2009

Biology (BIMS)

Montclair State University

		bottom dwelling organisms in relationship to their environment; lectures, laboratory work and field investigations of the marine benthos. Also offered at NJ Marine Sciences Consortium.
BIMS592	Title	Bacteriological Techniques in Marine Sampling.
	Number and type of credits	6 hours lab.
	Course Description	Standard methods of bacteriological water analysis, including MPN and membrane filtration. Special problems related to sampling and analysis of marine sediments, surface and sub-surface marine waters. NJ Marine Sciences Consortium. Cross listed with Biology, BIOL 504.
BIOL100	Title	Biological Sciences.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	The study of life from molecule to organism with focus on structure and function of cells, mechanisms of heredity and change, survey of animals and plants and their interrelationships in the living world. Open to non-majors as well as majors. BIOL 100 is not included in the GPA as a biology major course. Meets Gen Ed 2002 - Natural/Physical Science Laboratory.
BIOL103	Title	Basic Biology I.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	A study of the structure and function of cells, a survey of the plant kingdom describing the anatomy, physiology and ecology of plants with emphasis on the higher plants.
BIOL104	Title	Basic Biology II.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Adaptation of structure to function of cells, tissues and organs of plants and animals. Physical, chemical and ecological forces affecting these. (3 hours lecture; 3 hours lab.)
BIOL105	Title	Medical Miracles.
	Number and type of credits	3 hours lecture.
	Course Description	This course for non-biology majors will introduce the student to the recent advances in biotechnology and medical and surgical techniques. The
BIOL105	Course Description	applications of biotechnology in the production of important molecules, in the

		diagnosis of human diseases and in the treatment of human diseases will be addressed. Recent advances in reproductive physiology as in vitro fertilization will be described. The ethical implications of the techniques will be discussed. Biology majors may only take this course as a free elective.
BIOL107	Title	Biology for Survival.
	Number and type of credits	3 hours lecture.
	Course Description	Basic concepts of biology that focus on social implications of pollution, population control, radiation, drugs, pesticides, the genetic revolution, etc. For non-science majors. Biology majors may only take this course as a free elective.
BIOL109	Title	The Living World.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	This course will provide students an opportunity to learn about the biological and environmental components of life and how these components interact to affect their own lives. This course is designed to be effective for and approachable by students who are not biology majors. No prerequisites in biology are needed. Meets Gen Ed 2002 - Natural/Physical Science Laboratory.
BIOL110	Title	The Biology of Human Life.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	The course is intended to serve the non-biology major and present a basic introduction to human anatomy and physiology. It will provide students with a laboratory experience so that they may learn the scientific method and its application in the field of human biology. This course will provide these students with a body of knowledge specific to human anatomy and physiology so that they may be well informed when dealing with important personal, family and societal issues relative to health and life-style decisions. Meets Gen Ed 2002 - Natural/Physical Science Laboratory.
BIOL111	Title	Emerging Diseases.
	Number and type of credits	3 hours lecture.
	Course Description	This course employs topics in physiology and biology as foundation and forum to probe contemporary health and social issues for which an educated

		assessment and response requires an understanding of the science behind the issue. Specific topics will be discussed which demonstrate the importance of emerging diseases and how these diseases are affected by the environment, human development and international political events. These topics will include the emergence of new viral diseases, diseases related to diet and diseases related to aging.
BIOL112	Title	Principles of Biology I.
	Prerequisites	MATH 100 with a grade of C- or higher or a satisfactory score on the Math department's precalculus readiness test.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours laboratory.
	Course Description	Principles of Biology I involves the study of life from molecule to multicellular organism with focus on structure and function of cells, mechanisms of heredity and change, and the ways in which these processes shape higher levels of biological organization. This course is designed to fulfill the first core course requirement of the biology major.
BIOL113	Title	Principles of Biology II.
	Prerequisites	MATH 100 with a grade of C- or higher or a satisfactory score on the Math department's precalculus readiness test.
	Special Fee	Special fee.
BIOL113	Number and type of credits	3 hours lecture, 3 hours laboratory.
	Course Description	Principles of Biology II will provide an introductory level study of biodiversity and the origins of life, phylogenetic relationships among organisms, genetics, developmental biology, reproduction, the biology of populations and communities, and ecosystem processes.
BIOL121	Title	The Plant Kingdom.
	Number and type of credits	2 hours lecture, 4 hours lab.
	Course Description	Survey of the plant kingdom with emphasis on evolutionary trends and economic importance.
BIOL125	Title	Evolution: Darwin's Dangerous Idea.
	Number and type of credits	3 hours lecture.
	Course Description	This course is designed for non-science major students interested in the

		fundamental processes that underlie the evolution of living things. Students in the course will learn about evolution by natural selection and other mechanisms, and study the many ways in which the evolution of living things impacts every human being, past and present.
BIOL199	Title	Freshman Seminar in Biology.
	Number and type of credits	1 hour seminar.
	Course Description	An experience for biology freshmen that will help them to succeed as Biology majors by learning study skills and becoming acquainted with the culture of higher education. Meets Gen Ed 2002 - New Student Seminar.
BIOL213	Title	Introduction to Ecology.
	Prerequisites	BIOL 113 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Semester-long field oriented course designed as an introduction to the natural world. Emphasis will be placed on identifying and characterizing the variety of habitats in New Jersey through field observations, group and individual projects and specimen collection.
BIOL215	Title	Human Heredity.
	Number and type of credits	3 hours lecture.
	Course Description	A non-major course introducing concepts of classical heredity and modern molecular genetics, which stresses the techniques and significance of genetic knowledge and research.
BIOL230	Title	Cell and Molecular Biology.
	Prerequisites	CHEM 120 with a grade of "C-" or better.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	An introduction to the chemistry, structure, and function of prokaryotic and eukaryotic cells. Topics covered include membrane structure and transport processes, bioenergetics and energy transformations in cells, DNA replication and expression, protein synthesis, and cell movement.
BIOL240	Title	Mammalian Anatomy and Physiology I.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	Human anatomy and physiology for health education and physical education

		majors. Not for biology majors. Biology majors may only take this course as a free elective.
BIOL241	Title	Mammalian Anatomy and Physiology II.
	Prerequisites	BIOL 240.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	Human anatomy and physiology for health education and physical education majors. Not for biology majors. Biology majors may only take this course as a free elective.
BIOL243	Title	Human Anatomy and Physiology.
	Prerequisites	CHEM 130.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	A study of the dynamics of the human body in relation to its structure and function is based on its nutritional input. Each organ system is discussed in relation to its contribution to the whole functioning organism, as well as a basic survey of its pathologies. Primarily for ADA certification.
BIOL244	Title	Anatomy and Physiology I.
	Prerequisites	Departmental approval; non-majors only.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	The structure and function of the cell, tissue and organ systems-integumentary, skeletal, muscular, circulatory and respiratory.
BIOL245	Title	Anatomy and Physiology II.
	Prerequisites	BIOL 244; non-majors only; departmental approval.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	The structure and function of the organ systems - nervous, excretory, endocrine, digestive and reproductive. Not for biology majors.
BIOL254	Title	Applied Microbiology.
	Prerequisites	CHEM 130.
	Special Fee	Special fee.

	Number and type of credits	2 hours lecture, 3 hours lab.
	Course Description	Microbiological concepts and techniques applicable to food and dairy processing, health and disease, water, waste and other environmental problems.
BIOL255	Title	Survey of Microbiology.
	Prerequisites	CHEM 113: non-biology majors only.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	Microbiological concepts and techniques applicable to medical, health and environmental problems.
BIOL256	Title	Applied Environmental Microbiology.
	Prerequisites	CHEM 120.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 3 hours lab.
	Course Description	Microbiological concepts and techniques applicable to environmental microbiology: water, waste and other environmental problems, health and diseases.
BIOL300	Title	Environmental Biology and Related Controversial Issues.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Analysis of ecological problems of today's population trends and control, food production, environmental deterioration, waste disposal etc.
BIOL330	Title	Introduction to Animal Behavior.
	Prerequisites	BIOL 213 with a grade of C- or better.
	Number and type of credits	3 hours lecture.
	Course Description	Concepts and theories of the sensory world of animals and behavioral patterns resulting in environmental adaptations.
BIOL350	Title	Microbiology.
	Prerequisites	BIOL 230 with a grade of C- or higher and CHEM 120 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	A study of bacteria, yeast, molds and other microorganisms in relation to

BIOL350	Course Description	modern biological concepts and the welfare of man. Standard techniques employed in the laboratory.
BIOL360	Title	Introduction to Bio-Imaging.
	Prerequisites	BIOL 230 with a grade of C- or higher or departmental approval.
	Number and type of credits	3 hours lecture.
	Course Description	An introduction to biological applications of microscopy. Topics include history of microscopy, preparation of samples for light and electron microscipy, phase, polarization, interference, confocal, and cryogenic microscopy, as well as transmissiona and scanning electron microscopy. Special attention will be paid to microscopic localization and dynamics of biological molecules plus ions and intracellular messengers.
BIOL370	Title	Principles of Ecology.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	To acquaint the biology majors with the general principles of ecology, population dynamics and adaptations of plants and animals to the various habitats.
BIOL380	Title	Genetics.
	Prerequisites	BIOL 230 with a grade of C- or higher and CHEM 120 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Lecture and lab. Heredity, gene and chromosomal structure and function, gene regulation, mutation and repair, genes in populations, genetic manipulation, and applied genetics are covered. Lab exercises demonstrate genetic concepts. A semester-long project with research paper is required. Required of all biology majors and minors. Meets the University Writing Requirement for majors in Biology, Molecular Biology and Science Informatics.
BIOL404	Title	Plant and Animal Histological Techniques.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	1 hour lecture, 3 hours lab.

	Course Description	Basic techniques and skills in preparation of permanent microscopic slides of plant and animal tissue. Previous course BICL 404 effective through Spring 2014.
BIOL405	Title	Cell Culture.
	Prerequisites	BIOL 350 with a grade of C- or higher and BIOL 380 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	1 hour lecture, 3 hours lab.
	Course Description	Theory of and practice in working with living cells: tissue culture techniques, cell communication, differentiation, regeneration and aging in several living cell systems. Previous course BICL 405 effective through Spring 2014.
BIOL406	Title	Scanning Electron Microscopy.
	Prerequisites	BIOL 380 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Introduction to theory and practice of scanning electron microscopy. Includes specimen preparation, scanning electron microscope operation, electron specimen interactions/imagery, and microanalysis. Previous course BICL 406 effective through Spring 2014.
BIOL409	Title	Externship in Biological Research (Co-operative Education).
BIOL409	Prerequisites	BIOL 380 with a grade of C- or higher and departmental approval.
	Special Fee	Special fee.
	Course Description	Full or part-time work in an established laboratory with a scientific investigator for the duration of the term.
BIOL410	Title	Toxicology.
	Prerequisites	BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Examination of the major classes of toxic agents by identifying characteristics of their toxicity and factors which modify this outcome. Previous course BIOL 310 effective through Spring 2014.

BIOL411	Title	Introduction to Transmission Electron Microscopy.
	Prerequisites	BIOL 380 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Basic theory and practice of electron microscopy. Specimen preparation, ultramicrotomy, microscopy, photographic preparation of final print, interpretation of results.
BIOL415	Title	Population Genetics.
	Prerequisites	BIOL 380 with a grade of C- or higher and departmental approval.
	Number and type of credits	3 hours lecture.
	Course Description	Detailed survey of the theory and application of the genetics of populations. Topics to be covered include Hardy-Weinberg Equilibrium and Evolution, Natural and Artificial Selection, Migration, Mutation, Bottlenecks, Random Genetic Drift, and Genetic Variation. Students will learn population genetic principles and the mathematical theory behind those principles.
BIOL417	Title	Evolutionary Biology.
	Prerequisites	BIOL 213 with a grade of C- or higher AND BIOL 380 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Mechanisms and processes underlying biological evolution, including natural selection, genetic drift, mutation, quantitative genetics and speciation. The central organizing principle of life science, evolutionary biology investigates the study of molecular biology, organisms, and ecology.
BIOL418	Title	Biology Independent Research.
	Prerequisites	Minimum GPA 3.0 and BIOL 213 with a grade of C- or higher or BIOL 230 with a grade of C- or higher and departmental approval.
	Special Fee	Special fee.
	Course Description	Under the guidance of a sponsor, students will investigate individual problems of appropriate scope. A written and/or oral report is required. (Offered on demand.)
BIOL420	Title	Economic Botany.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Importance of plants to the world in general and to man in particular. (Not

		offered every year.)
BIOL425	Title	Elementary Plant Physiology.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture.
	Course Description	Major physiological processes of the flowering plant: growth, metabolism, photosynthesis, respiration, water relations and mineral nutrition. (Not offered every year.)
BIOL426	Title	New Jersey Flora.
BIOL426	Prerequisites	BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Field identification of mosses, liverworts, ferns, and seed plants in a variety of habitats. (Not offered every year.)
BIOL429	Title	Herpetology.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Biology of the extant ectothermic tetrapods (amphibians and non-avian reptiles) including field identification, systematics, anatomy, physiology, behavior, reproduction and ecology. Laboratory includes field trips on a varying schedule.
BIOL430	Title	Ornithology.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	The biology, identification, and natural history of birds in a variety of habitats. Laboratory includes trips on a varying schedule.
BIOL431	Title	Entomology.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.

	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	Identification, physiology and ecology of common insect families. (Not offered every year.)
BIOL432	Title	Medical Entomology.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	The study of arthropods that are vectors of diseases afflicting man and domestic animals. (Not offered every year.)
BIOL433	Title	Developmental Biology.
	Prerequisites	BIOL 230 with a grade of C- or higher and BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours laboratory.
	Course Description	This course discusses the concepts and principles that are rapidly emerging from studies of developmental processes in animals. We shall consider egg organization, origins of cell differences, molecular mechanisms of cell differentiation, cell movements, inductive interactions in animals, long-range signaling mechanisms, and the cellular and molecular processes underlying pattern formation.
BIOL434	Title	Molecular Biology.
	Prerequisites	BIOL 350 with a grade of C- or higher and BIOL 380 with a grade of C- or higher and CHEM 370 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	This course is designed to examine the molecular biology of plant and animal cells.
BIOL435	Title	Experimental Molecular Biology.
	Prerequisites	BIOL 434 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	6 hours lab.
	Course Description	A laboratory course that will introduce biology and molecular biology majors to the basic techniques of modern molecular biology. Techniques to be covered include nucleic acid isolation, restriction enzyme mapping, plasmid

BIOL435	Course Description	manipulation and subcloning, genomic library construction, PCR amplification, and DNA sequence analysis.
BIOL436	Title	Phylogenetic Zoology.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	Phylogenetic Zoology is a comprehensive survey of evolutionary zoology. The focus of the course is on the ecological and evolutionary processes that shape the natural histories of aquatic and terrestrial animals. Integrated lecture and laboratory investigations will explore the anatomy, physiology, diversity, ecology and evolutionary significance of animal clades. This course is designed to fulfill major elective requirements of the biology major.
BIOL439	Title	Biology of Animal Parasites.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	The basic principles of parasitism. Ecological, morphological, and physiological adaptations for parasitism. Evolution of parasites and integration with the host.
BIOL440	Title	Gross Mammalian Anatomy.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher. Starting Winter 2017: BIOL 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Functional mammalian anatomy at the microscopic and gross level. Laboratory dissection of the cat and study of selected organs and anatomical models.
BIOL441	Title	Comparative Anatomy of Vertebrates.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	A critical analysis of the ontogeny and morphology of the protochordates and

		chordates, and their phylogenetic relationships drawn from the fossil record, evolutionary trends, and comparisons of homologies and analogies. Materials include: extensive dissections, outside readings, and field trip to the American Museum of Natural History.
BIOL442	Title	Human Physiology.
	Prerequisites	BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Functions of animal organs and systems with emphasis on maintenance of homeostasis.
BIOL443	Title	Vertebrate Embryology.
	Prerequisites	BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Developmental anatomy of the vertebrates, especially amphibian, chick and human. General concepts of development and cell differentiation. (Not offered every year.)
BIOL444	Title	Cell Physiology.
	Prerequisites	BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
BIOL444	Number and type of credits	3 hours lecture.
	Course Description	Advanced course in cell function.
BIOL445	Title	Immunology.
	Prerequisites	BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Cellular and humoral immunal responses, immunoglobulins, antigen-antibody reactions, immunopathology, transplantation and blood transfusion. (Not offered every year.)
BIOL446	Title	Endocrinology.

	Prerequisites	BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Basic anatomy and physiology of the mammalian endocrine glands with special attention directed to the human endocrine glands. The interrelationships between the various endocrines including neural control and the role of these glands in maintaining the homeostasis of the body will be stressed.
BIOL447	Title	Fundamentals of Pharmacology.
	Prerequisites	BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Introduction to the study of chemicals that have biological effects, with special emphasis on those with medical importance.
BIOL448	Title	Mammalian Microanatomy.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Detailed examination of mammalian tissues using both light and electron micrographic analyses. Epithelial, connective, muscle, nervous and gametic tissues will be thoroughly examined as they occur structurally and functionally within mammalian organ systems.
BIOL450	Title	Medical Microbiology.
	Prerequisites	BIOL 350 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	The course is designed to acquaint the biology major with those microorganisms which cause disease, the prevention of disease, therapeutic agents to control microbial diseases and the body's natural defense mechanisms.
BIOL451	Title	Comparative Animal Physiology.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	A comparison of physiological processes across vertebrate and invertebrate groups. Topics may include feeding and digestion, energy metabolism,

		ventilation, circulation, and osmoregulation.
BIOL457	Title	Virology.
	Prerequisites	BIOL 380 with a grade of C- or better.
	Number and type of credits	3 hours lecture.
	Course Description	This course will develop the fundamental principles of modern virology and examine the connection between viruses and disease. It will examine the molecular biology of virus replication, infection, gene expression, the structure of virus particles and genomes, pathogenesis, and classification of viruses.
BIOL458	Title	Microbial Genetics.
	Prerequisites	BIOL 350 with a grade of C- or higher and BIOL 380 with a grade of C- or
BIOL458	Prerequisites	higher.
	Number and type of credits	3 hours lecture.
	Course Description	Microbial Genetics provides students with an understanding of the basis for genetic processes in microorganisms and the implication for higher organisms. The focus of the course will be on prokaryotes, particularily E.coli, and viruses, primarily bacteriophages. Current developments in microbial genetics, such as bioinformatics and genomics, will be presented.
BIOL460	Title	Biological Oceanography.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	Biological processes within oceans and estuaries are considered in relation to the physical environment. Field and laboratory work. (Not offered every year.)
BIOL461	Title	Aquatic Ecology.
	Prerequisites	BIOL 112 with a grade of C- or higher and BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	Biological and physical processes of rivers and lakes. Field work and laboratory. (Not offered every year.)

BIOL467	Title	Biology of the Fishes.
	Prerequisites	BIOL 213 with a grade of C- or higher.
	Number and type of credits	2 hours lecture, 4 hours lab.
	Course Description	Systematics, adaptations, reproduction, evolution, ecology and zoo-geography of major groups of marine fishes. At New Jersey Marine Sciences Consortium. (Not offered every year.)
BIOL468	Title	Neurobiology.
	Prerequisites	BIOL 230 with a grade of C- or higher and BIOL 380 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Fundamental principles and current concepts of neuronal function, including evidence that lead to these concepts, organization of the peripheral nervous system and the brain, current scientific approaches and methods in neuroscience. Special attention will be given to molecular and cellular bases of brain function and their role in neurological diseases and their treatment.
BIOL471	Title	Biomedical Ethics.
	Prerequisites	BIOL 380 with a grade of C- or higher.
	Number and type of credits	2 hours lecture.
	Course Description	Seminar course dealing with ethical dilemmas posed by advances in biomedical technology. Background readings in ethics will be followed by discussions of readings on the applications and consequences of modern biomedical research.
BIOL475	Title	Medical Genetics.
	Prerequisites	BIOL 230 with a grade of C- or higher and BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	A detailed study and analysis of human genetics, inborn genetic diseases, genomics, gene therapy, and the Human Genome Project.
BIOL476	Title	Biology of Cancer.
	Prerequisites	BIOL 230 with a grade of C- or higher and BIOL 380 with a grade of C- or higher and CHEM 230 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	An in depth examination of the biology of cancer, including risk factors, genetics, causes of cancer, metastasis, therapies (conventional and recombinant DNA), and prevention will be presented. This course will also

BIOL476	Course Description	help students develop proficiency in critically evaluating primary scientific articles dealing with cancer.
BIOL480	Title	Research Community I: Organism Biology.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 3 hours lab.
	Course Description	Survey of topics and techniques in contemporary organism biology research. Exploration and integration of molecular, cellular, physiological, population and ecological phenomena as they relate to biology at the organism level. Students will prepare and present a scientific research proposal for peer and faculty review.
BIOL481	Title	Research Community II: Organism Biology.
	Prerequisites	BIOL 480 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 3 hours lab.
	Course Description	Team-based independent research on topics in contemporary organismal biology. Students will conduct experimental explorations designed in the prerequisite course, BIOL 480. Students will ultimately prepare and present a scientific research paper for peer and faculty review.
BIOL482	Title	Research Community I: Molecular Biology.
	Prerequisites	BIOL 380 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 3 hours lab.
	Course Description	Survey of topics and techniques in contemporary molecular biology research. Exploration and integration of molecular, cellular, physiological, population and ecological phenomena as they relate to biology at the molecular level. Students will prepare and present a scientific research proposal for peer and faculty review.
BIOL483	Title	Research Community II: Molecular Biology.
	Prerequisites	BIOL 482 with a grade of C- or higher.
	Special Fee	Special fee.

	Number and type of credits	2 hours lecture, 3 hours lab.
	Course Description	Team-based independent research on topics in contemporary molecular biology. Students will conduct experimental explorations designed in the prerequisite course, BIOL 482. Students will ultimately prepare and present a scientific research paper for peer and faculty review.
BIOL484	Title	Research Community I: Ecology.
	Prerequisites	BIOL 112 with a grade of C- or higher and BIOL 213 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 3 hours lab.
	Course Description	Survey of topics and techniques in contemporary ecology research. Exploration and integration of molecular, cellular, physiological, population and ecological phenomena as they relate to biology at the ecological level. Students will prepare and present a scientific research proposal for peer and faculty review.
BIOL485	Title	Research Community II: Ecology.
	Prerequisites	BIOL 484 with a grade of C- or higher.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 3 hours lab.
	Course Description	Team-based student independent research on topics in contemporary ecology. Students will conduct experimental explorations designed in the prerequisite course, BIOL 484. Students will ultimately prepare and present a scientific research paper for peer and faculty review.
BIOL486	Title	Selected Topics in Biology.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher.
	Course Description	This course will acquaint the student with recent developments and specialized content in the biological sciences. Examples of topic areas are: vision science, biological modeling, forensic entomology, disease ecology, pathophysiology, and mitochondrial genomics. This course is designed to fulfill elective requirements of the biology major. This course may be repeated once for a maximum of 8.0 credits.

BIOL487	Title	Statistical Genomics.
	Prerequisites	BIOL 380 with a grade of C- or higher; and STAT 401 with a grade of C- or higher or STAT 440 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Analysis of discrete data illustrated with genetic data on morphological characters, allozymes, restriction fragment length polymorphisms and DNA sequences. Maximum likelihood and Bayesian estimation including iterative procedures. Numerical resampling and bootstrapping. Development of statistical techniques for characterizing genetic disequilibrium and diversity. Locating genes with markers. Cross listed with Mathematical Sciences STAT 487.
BIOL488	Title	Selected Topics in Cell and Molecular Biology.
	Prerequisites	BIOL 380 with a grade of C- or higher or departmental approval.
	Course Description	This course will acquaint the student with recent developments and specialized content in cell and molecular biology. Examples of topic areas are: cellular metabolism, cell signaling, molecular analysis and molecular biology of disease. This course is designed to fulfill elective requirements of the biology and the molecular biology major. May be repeated once for a maximum of 8.0 credits.
BIOL489	Title	Selected Topics in Organismal Biology.
	Prerequisites	BIOL 213 with a grade of C- or higher or BIOL 230 with a grade of C- or higher or departmental approval.
	Number and type of credits	Variable credit 3-4 semester hours. Course may be repeated for a maximum of 8 semester hours.
	Course Description	This course will acquaint the student with recent developments and specialized content in organismal biology. Examples of topic areas are: physiology under extreme environments, comparative physiology, structural biology and infectious disease. This course is designed to fulfill elective requirements of the biology and the molecular biology major.
BIOL490	Title	Senior Seminar in Biology.
	Prerequisites	Senior status in Department of Biology and Molecular Biology.
	Number and type of credits	3 hours seminar.
	Course Description	Course which will allow the advanced undergraduate student to study controversial biological, bioethical, and ecological issues in a seminar

		format. Students will be required to produce written and verbal presentations utilizing peer-reviewed scientific papers. Presentations will be in both individual and group formats. This course is required for Biology seniors.
BIOL491	Title	Research in Biology Literature.
	Prerequisites	BIOL 230 with a grade of "C-" or better.
	Number and type of credits	1 hour lecture.
	Course Description	Each student will survey current biological literature pertinent to a specific problem. A comprehensive report is required. May be repeated twice for a maximum of 3.0 credits.
BIOL492	Title	Senior Colloquium.
	Prerequisites	BIOL 380 with a grade of C- or higher or departmental approval.
	Number and type of credits	1 hour lecture.
BIOL492	Course Description	Students in this course will read primary resources material and interpret the data. This course will also teach students how to read, critique and present scientific data to a peer group. Students will analyze, discuss and present primary research articles with respect to scientific content, accuracy of the data and significance of the experiments.
BIOL493	Title	Molecular Ecology.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 230 with a grade of C- or higher and BIOL 380 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	Detailed survey of the application of molecular methods to address ecological, behavioral, and conservation questions. Topics to be covered include the principles of most common molecular techniques used in molecular ecology, and application of those molecular techniques to phylogeography, behavioral ecology, population genetics, conservation genetics, and adaptive variation.
BIOL495	Title	Selected Topics in Ecology.
	Prerequisites	BIOL 213 with a grade of C- or higher and BIOL 380 with a grade of C- or higher.
	Number and type of credits	3 hours lecture, 1 hour lab.
	Course Description	This course will acquaint the student with recent developments and specialized content in ecology. Examples of topic areas are: behavioral ecology,

		ecological physiology, evolutionary ecology, population ecology, community dynamics and ecosystem energetics. This course is designed to fulfill elective requirements of the biology major.
BIOL497	Title	Genomics.
	Prerequisites	BIOL 230 with a grade of C- or higher and BIOL 380 with a grade of C- or higher.
	Number and type of credits	3 hours lecture.
	Course Description	The course will examine the associations among nucleic acid sequence (RNA and DNA), structure, and function in complex biological systems, while treating these systems as biological databases. Both computer program-based and laboratory methods will be discussed to better understand the relationship between nucleic acid sequence and function. Future opportunities and current limitations of genome analyses will be critically addressed.
BIOL500	Title	Introductory Molecular Cell Biology.
	Prerequisites	Permission of graduate advisor.
	Number and type of credits	1.5 hours lecture.
	Course Description	This course will focus on an introduction to the science and methods of cell and molecular biology.
BIOL503	Title	Teaching Science in Secondary Schools.
	Prerequisites	Admission to the Teachers Education program for P-12 science certification.
	Number and type of credits	4 hours lecture.
	Course Description	This course is designed for pre-service teachers and considers the standards-based objectives, curricula, planning, instructional strategies, materials, assessment, health and safety, and legal responsibilities in the secondary science program. The use of technology in the science program will be emphasized.
BIOL504	Title	Bacteriological Techniques in Marine Sampling.
	Prerequisites	A course in microbiology.
	Number and type of credits	1 hour lecture, 3 hours lab.
	Course Description	Standard methods of bacteriological water analysis, including mpn and membrane filtration. Special problems relating to sampling and analysis of marine sediments, surface and subsurface marine waters. Also offered at NJ Marine Sciences Consortium. Cross listed with Biology, BIMS 592. Previous course BICL 505 effective through Spring 2014.

BIOL505	Title	Experimental Cell Culture.
BIOL505	Prerequisites	BIOL 380, or similar Genetics course with passing grade and a previous Microbiology course or experience.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	This graduate course will provide theoretical and practical experience working on living cells. Provides understanding, observation, and hands-on experiences in tissue and organ culture techniques, primary cell culturing, cell differentiation, and techniques in toxicity and mutagenicity assays, plant callus and protopast experimentation.
BIOL510	Title	Biology Pedagogy for Secondary Teachers.
	Prerequisites	24 semester hours in biology.
	Number and type of credits	3 hours lecture.
	Course Description	Seminar and research course designed for study of methods and practices being used in teaching of secondary school biology.
BIOL512	Title	Topics in Modern Genetics.
	Prerequisites	Undergraduate course in genetics.
	Number and type of credits	3 hours lecture.
	Course Description	Seminar course. Selected topics from current development in genetic research, including chromosome and gene fine structure, extra chromosomal genetic elements, genetic engineering, and aspects of biomedical genetic research. May be repeated once for a maximum of 6.0 credits as long as the topic is different.
BIOL513	Title	Instrumentation and Techniques for Biological Science.
	Prerequisites	24 semester hours in biology.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 4 hours lab.
	Course Description	This course is designed to acquaint students with modern analytical and research techniques in biology, including manometry, spectrophotometry, electrophoresis, chromatography, microbial batch growth and assay techniques, immunotechniques and evaluation of experimental design and data.
BIOL514	Title	Graduate Seminar in Biology.
	Prerequisites	Graduate biology majors only.

	Number and type of credits	2 hours seminar.
	Course Description	Through a series of seminars delivered by faculty and guests, students will survey a broad range of topics in modern biology, and be introduced to the variety of specializations represented within the department. Emphasis shall be placed on recent advances in diverse areas of biology.
BIOL515	Title	Population Genetics.
	Prerequisites	BIOL 547 or permission of instructor.
	Number and type of credits	3 hours lecture.
	Course Description	Detailed survey of the theory and application of the genetics of popoulations. Topics to be covered include Hardy-Weinberg Equilibrium and Evolution, Natural and Artificial Selection, Migration, Mutation, Bottlenecks, Random Genetic Drift, and Genetic Variation. Students will learn population genetic principles and the mathematical theory behind those principles. Students will be required to write a literature paper on a topic of their choice related to Population Genetics.
BIOL518	Title	Strategies for Teaching College Biology.
	Prerequisites	B.S. in Biology and departmental approval.
	Number and type of credits	1 hour lecture.
	Course Description	Biology Teaching Assistants and upper-level undergraduates with interests in teaching will interact with experienced teachers, but more importantly will gain access to a forum for discussing their experiences and concerns with other prospective biology teachers. Students will discuss contemporary articles on science teaching at the college level.
BIOL520	Title	Plant Physiology.
BIOL520	Prerequisites	Permission of instructor.
	Number and type of credits	3 hours lecture.
	Course Description	Investigation of physiology of plants. Plant growth, development and reproduction as well as the new advances in plant physiology. Water relations of plants, mineral nutrition, physiological significance of soil and soil moisture, photosynthesis, respiration, plant biosynthesis and dynamics of growth.
BIOL521	Title	Field Studies of Flowering Plants.

	Prerequisites	Botany and field course in biology.
	Number and type of credits	2 hours lecture, 4 hours lab.
	Course Description	The taxonomy, evolutionary trends and ecological adaptations of the gymnosperms and angiosperms. A variety of habitats will be visited and analyzed.
BIOL522	Title	Plant Pathology.
	Prerequisites	Botany and microbiology.
	Number and type of credits	2 hours lecture, 2 hours lab.
	Course Description	Causes, symptoms, and control of plant diseases.
BIOL529	Title	Advanced Herpetology.
	Prerequisites	BIOL 113.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture and 3 hours lab.
	Course Description	Biology of the extant ectothermic tetrapods (amphibians and non-avian reptiles), including field identification, systematics, anatomy, physiology, behavior, reproduction, and ecology.
BIOL532	Title	Advanced Entomology.
	Prerequisites	Matriculation in M.S. Biology program or permission of instructor.
	Number and type of credits	3 hours lecture.
	Course Description	Examination of insects as model systems for biological inquiry. Topics include an integrative treatment of insect molecular biology, genetics, physiology, behavior, evolution and ecology.
BIOL533	Title	Advanced Cell Biology.
	Prerequisites	Matriculation in the biology master's program or permission of professor.
	Number and type of credits	3 hours lecture.
	Course Description	Detailed analysis of cellular structure and function. Topics to be covered include the role of subcellular organelles in maintaining cell viability, analysis of cytoskeletal components, structure and function of the plasma membrane and cellular defects that lead to cancer and other disease states.
BIOL540	Title	Mammalian Physiology.
	Prerequisites	Graduate standing, but not open to students who have completed undergraduate upper division Mammalian/Human Physiology classes.
	Number and type of credits	3 hours lecture.
	Course Description	A broad survey of the physiology of mammalian systems aimed at graduate

		students who lack an upper-level background in physiology at the undergraduate level. The principles of homeostatis mechanisms as they apply to various organ systems will be stressed.
BIOL542	Title	Advanced Endocrinology.
	Prerequisites	Endocrinology and cell biology.
	Number and type of credits	3 hours lecture.
	Course Description	A study of the physiology of the mammalian endocrine system with emphasis on hormonal control of homeostasis.
BIOL543	Title	Advances in Immunology.
	Prerequisites	Immunology.
	Number and type of credits	3 hours lecture.
	Course Description	To study in detail selected topics in immunology.
BIOL544	Title	Advanced Comparative Animal Physiology.
BIOL544	Prerequisites	Undergraduate degree in Biology or permission of instructor. Students who have previously completed BIOL 451 may not enroll.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	The physiological mechanisms involved in the varied responses of both vertebrates and invertebrates to critical fluctuations of their physico-chemical environment.
BIOL545	Title	Experimental Endocrinology.
	Prerequisites	Endocrinology.
	Special Fee	Special fee.
	Number and type of credits	1 hour lecture, 6 hours lab.
	Course Description	A seminar and laboratory course in endocrinology in which the various endocrine glands will be surgically removed or chemically destroyed and the morphologic and physiologic effects measured and observed.
BIOL546	Title	Topics in Physiology.
	Prerequisites	An undergraduate or graduate course in Physiology and permission of the department.
	Number and type of credits	3 hours lecture.
	Course Description	To give the student an in-depth understanding of a specific area of physiology in which there is a rapidly expanding body of knowledge. May be repeated once

		for a maximum of 6.0 credits as long as the topic is different.
BIOL547	Title	Molecular Biology I.
	Prerequisites	Cell biology, and one year organic chemistry.
	Number and type of credits	3 hours lecture.
	Course Description	Central concepts at the cellular level will be emphasized. Contemporary viewpoints in the areas of biomolecules, energy yielding and energy requiring processes and transfer of genetic information.
BIOL548	Title	Molecular Biology II.
	Prerequisites	BIOL 547.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	Central concepts at the cellular level will be emphasized. Contemporary viewpoints in the areas of biomolecules, energy yielding and energy requiring processes and transfer of genetic information. The laboratory will deal with up-to-date investigative procedures via selected experiments.
BIOL549	Title	Topics in Developmental Biology.
	Prerequisites	Genetics and developmental embryology.
	Number and type of credits	3 hours lecture.
	Course Description	Seminar in the regulation of developmental events, including both classical morphogenesis and recent advances using techniques of cell and molecular biology. May be repeated once for a maximum of 6.0 credits as long as the topic is different.
BIOL550	Title	Topics in Microbiology.
	Prerequisites	Microbiology.
	Number and type of credits	3 hours lecture.
	Course Description	Coverage of selected topics such as the microbial genetics, antibiotic action, bacteriophage, virus, cancer and microbial metabolism. Emphasis will be placed on practical applications of modern research in specific areas. May be repeated once for a maximum of 6.0 credits as long as the topic is different.
BIOL551	Title	Intermediary Metabolism I.
	Prerequisites	Biochemistry and cell biology.
	Number and type of credits	3 hours lecture.
	Course Description	Discussion of interrelationships of catabolic and anabolic paths. Primary emphasis is placed on the metabolism of nucleic acids, carbohydrates, and

		proteins.
BIOL552	Title	Biology of Lipids.
BIOL552	Prerequisites	Cell biology and organic chemistry.
	Number and type of credits	3 hours lecture.
	Course Description	Biological cycles, unity and diversity in metabolic paths, metabolic evolution, metabolic control mechanisms and other special topics. Primary emphasis is placed on the metabolism of lipids.
BIOL554	Title	Microbial Physiology.
	Prerequisites	Microbiology.
	Number and type of credits	3 hours lecture.
	Course Description	A study of microorganisms in terms of their morphology and metabolism. The significance of metabolic diversity and secondary metabolic products of various microorganisms will be explored through lecture topics. The economic significance of microbial metabolism in relation to industry and pathogenic diseases will be emphasized.
BIOL555	Title	Medical Genetics.
	Prerequisites	A genetics course or permission of instructor.
	Number and type of credits	3 hours lecture.
	Course Description	A detailed study and analysis of human genetics, inborn genetic diseases, genomics, gene therapy, and the Human Genome Project.
BIOL556	Title	Molecular Biology of Proteins.
	Prerequisites	Admission into the graduate biology program or permission of department.
	Number and type of credits	3 hours lecture.
	Course Description	Study of the molecular biology of biomolecules, including proteins. The course will examine how changes in the three dimensional structure of biomolecules affect their biological function. Protein engineering, enzyme catalysis, and site-directed mutagenesis will be discussed.
BIOL557	Title	Virology.
	Prerequisites	Satisfactory completion of a Cell & Molecular Biology course or permission of instructor.
	Number and type of credits	3 hours lecture.
	Course Description	This course will develop the fundamental principles of modern virology and

		examine the connection between viruses and disease. It will examine the molecular biology of virus replication, infection, gene expression, the structure of virus particles and genomes, pathogenesis, classification of viruses, and contemporary viral research.
BIOL558	Title	Microbial Genetics.
	Prerequisites	BIOL 350.
	Number and type of credits	3 hours lecture.
	Course Description	Microbial Genetics provides students with an understanding of the basis for genetic processes in microorganisms and the implication for higher organisms. The focus of the course will be on prokaryotes, particularly E.coli, and viruses, primarily bacteriophages. Current developments in microbial genetics, such as bioinformatics and genomics, will be presented.
BIOL560	Title	Molecular Genetics.
	Prerequisites	BIOL 547 with a grade of "B" or better.
	Number and type of credits	3 hours lecture.
	Course Description	A course that will focus on biological research problems that are being addressed in eucaryotic systems from a molecular genetics viewpoint.
BIOL561	Title	Genomics.
	Prerequisites	BIOL 380 or permission of instructor.
	Number and type of credits	3 hours lecture.
	Course Description	Describes the entire DNA sequence of organisms. Faciltates the understanding of the function of the genomes. Specific topics include comparative genomics, functional genomics and bioinformantics.
BIOL562	Title	Short Topics in Molecular Biology.
	Prerequisites	BIOL 547.
BIOL562	Number and type of credits	1 hour lecture.
	Course Description	Focus on specific topics in molecular biology including the development induced pleuripotent cells, advances in RNA interference and recent innovations in understanding transcriptional regulation. Emphasis will be placed on providing the most up to date information on these topics. May be taken for up to 6 credits as long as the topics are different.
BIOL563	Title	Statistical Genomics.

	Prerequisites	BIOL 547 and STAT 401 or equivalent Statistics course as determined by department.
	Number and type of credits	3 hours lecture.
	Course Description	Introduction to the statistical problems arising recently in gene mapping, high throughputomic data analysis, phylogenetics and sequence analysis by integrating of both statistics and genomics. To learn the statistical methods and concepts that are of particular use in analyzing genetics and genomic data.
BIOL564	Title	Proteomics.
	Prerequisites	BIOL 547.
	Number and type of credits	3 hours lecture.
	Course Description	Proteomics is the study of the entire complement of proteins expressed by a genome. This course will describe the structure of the proteins in the proteome and the functional interaction between the proteins and cover the development of large-scale technologies for protein separation, isolation, detection and quantitation.
BIOL565	Title	Advanced Plant Molecular Genetics.
	Prerequisites	BIOL 547, minimum grade of B.
	Number and type of credits	3 hours lecture.
	Course Description	This course will focus on plant molecular biology and genetics and how plant systems differ from other eucaryotic systems at a cellular level.
BIOL566	Title	Bioinformatics.
	Prerequisites	BIOL 547.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	Describes the computational analysis of gene sequences, protein structures, and expression datasets on a large scale. Provides a way in which to manage and store huge amounts of data, and to create statistical tools for analyzing it. Specific topics include biological database search tools, DNA sequence alignment and comparison, analysis of protein structure, and phylogenetics analysis, as well as topics of current interest.
BIOL568	Title	Advanced Neuroscience.
	Prerequisites	BIOL 547 or departmental approval.
	Number and type of credits	3 hours lecture.
	Course Description	The students will achieve an understanding of current concepts of nervous

		system function at the cellular level and at the level of higher systems and brain. The students will learn about the state of the art methods in modern neuroscience research and their applications. They will summarize and critique primary research papers and develop research proposals based on the acquired knowledge and their vision of future progress in neuroscience. A particular attention will be given to the molecular and cellular mechanisms of neurological diseases, and to current scientific approaches to treatment.
BIOL570	Title	Ecology.
	Prerequisites	Botany and zoology.
	Number and type of credits	3 hours lecture.
	Course Description	Basic ecological principles and concepts. Habitat approach to field exercises in fresh water and terrestrial ecology. Intra and interspecific relationships with all living members of the ecosystem, problems in plant and animal biology.
BIOL571	Title	Physiological Plant Ecology.
	Prerequisites	Botany and one course in field biology.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 4 hours lab.
	Course Description	The effects of soil, light, and water on plant growth, as well as, toxic effects of metals and salinity are measured using growth chamber and greenhouse facilities.
BIOL572	Title	Wetland Ecology.
	Prerequisites	Botany, and zoology, and field biology.
	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 4 hours lab.
	Course Description	Important biotic, chemical and physical parameters of New Jersey's estuaries. Evolution and successional trends of estuarine communities. Ecology of individual communities studied by field trips to Delaware Bay shore and to some Atlantic coast bays, marshes and offshore barrier islands. Also offered at the New Jersey Marine Sciences Consortium.
BIOL573	Title	Shoreline Ecology.
	Prerequisites	Botany, and zoology, and field biology.

	Special Fee	Special fee.
	Number and type of credits	2 hours lecture, 4 hours lab.
	Course Description	Community structure, trophic dynamics, species diversity and distribution of bottom dwelling organisms in relationship to their environment; lectures, laboratory work and field investigations of the marine benthos. Also offered at NJ Marine Sciences Consortium.
BIOL574	Title	Behavioral Ecology.
	Prerequisites	Field biology and zoology.
	Number and type of credits	3 hours lecture.
	Course Description	This seminar course explains the ecological consequences of animal behavior, viewed within the context of how behavior evolves and how populations adapt to their environments.
BIOL575	Title	Avian Biology.
	Prerequisites	BIOL 570 or permission of instructor.
	Number and type of credits	3 hours lecture, 3 hours lab.
	Course Description	An in-depth examination of the biology and life histories of birds, including their anatomy, physiology, behavior, ecology and systematics. Laboratory includes field trips on a varying schedule.
BIOL576	Title	Biology of Extreme Habitats.
	Number and type of credits	3 hours lecture.
	Course Description	The course will describe the adaptations that allow the survival of plants and animals, as well as microorganisms, in a variety of extreme habitats. Some of these habitats include: deserts, arctic, grassland, estuaries.
BIOL579	Title	Physiological Ecology of Animals.
	Prerequisites	Graduate standing in Biology or permission of instructor.
	Number and type of credits	3 hours lecture.
	Course Description	A variety of different animals, ranging from protists to mammals, will be examined and compared to demonstrate the physiological adaptations they have evolved to successfully survive and reproduce.
BIOL580	Title	Evolutionary Mechanisms.
	Prerequisites	Matriculation in the biology master's program or permission of the instructor.
	Number and type of credits	3 hours lecture.
	Course Description	This course will provide students the opportunity to read primary resource material and interpret the findings of the data. This course will also teach

		students how to read, critique and present scientific data to a peer group. Students will analyze, discuss and present primary research articles with respect to scientific content, accuracy of the data and significance of the
BIOL580	Course Description	experiments.
BIOL586	Title	Selected Avanced Topics in Biology.
	Prerequisites	BIOL 520 or BIOL 540 or BIOL 547 or BIOL 570.
	Course Description	This course is designed to provide advanced biology graduate students with a literature intensive exploration of current developments and specialized content in the biological sciences. Topics will cover specific research areas in ecology, physiology, molecular biology, embryology and bioinformatics. This course is designed to fulfill elective requirements of the biology masters degree. This course may be repeated once for a maximum of 8.0 credits.
BIOL587	Title	Selected Advanced Topics in Molecular Biology.
	Prerequisites	BIOL 547.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	This course is designed to provide advanced biology and molecular biology graduate students with a literature intensive exploration of current developments and specialized content in the biological sciences. Topics will cover specific research areas in molecular biology. This course is designed to fulfill elective requirements of the biology masters degree and the molecular biology masters degree.
BIOL588	Title	Selected Advanced Topics in Physiology.
	Prerequisites	BIOL 520 or BIOL 540.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	This course is designed to provide advanced biology and molecular biology graduate students with a literature intensive exploration of current developments and specialized content in the biological sciences. Topics will cover specific research areas in physiology. This course is designed to fulfill elective requirements of the biology masters degree and the molecular biology masters degree.
BIOL589	Title	Selected Advanced Topics in Ecology.

	Prerequisites	BIOL 570.
	Number and type of credits	3 hours lecture, 2 hours lab.
	Course Description	This course is designed to provide advanced biology and molecular biology graduate students with a literature intensive exploration of current developments and specialized content in the biological sciences. Topics will cover specific research areas in ecology. This course is designed to fulfill elective requirements of the biology masters degree and the molecular biology masters degree.
BIOL592	Title	Graduate Colloquium.
	Prerequisites	Matriculation in the biology master's program or permission of the professor.
	Number and type of credits	1 hour lecture.
	Course Description	Students in this course will read primary resource material and interpret the data. This course will also teach students how to read, critique and present scientific data to a peer group. Students will analyze, discuss and present primary research articles with respect to scientific content, accuracy of the data and significance of the experiments.
BIOL593	Title	Molecular Ecology.
	Prerequisites	BIOL 547 or instructor's permission.
	Number and type of credits	3 hours lecture.
	Course Description	Detailed survey of the application of molecular methods to address ecological, behavioral, and conservation questions. Topics to be covered include the principles of most common molecular techniques used in molecular ecology, and application of those molecular techniques to phylogeography, behavioral ecology, population genetics, conservation genetics, and adaptive variation. Students will develop and present independent research proposal.
BIOL594	Title	Signal Transduction.
BIOL594	Prerequisites	BIOL 547 or permission of instructor.
	Number and type of credits	3 hours lecture.
	Course Description	This course will cover various aspects of cellular signaling from the plasma membrane to the nucleus. Topics will include specific signal transduction systems, methods for studying these systems and the results of these signaling events on cell division, cell differentiation and cell function.

BIOL595	Title	Conservation Biology: The Preservation of Biological Diversity.
	Prerequisites	Botany, and zoology, and field biology.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture.
	Course Description	This course addresses concerns about the loss of biological diversity and genetic resources through species extinctions. Students will learn about the importance of maintaining biological diversity, the problems involved in monitoring and protecting sensitive and crucial habitat, the impact of human societies on biodiversity, the alternatives to the destruction of habitat/species, the prospects of restoration, and the policies needed to prevent the loss of biological diversity. Students will also learn about population processes that are directly related to species survival. This course is cross listed with CNFS 595.
BIOL596	Title	Selected Techniques in Biology Science Education.
	Prerequisites	Biology teaching certification or approval of instructor.
	Number and type of credits	1 hour lecture, 2 hours lab.
	Course Description	A laboratory course that trains teachers in manipulatives suitable for secondary biology education. Students will be introduced to a variety of physiological, ecological, molecular biological techniques applicable for implementation in secondary school classrooms. May be repeated three more times for a total of six semester hours.
BIOL597	Title	Research in Biological Literature.
	Prerequisites	Departmental approval.
	Course Description	To allow the student to investigate and evaluate a specific topic in biology under the supervision of a faculty member and to develop the student's skills in presenting current research in both the written and oral modes.
BIOL598	Title	Selected Techniques in Molecular Biology.
	Prerequisites	Undergraduate or graduate molecular biology courses or equivalent and permission of instructor.
	Special Fee	Special fee.
	Number and type of credits	1 hour lecture, 2 hours lab.
	Course Description	A laboratory course that trains students in advanced techniques in molecular biology. Students will learn how to perform a specific technique as well as learning the theory behind the technique. May be repeated three times for a

		maximum of 6.0 credits.
BIOL599	Title	Introduction to Biological Research.
	Prerequisites	Departmental approval.
	Special Fee	Special fee.
	Course Description	A research experience in which students will be exposed to current biologic techniques by working with scientific investigators in industry, or within the department. Students will work on projects involving research techniques, data collection and the analysis and interpretation of the data.
BIOL601	Title	Advanced Biological Science Education Pedagogy.
	Number and type of credits	3 hours lecture.
	Course Description	This course aims for the development of an understanding of the pedagogy of inquiry-based learning and of the processes of scientific investigation and reasoning, as well as other factors influencing effective teaching (e.g. equity issues, assessment methods, and communication skills). Modeling of the inquiry-based approach will be applied to a range of scientific concepts,
BIOL601	Course Description	focusing on biological concepts such as natural selection, meiosis and Mendelian genetics, and photosynthesis. As these concepts are explored, relevant science education literature will be examined in order to understand the nature of student conceptions as well as broader issues of constructivist and situated learning and implications of philosophy and sociology of science for science education.
BIOL698	Title	Master's Thesis.
	Prerequisites	Departmental approval.
	Special Fee	Special fee.
	Course Description	Independent research project done under faculty advisement. Students must follow the MSU Thesis Guidelines, which may be obtained from the Graduate School. Students should take BIOL 699 if they don't complete BIOL 698 within the semester.
BIOL699	Title	Master's Thesis Extension.
	Prerequisites	BIOL 698.
	Course Description	Continuation of Master's Thesis Project. Thesis Extension will be graded as IP (in Progress) until thesis is completed, at which time a grade of Pass or