BIOLOGY (BIOL)

BIOL 1101 Supplemental Laboratory
This course allows a transfer student to make up a laboratory deficiency at the introductory level. May be taken only for introductory courses. Laboratory fee applicable.
Prerequisites: Permission of Department Chair.

BIOL 1106 Principles of Biology I-Lab
Laboratory course to accompany BIOL 1306. Practical exercises reinforce BIOL 1306 lecture material. Topics will include include biochemistry, cell structure and function, photosynthesis and respiration, DNA structure and function, mitosis, meiosis, and Mendelian genetics. Must be taken concurrently with BIOL 1306. Laboratory fee applicable.
TCCN: BIOL 1106

BIOL 1111 Principles of Biology II-Lab
Laboratory course to accompany BIOL 1311. Practical exercises reinforce BIOL 1311 lecture material. Emphasis will be on characteristics of the plant kingdom, but the relevant features of algae and fungi will also be discussed. General topics will include plant structure, physiology and development, evolution and ecology. Must be taken concurrently with BIOL 1311. Laboratory fee applicable.
TCCN: BIOL 1111

BIOL 1170 Survey of Life Science Lab
Laboratory course to accompany BIOL 1370. Must be taken concurrently with BIOL 1370. Required for elementary education certification. Not for students majoring or minoring in science. Fulfills the laboratory science core curriculum requirement. Laboratory fee applicable.
TCCN: BIOL 1108

BIOL 1171 Human Biology-Lab
Laboratory course to accompany BIOL 1371. Practical exercises reinforce BIOL 1371 lecture material. Topics include the basic anatomy and functioning of systems of the human body, including musculoskeletal, reproductive, circulatory, respiratory, immune, nervous, endocrine, urinary, and digestive systems. Not for students majoring or minoring in biology. Fulfills the laboratory science core curriculum requirement. Must be taken concurrently with BIOL 1371. Laboratory fee applicable.

BIOL 1306 Principles of Biology I
A study of the basic principles of Biology. Topics will include biochemistry, cell structure and function, photosynthesis and respiration, DNA structure and function, mitosis, meiosis, and Mendelian genetics. Required for all biology majors. Concurrent enrollment in CHEM 1311/1111 is strongly recommended; concurrent enrollment in BIOL 1106 is required. Fulfills the laboratory Science core requirement. May be taken by non-science majors with permission of instructor.
TCCN: BIOL 1306

BIOL 1311 Principles of Biology II
This course is designed to give the students a broad introduction to botany. Emphasis will be on characteristics of the plant kingdom, but the relevant features of algae and fungi will also be discussed. General topics will include plant structure, physiology and development, evolution and ecology. Concurrent enrollment in BIOL 1111 is required. May be taken by non-science majors with permission of instructor.
TCCN: BIOL 1311

BIOL 1370 Survey of Life Science
A basic introductory course stressing fundamental biological principles and concepts. It is designed to acquaint the future elementary teacher with the various structures, functions, life histories, and occurrence of local plants and animals. Must be taken concurrently with BIOL 1170. Required for elementary education certification. Not for students majoring or minoring in science. Fulfills the laboratory science core curriculum requirement.
TCCN: BIOL 1308

BIOL 1371 Human Biology
A survey of the basic anatomy and functioning of systems of the human body, including musculoskeletal, reproductive, circulatory, respiratory, immune, nervous, endocrine, urinary, and digestive systems. Not for students majoring or minoring in biology. Must be taken concurrently with BIOL 1171. Fulfills the laboratory science core curriculum requirement.

BIOL 1413 Principles of Biology III
A survey of the kingdom Animalia which considers the fundamentals of biology. Includes classification, phylogeny, evolution, anatomy, physiology and behavior of animals and related taxa in the protista. Lecture/laboratory. May be taken by non-science majors with permission of instructor. Laboratory fee applicable..
TCCN: BIOL 1413

BIOL 2101 Anatomy & Physiology I-Lab
Laboratory course to accompany BIOL 2301. Practical exercises reinforce BIOL 2301 lecture material. Topics include of the structure and function of the human body including cells, tissues, and organs of the following systems: integumentary, skeletal, muscular, nervous system and special senses. Not for students majoring or minoring in biology. Fulfills the laboratory science core curriculum requirement. Carries no credit for biology majors. Must be taken concurrently with BIOL 2301. Laboratory fee applicable.
TCCN: BIOL 2101

BIOL 2102 Anatomy & Physiology II-Lab
Laboratory course to accompany BIOL 2302. Practical exercises reinforce BIOL 2302 lecture material. Topics include endocrine, circulatory, respiratory, digestive, urinary, and reproductive systems. Other topics include metabolism, acid-base balance, development, and heredity. Carries no credit for biology majors. Must be taken concurrently with BIOL 2302. Laboratory fee applicable.
TCCN: BIOL 2102

BIOL 2301 Anatomy & Physiology I
A study of the structure and function of the human body including cells, tissues, and organs of the following systems: integumentary, skeletal, muscular, nervous system and special senses. Must be taken concurrently with BIOL 2101. Carries no credit for biology majors.
Prerequisites: Consult your departmental advisor or obtain instructor's permission.
TCCN: BIOL 2301

BIOL 2302 Anatomy & Physiology II
A study of the structure and function of the human body including endocrine, circulatory, respiratory, digestive, urinary, and reproductive systems. Other topics include metabolism, acid-base balance, development, and heredity. Must be taken concurrently with BIOL 2102. Carries no credit for biology majors.
TCCN: BIOL 2302

BIOL 2415 Microbiology for Allied Health
Clinically oriented overview of basic medical microbiology. Topics discussed include cell structure and function, microbial growth and its control, immunology, and genetics. Carries no credit for biology majors. Lecture/laboratory. Laboratory fee applicable.
Prerequisites: Consult School of Nursing.
TCCN: BIOL 2420

BIOL 2421 General Microbiology
A survey of microbiology. Topics include structure, growth, reproduction, metabolism, genetics, and taxonomy of microorganisms; a survey of microorganisms of soil, water, foods, and industry. Lecture /laboratory. Laboratory fee applicable.
Prerequisites: BIOL 1306/1106, and CHEM 1311/1111.
TCCN: BIOL 2421

BIOL 3401 Environmental Science
An interdisciplinary course including the following topics: ecosystems, population dynamics, flow of energy and materials and their transformations, renewable and non-renewable resources, wastes, energy, solid wastes, control of weeds and pests, environment and human health and anthropogenic effects on the environment. Required for Environmental Science majors. Laboratory fee applicable. (Cross-listed with ENSC 3401)
Prerequisites: Eight hours of major's biology or permission of instructor.

BIOL 3403 Human Anatomy
A laboratory-based intensive study of the gross structure of organs and organ systems. Suggested for prehealth professional students. Lecture/laboratory. Laboratory fee applicable.
Prerequisites: Eight SCH lower-level Biology for majors or permission of instructor.

BIOL 3405 Human Physiology
A study of the function of the human body including cell function, tissue functions, homeostasis, metabolism, nervous system, endocrine system, muscle function, cardiovascular system, breathing and gas exchange, digestive system, urinary system, water and electrolyte balance, acid base balance. Lecture/Laboratory. Laboratory fee applicable.
Prerequisites: Twelve hours of Biology, BIOL 3403, and junior standing.

BIOL 3406 Evolution
Genetic and ecological basis of evolutionary changes within populations of plants and animals. Historical, morphological, biochemical, behavioral, and biogeographical evidence will be considered.
Prerequisites: Eight SCH lower-level Biology for majors or permission of instructor.

BIOL 3407 Animal Behavior
An evolutionary perspective of behavioral diversity in animals. Topics covered will include the genetics of behavior and levels of selection, predator/prey interactions, mating systems, parental care, resource competition, feeding ecology, communication, social behavior and learning. Students will begin developing and testing their own hypotheses in animal behavior. Field work required. Laboratory fee applicable.
Prerequisites: Eight SCH lower-level Biology for majors or permission of instructor.

BIOL 3410 Ecology
A study of inter-relationships of plants and animals and their natural environment. Topics include distribution and abundance of plants and animals with respect to population, community, and ecosystem structure and function. Emphasis will be placed on local flora, and fauna. Extensive field work required. Required for biology majors. Laboratory fee applicable.
Prerequisites: Eight SCH lower-level Biology for majors or permission of instructor.

BIOL 3412 Cell Biology
An introduction to the structure and function of eukaryotic cells. Emphasis is placed on the biochemical and biological characteristics of macromolecules and organelles. The major experimental tools used in modern cell biology are presented in the context of research. Topics include membranes, structure and function of proteins, energy conversion, the maintenance of cellular compartments, and transmembrane and cell-cell signaling. Laboratory fee applicable.
Prerequisites: BIOL 1306/1106 and BIOL 1311/1111, BIOL 1413 or BIOL 2421 and CHEM 2423 or permission of instructor.

BIOL 3413 Intro to Genetics
A study of the basic principles of the science of heredity, with an emphasis in classical and molecular genetics. Classical and molecular approaches are discussed as applied to a range of organisms from bacteria to man. Laboratory fee applicable.
Prerequisites: BIOL 1306/1106 and BIOL 1311/1111, BIOL 1413 or BIOL 2421 and CHEM 2423 or permission of instructor.

BIOL 3414 Invertebrate Zoology
The class serves to give the student an appreciation for invertebrate form, function, natural history, evolution and systematics. Field work required. Laboratory fee applicable.
Prerequisites: Eight SCH lower-level Biology for majors including BIOL 1413 or permission of instructor.

BIOL 3416 Intro to Biological Statistics
An introduction to statistical methodology applied to biology. Topics covered include the scientific method, biological experimental design, data management, probability distributions, hypothesis testing, analysis of variance, regression analysis, correlation analysis, analysis of frequencies, and an introduction to multivariate analysis. A special emphasis will be given to the application of these techniques for the student's own research. Lecture/laboratory.
Prerequisites: BIOL 1306/1106, 1311/1111, 1413 or permission of instructor.

BIOL 3425 Paleontology and Earth History
An examination of the geologic history of the Earth focusing on the fossil and rock record. Specifically, this course will consider the development and history of life as documented by the fossil record and earth's history from a stratigraphic perspective. Includes three hours of laboratory per week. Laboratory fee applicable.
Prerequisites: Junior Standing.

BIOL 3451 Biochemistry I
An introduction to modern biochemistry using fundamental chemical principles. Topics covered include proteins, carbohydrates, lipids, nucleic acids, bioenergetics, enzymology, and metabolism with an emphasis on interrelationships between metabolic pathways and regulation. Cross-listed with CHEM 3451. Credit cannot be given for both BIOL 3451 and CHEM 3451. Laboratory fee applicable.
Prerequisites: BIOL 1306/1106 and CHEM 2423 or permission of instructor.

BIOL 4170 Biology Seminar
A study of current biological literature and the discussion of research in progress. May be repeated when topic changes. Required of all biology majors in their junior or senior year.

BIOL 4173 Undergraduate Research
A course adapted to the study of special topics in biology. For advanced students capable of developing a problem independently through conference and activities directed by the instructor. Problem is chosen by the student with the approval of the instructor prior to registration. Course may be repeated but not to exceed eight semester hours for biology majors and not exceed four hours for all other students. Laboratory fee applicable.
Prerequisites: Permission of instructor.

BIOL 4273 Undergraduate Research
A course adapted to the study of special topics in biology. For advanced students capable of developing a problem independently through conference and activities directed by the instructor. Problem is chosen by the student with the approval of the instructor prior to registration. Course may be repeated but not to exceed eight semester hours for biology majors and not exceed four hours for all other students. Laboratory fee applicable.
Prerequisites: Permission of instructor.

BIOL 4371 Current Topics in Biology
A seminar course on topics of current biological interest. Laboratory section included at discretion of instructor. May be repeated when topic changes.
Prerequisites: Junior standing and permission of instructor.

BIOL 4373 Undergraduate Research
A course adapted to the study of special topics in biology. For advanced students capable of developing a problem independently through conference and activities directed by the instructor. Problem is chosen by the student with the approval of the instructor prior to registration. Course may be repeated but not to exceed eight semester hours for biology majors and not exceed four hours for all other students. Laboratory fee applicable.
Prerequisites: Permission of instructor.

BIOL 4402 Mammalogy
A study of anatomy, evolution, distribution, systematics, ecology, and physiology of mammals, with special emphasis on local representatives. Laboratory fee applicable.
Prerequisites: Eight SCH lower-level Biology for majors including BIOL 1413 or permission of instructor.

BIOL 4404 Herpetology
A study of the anatomy, evolution, distribution, systematics, ecology, and physiology of amphibians and reptiles; primarily North American species with special emphasis on local representatives. Saturday field trips required. Lab fee: $30.
Prerequisites: Eight SCH lower-level Biology for majors including BIOL 1413 or permission of instructor.

BIOL 4407 Behavioral Ecology
A course in the function of behavior in the context of ecology and evolution. Topics will include foraging behavior, habitat selection, mating behavior, parental care, and social behavior.
Prerequisites: Eight SCH lower-level Biology for majors or permission of instructor.

BIOL 4408 Entomology
An introduction to the study of insects (and arachnids). Topics will include anatomy and physiology, evolution, ecology, and behavior. Special emphasis will be placed on insect diversity and identification of local families of insects (and arachnids). A collection of local representatives is required. Saturday field trips required. Laboratory fee applicable.
Prerequisites: Eight SCH lower-level Biology for majors including BIOL 1413 or permission of instructor.

BIOL 4409 Molecular Sys Biol&Chem Gene
A course dedicated to the discussion of current approaches to study "Omics" or systems biology, and the impact of chemical genetics in understanding how to activate or inactivate gene products as a way to determine the cellular functions of proteins. The course covers topics at the molecular level, including research in the evolving areas of genomics, proteomics, metabolomics, bioinformatics, microbial systems, and the integration of cell signaling and regulatory networks. Laboratory fee applicable. (Cross-listed with CHEM 4409 and BIOL 5409)
Prerequisites: Permission of instructor.

BIOL 4411 Animal Nutrition
A study of nutritive requirements for domestic animals, including ruminants, and monogastrics. Topics covered include the digestive system, nutrient metabolism, design of diets from available feed stuffs, and an introduction to feed and labeling laws.
Prerequisites: Consent of instructor.

BIOL 4418 Community Ecology
A study of biotic and abiotic interactions determining community structure emphasizing models, observations and field experiments on communities. Topics will include diversity, food webs, succession, the factors determining the composition of communities, and the functioning of ecosystems. Independent study of a selected community ecology topic required.
Prerequisites: Eight SCH lower-level Biology for majors or permission of instructor.

BIOL 4420 Environmental Microbiology
An overview of the relationship between microbial metabolism, physiology, and the environment. The application of modern microbiological concepts to address and solve current environmental problems is emphasized. Topics include air, water and soil microbiology, geochemical activities of microbes, biotransformations, pollution, and pollution abatement using microbes. Laboratory fee applicable.(Cross-listed with ENSC 4420/BIOL 5420).
Prerequisites: BIOL 2421 or permission of instructor.

BIOL 4425 Immunology
A detailed study of the immune response and related events. Emphasis is placed on cellular and humoral branches of immunity, including the study of blood (serology) as a diagnostic tool. Laboratory fee applicable. (Cross-listed with BIOL 5425).
Prerequisites: BIOL 2421 or permission of instructor.

BIOL 4430 Limnology
Study of the structure and function of inland waters, ecology of freshwater systems such as lakes, ponds, rivers, and streams. Topics include physical and chemical properties of freshwater, habitats, biotic composition, and productivity water use. Laboratory fee applicable. (Cross-listed with ENSC 4430).
Prerequisites: BIOL 3410 or permission of instructor.

BIOL 4440 Plant Systematics
An introduction to plant systematics with an emphasis on flowering plants. Topics will include principles of classification, rules of nomenclature, plant identification and the use of keys, the evolutionary relationships among plant groups, species concepts, and experimental approaches to systematics. Laboratory fee applicable. (Cross-listed with BIOL 5440)
Prerequisites: BIOL 1311/1111 or permission of the instructor.

BIOL 4441 Plant Physiological Ecology
This course will examine plant physiological mechanisms that explain ecological patterns. Topics will include the physiological characteristics if plants (photosynthesis, energy balance, water relations, mineral nutrition, growth, and development) and how those characteristics are adaptive to various environments. (Cross-listed with BIOL 5441)
Prerequisites: BIOL 1311/1111 or permission of the instructor.

BIOL 4452 Biochemistry II
A detailed study, using primary literature sources, of carbohydrates, amino acids, nucleic acids, and lipid metabolic pathways. Special attention is given to human metabolism in health and disease. Cross-listed with BIOL 4452.
Prerequisites: BIOL 3451 or CHEM 3451 with C or better, or permission of instructor.

BIOL 4455 Bioinformatics
Bioinformatics introduces general bioinformatics concepts and their practice. Students will be introduced to current techniques in generation and storage of biological information, biological databases, sequence alignments, molecular phylogeny. They will also learn modern Genomic/proteomic concepts, and the use of publicly available software in biological data analysis. Students will gain practical experience with bioinformatics tools and develop basic skills in the collection and presentation of bioinformatics data. Lab fee: $30.00.
Prerequisites: BIOL 1311/1111, BIOL 1413 or BIOL 2421.
Corequisites: BIOL 4055.

BIOL 4460 Geographic Info Systems
This course will explore fundamental concepts of geographic information technologies with a focus on applications within the geosciences and natural sciences in general. Students will be exposed to the power of geographic information systems to elucidate complex problems. (Cross-listed with GEOL 4460 and BIOL 5460)
Prerequisites: Senior standing.

BIOL 4470 Developmental Biology
A study of the molecular and cellular events that lead to the generation of a multicellular organism from a fertilized egg. Emphasis on cell differentiation, development of an entire organism from a single cell involving several stages of differentiation and cell interaction. The course will investigate the cellular and molecular processes involved in generating an embryo, in creating various tissues and organs. Laboratory fee applicable.
Prerequisites: BIOL 3413.

BIOL 4471 Current Topics in Biology
A seminar course on topics of current biological interest. May be repeated when topic changes. Laboratory section included and fee applicable.
Prerequisites: Junior standing and permission of instructor.

BIOL 4472 Current Topics in Biology
A seminar course on topics of current biological interest. May be repeated when topic changes. No laboratory section included.
Prerequisites: Junior standing or permission of instructor.

BIOL 4473 Undergraduate Research
A course adapted to the study of special topics in biology. For advanced students capable of developing a problem independently through conference and activities directed by the instructor. Problem is chosen by the student with the approval of the instructor prior to registration. Course may be repeated but not to exceed eight semester hours for biology majors and not exceed four hours for all other students. Laboratory fee applicable.
Prerequisites: Permission of instructor.

BIOL 4475 Evolutionary Dev Biology
The objective of this course is to integrate two disciplines, evolutionary biology and developmental biology into a common framework of genetics. The focus will be on the evolution of developmental genetic pathways in order to explain the evolution of animal development. This course will explore how our growing knowledge of developmental circuits, and their variation, affects our understanding of how organisms evolve.
Prerequisites: BIOL 3413.

BIOL 5197 Biology Research
Continuation of thesis or non-theses research by the students under the supervision of the student's advisor. Can be repeated other semesters. Cannot be substituted for required or elective graduate biology courses. Evaluation of performance in this course is on CR/NC basis.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5290 Graduate Seminar in Biology
A seminar on current topics in biology. Emphasis will be on recent research in a field of biology. May be repeated once when topic changes.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5297 Biology Research
Continuation of thesis or non-thesis research by the students under the supervision of the student's advisor. Can be repeated other semesters. Cannot be substituted for required or elective graduate biology courses. Evaluation of performance in this course is on CR/NC basis.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5371 Special Topics in Biology
A seminar course on topics of interest in biology. Laboratory section at discretion of instructor. May be repeated when topic changes. Laboratory fee, if applicable.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5397 Biology Research
Continuation of thesis or non-thesis research by the students under the supervision of the student's advisor. Can be repeated other semesters. Cannot be substituted for required or elective graduate biology courses. Evaluation of performance in this course is on CR/NC basis.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5398 Thesis I
This course is the first step in the Biology thesis and includes the thesis proposal and research. The course is to be scheduled by the student in consultation with student's major professor. Evaluation of this course is on CR/NC basis. The student will receive credit when the thesis proposal is approved by the student's thesis committee. If the proposal is not completed, then a grade of IP is received and the student must enroll again for credit. Laboratory fee applicable.
Prerequisites: Approval of the major professor and the Department Chair.

BIOL 5399 Thesis II
This course is the final step in the Biology thesis and includes research, the thesis and the thesis defense. The course is to be scheduled by the student in consultation with student's major professor. The student will receive credit when the thesis has been written and defended successfully. Evaluation of performance in this course is on CR/NC basis. If a grade of IP is received, the student must enroll again for credit. Laboratory fee applicable.
Prerequisites: Approval of the major professor and the Department Chair and credit in BIOL 5398.

BIOL 5401 Biometry
A course in experimental design and statistical analysis. The course will include techniques used in different fields of biological research and the application of these techniques for the student's own research.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5402 Advanced Mammalogy
A study of the anatomy, evolution, distribution, systematics, ecology, and physiology of mammals - with special emphasis on local representatives. Saturday field trips required. Laboratory fee applicable.
Prerequisites: Graduate standing and permission of instructor.

BIOL 5404 Advanced Herpetology
A study of the anatomy, evolution, distribution, systematics, ecology, and physiology of amphibians and reptiles; primarily North American species with special emphasis on local representatives. Saturday field trips required. Laboratory fee applicable.
Prerequisites: Graduate standing and permission of instructor.

BIOL 5407 Behavioral Ecology
A course in the function of behavior in the context of ecology and evolution. Topics will include foraging behavior, habitat selection, mating behavior, parental care, and social behavior.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5408 Advanced Entomology
An advanced study of insects (and arachnids). Topics will include anatomy and physiology, evolution, ecology, and behavior. Special emphasis will be placed on insect diversity and identification of local insects (and arachnids) to family and species. A collection of local representatives is required. Saturday field trips required. Laboratory fee applicable.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5409 Molecular Sys Biol&Chem Gens
A course dedicated to the discussion of current approaches to study "Omics" or systems biology, and the impact of chemical genetics in understanding how to activate or inactivate gene products as a way to determine the cellular function of proteins. Molecular Systems Biology and Chemical Genetics covers topics at the molecular level, including research in the evolving areas of genomics, proteomics, metabolomics, bioinformatics, microbial systems, and the integration of cell signaling and regulatory networks. Laboratory fee applicable. (Cross-listed with BIOL 4409 and CHEM 4409)
Prerequisites: Graduate standing and permission of instructor.

BIOL 5410 Advanced Ecology-Pop&Com
An advanced study of biotic and abiotic ecosystem interactions emphasizing field measurements, statistical procedures, and computer simulations of the growth of populations. Topics will include social and species interactions within populations, analysis of population composition and change, the distribution of communities, and the functioning of ecosystems. Independent study of a selected ecological topic required. Laboratory fee applicable.

BIOL 5415 Population Genetics
A study of population genetics models, including genetic variation, selection, inbreeding, genetic drift, mutation, gene flow, linkage disequilibrium and recombination. Lecture/laboratory. Laboratory fee applicable.
Prerequisites: Graduate standing and permission of instructor.

BIOL 5418 Advanced Community Ecology
A study of biotic and abiotic interactions determining community structure emphasizing models, observations and field experiments on communities. Topics will include diversity, food webs, succession, the factors determining the composition of communities, and the functioning of ecosystems. Independent study of a selected community ecology topic required.

BIOL 5420 Adv Environmental Microbiology
An overview of the relationship between microbial metabolism, physiology, and the environment with a discussion of the primary literature. The application of modern microbiological concepts to address and solve current environmental problems is emphasized. Topics include air, water and soil microbiology, geochemical activities of microbes, biotransformations, pollution, and pollution abatement using microbes. Laboratory fee applicable. (Cross-listed with ENSC 4420/BIOL 4420)
Prerequisites: Graduate standing and permission of instructor.

BIOL 5425 Advanced Immunology
A detailed study of the immune response and related events, with a discussion of primary literature. Emphasis is placed on cellular and humoral branches of immunity, including the study of blood (serology) as a diagnostic tool. Laboratory fee applicable.(Cross-listed with BIOL 4425)
Prerequisites: Graduate standing and permission of instructor.

BIOL 5440 Adv Plant Systematics
An introduction to plant systematics with an emphasis on flowering plants. Topics will include principles of classification, rules of nomenclature, plant identification and the use of keys, the evolutionary relationships among plant groups, species concepts, and experimental approaches to systematics. Laboratory fee applicable. (Cross-listed with BIOL 4440)
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5441 Adv Plant Physiological Ecolo
This course will examine plant physiological mechanisms that explain ecological patterns. Topics will include the physiological characteristics of plants (photosynthesis, energy balance, water relations, mineral nutrition, growth, and development) and how those characteristics are adaptive to various environments.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5450 Molecular Gen&Reg Gen Exp
An advanced course on the molecular mechanisms by which genes are controlled and regulated. Topics include induction, activation, repression and RNA interference of gene function.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5452 Advanced Biochemistry
A detailed study, using primary literature sources, of carbohydrate, amino acids, nucleic acids, and lipid metabolic pathways. Special attention is given to human metabolism in health and disease.
Prerequisites: one semester (3 SCH or more) of biochemistry for majors or permission of instructor.

BIOL 5455 Advanced Bioinformatics
Advanced bioinformatics introduces general bioinformatics concepts and their practice. Students will be introduced to current techniques in generation and storage of biological information, biological databases, sequence alignments, molecular phylogeny. They will also learn modern Genomic/proteomic concepts, and the use of publicly available software in biological data analysis. Students will gain practical experience with bioinformatics tools and develop basic skills in the collection and presentation of bioinformatics data. Lab fee: $30.00.
Prerequisites: Graduate standing and permission of instructor.
Corequisites: BIOL 5055.

BIOL 5460 Adv Geographic Info Systems
This course will explore fundamental concepts of geographic information technologies with a focus on applications within the geosciences and natural sciences in general. Students will be exposed to the power of geographic information systems to elucidate complex problems. (Cross-listed with GEOL 4460 and BIOL 4460)
Prerequisites: Graduate standing.

BIOL 5470 Adv Developmental Biology
A study of the molecular and cellular events that lead to the generation of a multicellular organism from a fertilized egg. Emphasis on cell differentiation, development of an entire organism from a single cell involving several stages of differentiation and cell interaction. The course will investigate the cellular and molecular processes involved in generating an embryo, in creating various tissues and organs. Laboratory fee applicable.
Prerequisites: BIOL 3413.

BIOL 5471 Special Topics in Biology
A seminar course on topics of current biological interest. May be repeated when topic changes. Laboratory section included and fee applicable.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5472 Special Topics in Biology
A seminar course on topics of current biological interest. May be repeated when topic changes. No laboratory section included.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5475 Adv Evolutionary Dev Biology
The objective of this course is to integrate two disciplines, evolutionary biology and developmental biology into a common framework of genetics. The focus will be on evolution of developmental genetic pathways in order to explain the evolution of animal development. This course will explore how our growing knowledge of developmental circuits, and their variation, affects our understanding of how organisms evolve.
Prerequisites: BIOL 3413

BIOL 5480 Field Biology
A field course on the diversity and ecology of populations and communities along the Rio Grande. A field trip of two to three weeks will be required. Laboratory fee applicable.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5497 Biology Research
Continuation of thesis or non-thesis research by the students under the supervision of the student's advisor. Can be repeated other semesters. Cannot be substituted for required or elective graduate biology courses. Evaluation of performance in this course is on CR/NC basis.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5597 Biology Research
Continuation of thesis or non-thesis research by the students under supervision of the student's advisor. Can be repeated other semesters. Cannot be substituted for required or elective graduate biology courses. Evaluation of performance in this course is on CR/NC basis.
Prerequisites: Graduate standing and permission of the instructor.

BIOL 5697 Biology Research
Continuation of thesis or non-thesis research by the students under the supervision of the student's advisor. Can be repeated other semesters. Cannot be substituted for require or elective graduate biology courses. Evaluation of performance in this course is on CR/NC basis.
Prerequisites: Graduate standing and permission of the instructor.