BIOLOGICAL SCIENCES

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| Course Subject and Number | Current Information | Proposed Change | If any requirements are being added or removed, provide a 1--2 sentence rationale. |
| BIOL 160 (4) | Microbiology for Health Sciences. Basic concepts of microbiology, including classification, metabolic activity and the effect of physical and chemical agents on microbial populations. Host parasite interactions, infectious agents, methods of transmission and control are also discussed. *Three hours of lecture and three hours of laboratory. Course is designed for Nursing students.* | Microbiology for Health Sciences. Basic concepts of microbiology, including classification, metabolic activity and the effect of physical and chemical agents on microbial populations. Host parasite interactions, infectious agents, methods of transmission and control are also discussed. *Three hours of lecture and three hours of laboratory. This is a Pre-Nursing Core course and enrollment is restricted to approved pre-health science students based on the nursing science impaction criteria.* | In collaboration with the CEHHS student services coordinator who handles nursing students, we clarified the restrictive language for students. |
| BIOL 175 (4) | Introduction to Human Anatomy and Physiology I. The first in a two-course series designed to introduce the principles of human anatomy and physiology for students in health and human services, including Nursing. Taught from a systems perspective where students will learn basic physiological principles and mechanisms along with their associated anatomical basis. Material includes anatomical terminology, cell and tissue structure and function, basic biochemical and metabolic pathways and the integumentary, skeletal, muscular, digestive and excretory systems.  *Three hours of lecture and three hours of laboratory. Enrollment restricted to declared Pre-Nursing students. Students must obtain consent from the School of Nursing Advisor; consent will only be given to students who have completed the Lower-Division General Education requirements in areas A1, A2, A3, and B4.* | Introduction to Human Anatomy and Physiology I. The first in a two-course series designed to introduce the principles of human anatomy and physiology for students in health and human services, including Nursing. Taught from a systems perspective where students will learn basic physiological principles and mechanisms along with their associated anatomical basis. Material includes anatomical terminology, cell and tissue structure and function, basic biochemical and metabolic pathways and the integumentary, skeletal, muscular, digestive and excretory systems.  *Three hours of lecture and three hours of laboratory. This is a Pre-Nursing Core course and enrollment is restricted to approved pre-health science students based on the nursing science impaction criteria.* | In collaboration with the CEHHS student services coordinator who handles nursing students, we clarified the restrictive language for students. |
| BIOL 176 (4) | Introduction to Human Anatomy and Physiology II. The second in a two-course series designed to introduce the principles of human anatomy and physiology for students in health and human services, including Nursing. Taught from a systems perspective where students will learn basic physiological principles and mechanisms along with their associated anatomical basis. Material includes nervous system and the senses, and the endocrine, reproductive, cardiovascular and respiratory systems. T*hree hours lecture and three hours of laboratory. Prerequisite: BIOL 175.* | Introduction to Human Anatomy and Physiology II. The second in a two-course series designed to introduce the principles of human anatomy and physiology for students in health and human services, including Nursing. Taught from a systems perspective where students will learn basic physiological principles and mechanisms along with their associated anatomical basis. Material includes nervous system and the senses, and the endocrine, reproductive, cardiovascular and respiratory systems. *Three hours lecture and three hours of laboratory. This is a Pre-Nursing Core course and enrollment is restricted to approved pre-health science students based on the nursing science impaction criteria. Prerequisite: BIOL 175.* | In collaboration with the CEHHS student services coordinator who handles nursing students, we clarified the restrictive language for students. |
| BIOL 178 (4) | Introduction to Human Anatomy and Physiology for Kinesiology II. The second in a two-course series designed to introduce the principles of human anatomy and physiology for students in Kinesiology. Taught from a systems perspective students will learn basic physiological principles and mechanisms along with their associated anatomical basis. Material includes nervous system and the senses, and the endocrine, reproductive, cardiovascular and respiratory systems. *Three hours of lecture and three of hours of laboratory. Enrollment requirement: BIOL 177. Enrollment restricted to Kinesiology majors.* | Introduction to Human Anatomy and Physiology for Kinesiology II. The second in a two-course series designed to introduce the principles of human anatomy and physiology for students in Kinesiology. Taught from a systems perspective students will learn basic physiological principles and mechanisms along with their associated anatomical basis. Material includes nervous system C7and the senses, and the endocrine, reproductive, cardiovascular and respiratory systems. *Three hours of lecture and three of hours of laboratory. Prerequisite: BIOL 104, 177. Enrollment restricted to Kinesiology majors.* | Upon consultation with KINE and CEHHS, changed enrollment requirement to pre-req of 177 and added pre-req of 104. Students were taking 177 and 178 simultaneously and need to have 104 done before 178. |
| BIOL 211 (4) | Introduction to Organismal and Population Biology. The second of a two-semester core sequence that provides the student with basic knowledge in biology, including specific experimental techniques and familiarity with the scientific method. Emphasizes physiology, development, diversity of life, evolution, and ecology. *Three hours lecture and three hours laboratory. Prerequisite: BIOL 210 with grade of C (2.0) or better.* | Introduction to Organismal and Population Biology. The second of a two-semester core sequence that provides the student with basic knowledge in biology, including specific experimental techniques and familiarity with the scientific method. Emphasizes physiology, development, diversity of life, evolution, and ecology. *Three hours lecture and three hours laboratory. Field trip(s) during or outside of class (including weekends) may be required. Prerequisite: BIOL 210 with grade of C (2.0) or better.* | Letting students know fieldtrips are possible in this course |
| BIOL 216 (3)  | Biostatistics for the Health Sciences. Study of the techniques and underlying principles necessary to analyze various types of data used in health science professions. Introduces sampling and experimental design, descriptive statistics, graphical display of data, point and interval estimation methods, and common hypothesis testing methods, including T-Tests, linear regression, and analysis of variance. Focuses on the use of statistical analysis in support of scientific reasoning, as it applies to health professions.  *May not be taken for credit by Biological Science Majors. Restricted to Pre-Nursing and Nursing Students.*  | Biostatistics for the Health Sciences. Study of the techniques and underlying principles necessary to analyze various types of data used in health science professions. Introduces sampling and experimental design, descriptive statistics, graphical display of data, point and interval estimation methods, and common hypothesis testing methods, including T-Tests, linear regression, and analysis of variance. Focuses on the use of statistical analysis in support of scientific reasoning, as it applies to health professions.  *May not be taken for credit by Biological Science Majors. Restricted to Pre-Nursing and Nursing Students.*  | Move to inactive list. Course replaced by Math 200 for pre-nursing students several years ago. |
| BIOL 309 (3) | ~~The Biology of Emerging Diseases. Defines and discriminates between emerging and other diseases, agent characteristics and risk factors, improper use of antibiotics, multi-drug resistant infectious agents as factors of emerging diseases. Selected emerging food-borne, bacterial, protozoal and viral diseases of humans will be described and analyzed. A special emphasis will be placed on HIV and bioterror agents.~~  *~~Not open to Biological Sciences majors except by consent of advisor.~~* | ~~The Biology of Emerging Diseases. Defines and discriminates between emerging and other diseases, agent characteristics and risk factors, improper use of antibiotics, multi-drug resistant infectious agents as factors of emerging diseases. Selected emerging food-borne, bacterial, protozoal and viral diseases of humans will be described and analyzed. A special emphasis will be placed on HIV and bioterror agents.~~ *~~Biological Sciences and Biotechnology majors will get no BB or elective credit toward their degree.~~* | THIS CHANGE WAS NOT APPROVED.~~Adding language to clarify to Biol/Biot majors they will not get credit for the course (but can take it). This continues to be a problem with students mistakenly enrolling in our BB courses.~~  |
| BIOL 320 (3) | Anatomy and Physiology of the Speech and Hearing Mechanism. Explores the anatomy and physiology of speech and hearing including respiration, phonation, resonance, articulation and perception. An introduction to the central and peripheral nervous system is also provided. *Also offered as EDSL 320. Students may not receive credit for both. Enrollment restricted to students who have completed the Lower-Division General Education requirement in Life Science (B2).* | Anatomy and Physiology of the Speech and Hearing Mechanism. Explores the anatomy and physiology of speech and hearing including respiration, phonation, resonance, articulation and perception. An introduction to the central and peripheral nervous system is also provided. *Also offered as SLP 320. Students may not receive credit for both. Enrollment restricted to students who have completed the Lower-Division General Education requirement in Life Science (B2).*  | Updating cross-list title (EDSL changed to SLP). |
| BIOL 323 (3) | The Physiology of Nutrition and Disease. Study of the anatomy and physiology of human nutrition and functional relationships to disease. Includes metabolism, cellular metabolism, digestive physiology, nutrients, enzymes, vitamins, weight manage­ment, stress, diet, the role of exercise in nutri­tion, and the role of nutrition in development. Also covered will be symptoms and effects of disease associated with inadequate nutrition, nutritional con­tributions to diseases not asso­ciated with inadequate diet, and contributions of nutri­tion to health. Special attention will be given to health concerns of women and the differences in nutritional needs between gen­ders. *Enrollment restricted to students who have obtained consent of Director/Chair-HHS Advisor.* | The Physiology of Nutrition and Disease. Study of the anatomy and physiology of human nutrition and functional relationships to disease. Includes metabolism, cellular metabolism, digestive physiology, nutrients, enzymes, vitamins, weight management, stress, diet, the role of exercise in nutrition, and the role of nutrition in development. Also covered will be symptoms and effects of disease associated with inadequate nutrition, nutritional contributions to diseases not asso­ciated with inadequate diet, and contributions of nutri­tion to health. Special attention will be given to health concerns of women and the differences in nutritional needs between genders.  *Seats or certain sections of this course will be restricted in Spring semesters to Nursing students.* | Clarify the restriction language and there is no Director/Chair HHS advisor. Students run around looking for someone who doesn't exist!  |
| BIOL 336 (3) | Coastal Environments. Considers the biological and physical processes that structure coastal environments and examines the application of marine science to the management of coastal resources. Investigates the impacts of the often conflicting uses of the coastal zone including fisheries, oil production and transportation, ocean dumping and coastal development. Coastal zone management tools and applications at local, state, federal, and international levels are discussed. *Not open to Biological Sciences majors except by consent of advisor. Fieldtrips outside the classroom may be required.* | Coastal Environments. Considers the biological and physical processes that structure coastal environments and examines the application of marine science to the management of coastal resources. Investigates the impacts of the often conflicting uses of the coastal zone including fisheries, oil production and transportation, ocean dumping and coastal development. Coastal zone management tools and applications at local, state, federal, and international levels are discussed. *Not open to Biological Sciences or Biotechnology majors except by consent of advisor. Field trip(s) during or outside of class (including weekends) may be required.*  | Field trip requirement clarified. |
| BIOL 338 (3) | Human Impact on the Environment. Considers the major areas where human use of resources and conse­quent waste production (chemical, industrial, and biological) have had a negative impact on specific environments and on the species that inhabit them. An attempt will be made to identify areas of future adverse human impact and to evolve remedial solutions.  | Human Impact on the Environment. Considers the major areas where human use of resources and conse­quent waste production (chemical, industrial, and biological) have had a negative impact on specific environments and on the species that inhabit them. An attempt will be made to identify areas of future adverse human impact and to evolve remedial solutions. *Field trip(s) during or outside of class (including weekends) may be required.*  | Adding warning about fieldtrips. |
| BIOL 351 (5) | Molecular Cell Biology. An integrated view of contemporary molecular biology, biochemistry, and cell biology. The fundamental principles of molecular biology including DNA replication, mechanisms and regula­tion of transcription and translation, and nucleic acid and protein structure and function will be presented and interwoven with some of the more traditional topics in cell biology and biochemistry. Examines the molecular basis of membrane structure and transport, cytoplasmic structure, and energy metabolism, organelle structure and function, cell motility, and cell-cell interaction and signal trans­duction. Three hours of lecture, one hour seminar, three hours laboratory. *Prerequisite: BIOL 210, 211, and 215 with grades of C (2.0) or better, or enrollment in Master of Science in Biology Program.*  | Molecular Cell Biology. An integrated view of contemporary molecular biology, biochemistry, and cell biology. The fundamental principles of molecular biology including DNA replication, mechanisms and regula­tion of transcription and translation, and nucleic acid and protein structure and function will be presented and interwoven with some of the more traditional topics in cell biology and biochemistry. Examines the molecular basis of membrane structure and transport, cytoplasmic structure, and energy metabolism, organelle structure and function, cell motility, and cell-cell interaction and signal trans­duction. Three hours of lecture, one hour seminar, three hours laboratory.  *Prerequisites: BIOL 210, 211, and 215 with grades of C (2.0) or better, or enrollment in the Biological Sciences graduate program.*  | Added 's' to prereq. Standardizing reference to our grad program throughout courses.  |
| BIOL 352 (4) | Genetics. Detailed study of classical transmission, molecular quantitative and population genetics. Included will be current observations and concepts of the nature, organization, function and regulation of the expression of genetic material. Subject matter covered includes mechanisms of genetic conveyance, recombination, mapping, mutation and repair, RNA and DNA viruses, karyotyping, human genetics, and genetics of organelles. *Three hours lecture and three hours laboratory. Prerequisite: BIOL 210, 211, 212, and 215 with grades of C (2.0) or better, or enrollment in Master of Science in Biology Program.*  | Genetics. Detailed study of classical transmission, molecular quantitative and population genetics. Included will be current observations and concepts of the nature, organization, function and regulation of the expression of genetic material. Subject matter covered includes mechanisms of genetic conveyance, recombination, mapping, mutation and repair, RNA and DNA viruses, karyotyping, human genetics, and genetics of organelles. *Three hours lecture and three hours laboratory. Prerequisites: BIOL 210, 211, 212, and 215 with grades of C (2.0) or better, or enrollment in the Biological Sciences graduate program.*  | Added 's' to prereq. Standardizing reference to our grad program throughout courses. |
| BIOL 353 (4) | Comparative Animal Physiology. A comparative survey of physiological adaptations including gas transport, metabolism, temperature and dehy­dration tolerance, and locomotion. *Three hours of lecture and three hours of labora­tory. Prerequisite: BIOL 210, 211, and 215 with grades of C (2.0) or better, or enrollment in Master of Science in Biology Program.* | Comparative Animal Physiology. A comparative survey of physiological adaptations including gas transport, metabolism, temperature and dehy­dration tolerance, and locomotion. *Three hours of lecture and three hours of labora­tory. Prerequisites: BIOL 210, 211, and 215 with grades of C (2.0) or better, or enrollment in the Biological Sciences graduate program.*  | Added 's' to prereq. Standardizing reference to our grad program throughout courses. |
| BIOL 354 (4) | Principles of Ecology. Discussion of major concepts in population, community, and evolutionary ecology including population growth and regulation, competition, predation, energetics, adapta­tions, and diversity. *Weekend field trips may be required. Three hours of lecture and three hours of laboratory. Prerequisite: BIOL 210, 211, 212, and 215 with grades of C (2.0) or better, or enrollment in Master of Science in Biology Program.*  | Principles of Ecology. Discussion of major concepts in population, community, and evolutionary ecology including population growth and regulation, competition, predation, energetics, adapta­tions, and diversity. *Field trip(s) during or outside of class (including weekends) may be required. Three hours of lecture and three hours of laboratory. Prerequisites: BIOL 210, 211, 212, and 215 with grades of C (2.0) or better, or enrollment in the Biological Sciences graduate program.*  | Added 's' to prereq, added details about fieldtrips. Standardizing reference to our grad program throughout courses. |
| BIOL 365 (3) | Computing Skills for Biologists. An introduction to basic data management, computation, visualization, and programming as related to the biological sciences. Focuses on the use of spreadsheets as tools to solve computational problems that are commonly encountered by working biologists, including numerical optimization, curve fitting, randomization testing, bootstrapping, and stochastic simulation modeling. *Prerequisites: BIOL 210 and BIOL 211 and BIOL 215.* | Computing Skills for Biologists. An introduction to basic data management, computation, visualization, and programming as related to the biological sciences. Focuses on the use of spreadsheets as tools to solve computational problems that are commonly encountered by working biologists, including numerical optimization, curve fitting, randomization testing, bootstrapping, and stochastic simulation modeling. *Prerequisites: BIOL 210, 211, and 215.* | Clean-up: removed extra and |
| BIOL 368L (1) | Developmental Biology Laboratory. Provides hands-on experience in techniques currently in use in developmental biology research. Techniques included may very from year to year as changes in the field warrant. Model organisms are used such as sponges, slime mold, sea urchin, C. Elegans, chicks, zebrafish, arabadopsis, and the fruit fly. Some techniques currently covered include cell-cell adhesion, in vitro fertilization, northern blotting, western blotting, and antibody based histochemical staining.  *Three hours laboratory. Recommended Preparation: BIOL 351 and 352. Co/Prerequisite: BIOL 368. Prerequisites: BIOL 210 and 211.* | Developmental Biology Laboratory. Provides hands-on experience in techniques currently in use in developmental biology research. Techniques included may very from year to year as changes in the field warrant. Model organisms are used such as sponges, slime mold, sea urchin, *C. elegans*, chicks, zebrafish, arabadopsis, and the fruit fly. Some techniques currently covered include cell-cell adhesion, in vitro fertilization, northern blotting, western blotting, and antibody based histochemical staining. *Three hours laboratory. Recommended Preparation: BIOL 351 and 352. Co/Prerequisite: BIOL 368.* | Fixed Latin capitalization issue. Omitted reference to Biol 210 and 211 since Biol 368 is a co/prereq. |
| BIOL 370 (3) | Plant Physiology. An examination of the physiological processes that contribute to plant growth and development, including the underlying molecular and genetic mechanisms. Areas covered include primary metabolism, water and nutrient relations, plant hormones, and plant biotechnology applications. *Three hours of lecture and three hours of laboratory. Recommended Preparation: BIOL 351. Prerequisites: BIOL 210 and 211.* | Plant Physiology. An examination of the physiological processes that contribute to plant growth and development, including the underlying molecular and genetic mechanisms. Areas covered include primary metabolism, water and nutrient relations, plant hormones, and plant biotechnology applications. *Recommended Preparation: BIOL 351. Prerequisites: BIOL 210 and 211.* | Clean-up: was lecture only, lab separate so don't need to mention lab time. |
| BIOL 370L (1) | Plant Physiology Lab. Provides hands-on experience with classical and molecular techniques utilized in modern plant physiology research, such as plant transformation, tissue culture, nucleic acid isolation, enzyme activity assays, and plant/pathogen challenge assays (specific subjects may vary by semester). *Three hours of laboratory. Pre/Corequisite: BIOL 370.* | Plant Physiology Lab. Provides hands-on experience with classical and molecular techniques utilized in modern plant physiology research, such as plant transformation, tissue culture, nucleic acid isolation, enzyme activity assays, and plant/pathogen challenge assays (specific subjects may vary by semester). *Three hours of laboratory. Co/Prerequisite: BIOL 370.* | Changed pre/co to co/pre to standardize |
| BIOL 372 (3) | Tissue Physiology and Structure. The physiology of tissues is intimately linked to their structure. Organ tissues out of homeostatic balance reflect consistent changes in their structure. Tissue physiology and structure explores the link between health and disease at the microscopic level by examining the interrelationship between microanatomical features and their function. Students will analyze the detailed structure and function of cells that comprise tissues, organs and organ systems, and how their structure dictates their specific physiological role in health and disease.  | Tissue Physiology and Structure. The physiology of tissues is intimately linked to their structure. Organ tissues out of homeostatic balance reflect consistent changes in their structure. Tissue physiology and structure explores the link between health and disease at the microscopic level by examining the interrelationship between micro-anatomical features and their function. Students will analyze the detailed structure and function of cells that comprise tissues, organs and organ systems, and how their structure dictates their specific physiological role in health and disease. *Prerequisites: BIOL 210 and 211.* | Added LD pre-req for student prep (missing). Added hypen. |
| BIOL 372L (1) | Tissue Physiology and Structure Lab. Students will examine detailed structure and function of cells and tissues, and how their structure dictates their specific physiological role. Techniques used to preserve, fix, stain and section tissues and pieces of organs for standard histological and pathological examination will be discussed, as well as specialized techniques (autoradiography, immunofluorescence, confocal microscopy, etc.). A comparison between normal tissues and pathological changes associated with homeostatic balance and disease will be examined. Students electing to take the laboratory will gain hands-on experience in collecting, embedding, sectioning and staining tissue sections. *May not be taken for credit by students who have received credit for BIOL 397-1. Prerequisites: BIOL 210 and 211. Co/Prerequisite: BIOL 372.* | Tissue Physiology and Structure Lab. Students will examine detailed structure and function of cells and tissues, and how their structure dictates their specific physiological role. Techniques used to preserve, fix, stain and section tissues and pieces of organs for standard histological and pathological examination will be discussed, as well as specialized techniques (autoradiography, immunofluorescence, confocal microscopy, etc.). A comparison between normal tissues and pathological changes associated with homeostatic balance and disease will be examined. Students electing to take the laboratory will gain hands-on experience in collecting, embedding, sectioning and staining tissue sections. *Co/Prerequisite: BIOL 372.* | Removed reference to old topics course last offered 2008. Omitted reference to Biol 210 and 211, since Biol 372 is a co/prereq. |
| BIOL 379 (4) | Invertebrate Biology. Introduction to the invertebrate phyla, with emphasis on struc­ture, function, adaptations, life histories, evo­lution and the interdependence of form, phy­si­ology, and ecology. Laboratory study will emphasize marine invertebrates of the San Diego area. *One Saturday field trip may be required. Three hours of lecture and three hours of laboratory. Prerequisites: BIOL 210 and 211.* | Invertebrate Biology. Introduction to the invertebrate phyla, with emphasis on struc­ture, function, adaptations, life histories, evo­lution and the interdependence of form, phy­si­ology, and ecology. Laboratory study will emphasize marine invertebrates of the San Diego area. *Field trip(s) during or outside of class (including weekends) may be required. Three hours of lecture and three hours of laboratory. Prerequisites: BIOL 210 and 211.* | Clarify field trip info. |
| BIOL 380 (3) | Comparative Animal Behavior. Experimental and theoretical investiga­tions in animal behavior, including humans. Interspecies compari­sons of sensory, motor, neural, and endo­crine structures and func­tioning. Influence of genetic, biochemical/ hormonal, and neurological factors on animal behavior. *One or more field trips may be required. Prerequisites: BIOL 210 and 211.*  | Comparative Animal Behavior. Experimental and theoretical investiga­tions in animal behavior, including humans. Interspecies compari­sons of sensory, motor, neural, and endo­crine structures and func­tioning. Influence of genetic, biochemical/ hormonal, and neurological factors on animal behavior. *Field trip(s) during or outside of class (including weekends) may be required. Prerequisites: BIOL 210 and 211.*  | Updating field trip language |
| BIOL 380L (1) | Animal Behavior Laboratory and Field Methods. Provides students with an introduction to ethology, and hands-on application of field research methods and behavioral research project study design, implementation, and data analyses. Students will learn the basic principles of tracking and conduct observational studies of local wildlife. *Three hours of laboratory. Optional field trips may be included. Pre/Corequisite: BIOL 380. Prerequisites: BIOL 210, 211, and 215.* | Animal Behavior Laboratory and Field Methods. Provides students with an introduction to ethology, and hands-on application of field research methods and behavioral research project study design, implementation, and data analyses. Students will learn the basic principles of tracking and conduct observational studies of local wildlife. *Three hours of laboratory. Optional field trips may be included. Co/Prerequisite: BIOL 380. Prerequisites: BIOL 210, 211, and 215.* | Clean-up: Changed pre/co to co/pre |
| BIOL 381 (3) | Plant Diversity. Introduction to the major taxonomic groupings of plants with emphasis on structure, function, adaptations, life histories, systematics, and evolution. Includes single cell to multicellular construction, water-to-land transition, structural adaptations, and trends in reproduction from cell division to simple sexual reproduction to well protected embryos and complex co-evolution of pollinators. *Three hours of lecture. Field trip outside of class may be required. Prerequisites: BIOL 210 and 211.* | Plant Diversity. Introduction to the major taxonomic groupings of plants with emphasis on structure, function, adaptations, life histories, systematics, and evolution. Includes single cell to multicellular construction, water-to-land transition, structural adaptations, and trends in reproduction from cell division to simple sexual reproduction to well protected embryos and complex co-evolution of pollinators.  *Field trip(s) during or outside of class (including weekends) may be required. Prerequisites: BIOL 210 and 211.* | Updated field trip language |
| BIOL 381L (1) | Plant Diversity Laboratory. Provides hands-on experience examining plants representing the diversity of plant life, including live cultures and specimens, microscopic materials, video clips, and preserved collections. Students will learn how to identify major groupings and representative genera by their distinguishing characteristics. Students will also learn a variety of microscopic and macroscopic techniques that will be useful in plant identification. *Three hours of laboratory. Field trip outside of class may be required. Corequisite: BIOL 381. Prerequisites: BIOL 210 and 211.*  | Plant Diversity Laboratory. Provides hands-on experience examining plants representing the diversity of plant life, including live cultures and specimens, microscopic materials, video clips, and preserved collections. Students will learn how to identify major groupings and representative genera by their distinguishing characteristics. Students will also learn a variety of microscopic and macroscopic techniques that will be useful in plant identification. *Three hours of laboratory. Field trip(s) during or outside of class (including weekends) may be required. Co/Prerequisite: BIOL 381.*  | Updated field trip language, changed lab to co/pre not just co so students can take lecture only if needed. Omitted Biol 210 and 211 prerequisites, as the lab cannot be taken alone, and Biol 381 is a co/pre. |
| BIOL 382 (3) | Biogeography. Introduction to the understanding of global biodiversity and the basis for geographic distribution patterns of individuals, populations and communities. The role of past geological and evolutionary events on these distributions will be considered. The considerable impact of humans on modern local to global range extensions will be studied including the basis for biological invasions. *May not be taken for credit by students who have received credit for BIOL 396-1. Prerequisites: BIOL 210 and 211.* | Biogeography. Introduction to the understanding of global biodiversity and the basis for geographic distribution patterns of individuals, populations and communities. The role of past geological and evolutionary events on these distributions will be considered. The considerable impact of humans on modern local to global range extensions will be studied including the basis for biological invasions. *Prerequisites: BIOL 210 and 211.* | Removed reference to old topics course offered in 2008 |
| BIOL 383 (3) | Tropical Ecology. A survey of the unmanaged and managed tropical terrestrial ecosystem and the biotic (living) and abiotic (non-living) factors that affect tropical ecosystem structure and function. Emphasis will be on the community dynamics and biogeochemical cycling of tropical ecosystems, and how these processes are affected by land-use and land-cover change. *This course will be taught together with BIOL 683 by the same instructor. Prerequisites: BIOL 210, 211, and 212.*  | Tropical Ecology. A survey of the unmanaged and managed tropical terrestrial ecosystem and the biotic (living) and abiotic (non-living) factors that affect tropical ecosystem structure and function. Emphasis will be on the community dynamics and biogeochemical cycling of tropical ecosystems, and how these processes are affected by land-use and land-cover change. *This course may be taught together with BIOL 683 by the same instructor. Prerequisites: BIOL 210, 211, and 212.*  | Changed will to 'may be taught…' as we don't always need to offer the grad portion |
| BIOL 384 (4) | Natural History of Southern California. Introduction to the natural history and community ecology of southern California. Major subjects include the climate, geology, and ecological factors that influence the local chaparral, coastal sage scrub, grassland, forest, desert, riparian, marsh, and estuarine communities of southern California. *Field trip(s) outside of class will be required. Prerequisites: BIOL 211.* | Natural History of Southern California. Introduction to the natural history and community ecology of southern California. Major subjects include the climate, geology, and ecological factors that influence the local chaparral, coastal sage scrub, grassland, forest, desert, riparian, marsh, and estuarine communities of southern California. *Three hours lecture and three hours laboratory. Field trip(s) during or outside of class (including weekends) will be required. Prerequisites: BIOL 210 and 211.* | Adding detail about lecture/lab, field trips, 210 pre req |
| BIOL 386 (3) | Terrestrial Ecology. A survey of terrestrial ecosystems and the biotic (living) and abiotic (non-living) factors that affect ecosystem structure and function. Emphasis will be on the important mass (C, H2O nutrient) and energy (production and consumption) fluxes that flow into, out of, and through terrestrial ecosystems, and the plant-animal interactions that regulate the rates and magnitudes of these mass and energy flows. *Weekend field trips may be required. Prerequisites: BIOL 210 and 211.*  | Terrestrial Ecology. A survey of terrestrial ecosystems and the biotic (living) and abiotic (non-living) factors that affect ecosystem structure and function. Emphasis will be on the important mass (C, H2O nutrient) and energy (production and consumption) fluxes that flow into, out of, and through terrestrial ecosystems, and the plant-animal interactions that regulate the rates and magnitudes of these mass and energy flows. *Field trip(s) during or outside of class (including weekends) may be required. Prerequisites: BIOL 210 and 211.*  | Updating field trip language |
| BIOL 386L (1) | Terrestrial Ecology Laboratory. Provides students with an introduction to laboratory and research techniques for quantifying the interactions between C, H2O and nutrient cycles of terrestrial ecosystems. Students will conduct observational and sampling studies of local ecosystems and manipulative experiments in the field, laboratory, and/or greenhouse. *May not be taken for credit by students who have received credit for BIOL 397D. Three hours of laboratory. Co/Prerequisite: BIOL 386. Prerequisites: BIOL 210 and 211.* | Terrestrial Ecology Laboratory. Provides students with an introduction to laboratory and research techniques for quantifying the interactions between C, H2O and nutrient cycles of terrestrial ecosystems. Students will conduct observational and sampling studies of local ecosystems and manipulative experiments in the field, laboratory, and/or greenhouse. *Three hours of laboratory. Co/Prerequisite: BIOL 386.*  | Removed reference to old topics course offered in 2001. Removed redundant pre-req of 210/211 as they have to have had that for 386, and 386 is co/pre for 386L. |
| BIOL 387 (3) | Ecological Processes in Aquatic Systems. Discusses the biological, physical, and chemical processes affecting marine and freshwater environments, and the interactions among these processes. Emphasis on productivity, nutrient dynamics, food webs, biogeochemical cycles and biogeography of pelagic systems. *One Saturday field trip may be required. Recommended Preparation: Concurrent enrollment in BIOL 387L, when also offered. Prerequisites: BIOL 210 and 211.*  | Ecological Processes in Aquatic Systems. Discusses the biological, physical, and chemical processes affecting marine and freshwater environments, and the interactions among these processes. Emphasis on productivity, nutrient dynamics, food webs, biogeochemical cycles and biogeography of pelagic systems. *Field trip(s) during or outside of class (including weekends) may be required. Concurrent enrollment in BIOL 387L is recommended, but not required. Prerequisites: BIOL 210 and 211.*   | Updating field trip language. Clarified role of Biol 387L.  |
| BIOL 387L (1) | Aquatic Ecology Lab. Provides students with experience in laboratory and field methods used by oceanographers and limnologists to sample populations, measure rate processes, and quantify the aquatic environment. *Prerequisites: BIOL 210 and 211. Pre/Corequisite: BIOL 387 or 388 or 389.* | Aquatic Ecology Lab. Provides students with experience in laboratory and field methods used by oceanographers and limnologists to sample populations, measure rate processes, and quantify the aquatic environment. *Co/prerequisite: BIOL 387 or 388 or 389.* | Changed pre/co to co/pre to standardize. Removed redundant pre-req of 210/211 as co/pre already carry those pre-reqs. |
| BIOL 388 (3) | Marine Communities. Examines the environmental characteristics, patterns of species distribution and abundance, and adaptations of organisms in marine benthic communities. Community structure and biological interactions including predation, competition, and symbiosis will be investigated in specific communities such as the rocky intertidal zone, lagoons, coral reefs, hydrothermal vents, and shallow polar seas. Human impacts on specific marine communities will be explored.  *Field trip(s) outside of class hours may be required. Prerequisites: BIOL 210 and 211.* | Marine Communities. Examines the environmental characteristics, patterns of species distribution and abundance, and adaptations of organisms in marine benthic communities. Community structure and biological interactions including predation, competition, and symbiosis will be investigated in specific communities such as the rocky intertidal zone, lagoons, coral reefs, hydrothermal vents, and shallow polar seas. Human impacts on specific marine communities will be explored. *Field trip(s) during or outside of class (including weekends) may be required. Prerequisites: BIOL 210 and 211.* | Updating field trip language |
| BIOL 389 (3) | Freshwater Biology. Introduction to the physical, chemical and biological processes in freshwater systems, including headwaters, streams, rivers, lakes, ponds, reservoirs, and vernal pools. Topics include biogeochemical cycling, controls on production, evolutionary selection, community patterns, population dynamics, and food web structure. Significant species in the open water and attached communities will be discussed regarding composition, environmental factors and role. Analyzes the impacts of using freshwaters for drinking water, irrigation, recreation, transportation, flood control, and power generation. *Field trip outside class may be required. Prerequisites: BIOL 210 and 211.* | Freshwater Biology. Introduction to the physical, chemical and biological processes in freshwater systems, including headwaters, streams, rivers, lakes, ponds, reservoirs, and vernal pools. Topics include biogeochemical cycling, controls on production, evolutionary selection, community patterns, population dynamics, and food web structure. Significant species in the open water and attached communities will be discussed regarding composition, environmental factors and role. Analyzes the impacts of using freshwaters for drinking water, irrigation, recreation, transportation, flood control, and power generation. *Field trip(s) during or outside of class (including weekends) may be required. Prerequisites: BIOL 210 and 211.* | Updating field trip language |
| BIOL 390 (3) | Terrestrial Plant Ecology. Survey of the factors that influence the distribution and abundance of land (terrestrial) plants. Focuses on plant population dynamics (e.g., dispersal, germi­nation, and recruitment), plant-plant and plant-animal interactions, and the effect of abiotic factors (e.g., climate, water, and nutrients) on the structure and function of terrestrial plant communities. *Weekend field trips may be required. This course will be taught together with BIOL 690 by the same instructor. Prerequisites: BIOL 210 and 211.* | Terrestrial Plant Ecology. Survey of the factors that influence the distribution and abundance of land (terrestrial) plants. Focuses on plant population dynamics (e.g., dispersal, germi­nation, and recruitment), plant-plant and plant-animal interactions, and the effect of abiotic factors (e.g., climate, water, and nutrients) on the structure and function of terrestrial plant communities. *Field trip(s) during or outside of class (including weekends) may be required. This course may be taught together with BIOL 690 by the same instructor. Prerequisites: BIOL 210 and 211.* | Updating field trip language. Changed will to 'may be taught…' as we don't always need to offer the grad portion |
| BIOL 390L (1) | Terrestrial Plant Ecology Laboratory. Provides students with an introduction to laboratory and research techniques in terrestrial plant ecology. Students will conduct experiments to investigate environmental controls on the physiology (including photosynthesis, respiration, and transpiration), growth, and resource allocation of land plants. Students will learn standard research techniques in plant ecology and utilize technology specifically designed to quantify plant function. Experiments will be conducted in the laboratory and green house, and weekend field trips may be required. *Three hours of laboratory. May not be taken for credit by students who have received credit for BIOL 397E. Prerequisites: BIOL 210 and 211. Co/Prerequisite: BIOL 390.*  | Terrestrial Plant Ecology Laboratory. Provides students with an introduction to laboratory and research techniques in terrestrial plant ecology. Students will conduct experiments to investigate environmental controls on the physiology (including photosynthesis, respiration, and transpiration), growth, and resource allocation of land plants. Students will learn standard research techniques in plant ecology and utilize technology specifically designed to quantify plant function. Experiments will be conducted in the laboratory and green house. *Three hours of laboratory. Field trip(s) during or outside of class (including weekends) may be required. Co/Prerequisite: BIOL 390.*  | Removed reference to old topics course (taught 2001). Updating field trip language. Removed redundant pre-req of 210/211 as the co/pre of 390 already carries those |
| BIOL 400 (3) | Vertebrate Biology. Introduction to vertebrate animals, including overview of their evolution, systematics, anatomy, physiology, ecology and behavior. Major subjects will include, water-to-land transition, origins of amniotic egg, flight and endothermy, patters of social organization and mating systems, and general life-history strategies. Courses will emphasize terrestrial vertebrates of the San Diego area. *Field trip(s) outside the class may be required. Prerequisites: BIOL 210, 211, and 212, or enrollment in Master of Science in Biology Program.*  | Vertebrate Biology. Introduction to vertebrate animals, including overview of their evolution, systematics, anatomy, physiology, ecology and behavior. Major subjects will include, water-to-land transition, origins of amniotic egg, flight and endothermy, patterns of social organization and mating systems, and general life-history strategies. Courses will emphasize terrestrial vertebrates of the San Diego area. *Field trip(s) during or outside of class (including weekends) may be required. Prerequisites: BIOL 210, 211, and 212, or enrollment in the Biological Sciences graduate program.*  | Updating field trip language. Standardizing reference to our grad program throughout courses. Fixed typo (“patters” to “patterns”). |
| BIOL 400L (1) | Vertebrate Biology Laboratory. Provides hands-on experience in identifying terrestrial vertebrates of Southern California. Using preserved specimens and interactive computer programs, students will learn to use and develop dichotomous species keys and to identify vertebrates by sight and sound. Students will design and conduct independent field research projects. Course will possibly include visits to local museums, zoos and aquaria. *Three hours of laboratory. Field trip(s) outside of class may be required. Co/Prerequisite: BIOL 400. Prerequisites: BIOL 210, 211, and 212, or enrollment in Master of Science in Biology Program.*  | Vertebrate Biology Laboratory. Provides hands-on experience in identifying terrestrial vertebrates of Southern California. Using preserved specimens and interactive computer programs, students will learn to use and develop dichotomous species keys and to identify vertebrates by sight and sound. Students will design and conduct independent field research projects. Course will possibly include visits to local museums, zoos and aquaria. *Three hours of laboratory. Field trip(s) during or outside of class (including weekends) may be required. Co/Prerequisite: BIOL 400.*  | Updating field trip information. Standardizing reference to our grad program throughout courses. Removed redundant pre-req of 210/211/212 or graduate program, since Biol 400 is co/pre. |
| BIOL 401 (4) | Comparative Vertebrate Anatomy. Comparison of similarities and differences among vertebrate groups on the basis of structure and function. Emphasis will be placed on the evolution and vertebrate structures, new roles for derived and ancestral characters, adaptation of new functions, relationship to life style, life history and evolutionary phylogeny. A major goal of this course is to generate a greater understanding of the evolutionary processes and concomitant structural changes that have occurred among vertebrates including humans. Laboratory study includes dissection, and analysis of organ systems, and evolutionary innovations among representative vertebrates.  *Prerequisites: Biology 210, 211, and 212.* | Comparative Vertebrate Anatomy. Comparison of similarities and differences among vertebrate groups on the basis of structure and function. Emphasis will be placed on the evolution and vertebrate structures, new roles for derived and ancestral characters, adaptation of new functions, relationship to life style, life history and evolutionary phylogeny. A major goal of this course is to generate a greater understanding of the evolutionary processes and concomitant structural changes that have occurred among vertebrates including humans. Laboratory study includes dissection, and analysis of organ systems, and evolutionary innovations among representative vertebrates.  *Three hours lecture and three hours lab. Prerequisites: BIOL 210, 211, and 212, or enrollment in the Biological Sciences graduate program.*  | Updated class info. Added option for grads to enroll directly. Standardizing reference to our grad program throughout courses. |
| BIOL 411 (3) | Animal Reproductive Physiology. Overview of the comparative structure and function of reproductive systems in animals, with in depth coverage of the reproductive physiology of select model species representing diverse taxa. Major topics will include sexual development, male and female reproductive cycles, gametogenesis, fertilization, implantation, gestation, birth, and lactation. Minor topics include mechanisms of environmental regulation of reproduction and applications of assisted reproductive technology. Course will emphasize evolution of diverse physiologic adaptations of the reproductive system. *One Saturday field trip may be required. Three hours of lecture. Recommended Preparation: BIOL 375. Enrollment Requirement: BIOL 212. Prerequisite: BIOL 353.*  | Animal Reproductive Physiology. Overview of the comparative structure and function of reproductive systems in animals, with in depth coverage of the reproductive physiology of select model species representing diverse taxa. Major topics will include sexual development, male and female reproductive cycles, gametogenesis, fertilization, implantation, gestation, birth, and lactation. Minor topics include mechanisms of environmental regulation of reproduction and applications of assisted reproductive technology. Course will emphasize evolution of diverse physiologic adaptations of the reproductive system. *Field trip(s) during or outside of class (including weekends) may be required. Recommended Preparation: BIOL 375. Prerequisites: BIOL 212 and 353 or enrollment in the Biological Sciences graduate program.*  | Updating field trip language, moved BIOL 212 to pre-req instead of ER, as course is offered enough now and is necessary prep for success in 411. Standardizing reference to our grad program throughout courses. |
| BIOL 411L (1) | Animal Reproductive Physiology Laboratory. Provides hands-on exploration of the anatomy, histology and physiology of the male and female reproductive system in a wide variety of animal species, including laboratory animals, livestock and wildlife. Both preserved specimens and computer programs will be used in the course to explore the diversity of physiologic adaptations of the reproductive system in animals. *Optional field trips may be included. Three hours of laboratory. Recommended Preparation: BIOL 375. Enrollment Requirement BIOL 212: Prerequisite: BIOL 353. Co/Prerequisite: BIOL 411.*  | Animal Reproductive Physiology Laboratory. Provides hands-on exploration of the anatomy, histology and physiology of the male and female reproductive system in a wide variety of animal species, including laboratory animals, livestock and wildlife. Both preserved specimens and computer programs will be used in the course to explore the diversity of physiologic adaptations of the reproductive system in animals. *Field trip(s) during or outside of class (including weekends) may be required. Three hours of laboratory. Recommended Preparation: BIOL 375. Co/Prerequisite: BIOL 411.*  | Cleaning up field trip language. Standardizing reference to our grad program throughout courses. Removing redundant prerequisites, as Biol 411 is a co/pre. |
| BIOL 420 (4) | Ecological Monitoring. An overview of the various approaches used to assess ecological condition (status) and change over time (trend) for ecosystems, vegetation types, populations, and biological communities. Lectures that provide conceptual understanding will be combined with hands-on practical exercises in the lab, so that students will be prepared to apply their knowledge to real-world conservation problems. *Prerequisites: BIOL 215 and BIOL 354.* | Ecological Monitoring. An overview of the various approaches used to assess ecological condition (status) and change over time (trend) for ecosystems, vegetation types, populations, and biological communities. Lectures that provide conceptual understanding will be combined with hands-on practical exercises in the lab, so that students will be prepared to apply their knowledge to real-world conservation problems. *Three hours lecture and three hours laboratory. This course may be taught together with BIOL 620 by the same instructor. Prerequisites: BIOL 215 and BIOL 354.* | Added detail about course time, and option for grads to enroll directly. Standardizing reference to our grad program throughout courses. The class is now dual-listed with Biol 620, which may be offered simultaneously. |
| BIOL 452 (3) | Medical Genetics. The study of genetic principles as it relates to the practice of medicine. Emphasis will be placed on the diagnosis, treatments, and inheritance of genetic diseases, mapping of disease genes to their chromosome locations, study of the molecular genetics and pathogenesis of inherited disorders, and investigations of methods for gene therapy. A major goal for this course is to provide a foundation in medical genetics with emphasis on critical thinking skills including primary literature reviews and problem based learning of genetic disorders. *Enrollment Requirement: BIOL 210, 211, 212. Prerequisite: BIOL 352.*  | Medical Genetics. The study of genetic principles as it relates to the practice of medicine. Emphasis will be placed on the diagnosis, treatments, and inheritance of genetic diseases, mapping of disease genes to their chromosome locations, study of the molecular genetics and pathogenesis of inherited disorders, and investigations of methods for gene therapy. A major goal for this course is to provide a foundation in medical genetics with emphasis on critical thinking skills including primary literature reviews and problem based learning of genetic disorders. *Prerequisite: BIOL 212 and 352, or enrollment in the Biological Sciences graduate program.*  | Changed ER to pre-req, 352 requires 210 and 211 so removed reference to those. Added option for grads to enroll directly. Standardizing reference to our grad program throughout courses. |
| BIOL 463 (3) | Principles of Conservation Biology. An in-depth focus on the principles and practices of conservation and restoration ecology. Factors that affect the creation, destruction, and distribution of biological diversity are examined. Class discussions and assignments will focus on human destruction and degradation of habitats, invasive species introductions, accelerated species extinctions, pollution, global climate change, and species over-exploitation. The selection and maintenance of conservation areas will be explored, as well as the theory and methodology for restoring degraded habitats. *Field trip(s) outside of class may be required. May not be repeated for credit by students who have received credit for BIOL 363. Co/Prerequisite: BIOL 354. Prerequisite: BIOL 210 and 211.* | Principles of Conservation Biology. An in-depth focus on the principles and practices of conservation and restoration ecology. Factors that affect the creation, destruction, and distribution of biological diversity are examined. Class discussions and assignments will focus on human destruction and degradation of habitats, invasive species introductions, accelerated species extinctions, pollution, global climate change, and species over-exploitation. The selection and maintenance of conservation areas will be explored, as well as the theory and methodology for restoring degraded habitats. *Field trip(s) during or outside of class (including weekends) may be required. May not be repeated for credit by students who have received credit for BIOL 363. This course may be taught together with BIOL 663 by the same instructor. Co/Prerequisite: BIOL 354.*  | Updating field trip language, removing unnecessary reference to 210,211 because they are required for 354. Added option for grads to enroll directly. This class is now dual-listed with Biol 663, and they may be offered simultaneously. |
| BIOL 477 (3) | Immunology. Study of the mammalian immune system at the molecular and cellular level. Mechanisms of immu­nology, such as generation of unique receptor specificities, transduction of signals through T and B cell receptors, programmed cell death and lymphocyte selection, regulation of responses by growth factors and cytokines, and cell-cell interactions, are explored. The course perspectives includes historical and technological aspects of modern immuno­biology. *May not be taken for credit by students who have received credit for BIOL 377. Prerequisites: BIOL 210 and 211.*  | Immunology. Study of the mammalian immune system at the molecular and cellular level. Mechanisms of immu­nology, such as generation of unique receptor specificities, transduction of signals through T and B cell receptors, programmed cell death and lymphocyte selection, regulation of responses by growth factors and cytokines, and cell-cell interactions, are explored. The course perspectives includes historical and technological aspects of modern immuno­biology. *Prerequisite: BIOL 351 or BIOT 355, or enrollment in the Biological Sciences graduate program.*  | Removed reference to old topics course (taught 2008). Updated pre-req for course. Added option for grads to enroll directly. Standardizing reference to our grad program throughout courses. |
| BIOL 477L (1) | Immunology Lab. As a complementary course to Immunology (BIOL 477), this technique-oriented course will cover modern immunological assays and methodologies. Specific techniques covered in detail include hemagluttination, ELISAs, immunoprecipitation and Western blot assays. A section on animal handling, targeting animal research ethics, rodent handling and tissue dissection will be explored. Students will also be exposed to immunological database and algorithmic tools in a bioinformation unit. *May not be taken for credit by students who have received credit for BIOL 377L. Three hours of laboratory. Co/Prerequisite: BIOL 477.* | Immunology Lab. As a complementary course to Immunology (BIOL 477), this technique-oriented course will cover modern immunological assays and methodologies. Specific techniques covered in detail include hemagluttination, ELISAs, immunoprecipitation and Western blot assays. A section on animal handling, targeting animal research ethics, rodent handling and tissue dissection will be explored. Students will also be exposed to immunological database and algorithmic tools in a bioinformation unit. *Three hours of laboratory. Co/Prerequisite: BIOL 477, or enrollment in the Biological Sciences graduate program.*  | Removed reference to old topics course (as for 477), added option for grads to enroll directly. Standardizing reference to our grad program throughout courses. |
| BIOL 480 (4) | Bioinformatics. An overview of the field of bioinformatics, which lies at the crossroads between the fields of molecular biology and computer science, and examines the structure and function of genes, proteins, and whole genomes through the use of computation analysis, statistics, and pattern recognition. A combination of lecture/class discussions and hands-on instruction in the use of, and theory behind bioinformatics algorithms/software used in genome analysis will be presented. *Three hours of lecture and three hours of laboratory. Prerequisite: BIOL 351.* | Bioinformatics. An overview of the field of bioinformatics, which lies at the crossroads between the fields of molecular biology and computer science, and examines the structure and function of genes, proteins, and whole genomes through the use of computation analysis, statistics, and pattern recognition. A combination of lecture/class discussions and hands-on instruction in the use of, and theory behind bioinformatics algorithms/software used in genome analysis will be presented. *Three hours of lecture and three hours of laboratory. Prerequisite: BIOL 351, or enrollment in the Biological Sciences graduate program.*  | Added option for grads to enroll directly. Standardizing reference to our grad program throughout courses. |
| BIOL 486 (1-3) | Topics in Advanced Biology. Selected advanced topics in Biological Sciences with emphasis on current problems and advances in sub-disciplines of biology. *Prerequisites: BIOL 210 and 211. Note: There may be other prerequisites depending on topic. Students should check the Class Schedule for listing of actual topics.* | Topics in Advanced Biology. Selected advanced topics in Biological Sciences with emphasis on current problems and advances in sub-disciplines of biology. *Prerequisites: BIOL 210 and 211, or enrollment in Biological Sciences graduate program. Note: There may be other prerequisites depending on topic. Students should check the Class Schedule for listing of actual topics.* | Added option for grads to enroll directly. Standardizing reference to our grad program throughout courses. |
| BIOL 487 (1) | Topics in Advanced Biology Lab. Advanced laboratory experience that explores phenomena and techniques in the biological sciences. *Prerequisites: BIOL 210 and 211. Note: There may be other prerequisites depending on topic. Note: There may be corequisites if companion lecture is offered. Students should check the Class Schedule for listing of actual topics.* | Topics in Advanced Biology Lab. Advanced laboratory experience that explores phenomena and techniques in the biological sciences. *Prerequisites: BIOL 210 and 211, or enrollment in the Biological Sciences graduate program. Note: There may be other prerequisites depending on topic. Note: There may be corequisites if companion lecture is offered. Students should check the Class Schedule for listing of actual topics.* | Added option for grads to enroll directly. Standardizing reference to our grad program throughout courses. |
| BIOL 488 (2) | Seminar in Biomedical Research. Provides a foundation in biomedical research and effective communication practices for students preparing for biomedical research careers. Integrates disciplinary approaches to biomedical research around fundamental principles and practices of scientific method, research ethics and responsible conduct, and the organization of scientific inquiry in institutions of higher learning. *Subject matter will change each semester. May be repeated for a total of eight (8) units. Enrollment restricted to students who have obtained consent of instructor.* | Seminar in Biomedical Research. Provides a foundation in biomedical research and effective communication practices for students preparing for biomedical research careers. Integrates disciplinary approaches to biomedical research around fundamental principles and practices of scientific method, research ethics and responsible conduct, and the organization of scientific inquiry in institutions of higher learning. *Subject matter will change each semester. May be repeated, but no more than four (4) units of credit may be applied to the Biological Sciences major. Enrollment restricted to students who have obtained consent of instructor.* | Clarifying repetition and number of units that can be applied to degree. |
| BIOL 495 (3) | Internship in Biology. Career-related laboratory and/or field experience in private industry and public agencies. All participants utilize learning agreements. A final written report is required. Students will be supervised both on site and by the course instructor. Includes participation in a one hour seminar each week. The learning agreement form must be completed and signed prior to enrollment. *May be repeated for a maxi­mum of six (6) units, but only three (3) units can be applied toward the major. Enrollment restricted to students who have obtained consent of instructor prior to registration.* | Internship in Biology. Career-related laboratory and/or field experience in private industry and public agencies. All participants utilize learning agreements. A final written report is required. Students will be supervised both on site and by the course instructor. Includes participation in a one hour seminar each week. The learning agreement form must be completed and signed prior to enrollment. *May be repeated for a maximum of six (6) units, but only three (3) units can be applied toward the major. Enrollment restricted to students who have obtained consent of instructor.* | Clean-up - removed prior to registration |
| BIOL 496A (1) 496B (2)  | Supervised Laboratory Instruction. Experience for senior biology majors in the organization of and techniques for teaching a laboratory in biology. Includes individual supervision of directed teaching. A written report is required.  *May be repeated for a maximum of two (2) units (one hour conference and three hours lab per unit). Enrollment Requirement: BIOL 210 and 211. Enrollment restricted to students who have obtained consent of instructor.* | Supervised Laboratory Instruction. Experience for senior biology majors in the organization of and techniques for teaching a laboratory in biology. Includes individual supervision of directed teaching. A written report is required. *May be repeated, but no more than two (2) units may be applied to the major. Enrollment restricted to students who have obtained consent of instructor.* | Updating repetition language and removed ER |
| BIOL 498 (2) | Senior Library Thesis. In-depth reading and researching of the literature on current issues in biology. The student must consult with a biology faculty member to decide on the topic and then produce a (approximately) 30-page paper with supporting citations that summarizes the current state of knowledge on the topic. *Enrollment restricted to students who have obtained consent of instructor*. | Senior Library Thesis. In-depth reading and researching of the literature on current issues in biology. The student must consult with a biology faculty member to decide on the topic and then produce a (approximately) 30-page paper with supporting citations that summarizes the current state of knowledge on the topic. *May be repeated, but no more than two (2) units may be applied to the major. Enrollment restricted to students who have obtained consent of instructor.* | Clarified repetition language |
| BIOL 499 (2) | Senior Laboratory Thesis. Research project in the laboratory or field, generated in collaboration with a biology faculty member. *Enrollment Requirement: At least one course related to the subject area completed with a B or better. Prerequisite: BIOL 489. Enrollment restricted to students who have obtained consent of instructor.*  | Senior Laboratory Thesis. Research project in the laboratory or field, generated in collaboration with a biology faculty member. *May be repeated, but no more than two (2) units may be applied to the major. Enrollment restricted to students who have obtained consent of instructor.* | Removed outdated enrollment requirement - we prefer instructor consent to determine enrollment suitability. |
| BIOL 502 (3) | Population Genetics. Patterns of the distribution of genes in populations with emphasis on quantitative genetics, gene frequency, selection of the effects of mutation on populations. Genetic mechanisms in evolution are considered. *Prerequisite for undergraduates and enrollment requirement for graduate students: BIOL 352.* | Population Genetics. Patterns of the distribution of genes in populations with emphasis on quantitative genetics, gene frequency, selection and the effects of mutation on populations. Genetic mechanisms in evolution are considered. *Prerequisite: BIOL 352, or enrollment in the Biological Sciences graduate program.*  | Added specificity to bio grads. Standardizing reference to our grad program throughout courses. Changed wording from “selection of” to “selection and”. |
| BIOL 503 (3) | Modern Molecular Biology and Genomics. An introduction to modern application of molecular biology, including genomics. Specific topics covered will include genome sequencing, transcript profiling, genome-wide association studies, and large scale mutagenesis. Using the primary literature as a guide, the class explores both the technologies that underlie modern molecular biology and the impacts that current studies are having on our understanding of all biology, from agriculture to human disease. Accompanying laboratory provides students with hands-on experience in the analysis of genomic data sets. *May not be taken for credit by students who have received credit for BIOL 596G, 403. Enrollment requirement for graduate students and prerequisite for undergraduates: BIOL 351 or BIOT 355.* | Modern Molecular Biology and Genomics. An introduction to modern application of molecular biology, including genomics. Specific topics covered will include genome sequencing, transcript profiling, genome-wide association studies, and large scale mutagenesis. Using the primary literature as a guide, the class explores both the technologies that underlie modern molecular biology and the impacts that current studies are having on our understanding of all biology, from agriculture to human disease. Accompanying laboratory provides students with hands-on experience in the analysis of genomic data sets. *May not be taken for credit by students who have received credit for BIOL 596G. Prerequisite: BIOL 351 or BIOT 355, or enrollment in the Biological Sciences graduate program.*  | Removed reference to BIOL 403, updated pre-req language. Standardizing reference to our grad program throughout courses. |
| BIOL 504 (4) | Virology. A comparative survey of bacterial, animal and plant virus variations, including retroviruses and prions. Emphasis is placed upon the variations in structure, nucleic acid composition, and replication patterns. The relationship of viruses to disease is given serious considera­tion. C*o/Prerequisites: BIOL 352, or enrollment in Master of Science in Biology Program.*  | Virology. A comparative survey of bacterial, animal and plant virus variations, including retroviruses and prions. Emphasis is placed upon the variations in structure, nucleic acid composition, and replication patterns. The relationship of viruses to disease is given serious considera­tion. *Prerequisite: BIOL 351 or BIOT 355, or enrollment in the Biological Sciences graduate program.*  | Changed pre-req for better prep by students. Standardizing reference to our grad program throughout courses. |
| BIOL 505 (3) | Physiological Ecology. Advanced exploration of the interactions between animals and their environment. Focuses on major life processes such as respiration, endothermy versus ectothermy, torpor, hibernation, and the physiological trade-offs between growth, storage, reproduction and survival. Physiological features of animals that permit them to live in extreme environments including the deep sea, deserts, boreal/polar regions, and caves will be discussed. *Field trip(s) outside of class may be required. Prerequisites: BIOL 210, 211, and 353, or enrollment in Master of Science in Biology Program.*  | Physiological Ecology. Advanced exploration of the interactions between animals and their environment. Focuses on major life processes such as respiration, endothermy versus ectothermy, torpor, hibernation, and the physiological trade-offs between growth, storage, reproduction and survival. Physiological features of animals that permit them to live in extreme environments including the deep sea, deserts, boreal/polar regions, and caves will be discussed. *Field trip(s) during or outside of class (including weekends) may be required. Prerequisite: BIOL 353, or enrollment in the Biological Sciences graduate program.*  | Updated field trip language and pre req language. Standardizing reference to our grad program throughout courses. |
| BIOL 512 (3) | Physiology of Aging. Examines changes in animal physiology that occurs during aging. Subjects include evolutionary and proximate causes of aging, physiological mechanisms proposed to explain aging, and methods to study and to manipulate rate of aging (e.g. caloric restriction). Both theoretical concepts and empirical examples will be addressed. *Prerequisite for undergraduates and enrollment requirement for graduate students: BIOL 353.*  | Physiology of Aging. Examines changes in animal physiology that occurs during aging. Subjects include evolutionary and proximate causes of aging, physiological mechanisms proposed to explain aging, and methods to study and to manipulate rate of aging (e.g. caloric restriction). Both theoretical concepts and empirical examples will be addressed. *Prerequisite: BIOL 353, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 513 (3) | Ecology of Parasitism. Parasites have regulatory effects on host populations, impart significant economic impact, and are sensitive indicators of pollution as well as other natural and anthropogenic effects. Examines the interaction of parasites with their hosts. The host-parasite interaction creates a unique physiological and genetic system as both host and parasite adjust and adapt to the pressures imposed by the other. Modes of parasitism, life cycles, mechanisms of infection, alteration of host behavior, and novel physiological pathways will be examined as a biological arms race is waged between genetically distinct organisms. *Prerequisite: BIOL 354, or enrollment in Master of Science in Biology Program.* | Ecology of Parasitism. Parasites have regulatory effects on host populations, impart significant economic impact, and are sensitive indicators of pollution as well as other natural and anthropogenic effects. Examines the interaction of parasites with their hosts. The host-parasite interaction creates a unique physiological and genetic system as both host and parasite adjust and adapt to the pressures imposed by the other. Modes of parasitism, life cycles, mechanisms of infection, alteration of host behavior, and novel physiological pathways will be examined as a biological arms race is waged between genetically distinct organisms. *Prerequisite: BIOL 354, or enrollment in the Biological Sciences graduate program.*  | Updating language. Standardizing reference to our grad program throughout courses. |
| BIOL 514 (3) | Physiology of Parasitism. Examines the physiology of hosts and parasites including how host physiology affects its susceptibility to parasites and subsequent host response to infection. Explores how parasite physiology influences their ability to infect hosts. Subjects will range from whole animal metabolism and immune response to specific biochemical pathways that change during parasitism. Both theoretical concepts and empirical examples will be addressed. *Prerequisite for undergraduates and enrollment requirement for graduate students: BIOL 353.* | Physiology of Parasitism. Examines the physiology of hosts and parasites including how host physiology affects its susceptibility to parasites and subsequent host response to infection. Explores how parasite physiology influences their ability to infect hosts. Subjects will range from whole animal metabolism and immune response to specific biochemical pathways that change during parasitism. Both theoretical concepts and empirical examples will be addressed. *Prerequisite: BIOL 353, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 515 (3) | Medical Physiology. An advanced study of human physiology, particularly as it relates to disease. Examines physiological systems at the molecular, cellular and organ levels. Consists of lectures, student reviews of current articles from medical journals, group presentations, and class discussions designed as an in-depth examination of a particular disease, its causes and current treatments. Subjects will be organized around physiological systems and their defects. *May not be taken for credit by students who have received credit for BIOL 596A. Prerequisite for undergraduates and enrollment requirement for graduate students: BIOL 353.*  | Medical Physiology. An advanced study of human physiology, particularly as it relates to disease. Examines physiological systems at the molecular, cellular and organ levels. Consists of lectures, student reviews of current articles from medical journals, group presentations, and class discussions designed as an in-depth examination of a particular disease, its causes and current treatments. Subjects will be organized around physiological systems and their defects. *Prerequisite: BIOL 353, or enrollment in the Biological Sciences graduate program.*  | Removed reference to old topics course (taught last in 2000 or 2004). Standardizing reference to our grad program throughout courses. |
| BIOL 520 (3) | Advanced Molecular Cell Biology. Treatment of contemporary areas of interest in cell biology, molecular genetics, and development. Subjects covered may include, but are not limited to, the cell cycle, signal transduction and cell-cell communication, the regulation of gene expression, determination and differentiation, and oncogenes. *May not be taken for credit by students who have received credit for BIOL 428. Recommended Preparation: BIOL 368 and CHEM 304. Prerequisite for undergraduates and enrollment requirement for graduate students: BIOL 351 and 352.*  | Advanced Molecular Cell Biology. Treatment of contemporary areas of interest in cell biology, molecular genetics, and development. Subjects covered may include, but are not limited to, the cell cycle, signal transduction and cell-cell communication, the regulation of gene expression, determination and differentiation, and oncogenes. *Recommended Preparation: BIOL 368 and CHEM 304. Prerequisites: BIOL 351 and BIOL 352, or enrollment in the Biological Sciences graduate program.*  | Removed reference to old topics course (taught last in 1995). Standardizing reference to our grad program throughout courses. |
| BIOL 531 (3) | Biological Data Analysis I — Linear Models. A large fraction of common statistical analysis types in the biological sciences can be expressed as a linear model. Teaches students to use linear models to statistically analyze data, and emphasizes the conceptual unity of seemingly disparate analytical techniques. Specific analysis types will include: analysis of variance, analysis of covariance, linear regression, logistic regression, and log linear models. New advances in likelihood-based model selection will also be addressed. Additional subjects will be selected by students.  *Prerequisites: BIOL 215 or enrollment in Master of Science in Biology Program.* | Biological Data Analysis I — Linear Models. A large fraction of common statistical analysis types in the biological sciences can be expressed as a linear model. Teaches students to use linear models to statistically analyze data, and emphasizes the conceptual unity of seemingly disparate analytical techniques. Specific analysis types will include: analysis of variance, analysis of covariance, linear regression, logistic regression, and log linear models. New advances in likelihood-based model selection will also be addressed. Additional subjects will be selected by students. *Prerequisite: BIOL 215, or enrollment in the Biological Sciences graduate program.*  | Updating language. Standardizing reference to our grad program throughout courses. |
| BIOL 532 (3) | Biological Data Analysis II — Multivariate Analysis. From molecular biology to ecosystem studies, technology is facilitating collection of large, multivariate biological data sets. Multivariate analyses seek to simplify, summarize, and test hypotheses about these complex data sets. Addresses major issues in multivariate analysis, and will introduce students to common analysis types and visualization approaches. Subjects covered will include: principal components analysis, discriminant analysis, canonical correlation, and redundancy analysis. Additional subjects will be selected by students based on their needs and interests.  *Prerequisites: BIOL 215 or enrollment in Master of Science in Biology Program.* | Biological Data Analysis II — Multivariate Analysis. From molecular biology to ecosystem studies, technology is facilitating collection of large, multivariate biological data sets. Multivariate analyses seek to simplify, summarize, and test hypotheses about these complex data sets. Addresses major issues in multivariate analysis, and will introduce students to common analysis types and visualization approaches. Subjects covered will include: principal components analysis, discriminant analysis, canonical correlation, and redundancy analysis. Additional subjects will be selected by students based on their needs and interests.  *Prerequisite: BIOL 215, or enrollment in the Biological Sciences graduate program.*  | Updating language. Standardizing reference to our grad program throughout courses. |
| BIOL 533 (4) | Geographic Information Systems Applications in Landscape Ecology. Explores how landscape structure and pattern affect ecological processes, at the individual, population, community, and ecosystem levels. Applications to land use planning and conservation biology will be covered. The primary enabling technologies for this new, rapidly growing discipline include remote sensing (such as satellite imagery) and geographic information systems (GIS), which will be covered during a weekly lab session.  | Geographic Information Systems Applications in Landscape Ecology. Explores how landscape structure and pattern affect ecological processes, at the individual, population, community, and ecosystem levels. Applications to land use planning and conservation biology will be covered. The primary enabling technologies for this new, rapidly growing discipline include remote sensing (such as satellite imagery) and geographic information systems (GIS), which will be covered during a weekly lab session. *Prerequisite: BIOL 354, or enrollment in the Biological Sciences graduate program.*  | Added pre-req of BIOL 354 for undergrads to make sure they are prepared for this 500 level course. Standardizing reference to our grad program throughout courses. |
| BIOL 535 (3) | Ecological Modeling. An introduction to the use and development of mathematical models for simulating dynamics of ecological systems. Ecological theory will be considered through the development of mathematical models. Models developed for simulating the effects of abiotic and biotic controls on ecological processes include continuous-and discrete-time population models, “gap” models, cellular automata, fisheries, and biogeochemical and biogeographical models. *Enrollment Requirement: BIOL 210 and 211. Prerequisite for undergraduates and enrollment requirement for graduate students: BIOL 354.* | Ecological Modeling. An introduction to the use and development of mathematical models for simulating dynamics of ecological systems. Ecological theory will be considered through the development of mathematical models. Models developed for simulating the effects of abiotic and biotic controls on ecological processes include continuous-and discrete-time population models, “gap” models, cellular automata, fisheries, and biogeochemical and biogeographical models. *Prerequisite: BIOL 354, or enrollment in the Biological Sciences graduate program.*  | Removed 210/211 reference as they are required for 354 already. Standardizing reference to our grad program throughout courses. |
| BIOL 536 (3) | Biogeochemical Cycles and Global Change. Biological, chemical, and physical processes controlling the transport and transformation of carbon, nitrogen, phosphorus, sulfur, and trace metals in natural ecosystems and at the global level. Global models of the major elemental and hydrologic cycles are discussed, with emphasis on the linkages between cycles and the effects of human perturbations. *Enrollment Requirement: BIOL 210 and 211. Prerequisite for undergraduates and enrollment requirement for graduate students: BIOL 354.* | Biogeochemical Cycles and Global Change. Biological, chemical, and physical processes controlling the transport and transformation of carbon, nitrogen, phosphorus, sulfur, and trace metals in natural ecosystems and at the global level. Global models of the major elemental and hydrologic cycles are discussed, with emphasis on the linkages between cycles and the effects of human perturbations. *Prerequisite: BIOL 354, or enrollment in the Biological Sciences graduate program.*  | Removed 210/211 reference as they are required for 354 already. Standardizing reference to our grad program throughout courses. |
| BIOL 537 (3) | Microbial Physiology. Current concepts and research involving the interactions of microorganisms with their environment, particularly those environments affecting human health. Demonstrates the interrelatedness of microbial ecology and medical microbiology. The course will (1) present modern experimental techniques used in conducting these interdisciplinary studies; (2) emphasize unusual bacteria pathways and cell signaling mechanisms found across the Bacteria, Archea and Eukarya, and (3) discuss the roles of microbial physiology in parthogenesis and the biotechnology industry. *Prerequisite for undergraduates and enrollment requirement for graduate student: BIOL 351 or 367.* | Microbial Physiology. Current concepts and research involving the interactions of microorganisms with their environment, particularly those environments affecting human health. Demonstrates the interrelatedness of microbial ecology and medical microbiology. The course will (1) present modern experimental techniques used in conducting these interdisciplinary studies; (2) emphasize unusual bacteria pathways and cell signaling mechanisms found across the Bacteria, Archea and Eukarya, and (3) discuss the roles of microbial physiology in parthogenesis and the biotechnology industry. *Prerequisite: BIOL 351 or BIOL 367, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 540 (3) | Molecular Methods in Ecology and Evolution. Theory and practical application of modern molecular tools to identify and study ecological and evolu­tionary relation­ships. *Two hours lecture and three hours laboratory. Prerequisite for undergraduates and enrollment requirement for graduate students: BIOL 352.* | Molecular Methods in Ecology and Evolution. Theory and practical application of modern molecular tools to identify and study ecological and evolu­tionary relation­ships. *Two hours lecture and three hours laboratory. Prerequisite: BIOL 352, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 560 (2) | Seminar in Molecular Cell Biology. Readings from the original literature, discussions, and writing on selected cur­rent subjects in cell and molecular biology. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 351 for undergraduates, or enrollment in Master of Science in Biology Program.* | Seminar in Molecular Cell Biology. Readings from the original literature, discussions, and writing on selected cur­rent subjects in cell and molecular biology. May be repeated with new content for a maximum of four (4) units toward the Master’s degree. *Prerequisite: BIOL 351, or enrollment in the Biological Sciences graduate program.*  | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 561 (2) | Seminar in Genetics. Readings from the original literature, discussions, and writing on selected current subjects in genetics. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 352 for undergraduates, or enrollment in Master of Science in Biology Program.* | Seminar in Genetics. Readings from the original literature, discussions, and writing on selected current subjects in genetics. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 352 for undergraduates, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 563 (2) | Seminar in Physiology. Readings from the original literature, discussions, and writing on selected current subjects in physiology. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 353 for undergraduates, or enrollment in Master of Science in Biology Program.* | Seminar in Physiology. Readings from the original literature, discussions, and writing on selected current subjects in physiology. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 353 for undergraduates, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 564 (2) | Seminar in Evolution. Readings from the original literature, discussions, and writing on selected current subjects in evolution. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 212 for undergraduates, or enrollment in Master of Science in Biology Program.* | Seminar in Evolution. Readings from the original literature, discussions, and writing on selected current subjects in evolution. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 212 for undergraduates, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 565 (2) | Seminar in Ecology. Readings from the original literature, discussions, and writing on selected current subjects in ecology. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 354 for undergraduates, or enrollment in Master of Science in Biology Program.* | Seminar in Ecology. Readings from the original literature, discussions, and writing on selected current subjects in ecology. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 354 for undergraduates, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 566 (2) | Seminar in Aquatic Biology. Readings from the original literature, discussions, and writing on selected current subjects in aquatic biology. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 354 for undergraduates, or enrollment in Master of Science in Biology Program.* | Seminar in Aquatic Biology. Readings from the original literature, discussions, and writing on selected current subjects in aquatic biology. *May be repeated with new content for a maximum of four (4) units toward the Master’s degree. Prerequisites: BIOL 354 for undergraduates, or enrollment in the Biological Sciences graduate program.* | Clean-up enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 576 (1) | Laboratory Experience in Neurobiology. Provides hands-on experience using the latest techniques in neurophysiology. Students will record intracellular signals in neurons using an invertebrate model nervous system. Students will gain experience in physiological and anatomical techniques. *Three hours of laboratory. May not be taken for credit by students who have received credit for BIOL 597A. Co/Prerequisite: BIOL 476.* | Laboratory Experience in Neurobiology. Provides hands-on experience using the latest techniques in neurophysiology. Students will record intracellular signals in neurons using an invertebrate model nervous system. Students will gain experience in physiological and anatomical techniques.  *Three hours of laboratory. Co/Prerequisite: BIOL 476, or enrollment in the Biological Sciences graduate program.*  | Removed reference to old topics course (last taught 2001). Standardizing reference to our grad program throughout courses. |
| BIOL 596 (1-3) | Advanced Topics in Biology. Advanced study of selected biological topics based on current problems or advances, and as demand warrants. *Students should check the Class Schedule for listing of actual topics.* | Advanced Topics in Biology. Advanced study of selected biological topics based on current problems or advances, and as demand warrants.  *Students should check the Class Schedule for listing of actual topics and course prerequisites.* | Updating language. |
| BIOL 597 (1) | Advanced Topics in Biology Lab. Laboratory in selected advanced topics in biology. Topics based on current problems or advances, and as demand warrants.  *Students should check the Class Schedule for listing of actual topics. Three hours laboratory.* | Advanced Topics in Biology Lab. Laboratory in selected advanced topics in biology. Topics based on current problems or advances, and as demand warrants. *Three hours laboratory. Students should check the Class Schedule for listing of actual topics and prerequisites.* | Updating language |
| BIOL 600 (3) | Scientific Communication. Practical experience in the preparation of written, oral, and poster presentations in the biological sciences. Students will also actively take part in the peer review process commonly used to evaluate the scientific and technical merits of research proposals. Final products may include formal grant (NSF or NIH) and thesis proposals.  *Enrollment restricted to students with Graduate standing. May not be taken for credit by students who have received credit for BIOL 610 or 611.* | Scientific Communication. Practical experience in the preparation of written, oral, and poster presentations in the biological sciences. Students will also actively take part in the peer review process commonly used to evaluate the scientific and technical merits of research proposals. Final products may include formal grant (NSF or NIH) and thesis proposals.  *Enrollment restricted to students in the Biological Sciences graduate program. May not be taken for credit by students who have received credit for BIOL 610 or 611.* | Standardizing reference to our grad program throughout courses. |
| BIOL 620 (4) | Advanced Ecological Monitoring. An overview of the various approaches used to assess ecological condition (status) and change over time (trend) for ecosystems, vegetation types, populations, and biological communities. Lectures that provide conceptual understanding will be combined with hands-on practical exercises in the lab, so that students will be prepared to apply their knowledge to real-world conservation problems. Readings from the primary literature will explore the challenges and controversies involved in ecological monitoring. *Enrollment restricted to students with Graduate standing. May not be taken for credit by students who have received credit for BIOL 420.* | Advanced Ecological Monitoring. An overview of the various approaches used to assess ecological condition (status) and change over time (trend) for ecosystems, vegetation types, populations, and biological communities. Lectures that provide conceptual understanding will be combined with hands-on practical exercises in the lab, so that students will be prepared to apply their knowledge to real-world conservation problems. Readings from the primary literature will explore the challenges and controversies involved in ecological monitoring. *Three hours lecture and three hours laboratory. This course will be taught together with BIOL 420 by the same instructor. Enrollment restricted to students in the Biological Sciences graduate program. May not be taken for credit by students who have received credit for BIOL 420.* | Added course time detail. Standardizing reference to our grad program throughout courses. |
| BIOL 663 (3) | Advanced Principles of Conservation Biology. An in-depth focus on the princples and practices of conservation and restoration ecology. Factors that affect the creation, destruction, and distribution of biological diverseity are examined. Class discussions and assignments will focus on human destruction and degradation of habitats, invasive species introductions, accelerated species extinctions, pollution, global climate change, and species over-exploitation. The selection of maintenance of conservation areas will be explored, as well as the theory and methodology for restoring degraded habitats. *May not be taken for credit by students who have received credit for BIOL 363 or BIOL 463. Enrollment restricted to students with Graduate standing.* | Advanced Principles of Conservation Biology. An in-depth focus on the principles and practices of conservation and restoration ecology. Factors that affect the creation, destruction, and distribution of biological diversity are examined. Class discussions and assignments will focus on human destruction and degradation of habitats, invasive species introductions, accelerated species extinctions, pollution, global climate change, and species over-exploitation. The selection of maintenance of conservation areas will be explored, as well as the theory and methodology for restoring degraded habitats. *May not be taken for credit by students who have received credit for BIOL 363 or BIOL 463. This course will be taught together with BIOL 463 by the same instructor. Enrollment restricted to students in the Biological Sciences graduate program.*  | Fixed typos. Standardizing reference to our grad program throughout courses. |
| BIOL 683 (3) | Tropical Ecology. A survey of the unmanaged and managed tropical terrestrial ecosystem and the biotic (living) and abiotic (non-living) factors that affect tropical ecosystem structure and function. Emphasis will be on the community dynamics and biogeochemical cycling of tropical ecosystems, and how these processes are affected by land-use and land-cover change. *This course will be taught together with BIOL 383 by the same instructor. Enrollment Requirement: BIOL 210, 211, and 212. Prerequisite BIOL 354; enrollment is restricted to students who have not taken BIOL 383.* | Tropical Ecology. A survey of the unmanaged and managed tropical terrestrial ecosystem and the biotic (living) and abiotic (non-living) factors that affect tropical ecosystem structure and function. Emphasis will be on the community dynamics and biogeochemical cycling of tropical ecosystems, and how these processes are affected by land-use and land-cover change. *This course will be taught together with BIOL 383 by the same instructor. Enrollment requirements: BIOL 212 and 354. Enrollment restricted to students in the Biological Sciences graduate program who have not received credit for BIOL 383.* | Updated ER/pre req and added enrollment restriction to grad students. Standardizing reference to our grad program throughout courses. |
| BIOL 685 (2) | Internship in Biology Instruction. Supervised instruction in a laboratory course in the biological sciences.  *May be repeated, but no more than two (2) units may be applied toward the 30 units in the Master’s degree. Enrollment restricted to students with Graduate standing.*  | Introduction to Biology Instruction. Supervised instruction in a laboratory course in the biological sciences.  *May be repeated, but no more than two (2) units may be applied toward the 30 units in the Master’s degree. Enrollment restricted to students in the Biological Sciences graduate program.*  | Changed title because term internship now has more specific meaning on campus. Students are hired as Tas and conduct all teaching on campus. Standardizing reference to our grad program throughout courses. |
| BIOL 686 (1-3) | Graduate Topics in Biology. Lecture and discussion of selected topics with emphasis on current problems and advances in subdisciplines of biological science. *Students should check the Class Schedule for listing of actual topics. Enrollment restricted to students with Graduate standing.* | Graduate Topics in Biology. Lecture and discussion of selected topics with emphasis on current problems and advances in subdisciplines of biological science. *Students should check the Class Schedule for listing of actual topics and prerequisites. Enrollment restricted to students in the Biological Sciences graduate program.*  | Added word prereq. Standardizing reference to our grad program throughout courses. |
| BIOL 687 (1-2) | Advanced Methods in Biology. Graduate-level field or laboratory techniques in a specialized area of contemporary biology. *Students should check the Class Schedule for listing of actual topics. Enrollment restricted to students with Graduate standing.* | Advanced Methods in Biology. Graduate-level field or laboratory techniques in a specialized area of contemporary biology. *Students should check the Class Schedule for listing of actual topics and prerequisites. Enrollment restricted to students in the Biological Sciences graduate program.*  | Added word prereq. Standardizing reference to our grad program throughout courses. |
| BIOL 690 (3) | Terrestrial Plant Ecology. Survey of the factors that influence the physiology, distribution, and abundance of land (terrestrial) plants. Focuses on plant ecophysiology, plant population dynamics (e.g., dispersal, germination, and recruitment), plant-plant and plant-animal interactions, and the effects of the abiotic factors (e.g., climate, water, and nutrients) on the structure and function of terrestrial plant communities. *This course will be taught together with BIOL 390 by the same instructor. Prerequisite: BIOL 354; enrollment is restricted to students who have not taken BIOL 390.*  | Terrestrial Plant Ecology. Survey of the factors that influence the physiology, distribution, and abundance of land (terrestrial) plants. Focuses on plant ecophysiology, plant population dynamics (e.g., dispersal, germination, and recruitment), plant-plant and plant-animal interactions, and the effects of the abiotic factors (e.g., climate, water, and nutrients) on the structure and function of terrestrial plant communities. *This course will be taught together with BIOL 390 by the same instructor. Enrollment restricted to students in the Biological Sciences graduate program who have not received credit for BIOL 390.* | Updating enrollment language. Standardizing reference to our grad program throughout courses. |
| BIOL 697B (2) 697C (3) 697D (4) 697E (5) 697F (6) | Directed Studies. Laboratory or field research directed or sponsored by Biological Sciences faculty. *May be repeated for a maximum of six (6) units toward the Master’s degree. Enrollment restricted to students with Graduate standing. Enrollment restricted to students who have obtained consent of instructor.* | Directed Studies. Laboratory or field research directed or sponsored by Biological Sciences faculty. *May be repeated, but only a maximum of six (6) units can be applied to the Master’s degree. Enrollment restricted to students in the Biological Sciences graduate program and who have obtained consent of instructor.* | Clarified language about repetition and application of units. Standardizing reference to our grad program throughout courses. |
| BIOL 698B (2) 698C (3) 698D (4) 698E (5) 698F (6)  | Thesis. Design, implementation, and analysis of a formal research project in the biological sciences. *May be repeated for a maximum of six (6) units toward the Master’s degree. Graded Credit/No Credit. Prerequisite: Advancement to candi­dacy. Enrollment restricted to students who have obtained consent of instructor.* | Thesis. Design, implementation, and analysis of a formal research project in the biological sciences. *May be repeated, but only a maximum of six (6) units can be applied to the Master’s degree. Graded Credit/No Credit. Prerequisite: Advancement to candidacy. Enrollment restricted to students in the Biological Sciences graduate program and who have obtained consent of instructor.* | Clarified language about repetition and application of units. Standardizing reference to our grad program throughout courses. |
| BIOL 699B (2) 699C (3) 699D (4) 699E (5) 699F (6)  | Thesis Extension.  | Thesis Extension. Intended for students who have completed six units of BIOL 698. *May be repeated. Graded Credit/No Credit. Enrollment restricted to students in the Biological Sciences graduate program and who have obtained consent of instructor.* | Clarified that course can be repeated and grading (already graded c/nc just not in catalog). Limit to biol grads and put on consent. Added a course description. |

BIOTECHNOLOGY

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| BIOT 355 (4) | Molecular Biotechnology . In-depth treatment of the fundamental molecular techniques in use in the field of biotechnology. Designed to give hands-on experience as well as conceptual background in biotechnological methods. Subjects covered will include: nucleic acid isolations, vectors, cloning, library screening, hybridi­zations, PCR, sequencing, sequence analysis and bioinformatics, and transgenic organisms. Other subjects will vary to reflect current practice and develop­ments in biotechnology. May not be taken for credit by students who have received credit for BIOL 355. Three hours lecture and three hours laboratory. Enrollment Requirement: BIOL 210 and 211. Enrollment is restricted to students in the Biotechnology major. | Molecular Biotechnology . In-depth treatment of the fundamental molecular techniques in use in the field of biotechnology. Designed to give hands-on experience as well as conceptual background in biotechnological methods. Subjects covered will include: nucleic acid isolations, vectors, cloning, library screening, hybridizations, PCR, sequencing, sequence analysis and bioinformatics, and transgenic organisms. Other subjects will vary to reflect current practice and developments in biotechnology. *Three hours lecture and three hours laboratory. Prerequisites: BIOL 210 and 211. Enrollment is restricted to students in the Biotechnology and Biochemistry majors.* | Changed ER to Prereq. Removed language referring to old course not offered since 2007. Changed enrollment restriction to include biochem students. |
| BIOT 356 (4) | Cellular Biotechnology . In-depth treatment of the fundamental cellular techniques in the field of biotechnology. An overview of the drug discovery process is presented together with theoretical and practical aspects of specific technologies. Included in lecture and laboratory instruction are the physiology of prokaryotic and eukaryotic cells, culture of bacterial, plant, insect and mammalian cells, genetic engineering and expression systems, hybridomas, fermentation and scale-up technology, separation technology, protein, purification, and immunochemistry. May not be taken for credit by students who have received credit for BIOL 356. Three hours lecture and three hours of laboratory. Enrollment Requirement: BIOL 210 and 211. | Cellular Biotechnology . In-depth treatment of the fundamental cellular techniques in the field of biotechnology. An overview of the drug discovery process is presented together with theoretical and practical aspects of specific technologies. Included in lecture and laboratory instruction are the physiology of prokaryotic and eukaryotic cells, culture of bacterial, plant, insect and mammalian cells, genetic engineering and expression systems, hybridomas, fermentation and scale-up technology, separation technology, protein, purification, and immunochemistry. *Three hours lecture and three hours of laboratory. Prerequisites: BIOL 210 and 211.* | Changed ER to Prereq. Removed language referring to old course not offered since 2008. |
| BIOT 357 (2) | Foundations of Biotechnology . A review of biotechnology applications and product development in the life science industry. Topics will include: 1) the process of bringing a product to market from concept to sales; 2) laws, regulations, ethics, and social issues pertaining to the discovery, development, testing, manufacturing and commercial distribution; 3) skills of technical writing, Standard Operating Procedures and documentation for regulatory, quality assurance, and intellectual property; and 4) employment opportunities. May not be taken for credit by students who have received credit for BIOL 357. Enrollment Requirement: BIOL 210 and 211. | Foundations of Biotechnology . A review of biotechnology applications and product development in the life science industry. Topics will include: 1) the process of bringing a product to market from concept to sales; 2) laws, regulations, ethics, and social issues pertaining to the discovery, development, testing, manufacturing and commercial distribution; 3) skills of technical writing, Standard Operating Procedures and documentation for regulatory, quality assurance, and intellectual property; and 4) employment opportunities. *Prerequisites: BIOL 210 and 211.* | Changed ER to Prereq. Removed language referring to old course not offered since 2007. |
| ~~BIOT 358 (3)~~ | ~~Computer Skills for Biotechnology. Designed to introduce and explain the application of computational and analytical methods to solve problems in biotechnology. Many of the popular software tools employed in biotechnology and informatics research will be covered. The theoretical basis governing the use and importance of these tools will also be explored. Enrollment Requirement: BIOL 210 and 211. Co/Prerequisite: CS 111.~~ | ~~Computer Skills for Biotechnology. Designed to introduce and explain the application of computational and analytical methods to solve problems in biotechnology. Many of the popular software tools employed in biotechnology and informatics research will be covered. The theoretical basis governing the use and importance of these tools will also be explored.~~  *~~Prerequisites: BIOL 210, 211 and 215.~~* | **MUST SUBMIT C-2 FORM FOR THIS COURSE**~~.>Change ER to prereq. After discussion among BIOL/BIOT and in consultation with CSIS, we have decided BIOL 215 is better prep for this course. BIOT majors already take BIOL 215 for their degree, unlike CS 111 that they cannot count towards their degree electives.~~ |
| BIOT 420 (3) | Plant Biotechnology. Introduces the practice and applications of biotechnology in plants and algae. Reviews the basic technologies involved in the genetic modification of plants and focuses on the diverse applications of these technologies, from biofuel production in algae to increasing the nutrient content of crops. Readings from the primary literature and case studies will be utilized to provide an in-depth overview of the current state of the field. Prerequisites: BIOT 355 or BIOL 351. | Plant Biotechnology. Introduces the practice and applications of biotechnology in plants and algae. Reviews the basic technologies involved in the genetic modification of plants and focuses on the diverse applications of these technologies, from biofuel production in algae to increasing the nutrient content of crops. Readings from the primary literature and case studies will be utilized to provide an in-depth overview of the current state of the field. *Prerequisite: BIOT 355 or BIOL 351.* | Clean-up: made prerequisite singular |
| BIOT 450 (3) | Medical Biotechnology. An overviews of the various drivers of medical biotechnology, and how they interact with another to shape the business and finance of this industry and impact the growth of medical biotechnology companies. Introduces a host of scientific development, legal, and ethical issues that shape the public view of medical biotechnology and its applications. Prerequisites: BIOT 355 or BIOL 351. | Medical Biotechnology. An overviews of the various drivers of medical biotechnology, and how they interact with another to shape the business and finance of this industry and impact the growth of medical biotechnology companies. Introduces a host of scientific development, legal, and ethical issues that shape the public view of medical biotechnology and its applications. *Prerequisite: BIOT 355 or BIOL 351.* | Clean-up: made prerequisite singular |
| BIOT 460 (3) | Scientific Communication in Biotechnology . Study of communication principles and rhetorical strategies to effectively communicate with intended audiences in the context of the biotechnology industry. Students will apply this knowledge to plan, prepare, construct, and evaluate communication situations in which they participate as both producers and consumers of communication in careers related to biotechnology. *Enrollment restricted to students with Junior or Senior standing. Prerequisite: BIOT 355 or 356.*  | Scientific Communication in Biotechnology . Study of communication principles and rhetorical strategies to effectively communicate with intended audiences in the context of the biotechnology industry. Students will apply this knowledge to plan, prepare, construct, and evaluate communication situations in which they participate as both producers and consumers of communication in careers related to biotechnology. *Also offered as COMM 416.* *Enrollment restricted to students with Junior or Senior standing. Prerequisite: BIOT 355 or 356.*  | Co-listing with COMM 416 just approved. |
| BIOT 498 (12) | Stem-Cell Internship . A laboratory experience in which students follow a plan developed with the internship supervisor that is regularly evaluated by the course instructor. Internship plans include specialized goals unique to the host laboratory. A final written report is required. Participation in a weekly one-hour seminar at CSUSM is required. *May be repeated three (3) times. Enrollment Requirements: BIOL 210 and 211. Also, an independent research contract form must be completed and signed prior to enrollment.*  | Stem-Cell Internship . A laboratory experience in which students follow a plan developed with the internship supervisor that is regularly evaluated by the course instructor. Internship plans include specialized goals unique to the host laboratory. A final written report is required. Participation in a weekly one-hour seminar at CSUSM is required. *May be repeated three (3) times. Enrollment restricted to students who have obtained consent of instructor. Prerequisites: BIOL 210 and 211.* | Clean-up: enrollment language and changed ER to pre-req |

COMPUTER SCIENCE AND INFORMATION SYSTEMS

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| **Course Subject and Number** | **Current Information** | **Proposed Change** | **If any requirements are being added or removed, provide a 1--2 sentence rationale.** |
| CIS 341 | Prerequisite: CS 111 | Prerequisite: CS 211 | It’s really difficult for students to really appreciate system development life cycle with very limited background in computer science built through CS 111. Most of our past CIS majors don’t take CIS 341 right after CS 111 any way. |
| CS 331 | Co/Prerequisites: CS 231 | Prerequisite: CS 231 | Students really should not be taking CS 231 and CS 331 at the same time.  |
| CS 421 | Math 270 or 370, co/prerequisite CS 351, Prerequisite CS 311 | Prerequisite: CS 351 | Students really should have taken CS 351 before taking CS 421. And the listing of math 270/370 and cs 311 is redundant. Students should have completed them by the time they pass CS 351. |
| CS 537 | Prerequisite for undergraduates and enrollment requirement for graduate students: CS 433 or CS 436 | Prerequisite: CS 436 | We have hired a TTF with expertise in network who feels that CS 436 is adequate and sufficient prerequisite. |
| CS 612 | Prerequisite: CS 512 | Prerequisite: CS 513 | We are adjusting the prerequisite for several 600-level classes to be one of the core courses all master’s students have to take to ensure a better support for students. |
| CS 614 | Prerequisite: CS 511 | Prerequisite: CS 513 |
| CS 673 | Enrollment requirements: Math 242/440 and CS 473 or 475 or 471  | Prerequisite: CS 571 |
| CS 677 | Prerequisite: CS 577 | Prerequisite: CS 571 |
| CS 678 | Prerequisite: CS 578 | Prerequisite: CS 571 |