BIOL - BIOLOGY

BIOL 601 Biological Clocks

Credits 3. 3 Lecture Hours. Introduction to the formal properties of biological rhythms; cellular and molecular bases for rhythmicity; temporal adaptations of organisms using clocks. **Prerequisite:** Graduate classification or approval of instructor.

BIOL 606 Microbial Genetics

Credits 3. 3 Lecture Hours. Basic understanding of microbial genetic systems and how genetic analyses can be used to investigate fundamental biological processes in bacteria. **Prerequisite:** GENE 302 or BIOL 351.

BIOL 608 Theory and Applications of Light Microscopy

Credits 3. 2 Lecture Hours. 3 Lab Hours. Provides biologists, material scientists and students from other disciplines with the theoretical background and practical techniques of sample preparation, operation of light microscopes as well as image acquisition and processing; individual instruction which facilitates the completion of their research projects involving light microscopic techniques. **Prerequisite:** half-page write-up describing how their graduate work will benefit.

BIOL 609 Molecular Tools in Biology

Credits 3. 3 Lecture Hours. Interactive lecture course in molecular biology for beginning graduate students; introduction to tools and methodologies used in prokaryotic and eukaryotic molecular labs; choosing the appropriate experimental technique for a given scientific question; virtual experiments will reinforce the applications and introduce useful bioinformatics tools. **Prerequisite:** Graduate classification.

BIOL 610 Evolution

Credits 3. 3 Lecture Hours. 0 Lab Hours. Fundamentals of evolutionary biology with an emphasis on evolutionary theory. **Prerequisite:** Graduate classification or approval of instructor.

BIOL 611 Developmental Genetics

Credits 3. 3 Lecture Hours. Major paradigms of eukaryotic gene regulation in terms of the role of gene expression during ontogeny and the effect of dysfunction in these processes on the neoplastic state.

BIOL 612 Fundamental Molecular Cell Biology

Credits 3. 3 Lecture Hours. Foundation in current molecular and cellular biology and genetics; basis for many interdisciplinary studies including biostatistics, cancer biology, and biomedical materials and devices. **Prerequisites:** Graduate classification; non-biology majors.

BIOL 613 Cell Biology

Credits 3. 3 Lecture Hours. Consideration of the eukaryotic cell as a functional, integrated unit in living organisms including structure, composition, function and biogenesis of subcellular components; dynamic processes and interactions of cells, including division, communication, and death; experimental approaches in modern cell biology and selected applications of experimental cell biology to problems in medicine. **Prerequisite:** BICH 410 or BIOL 213; concurrent enrollment in BIOL 213 or BICH 410 strongly discouraged.

BIOL 622 Microbial Physiology

Credits 3. 3 Lecture Hours. An area of microbial physiology will be explored at the molecular, cellular, and genetic levels through reading and discussion of classic and current research literature. The area of focus may change from semester to semester. May be taken three times for credit with approval of instructor. **Prerequisite:** Graduate classification.

BIOL 627 Principles of Neuroscience I

Credits 3. 3 Lecture Hours. Detailed introduction to the basic fundamentals of cellular and molecular neuroscience; topics include membrane potentials, action potential generation, and the mechanisms underlying synaptic transmission, as well as their molecular basis. **Prerequisites:** Graduate classification or approval of instructor. **Cross Listing:** NEXT 610 and NRSC 601.

BIOL 628/NRSC 602 Principles of Neuroscience II

Credits 3. 3 Lecture Hours. Fully integrated overview of nervous system organization and systems-level neurobiology; broad topics include sensory systems and sensory systems function, motor systems and neuromuscular function, central pattern generation and locomotion, homeostatic regulation, motivation, emotions, learning and memory, and circadian rhythms. **Prerequisites:** Graduate classification or approval of instructor. **Cross Listing:** NRSC 602/BIOL 628.

BIOL 635 Plant Molecular Biology

Credits 3. 3 Lecture Hours. Molecular aspects of plant growth, development, reproduction and evolution, emphasizing the structure, function, regulation, interaction and manipulation of plant genes; practical applications of plant molecular biology. **Prerequisite:** GENE 431/ BICH 431.

BIOL 644/NRSC 644 Neural Development

Credits 3. 3 Lecture Hours. Classical and current research literature to explore the major events in the development of a nervous system, including topics ranging from neurogenesis to synapse information. **Prerequisite:** Graduate classification. **Cross Listing:** NRSC 644/BIOL 644.

BIOL 647 Digital Biology

Credits 4. 4 Lecture Hours. Obtain, organize, process, and analyze genome and genome-related data; learning to ask and answer biologically relevant questions by designing and performing experiments using computers. **Prerequisite:** Graduate classification or approval form instructor.

BIOL 650 Genomics

Credits 3. 3 Lecture Hours. Modern genomics as a tool for understanding biological systems; review of gene structure and organization and the history of sequencing technologies; focus on transcriptional, translational and functional genomics. **Prerequisite:** Graduate classification or approval of instructor.

BIOL 651 Bioinformatics

Credits 3. 3 Lecture Hours. Introduction to applications related to information processing in biological research with practical training exercises; includes internet databases, sequence alignment, motif prediction, gene and prometer prediction, phylogenetic analysis, protein structure classification, analysis and prediction, genome annotation, assembly and comparative analysis, and proteomics analysis. **Prerequisite:** Graduate classification or approval of instructor.

BIOL 661 Antimicrobial Agents

Credit 1. 1 Lecture Hour. Understanding of microbial agents, limitations of use, biosynthesis and regulation, and challenges in development as new therapeutics. **Prerequisite:** Approval of instructor.

BIOL 681 Seminar

Credit 1. 1 Lecture Hour. Detailed reports on specific topics in field chosen. Students may register in up to but no more than three sections of this course in the same semester.

BIOL 682 Communicating Biological Science

Credit 1. 1 Lecture Hour. Instruction and practice with presenting research topics on biological science to a variety of audiences under different time constraints; emphasis on oral communication, including talks, poster presentations, and scientific writing; topics include critical elements in any presentation; knowing your audience/readers; designing effective visual aids and graphics; leading your audience/readers through complex concepts; preparing for presentations; and communicating with non-scientists. **Prerequisites:** Graduate classification.

BIOL 683 Experimental Design in Biology

Credits 3. 3 Lecture Hours. Design of scientific research projects in the field of biology; a wide range of biological experiments designed with the appropriate statistical technique for analysis; design biological studies that are statistically tractable and perform basic statistical analyses using the statistical programming language R. **Prerequisites:** Graduate classification and STAT651 or approval of instructor.

BIOL 685 Directed Studies

Credits 1 to 8. 1 to 8 Other Hours. Limited investigations in fields other than those chosen for thesis or dissertation.

BIOL 686 Biomedical Therapeutics Development

Credit 1. 1 Lecture Hour. Basic aspects of the biotechnology business; includes key aspects of biotechnology patents, the main steps in preclinical drug development and company structure and funding. **Prerequisites:** Graduate classification or approval of instructor; BIOL 696 or concurrent enrollment.

BIOL 689 Special Topics in...

Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours. Selected topics in an identified area of biology.

BIOL 691 Research

Credits 1 to 23. 1 to 23 Other Hours. Research for thesis or dissertation.

BIOL 694 Graduate Orientation

Credit 1. 1 Lecture Hour. Instruction on what constitutes fraud in science, how to recognize it and avoid committing fraud; includes basis of ethics and plagiarism; negotiation techniques and conflict management; regulations and ethics covering animal and human experiments; record-keeping; data management; peer review. **Prerequisite:** Graduate classification.

BIOL 696 Ethics and Responsible Conduct of Research

Credit 1. 1 Lecture Hour. Instruction on what constitutes fraud in science, how to recognize it and avoid committing fraud; includes basis of ethics and plagiarism; negotiation techniques and conflict management; regulations and ethics covering animal and human experiments; record-keeping; data management; peer review. May be taken four times for credit. **Prerequisite:** Graduate classification or approval of instructor.

BIOL 697 Methods in Teaching Biology Laboratory

Credit 1. 1 Lecture Hour. Introduction to teaching methods associated with the teaching of undergraduate biology laboratories; emphasis on effective preparation and delivery of laboratory course content, clear instructions for procedures and laboratory safety. **Prerequisite:** Graduate classification in a biological science.