

## Biological Sciences

### *Biochemistry, BIOC*

**5340. Molecular Biology.** 3 hours. Mechanisms and regulation of genetic expression, chromosome replication, mutagenesis and DNA repair, and gene cloning in prokaryotic and eukaryotic systems. Prerequisite(s): BIOL 4570 and 4580, or BIOC 4570 and 4580, and at least two of the following: BIOC 4540, 4550 or 4560, or BIOL 3510 or 3520. (Same as BIOL 5340.)

**5540. Biochemistry I.** 3 hours. (3;0;1) Chemistry and biochemistry of carbohydrates, lipids, amino acids and proteins, and nucleic acids; biochemical energetics, enzyme catalysis, vitamins and coenzymes, and their inter-relationships in energy-producing cycles and pathways. A recitation period is scheduled for problem-solving and student reports from the current biochemical literature. Prerequisite(s): CHEM 2380 or consent of department.

**5550. Biochemistry II.** 3 hours. (3;0;1) Continuation of BIOC 5540. Metabolic pathways in biosynthesis and degradation of lipids, nucleic acids, proteins and carbohydrates, photosynthesis, nitrogen cycle, biochemical genetics and metabolic regulation. A recitation period is scheduled for problem-solving and student reports from the current biochemical literature. Prerequisite(s): BIOC 5540 or consent of department.

**5560. Biochemistry Laboratory.** 2 hours. (1;3) Analysis and characterization of amino acids, peptides, enzymes, lipids, nucleic acids, carbohydrates, and metabolic pathways and processes. Techniques include a variety of chromatographic methods, electrophoresis, UV-vis spectroscopy and radiochemistry. Prerequisite(s): BIOC 5540 (may be taken concurrently). (Same as BIOC 4560.)

**5580. Molecular Biology and Biotechnology Laboratory.** 2 hours. Experiments in recombinant DNA techniques, gene regulation and other areas of molecular biology. Prerequisite(s): BIOC or BIOL 5340 (may be taken concurrently). (Same as BIOC 4580 and BIOL 5580.)

**5680. Selected Topics in Biochemistry.** 1–3 hours. Current research interests in the field of biochemistry. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**5900-5910. Special Problems.** 1–3 hours each. Independent study or laboratory research for the master's level. Problem must be approved by the major professor.

**5940. Seminar in Current Biochemistry.** 1 hour. A study of current literature; current research emphasized. May be repeated for credit.

**5950. Master's Thesis.** 3 or 6 hours. To be scheduled only with consent of department. 6 hours credit required. No credit assigned until thesis has been completed and filed with the graduate dean. Continuous enrollment required once work on thesis has begun. May be repeated for credit. Prerequisite(s): approved thesis proposal must be filed with department graduate office prior to enrollment.

**6010. Seminar for Doctoral Candidates.** 3 hours. Demonstration of competence in a specific area of biochemistry and/or molecular biology as evidenced by criteria established by the faculty. May be repeated for credit.

**6600. Advanced Molecular Biology.** 3 hours. Genetic structure and regulation of gene expression in prokaryotic and eukaryotic organisms; mechanisms of gene action, gene/enzyme relationships and metabolic control;

bio-chemical manipulation and characterization of genetic macromolecules. Prerequisite(s): BIOL 4570 or 5340 or equivalent. (Same as BIOL 6600.)

**6610. Advanced Metabolism.** 3 hours. Advanced intermediary metabolism of carbohydrates, lipids, nitrogenous compounds and nucleic acids. Relevant new findings particularly regarding the regulation of these pathways are also covered. Prerequisite(s): BIOC 4550/5550 or consent of department.

**6620. Advanced Cell Biology.** 3 hours. Structure and function of animal and plant cells with emphasis on cell membranes, cytoplasmic organelles and the nucleus; readings in current literature. Prerequisite(s): biochemistry, BIOL 3510/3520 or equivalent, or consent of department. (Same as BIOL 6620.)

**6630. Protein Structure and Function.** 3 hours. An introduction to protein structure. Coverage of recurring structural motifs and the determination of protein structure as it determines enzyme function. Catalytic reaction mechanisms, protein-substrate interactions and the kinetics of enzyme catalyzed reactions. Prerequisite(s): BIOC 4550 or 5550.

**6640. Biochemical Regulation and Signal Transduction.** 3 hours. A study of regulation in metabolic processes and pathways, emphasizing theories of metabolic flux and enzyme regulation in the context of cellular signaling processes. Signal transduction pathways fundamental regulatory mechanisms, such as allosterism, induction and protein degradation are discussed. Prerequisite(s): BIOC 4550 or 5550, or consent of department.

**6650. Plant Biochemistry and Biotechnology.** 3 hours. Contemporary plant biochemistry, with a focus on the major pathways for carbon and nitrogen metabolism and the acquisition of mineral nutrients, is integrated with plant physiology. The biotechnology component focuses on metabolic engineering and secondary metabolites (also called natural products) that help plants cope with their environments and provide compounds that improve quality of life for humans. Prerequisite(s): consent of department.

**6680. Advanced Techniques in Biochemistry.** 1–3 hours. Methods and instrumentation currently used in biochemical analyses. Presented in four-week minicourses consisting of 8 hours of lecture and 24 hours of laboratory. Topics vary from year to year but include, among others, protein sequencing and amino acid analysis, nucleic acid sequencing, tissue culture, monoclonal antibody production, column chromatography, radioisotopes, peptide synthesis, and gel electrophoresis and electrofocusing. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**6900-6910. Special Problems.** 1–3 hours each. Independent study or laboratory research for doctoral students. Problem must be approved by the major professor.

**6940. Individual Research.** 1–12 hours. Doctoral research of independent nature. Number of hours counted toward the PhD determined by major professor and graduate advisory committee.

**6950. Doctoral Dissertation.** 3, 6 or 9 hours. To be scheduled only with consent of department. 12 hours of credit required. No credit assigned until dissertation has been completed and filed with the graduate dean. Doctoral students must maintain continuous enrollment in this course subsequent to passing qualifying examination for admission to candidacy. May be repeated for credit. Prerequisite(s): approved dissertation research proposal must be filed with department graduate office prior to registration.

**6990. Postdoctoral Research.** 1–3 hours. For post-doctoral fellows to further training and research experience in developing and solving research problems independently. Prerequisite(s): consent of department. May be repeated for credit.

### **Biological Sciences, BIOL**

**5001. Contemporary Topics in Molecular Biology.** 1–3 hours. Contemporary topics in molecular biology and biochemistry. Topics may vary from semester to semester and may include eukaryotic and prokaryotic molecular genetics, DNA profiling, physiology and metabolism and application of recombinant DNA technologies. May be repeated for credit as topics vary.

**5002. Contemporary Topics in Microbiology.** 1–3 hours. Contemporary topics in microbiology. Topics vary from semester to semester and may include bacterial physiology or metabolism and microbial chemistry. May be repeated for credit as topics vary.

**5003. Contemporary Topics in Neuroscience.** 1–3 hours. Contemporary topics in neuroscience and physiology. Topics vary from semester to semester and may include neuro-physiology, computational neuroscience, neurotransmitters, central nervous system trauma. May be repeated for credit as topics vary.

**5005. Contemporary Topics in Biology.** 1–3 hours. Contemporary topics in the biological sciences. Topics may vary from semester to semester and may include topics such as human development, epidemiology or plant physiology. May be repeated for credit as topics vary.

**5006. Topics in Forensic Biology.** 1–3 hours. Specific titles vary but may include forensic entomology, forensic toxicology or forensic biology of the human skeleton. May be repeated for credit as topics vary.

**5030. Foundations of Environmental Science.** 1 hour. Course lays the foundation for graduate studies in environmental science. Introduces graduate students to the faculty, research expertise and resources available in environmental sciences at UNT. Covers topics essential to a successful graduate experience and career in environmental science.

**5040. Contemporary Topics in Environmental Science and Ecology.** 1–3 hours. Contemporary topics and issues in environmental science and ecology. Topical themes include global climate change, biodiversity, wetlands, population and aquatic, terrestrial or plant ecology. May be repeated for credit as topics vary.

**5051. Community Ecology.** 3 hours. Structure, dynamics and diversity of biotic communities and ecosystems. Focus on population interactions, niche relationships and processing of matter and energy. Prerequisite(s): 6 hours of biology including BIOL 2140.

**5052. Community Ecology Laboratory.** 1 hour. Field and laboratory exercises on distribution, dispersion, abundance and diversity of organisms and their populations. Focus on quantitative description of biotic communities and ecosystems. Prerequisite(s): concurrent enrollment in or credit for BIOL 5051, or consent of department.

**5060. Electron Microscopy.** 4 hours. (2;6) Theory and application of scanning and transmission electron microscopy, including sample preparation and analytical techniques.

**5070. Insect Biology.** 4 hours. (3;3) Morphology, physiology, ethology, classification and control of insects and related arthropods. Prerequisite(s): 6 hours of biology.

**5080. Radiation Safety.** 1 hour. Radiation sources, interaction of radiation with matter and human tissues, radiation measurement and dosage, instrumentation, regulations and practical safety procedures.

**5100. Introduction to Environmental Impact Assessment.** 3 hours. Principles and practices of preparing environmental impact assessments and statements. Addresses how to understand the effects that projects, plans and policies have on the environment and the impact those effects have on specific resources, ecosystems and human communities. Methods for identifying impacts, describing the affected environment, predicting and assessing impacts and selecting the proposed action from a group of alternatives for meeting specific needs will be examined. A detailed review of an environmental assessment and environmental impact statement are required.

**5110. Endocrinology.** 3 hours. Regulation of physiological processes in animals by hormones and related chemical agents. Prerequisite(s): BIOL 3800 or equivalent, or consent of department.

**5120. Environmental Contaminants.** 3 hours. Presents a scientific overview of environmental contaminants, their occurrence, sources and impact on humans and the environment. Prerequisite(s): 8 hours of chemistry.

**5150. Pharmacology: The Biological Basis of Drug Action.** 3 hours. An overview of pharmacology for graduate students, based on principles of drug action. The course emphasizes drugs by class, not specific drugs per se. Course covers general principles, antibiotics and pharmacology of the autonomic, cardiovascular, central nervous and endocrine systems.

**5160. Advanced Techniques in Microbiology and Molecular Biology.** 6 hours. (0;6) Intensive laboratory exercises in cultivation, analysis and gene transfer in bacterial mutants. Further emphasis on techniques for studying macromolecular and enzyme synthesis, preparation and analysis of plasmid DNA, cloning and gene expression. Prerequisite(s): microbiology, biochemistry or BIOL 3510.

**5180. Techniques in Molecular Biology.** 6 hours. (1;6) Teaches advanced molecular biology laboratory methodology. Techniques include gene cloning, plasmid purification, restriction analysis, DNA fingerprinting and DNA sequencing. Prerequisite(s): BIOL/BIOC 4570, or BIOL 5340, or consent of instructor.

**5200. Environmental Health.** 3 hours. An introduction to the environmental determinants of health that focuses on health risks of human-mediated changes to the environment, as well as the regulatory framework that directs decision making on environmental issues. Consideration given to health implications of growing populations, available food quantity and quality, loss of habitat and biodiversity, radiation, toxins in the environment, sanitation, solid and hazardous waste disposal and environmental degradation including noise, air and water pollution.

**5220. Neuropsychopharmacology.** 3 hours. A comprehensive examination of the physiological effects on major psychotropic drug classes that affect the central nervous system, including the interactions between neurotransmitter systems and physiology; neuroanatomical pathways and behavior; synaptic functions and behavioral disorders.

**5250. Advanced Human Physiology.** 3 hours. Physiological mechanisms in humans, with emphasis on medical physiology.

- 5260. Principles of Evolution.** 3 hours. Genetic, systematic, ecological, historical and geographical concepts of evolution. Prerequisite(s): consent of department.
- 5270. Limnology.** 4 hours. (2;4;1) Physical, chemical and biological factors that affect productivity in reservoirs, lakes and ponds. Field studies using current limnological methods and instruments. For biologists, chemists, teachers and sanitarians. Prerequisite(s): 12 hours biology or 6 hours biology plus 6 hours of another science.
- 5280. Aquatic Botany.** 3 hours. (2;3) Ecology, identification and management of aquatic plants and algae. Special emphasis on the role of aquatic plants in reservoir and river ecosystems. Prerequisite(s): 8 hours of biology.
- 5300. Physiological Ecology.** 3 hours. Physiological, behavioral and biochemical adaptations of animals to environmental limiting factors, including temperature, oxygen, water, salinity, light and toxic chemicals.
- 5340. Molecular Biology.** 3 hours. Mechanisms and regulation of genetic expression, chromosome replication, mutagenesis and DNA repair, and gene cloning in prokaryotic and eukaryotic systems. Prerequisite(s): BIOL/BIOC 4570/4580 and at least two of the following: BIOC 4540/4550/4560 or BIOL 3510/3520. (Same as BIOC 5340.)
- 5380. Fundamentals of Aquatic Toxicology.** 3 hours. (2;3) Theory and methodologies used by scientists, regulatory agencies and industry to measure the impact of man's activities on freshwater aquatic ecosystems. The course has its foundations in history, but concentrates on current methodologies and theories.
- 5400. Wetland Ecology and Management.** 4 hours. (3;4) Ecology and management of various types of wetlands with emphasis on the role of aquatic and wetland plants in determining wetland structure and function. Wetland restoration and creation for wildlife habitat or water quality benefits are reviewed.
- 5420. Industrial Microbiology.** 3 hours. Use of micro-organisms and microbial processes in the pharmaceutical, chemical and food industries. Prerequisite(s): biochemistry.
- 5440. Stream Ecology.** 4 hours. (3;4) Ecological principles of how stream dynamics influence the biological and hydrologic patterns and processes occurring in stream ecosystems. Laboratory studies designed to teach techniques and to test hypotheses related to environmental assessment. Prerequisite(s): 3 hours of ecology. (Same as BIOL 4440.)
- 5460. Eukaryotic Genetics.** 3 hours. Research and theory in eukaryotic genetics with an emphasis in metazoan genetic model systems and human genetics, including chromosome structure, genomic analysis, developmental genetics and diseases. Prerequisite(s): BIOL 3451/3452 and BIOL 3510/3520; molecular biology or biochemistry suggested (may be taken concurrently).
- 5470. Laboratory Techniques in Cytology.** 1 hour. (0;3;1) Cytological techniques in plants, animals and humans, including karyotyping, cell and tissue culture, and sex chromatin analysis. Prerequisite(s): consent of department. May be taken with or without BIOL 5490.
- 5490. Cytology and Cytogenetics.** 3 hours. Cell structure and function in plants and animals with emphasis on genetic and chromosomal aberrations. Prerequisite(s): consent of department.
- 5501. Bacterial Diversity and Physiology.** 3 hours. Comparative survey of bacteria. Growth, ecology, metabolism, energy transformations, differentiation and adaptive mechanisms.
- 5502. Bacterial Diversity and Physiology Laboratory.** 1 hour. Isolation of bacteria from nature. Enrichment methods, morphology, enumeration of bacterial growth and enzymes. Prerequisite(s): BIOL 5501 (may be taken concurrently).
- 5503. Plant Physiology.** 3 hours. Plant physiology from the molecular to organismal level with ecosystem considerations. Topics include nutrient acquisition and distribution, biochemistry and metabolism, growth and development.
- 5505. Comparative Animal Physiology.** 3 hours. Comparison of structure and physiological function in a wide variety of animals. Emphasis on thermoregulation and on respiratory, circulatory, excretory, endocrine and digestive systems. Prerequisite(s): 8 hours of biology.
- 5520. Invertebrate Biology.** 4 hours. (3;3) Biology of non-vertebrate animals with emphasis on anatomical, physiological and behavioral adaptations to varied environments and phylogenetic relationship. Prerequisite(s): 6 hours of biology.
- 5570. Aquatic Insects of North America.** 4 hours. (3;4) Ecology, sampling methods, systematics and classification of Nearctic aquatic insects at the family level; use of keys and key terminology in aquatic insect identification. Prerequisite(s): invertebrate zoology or entomology, or consent of instructor.
- 5580. Molecular Biology and Biotechnology Laboratory.** 2 hours. (0;5) Experiments in recombinant DNA techniques, gene regulation and other areas of molecular biology. Prerequisite(s): BIOL or BIOC 5340 (may be taken concurrently). (Same as BIOC 5580.)
- 5650. Environmental Science Field Course.** 6 hours. (3;5) Advanced field methods and approaches for analysis of the physical, chemical and ecological aspects of aquatic, terrestrial and estuarine ecosystems are covered. On a rotating basis, the field course focuses on alpine lakes, deserts and estuaries. Prerequisite(s): consent of instructor. May be repeated for credit as topics vary.
- 5670. Natural History and Philosophy of Rivers.** 6 hours. (3;5) Ecological, geological and philosophical history of arid watersheds of the western United States. Extended field trip required. Desert canyons are geologically unique and present wonderful opportunities to study interactions of geology, fauna, flora, environment, cultural development and environmental ethics. Prerequisite(s): consent of instructor. (Same as PHIL 5670.)
- 5700. Procedures and Materials for Science Instruction.** 3 hours. (2;4) Problems, techniques and procedures for classroom and laboratory experiences based on current science education research. Recommended for students who desire secondary teacher certification in a science field. Field experience in the public schools is a required component. Prerequisite(s): completion of undergraduate science courses required for certification and consent of department.
- 5701. Biotechnology and Society.** 3 hours. Survey of major advances in biotechnology. Emphasis on the development of the technology, underlying biological principles, historical context, current practices and societal implication. Prerequisite(s): genetics or biochemistry or consent of department.
- 5720. Sediment Toxicology.** 3 hours. Mechanisms of contaminant transport and fate in freshwater and marine sediments and pollutant effects at the individual, population and biotic community levels. Sediment contaminant bioavailability and bioaccumulation into food webs and the scientific aspects of legal control and remediation of hazardous sediments. Prerequisite(s): one year of chemistry and biology or consent of department.

- 5750. Neuroscience.** 3 hours. Brain chemistry, physiology and anatomy; neural basis of memory, perception, rhythms, emotion, cognition; development of the nervous system; neurological disorders. Prerequisite(s): 16 hours of biology or consent of department. (Same as BIOL 4750.)
- 5760. Neurobiology Laboratory.** 1 hour. (0;3) Vertebrate neuroanatomy and experimental neurobiology using electrophysiological and behavioral methods. Prerequisite(s): concurrent enrollment in BIOL 6460 or consent of department.
- 5800. Microbial Genetics.** 3 hours. Genetic structure, inheritance and gene expression in microorganisms and their viruses. Prerequisite(s): consent of department.
- 5830. Advanced Genetics.** 3 hours. Genetic structure and inheritance in viruses, bacteria and higher organisms, including gene biochemistry, gene expression, population genetics, cytogenetics and organelle genetics. Prerequisite(s): consent of department.
- 5840. Medical Genetics and Genetic Counseling.** 3 hours. Human genetics, including cytogenetics, immunogenetics, population genetics, molecular genetics, human biochemical genetics and genetic counseling. Prerequisite(s): BIOL 3350 or equivalent.
- 5860. Biological Sciences Seminar Series.** 1 hour. A weekly seminar series covering a broad range of biological research topics. Invited speakers are prominent local, regional or national researchers. May be repeated for credit. Pass/no pass only.
- 5880. Environmental Sciences Seminar Series.** 1 hour. A weekly seminar series covering a broad range of environmental research topics. Invited speakers are prominent local, regional or national researchers. May be repeated for credit. Pass/no pass only.
- 5900-5910. Special Problems.** 1–3 hours each. Independent study or laboratory research for the master's level. Problem must be approved by the major professor. No more than 6 hours can be counted toward a master's degree.
- 5920-5930. Research Problems in Lieu of Thesis.** 3 hours each.
- 5950. Master's Thesis.** 3 or 6 hours. To be scheduled only with consent of department. 6 hours credit required. No credit assigned until thesis has been completed and filed with the graduate dean. Continuous enrollment required once work on thesis has begun. May be repeated for credit. Prerequisite(s): approved thesis proposal must be filed with department graduate office prior to enrollment.
- 5960. Science Institute.** 1–6 hours. For students who assist in instruction or participate in special research workshops. Prerequisite(s): consent of department. No more than 6 hours may be counted toward a degree.
- 6010. Biology Seminar.** 1 hour. Weekly lectures on research in biology and related disciplines. Prerequisite(s): consent of department. May be repeated for credit as topics vary.
- 6070. Ecology of Benthic Organisms.** 4 hours. (3;2;1) Adaptations, biotic interrelationships and population characteristics of bottom-dwelling aquatic organisms. Field techniques, population analysis and dynamics in both lentic and lotic habitats. Prerequisite(s): BIOL 2140 or equivalent, and a minimum of 7 hours advanced or graduate ecology.
- 6080. Current Advances in Pharmacology.** 3 hours. Course covers the latest advances in pharmacology on a rotating basis, with emphasis on neuropharmacology, autonomic pharmacology and biochemical/molecular pharmacology. May be repeated up to a total of three times to cover all aspects.
- 6150. Communication in Scientific Teaching and Research.** 3 hours. A seminar and workshop that cover lecture course techniques, laboratory preparation and teaching, seminar techniques, research presentations at scientific meetings, research publications, research proposals, scientific illustration, photography, departmental and university services for teaching and research, and job-seeking techniques in academe, government and industry.
- 6200. Bioinstrumentation and Analytical Techniques.** 4 hours. (3;0;1) Current research instrumentation and techniques in biological sciences. Prerequisite(s): consent of department.
- 6220. Biostatistics.** 6 hours. Statistical methods and experimental design; descriptive statistics; data presentation; parametric and non-parametric methods of hypothesis testing, including two-sample tests, analysis of variance, regression and correlation analyses; introduction to multivariate statistics. Competency with computer statistical packages is developed. Computer fee required.
- 6240. Multivariate Biostatistics.** 2 hours. Application of techniques, e.g., multiple regression, discriminate, factor and cluster analyses, to explore multivariable biological and environmental data in a seminar setting. Emphasis is placed on concepts and applications rather than theory and development. Prerequisite(s): BIOL 6620 or graduate level statistics and familiarity with either SAS or SSPS statistical software.
- 6320. Remote Sensing.** 4 hours. (3;3) The theoretical bases and practical aspects of digital remote sensing. Remote sensing technology is reviewed and data analysis techniques are presented. Approaches to the development of a remote sensing project are given. Hands-on experience is provided in the laboratory. Prerequisite: GEOG 5170 is recommended.
- 6341. Advanced Environmental Impact Assessment.** 3 hours. Advanced topics in preparing environmental impact assessments and statements by examining deficiencies and inadequacies of environmental assessments and impact statements (i.e., was the analysis adequate), as defined by U.S. District, Appeals and Supreme Court decisions. Prerequisite(s): BIOL 5100 or equivalent.
- 6360. Environmental Engineering.** 4 hours. (3;3) Water, land and air pollution control technologies are presented. Engineering approaches to pollution problems are demonstrated by considering technical feasibility and economic constraints. Laboratory exercises provide instruction for quantitative analysis of water and waste water; field trips to various pollution-control facilities. Prerequisite(s): CHEM 1410-1420 and 1430-1440.
- 6390. Techniques in Environmental Analysis.** 4 hours. (3;3) Theory and application of advanced analytical chemistry techniques for metals and organics in environmental and biological samples. Introduces methods for trace metals analysis and identification, and organics separation and identification techniques. Laboratory teaches state-of-the-art spectroscopic and chromatographic techniques.
- 6400. Ecological Risk Assessment.** 3 hours. A detailed treatment of aquatic and terrestrial methods and procedures used to assess the ecological hazard of chemicals in the environment. Emphasizes quantitative methods in testing site assessment, monitoring procedures, regulatory requirements and field and laboratory techniques useful to assess damage to aquatic, terrestrial and avian resources. Prerequisite(s): ecology, statistics, general chemistry (8 hours), or consent of instructor.



**6460. Cellular Neuroscience.** 3 hours. Detailed examination of the nervous system, specifically neuroanatomy, neurophysiology, neurochemistry and sensory transduction. Prerequisite(s): consent of department.

**6480. Systems Neuroscience.** 3 hours. A detailed examination of the major brain functions, including sensation, perception, movement, emotions, language, thought and memory. Prerequisite(s): BIOL 6460 or equivalent, or consent of department.

**6500. Brain Development and Plasticity.** 3 hours. Development of the nervous system from early embryo through adulthood; neurogenesis, cell migration, differentiation, synaptogenesis; similarities among mechanisms of ontogeny, learning and regeneration; emphasis on experimental approaches. Prerequisite(s): BIOL 4750 or 6480 or equivalent is recommended.

**6540. Neurochemistry.** 3 hours. Chemistry of the nervous system and behavior; pharmacology, anatomy and physiology of neurotransmitter systems; current techniques in neurochemistry and neuropharmacology. Prerequisite(s): BIOL 4750 or 6460 or equivalent, and one term/semester of undergraduate biochemistry are recommended.

**6600. Advanced Molecular Biology.** 3 hours. Genetic structure and regulation of gene expression in prokaryotic and eukaryotic organisms; mechanisms of gene action, gene/enzyme relationships and metabolic control; biochemical manipulation and characterization of genetic macromolecules. Prerequisite(s): BIOL 4570 or 5340 or equivalent. (Same as BIOC 6600.)

**6620. Advanced Cell Biology.** 3 hours. Structure and function of animal and plant cells with emphasis on cell membranes, cytoplasmic organelles and the nucleus; readings in current literature. Prerequisite(s): biochemistry, BIOL 3510/3520 or equivalent, or consent of department. (Same as BIOC 6620.)

**6900-6910. Special Problems.** 1–3 hours each. Independent study or laboratory research for doctoral students. Problem must be approved by major professor. No more than 6 hours may be counted toward a degree.

**6940. Individual Research.** 1–12 hours. Doctoral research of independent nature. Number of hours counted toward the PhD determined by major professor and graduate advisory committee. Pass/no pass only.

**6950. Doctoral Dissertation.** 3, 6 or 9 hours. To be scheduled only with consent of department. 12 hours of credit required. No credit assigned until dissertation has been completed and filed with the graduate dean. Doctoral students must maintain continuous enrollment in this course subsequent to passing qualifying examination for admission to candidacy. May be repeated for credit. Prerequisite(s): approved dissertation research proposal must be filed with department graduate office prior to registration.

## **Molecular Biology**

Related Courses Offered at Texas Woman's University

Students who wish to enroll in the following TWU courses may do so through a cross-registration mechanism administered by the Toulouse School of Graduate Studies at UNT.

**BACT 6534. Plasmids as Vectors for Recombinant DNA.** 4 hours. Molecular structure and replication of plasmids. Utilization of plasmids for isolation, characterization, and expression of prokaryotic and eukaryotic genes. One lecture, 6 laboratory hours a week.

**BACT 6544. Viruses as Vectors for Recombinant DNA.** 4 hours. Replicative cycle of viruses utilized in recombinant DNA technology. Viruses used to isolate genetic material from other sources and characterization of the recombinant DNA by size, restriction endonuclease mapping and nucleic acid sequencing. One lecture, 6 laboratory hours a week.

**BIOL 5123. Biostatistics.** 3 hours. Advanced studies in biometric systems, experimental design and data analysis. 3 lecture hours a week. Prerequisite(s): 12 hours of biology and permission of instructor.

**BIOL 5653. Human Development.** 3 hours. Fundamentals of human embryology, the anatomy of human development and pathology of development. Emphasis on normal and pathological aspects of human gestation. Lectures, films, student reports and tests. 3 lecture hours a week.

**BIOL 5703. Radiation, Protection and Dosimetry.** 3 hours. Interactions of ionizing radiations and matter, radiation instrumentation, determination of radiation, case and principles of radiation protection. 3 lecture hours a week. Prerequisite(s): one year of physics and permission of instructor.

**BIOL 6334. Advanced Cell Biology.** 4 hours. Survey of current understanding of biogenesis, architecture and function of cellular organelles. The cell cycle and regulation of cell growth. 4 lecture hours. Prerequisite(s): permission of instructor.

**BIOL 6513. Molecular Biology.** 3 hours. Survey of current understanding of DNA structure, organization, chromosome replication, gene transcription, ribosome assembly and translation. Emphasis is on molecular processes and their regulation in both prokaryotes and eukaryotes. 3 lecture hours a week. Prerequisite(s): CHEM 5613 and CHEM 5623 or permission of instructor.

**ZOOL 5423. Endocrinology.** 3 hours. Advanced studies of biology and biochemistry of the glands of internal secretion. 3 lecture hours a week. Prerequisite(s): ZOOL 4243.

---

## **Business Administration, College of**

### **Business Administration, Interdepartmental, BUSI**

**5190. Administrative Strategy.** 3 hours. Capstone course providing the integration of functional areas of business administration. Requires students to determine policy at the general- or top-management level. Students address strategic organizational problems and the optimization of the total enterprise. Course includes the use of lectures, case analysis and special topics. This course must be taken in the student's last term/semester of course work.