a strong emphasis on genetic resource conservation. The course provides numerous opportunities for hands-on practice of sustainable agriculture.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 644 - Fertility Considerations in Regenerative Agriculture**

This is a follow-up to Soils as a Resource (645), focusing on sustainable management of the soil fertility base through cropping system development and use of organic amendments.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 645 - Soils as a Resource**

This course is designed to provide students with an analysis of the soil resource as a pivotal component of agricultural and natural ecosystems. This synthesis of historic and scientific information will enable students to critically evaluate the sustainability of soil management systems.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 654 - Natural and Cultural Resources Law**

Provides students with advanced knowledge of public land laws regarding natural and cultural resources. Topics of student include history and associated laws concerning water, mineral, timber, range, wildlife, recreation, and cultural resources.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 655 - Social Science Research Methods in Conservation**

A practical course in using research to study recreation, park, and resource management problems.

Credits: 3

Enrollment limited to students in the MED 9625, MED 9626, MS 966B or MS 966D programs.

Enrollment is limited to Graduate level students.

**PCRM 656 - Environmental Issues**

A course designed to develop skills in the identification, investigation, evaluation, and solution of environmental problems and issues. Students will learn how to use these skills, in formal and non-formal educational situations, in the development of an environmentally literate citizenry.

Credits: 3

Enrollment limited to students in the MED 9625, MED 9626, MS 966B or MS 966D programs.

Enrollment is limited to Graduate level students.

**PCRM 657 - Environmental Grant Writing**

Grant writing is a specialized skill that can supplement and enhance projects and programming. This course is designed to provide basic information and skills in grant writing, with emphasis on the environmental and educational grant potential. Students will learn how to search for appropriate grant sources, the intricacies of grant writing from both the scientific and sociological venues, as well as grant-related nuances.

Prerequisites: PCRM 655 (may be taken concurrently)<sup>C</sup> or PCRM 799<sup>\*C</sup> or PREE 799<sup>C</sup> (may be taken concurrently).

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Enrollment limited to students in the MED 9625, MED 9626, MS 966B or MS 966D programs.

Enrollment is limited to Graduate level students.

**PCRM 658 - Environmental Education**

A study of the history, philosophy, and theory of environmental education; problems and trends in environmental education; and relationships of environmental education to the total school program.

Prerequisites: PCRM 656 (may be taken concurrently)<sup>C</sup> or PCRM 681<sup>\*C</sup> or PREE 681<sup>C</sup> (may be taken concurrently).

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Enrollment limited to students in the MED 9625, MED 9626, MS 966B or MS 966D programs.

Enrollment is limited to Graduate level students.

**PCRM 661 - Design and Resource Development for Energy Conservation**

This course provides an introduction to the concepts and practices of environmentally conscious design. With an emphasis on understanding the natural and cultural context, the course will address the environmental issues related to the development of a small-scale design project.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 662 - Healthy Building Systems and Materials**

This course provides an introduction to the theories and practices related to the design of healthy buildings. The course examines the impacts of the built environment on both human health and environmental health, and the role of the designer in addressing these issues.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 663 - Alternative Energy and Engineering for Sustainable Systems**

The course will explore environmental technology and energy efficiency as they relate to buildings. Topics will include passive and active techniques for thermal comfort, day-lighting and alternative energy resources.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 673 - Ecosystem Ecology**

This course examines the principles and practices of ecosystem management. An examination of the ecological concepts and processes that underlie ecosystem integrity is followed by an analysis of the role of humans in shaping and managing ecosystems, including institutional and socioeconomic considerations.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 675 - Recreation Resources Management**

The principles and practices of recreational land and water management.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 676 - Site and Building Feasibility Studies**

This course is designed to develop a comprehensive feasibility study for selected land-based sustainable enterprises. The course will include an on-site inventory and analysis, market evaluation, preliminary planning and cost-return analysis. Three project tracks recreation resource management, community development and sustainable agriculture.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 677 - Cultural Resource Management**

The course presents information on current cultural resource preservation efforts and protection strategies for wildland recreation areas. The course covers: current trends and strategies for identifying cultural resource looting and vandalism; protection strategies for managing cultural and historic resources; and methods for developing a proactive cultural and historic resources protection and management program.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 678 - Restoration Ecology**

Restoration ecology is an emerging discipline that addresses ecological healing, and this course examines the principles and practices underlying this growing field. Exploration of conceptual issues is followed by a review of key ecological concepts pertinent to successful restoration of biodiversity and other ecological features. Practical issues for implementation of a restoration project are also thoroughly addressed. A prior understanding of ecological principles is required.

Credits: 3

**PCRM 683 - Parks and Recreation/Environmental Education Administration**

A study of education administration and curricular development for programs; duties and responsibilities of the coordinator or director; and operation and administration of the areas and facilities.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 686 - Management Strategy in Parks and Recreation**

A study of administrative and managerial strategy focused on the needs of a parks and recreation professional. Offered only as an on-line course.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 688 - Interpretive Media**

A study of various media useful in an interpretive situation, interpretive planning and analysis, and interpretive programming for park and recreation professionals.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 689 - Applied Ecology**

This course is an integration of ecology, resource management, and environmental education to promote an understanding of the application of ecological principles as they relate to sustainability. Emphasis is placed on ecological principles that relate to social value orientations and directly apply to resource management practices.

Credits: 3

Enrollment is limited to Graduate level students.

**PCRM 690 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

**PCRM 695 - Recreation Workshops**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Enrollment is limited to Graduate level students.

**PCRM 698 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

**PCRM 700 - Independent Study**

A special study opportunity for students to investigate, in depth, approved topics in recreation, environmental education, or sustainable systems. Topics and credit are established by student and supervising instructor. Independent Study courses give students the opportunity to pursue research and/or studies that are not part of the university's traditional course offerings. Students work one on one or in small groups with faculty guidance and are typically required to submit a final paper or project as determined by the supervising professor.

Credits: 1-3

Enrollment is limited to Graduate level students.

**PCRM 750 - Parks and Recreation/Environmental Education Internship**

Individually designed experiential learning intended to provide the student with an opportunity for observation and participation in an array of parks, recreation, and/or environmental education activities in an approved setting.

Credits: 3-6

Enrollment is limited to Graduate level students.

**PCRM 790 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Enrollment limited to students with a semester level of Graduate.

**PCRM 795 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Enrollment is limited to Graduate level students.

**PCRM 798 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Enrollment is limited to Graduate level students.

**PCRM 800 - Thesis**

Students pursuing a thesis program should contact their academic advisor concerning research after completing about one-half of their degree coursework. The advisor will assist the student with the necessary steps (such as preliminary selection of a topic and arranging for the appointment of a committee) to proceed.

Credits: 6

Enrollment is limited to Graduate level students.

**PREE Courses****PREE 411 - Tourism Planning and Operations**

This course studies the different components of travel, as well as the planning and operation of group/package tours and tourist attractions.

Credits: 3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

**PREE 414 - Concepts and Trends in Travel and Tourism**

The course will focus on current concepts and trends of the travel and tourism industries both domestically and internationally. This will test paragraph two. Test This will test paragraph three. Test This will test paragraph four. Test This will test paragraph five. Test

Credits: 1-3

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.