MOLECULAR AND CELL BIOLOGY (MCB)

MCB Class Schedule (https://courses.illinois.edu/schedule/DEFAULT/DEFAULT/MCB)

Courses

MCB 100 Introductory Microbiology credit: 3 Hours.
Introduction to the principal activities and properties of microorganisms, including bacteria, yeasts, molds, and viruses; consideration of the role of natural processes, such as photosynthesis; and man's use and control of microorganisms in the production of antibodies and vaccines in industrial fermentations, in sanitation and public health, and in agriculture. Credit is not given for both MCB 100 and MCB 300. Prerequisite: There are no prerequisites for MCB 100, but some chemistry is recommended. This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

MCB 101 Intro Microbiology Laboratory credit: 2 Hours.
Laboratory introduction to the techniques employed in the investigation of microbial activities and properties; experiments designed to familiarize the student with the handling, identification, and characterization of microorganisms and their activities, particularly those of interest to man. Credit is not given for both MCB 101 and MCB 301. Prerequisite: Credit or concurrent registration in MCB 100.

MCB 150 Molec & Cellular Basis of Life credit: 4 Hours.
Introductory course focusing on the basic structure, metabolic, and molecular processes (including membranes, energy metabolism, genes) common to all cells. Emphasis on unique properties that differentiate the major sub-groups of organisms (Archaea, Bacteria, plants, and animals), and will discuss how cells are integrated into tissues and organs in multicellular organisms. This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

MCB 151 Molec & Cellular Laboratory credit: 1 Hour.
Introductory laboratory course focusing on basic techniques in molecular and cellular biology. Credit is not given for MCB 151 for students majoring in Molecular and Cellular Biology, or Integrative Biology; Credit is not given for both MCB 151 and MCB 251. Prerequisite: Concurrent enrollment in MCB 150.

MCB 170 Society and the Brain credit: 3 Hours.
_presents recent findings concerning the brain-society interaction. The facts will span many levels, from molecular and cellular interactions, to the functions of specific brain regions, and on to the behaviors of individuals, groups and societies. Intended to bring a broad range of neurobiological data and ideas into an interesting and relevant context. This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

MCB 180 Human Reproduction & Society credit: 3 Hours.
Lectures and discussions on topics in human reproduction where technological and clinical advances are having economic, social, and ethical consequences. This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

MCB 198 Internship credit: 0 Hours.
Full-time or part-time internship at another University or an off-campus medical facility, research institute or other approved institution. Approved for S/U grading only. May be repeated. Prerequisite: For MCB and Biochemistry majors only. This course satisfies the General Education Criteria for: UIUC: Ugrad Zero Credit Intern

MCB 199 Undergraduate Open Seminar credit: 1 to 5 Hours.
Approved for letter and S/U grading. May be repeated to a maximum of 10 hours.

MCB 215 Foundation in Mol & Cell Bio credit: 3 Hours.
Online course that will provide transfer students with the essential bases in Molecular and Cellular Biology needed to succeed in the MCB core curriculum, when entering it at the sophomore level. Students will be exposed to the major concepts and the experimental aspects of MCB and be presented with an integrated view of a cell and its inner workings. In addition, a strong peer mentoring program will help students transitioning from their previous institutions by introducing them to the complex setting of a large undergraduate campus. Prerequisite: Successful completion of two semesters of college biology. Credit or concurrent enrollment in CHEM 101, CHEM 102, or equivalent, or consent of instructor.

MCB 244 Human Anatomy & Physiology I credit: 3 Hours.
Organ system biology with an emphasis on normal human anatomy and physiology, physiological processes and associated disease processes of the following systems; skeletal, muscle, nervous, sensory, and endocrine. Prerequisite: Credit or concurrent enrollment in CHEM 101, CHEM 102, or equivalent; or consent of instructor.

MCB 245 Human Anat & Physiol Lab I credit: 2 Hours.
Laboratory exploration of normal human anatomy and physiology and relevant disease processes for the following systems: tissue, skeletal, nervous, muscular, sensory, and endocrine. Previously dissected human cadavers are an important part of the learning experience in this course, but students will not dissect human cadavers. Neither animal dissection or animal use are elements of this course. Prerequisite: Credit or concurrent enrollment in CHEM 101, CHEM 102, or equivalent; or consent of instructor.

MCB 246 Human Anatomy & Physiology II credit: 3 Hours.
Organ system biology with an emphasis on normal human anatomy and physiology, physiological processes and associated disease processes of the following systems: digestion, cardiovascular, respiratory, renal, and reproductive. Prerequisite: MCB 244 and credit or concurrent enrollment in CHEM 101, CHEM 102, or equivalent; or consent of instructor.

MCB 247 Human Anat & Physiol Lab II credit: 2 Hours.
Laboratory exploration of normal human anatomy and physiology and relevant disease processes for the following systems: digestive, cardiovascular, respiratory, renal, and reproductive. Previously dissected human cadavers are an important part of the learning experience in this course, but students will not dissect human cadavers. Neither animal dissection or animal use are elements of this course. Prerequisite: MCB 245 and credit or concurrent enrollment in CHEM 101, CHEM 102, or equivalent; or consent of instructor.

Information listed in this catalog is current as of 04/2018
MCB 250  Molecular Genetics  credit: 3 Hours.
Fundamentals of molecular biology including structure of DNA, RNA and proteins, mechanisms of DNA replication, transcription and translation, gene organization, genetic variation and repair, and regulation of gene expression in Bacteria, and Eukarya. Students who enter the University Fall 2011 or later are responsible for additional course-based tuition of $300 unless they are already paying differential tuition during the term of course enrollment. Additional fees may apply. See Class Schedule. Prerequisite: MCB 150, CHEM 102 and CHEM 104, or equivalents or consent of instructor.

MCB 251  Exp Techniqs in Molecular Biol  credit: 2 Hours.
Laboratory course emphasizing a range of molecular biology questions, and the experimental approaches and methodologies needed to answer these questions. Lectures will accompany labs to explain theoretical background and experimental rationale. Students who enter the University Fall 2011 or later are responsible for additional course-based tuition of $300 unless they are already paying differential tuition during the term of course enrollment. Additional fees may apply. See Class Schedule. Credit is not given for both MCB 251 and MCB 151. Prerequisite: Concurrent or prior enrollment in MCB 250 or consent of instructor.

MCB 252  Cells, Tissues & Development  credit: 3 Hours.
Functional organization and physiology of cells and tissues, including cellular signaling, cellular interactions, and developmental processes. Students who enter the University Fall 2011 or later are responsible for additional course-based tuition of $300 unless they are already paying differential tuition during the term of course enrollment. Additional fees may apply. See Class Schedule. Prerequisite: MCB 250 or equivalent with consent of instructor.

MCB 253  Exp Techniqs in Cellular Biol  credit: 2 Hours.
Laboratory course emphasizing experimental techniques in cellular biology, cellular physiology, and developmental biology. Students who enter the University Fall 2011 or later are responsible for additional course-based tuition of $300 unless they are already paying differential tuition during the term of course enrollment. Additional fees may apply. See Class Schedule. Credit is not given for both MCB 253 and MCB 151. Prerequisite: Concurrent or prior enrollment in MCB 252 or consent of instructor.

MCB 270  Medical Genetics  credit: 3 Hours.
Addresses key issues in medical genetics, defined as human genetics for pre-health care professionals. The course covers basic principles of medical ethics, modes of inheritance, the molecular basis of genetic disorders, treatment approaches, gene therapy and emerging technologies like whole genome sequencing. Prerequisite: MCB 252 or equivalent or consent of instructor.

MCB 290  Undergraduate Research  credit: 1 to 5 Hours.
Students assist in and/or conduct research under faculty supervision in an MCB research laboratory. The topics and nature of the work will vary but will be defined as work conducted in MCB research laboratories. For each hour of course credit in fall and spring terms, the student will be expected to complete 5 hours of work in the lab as directed. 75-80 total hours would be the expectation for 1 credit hour during 15-16 week terms. May be repeated to a maximum of 10 hours. Prerequisite: Consent of instructor.

MCB 291  Undergraduate Research Abroad  credit: 1 to 5 Hours.
Students engage in research under faculty supervision at a location outside of the United States. Topics and precise nature of assistance to be determined by MCB faculty in consultation with faculty at the institution. May be repeated in separate terms up to 10 hours. Prerequisite: Consent of MCB faculty who has approved the proposed research plan; consent of faculty member at institution abroad who will be supervising the work and has approved the proposed research plan; evidence of adequate preparation for such study; consent of School of MCB. Not available to freshmen.

MCB 297  MCB Honors Discussion  credit: 1 Hour.
Honors discussion section associated with MCB 250, MCB 252, and MCB 354. Concurrent enrollment in the appropriate lecture course is required. May be repeated in separate terms to a maximum of 3 hours.

MCB 298  MCB Honors Lab Discussion  credit: 1 Hour.
Discussion section associated with the Honors lab sections of MCB 251 and MCB 253. Concurrent enrollment in the appropriate Honors lab section is required. May be repeated in separate terms to a maximum of 2 hours.

MCB 299  MCB Merit Program Discussion  credit: 1 Hour.
Provides the extra earned credit hours for students enrolled in the Merit Program in MCB 250, MCB 252, or MCB 354. Approved for letter and S/U grading. May be repeated up to 6 hours in a semester, to a maximum of 10 total hours. Prerequisite: Consent of instructor.

MCB 300  Microbiology  credit: 3 Hours.
Emphasizes fundamental concepts of microbiology, including nutrition, physiology, genetics, molecular biology, ecology and evolution of microorganisms, and their role in nature, human health and disease. Credit is not given for both MCB 300 and MCB 100. Prerequisite: MCB 250 and credit or concurrent registration in MCB 252 or consent of instructor.

MCB 301  Experimental Microbiology  credit: 3 Hours.
Laboratory emphasizing the fundamentals of microbiology. Topics include growth, isolation, and identification of bacteria; restriction endonuclease analysis of DNA, genetic cloning, and gene transfer. Computer methods are used for the identification of microorganisms and for the analysis of recombinant DNA molecules. Prerequisite: MCB 250 and 251 and credit or concurrent registration in MCB 300, or consent of instructor.

MCB 314  Introduction to Neurobiology  credit: 3 Hours.
Introduction to functional and organizational principles of the mammalian nervous system. Topics include the function of nerve cells, neural signaling, sensory and motor systems, learning and memory, attention, motivation, emotions, language, neural development and neurological disorders. A general introduction appropriate for all majors. Same as NEUR 314. Prerequisite: Junior or senior standing.

MCB 316  Genetics and Disease  credit: 4 Hours.
Introduction of the structure, expression, and regulation of genes of higher eukaryotes with an emphasis upon animal cells. Specific topics will include chromatin structure and its relation to gene expression, regulation of gene expression during development, recombination, molecular genetic technologies, gene replacement therapy, and the molecular genetics of cancers. Credit is not given for both MCB 316 and MCB 317. Prerequisite: MCB 150 and credit or concurrent registration in MCB 250 or consent of instructor.
MCB 317  Genetics and Genomics  credit: 4 Hours.
Study of genetics as a discipline, genetic analysis as a tool to understand biology and the role of genome sciences in biology. Credit is not given for both MCB 317 and MCB 316. Prerequisite: MCB 250, MCB 251, MCB 252, and MCB 253; or consent of instructor.

MCB 320  Mechanisms of Human Disease  credit: 3 Hours.
The advent of molecular biology and the Human Genome Project has dramatically increased our understanding of the mechanisms of human disease. The underlying molecular causes for many diseases have been elucidated. This course examines how abnormalities that occur at the molecular and cellular level manifest as pathologies affecting the structure and function of human tissues and organs. In addition, this course focuses on the pathophysiology of common human diseases and the environmental, genetic and epigenetic causes of specific disease types. Prerequisite: MCB 252 or consent of instructor.

MCB 354  Biochem & Phys Basis of Life  credit: 3 Hours.
Introduction to biochemistry and structural biology emphasizing the physical and chemical properties of macromolecules. Credit is not given for both MCB 354 and MCB 450. Prerequisite: CHEM 232 or CHEM 236, and MCB 250 and MCB 252, or consent of instructor.

MCB 364  Eukaryotic Cell Biology Laboratory  credit: 2 Hours.
Laboratory course emphasizing biochemical, immunological and molecular biological techniques used to probe the molecules and processes of eukaryotic cells. Special emphasis will be given to the cell cycle, intracellular trafficking, and cellular differentiation. Students will also learn proper data handling and reporting techniques. Prerequisite: MCB 252 and MCB 253 or consent of instructor. Priority is given to undergraduate MCB and Biochemistry majors.

MCB 395  Special Topics in Human Physiology  credit: 2 Hours.
This course consists of 2 components: (1) a journal club, in which students explore current advances in the diagnosis, treatment, and understanding of human diseases by reading, presenting and discussing primary research articles; and (2) instructional support for MCB 244, in which students hold open office hours and make brief (10-15 minute) instructional videos that highlight advanced topics covered in journal club. Prerequisite: MCB 244 and MCB 246 and instructor approval.

MCB 396  Special Topics in Human Health and Disease  credit: 2 Hours.
This course consists of 2 components: (1) a journal club, in which students explore current advances in the diagnosis, treatment, and understanding of human diseases by reading, presenting and discussing primary research articles; and (2) instructional support for MCB 246, in which students hold open office hours and make brief (10-15 minute) instructional videos that highlight advanced topics covered in journal club. Prerequisite: MCB 244 and MCB 246 and instructor approval.

MCB 400  Cancer Cell Biology  credit: 3 Hours.
Principles of eukaryotic cell biology with an emphasis on cancer cell biology; consideration of molecular and fine structural components of the cell with an emphasis on experimental analysis of the relationship of structure to function of gene, membrane, cytoskeleton, and extracellular matrix. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 250, MCB 251, MCB 252, MCB 253, and credit or concurrent registration in MCB 354 or MCB 450 or consent of instructor.

MCB 401  Cell & Membrane Physiology  credit: 3 Hours.
Cellular and molecular basis of physiological process with an emphasis on phenomena taking place at the membrane of cells and organelles (e.g., signal transduction, ion transport, synaptic transmission, nerve conduction, bioelectricity, synaptic plasticity.) Structure and function of biological membranes through a quantitative lens. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 252 or consent of instructor.

MCB 402  Sys & Integrative Physiology  credit: 3 Hours.
Examines human systems physiology. Topics to be covered include the nervous and endocrine systems, muscle physiology, cardiac physiology, respiratory physiology, blood and immune homeostasis, renal physiology, and gastrointestinal physiology and energy homeostasis. Special emphasis is on homeostatic control and integration of body systems in both health and disease. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 252 or consent of instructor.

MCB 403  Cell & Membrane Physiology Lab  credit: 1 or 2 Hours.
Experimental investigation of cellular functions common to most eukaryotic cells; emphasis on biochemical, electrical, and mechanical recording techniques. Some animal dissection and the use of animal tissues are required in this course. Alternatives are not available. Inquiries concerning the use of or the dissection of animal tissues can be directed to the Instructor or Head of the Department. 2 undergraduate hours. 1 graduate hour. Prerequisite: Credit or concurrent registration in MCB 401 and previous biology laboratory experience.

MCB 404  Sys & Integrative Physiol Lab  credit: 1 to 2 Hours.
Experimental investigation of organ systems of vertebrates with emphasis on biochemical, electrical and physical recording techniques. Some animal dissection and the use of animal tissues are required in this course. Alternatives are not available. Inquiries concerning the use of, or the dissection of animal tissues can be directed to the instructor or Head of the Department. 2 undergraduate hours. 1 graduate hour. Prerequisite: Credit or concurrent registration in MCB 402 and previous biology laboratory experience.

MCB 406  Gene Expression & Regulation  credit: 3 Hours.
Provides in-depth and up-to-date coverage of gene expression and regulation. Lectures are centered on the principles of regulating gene expression in eukaryotic cells. The course covers macromolecule structure and function in gene expression; molecular mechanisms of the key gene expression events including transcription, RNA processing, localization and translation. Applications of these principles in medicine and therapeutics such as aging, cancer and drug design are also discussed. Same as BIOL 406. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 354 or consent of instructor.

MCB 408  Immunology  credit: 3 Hours.
Introduction to fundamentals of immunology with emphasis on biological application; basic background for understanding immunological responses and techniques applicable to biological research. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 250, MCB 251, MCB 252, MCB 253, and MCB 354; or consent of instructor.
MCB 410 Developmental Biology, Stem Cells and Regenerative Medicine credit: 3 Hours.
Survey of molecular and cellular mechanisms involved in development and growth of animals, as well as recent advancement in stem cell and Regenerative medicine research. Topics to be covered include fertilization and early cell lineage, body axis formation, gastrulation, neural induction and patterning, segmentation, and other aspects of pattern formation including organogenesis and limb development, as well as embryonic stem cells, induced pluripotent stem cells, adult stem cells, regeneration and regenerative medicine. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 252 or consent of instructor.

MCB 413 Endocrinology credit: 3 Hours.
Physiology and biochemistry of the endocrine system and its hormones with special reference to vertebrates and to human endocrine disorders. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 252 or consent of instructor. One semester of biochemistry is recommended.

MCB 419 Brain, Behavior & Info Process credit: 3 Hours.
Exploration of the neural basis of animal behavior. Emphasis on the information processing problems that animals face in complex natural environments and how nervous systems have evolved to solve these problems. Introduction to the use of computer modeling and simulation techniques for exploring principles of nervous system design and function. Current literature in computational neurobiology and neuroethology will be incorporated in readings and class discussion. Same as BIOP 419 and NEUR 419. 3 undergraduate hours. 3 graduate hours. Prerequisite: CS 101; and PHYS 102 or PHYS 212; and MCB 252; or equivalent or consent of instructor.

MCB 421 Microbial Genetics credit: 3 Hours.
Prokaryotic microbial genetic systems; emphasis on typical data analyses, together with the basic classes of genetic phenomena. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 300 or consent of instructor.

MCB 424 Microbial Biochemistry credit: 3 Hours.
Examines the biochemical ecology of diverse microbial groups with emphasis on anaerobic systems. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 250 and MCB 354 or MCB 450, or consent of instructor.

MCB 426 Bacterial Pathogenesis credit: 3 Hours.
Emphasizes prokaryotes that cause important diseases in humans and other animals; host-parasite bacteriology; and chemistry and genetics of mechanisms of pathogenesis. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 300 and MCB 354, or consent of instructor.

MCB 428 Microbial Pathogens Laboratory credit: 2 Hours.
Laboratory study of methods of recognition and differentiation, diagnostic tests, and mechanisms of bacterial and viral pathogenesis. Topics include infections of the urinary tract, respiratory tract, gastrointestinal tract, and sexually transmitted diseases. 2 undergraduate hours. 2 graduate hours. Prerequisite: MCB 300 and MCB 301 or consent of instructor.

MCB 429 Cellular Microbiology & Disease credit: 3 Hours.
Emphasizes cell biology of infectious diseases, using cellular, molecular, and animal models. Will stress molecular cross-talk that drives host-pathogen interactions, state-of-the art approaches for investigating host and microbial cell and molecular biology, latest paradigms in host cell biology, and, the evolutionary basis by which pathogens can manipulate host cell cytoskeleton, membranes, organelles, cell cycle, gene expression, and signaling in eukaryotic cells. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 300 and MCB 354 or consent of instructor.

MCB 430 Molecular Microbiology credit: 3 Hours.
Modern contributions to the science of microbiology; emphasizes the structure, function, and synthesis of informational macromolecules and on the role microorganisms have played in molecular biology. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 300 and consent or concurrent registration in MCB 354, or consent of instructor.

MCB 431 Microbial Physiology credit: 3 Hours.
Examines bacterial physiology, including discussions of energetics, regulation of metabolism, and cell structure. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 300 or equivalent; credit or concurrent registration in a biochemistry course.

MCB 432 Computing in Molecular Biology credit: 3 Hours.
Examination of computational aspects of biology with an emphasis on the relationships between biological questions and their recastings as mathematical or logical problems. Topics are drawn from biochemistry, genetics, molecular sequence analysis, and molecular structure. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 250, MCB 252, MCB 354, and calculus I (MATH 220 or MATH 221), and calculus II (MATH 231) or biostatistics (STAT 212); or consent of instructor.

MCB 433 Virology & Viral Pathogenesis credit: 3 Hours.
Same as PATH 433. See PATH 433.

MCB 434 Food & Industrial Microbiology credit: 3 Hours.
Same as FSHN 471. See FSHN 471.

MCB 435 Evolution of Infectious Disease credit: 3 Hours.
Understanding the evolution and ecology of the microbial world is of great importance to human health and the health of our planet. Students will explore the ecology and evolution principles that apply to viruses, microbial eukaryotes, archaea and bacteria. The primary literature on historical and emerging infectious diseases will be used to illustrate critical applications of these basic principles. Examples include applying genomics tools to understand the evolutionary basis for antibiotic resistance, the spread of emerging pathogens, and the ecology of probiotics and the human microbiome. The objective of this class is to better understand how humans shape the diversity and dynamics of the microbial world living in and around us every day. Same as IB 442. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 300 or consent of instructor.

MCB 436 Global Biosecurity credit: 1 Hour.
Designed to provide students with broad coverage of key areas of scientific, legal, social, ethical, and political aspects of biosecurity, emphasizing current problems and research in the areas of biodefense, emerging infectious diseases, synthetic biology, and other topics. In combination with related reading assignments, the weekly special topics-based seminar will integrate knowledge of modern biomedical research, advances in biotechnology, and natural and manmade biological threats with the skills to analyze and develop public policies and strategies for enhancing global biosecurity. 1 undergraduate hour. 1 graduate hour. Prerequisite: MCB 150 or the equivalent or consent of instructor.

MCB 442 Comparative Immunobiology credit: 4 Hours.
Same as ANSC 450 and PATH 410. See ANSC 450.

MCB 446 Physical Biochemistry credit: 3 Hours.
Same as CHEM 472 and BIOL 446. See BIOL 446.
MCB 450 Introductory Biochemistry  credit: 3 Hours.
Chemistry and metabolism of carbohydrates, lipids, proteins, nucleic acids, vitamins, and coenzymes and their relation to the regulation and processes of organisms, cells, and subcellular components. Students who enter the University Fall 2011 or later are responsible for additional course-based tuition of $300 unless they are already paying differential tuition during the term of course enrollment. Additional fees may apply. See Class Schedule. 3 undergraduate hours. 3 graduate hours. Credit is not given for both MCB 450 and MCB 354. Prerequisite: CHEM 232 or CHEM 236, or equivalent, or consent of instructor. Not intended for students in the MCB or biochemistry curricula.

MCB 458 Basic Human Pathology  credit: 3 Hours.
Introduction to the basic mechanisms of human disease with a focus on the building blocks of pathological processes at the sub-organismal and organismal level. Basic biological processes will be stressed including tissue adaptation, injury, inflammation, repair and neoplasia. Pathology synthesizes cellular and molecular biology, biochemistry and immunology holistically so as to understand the body’s limited responses to the comucruptcy of experienced physiological insults. 3 undergraduate hours. No graduate credit. Prerequisite: MCB 354 or equivalent, or consent of instructor. For MCB and Biochemistry undergraduate majors only.

MCB 460 Regeneration and Medicine  credit: 3 Hours.
A survey of regeneration biology and medicine at the organ, tissue, and cellular/genetic/molecular/levels. Basic concepts are presented with a focus on contemporary methods and seminal experiments. Students will learn to think critically and creatively about experimentation and analyses of three regenerative medicine strategies: stem cell transplantation, bioartificial tissues, and chemical induction of regeneration in vivo. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 410 or consent of instructor. Recommended: knowledge of vertebrate histology and anatomy.

MCB 461 Cell & Molecular Neuroscience  credit: 3 Hours.
Designed as an in-depth foundation course for graduate and undergraduate students with strong neuroscience interests. Covers up-to-date cellular and molecular neurobiology (including basic principles of neuronal function, signaling, and plasticity) and introductory brain anatomy that underlie brain function and animal behaviors. Pathogenic mechanisms of neurological diseases and disorders from the latest research will be heavily explored. Same as NEUR 481. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 252, MCB 250 or equivalent, or consent of instructor. May be taken concurrently with MCB 462.

MCB 462 Integrative Neuroscience  credit: 3 Hours.
Employs integrative, multi-level systems approaches to nervous system and behavior. Focuses on neural circuits in sensory integration, pattern generation, the interaction of sensation, internal states and learning in behavioral decision, the neuronal nature of pain, sleep, and biological rhythms, neuroeconomics, new vistas in neural modeling and interfacing brain and machine. Students are presented in neuroethological contexts of evolution and the economics of behavior and physiology. Same as NEUR 462. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 252 or consent of instructor. May be taken concurrently with MCB 461.

MCB 465 Human Metabolic Disease  credit: 3 Hours.
Examination of the molecular and physiological basis of human metabolic disease. Disruption of metabolic and energy homeostasis plays key roles leading to metabolic disorders. We will examine how lipid/glucose levels and energy balance are controlled in health and how they are abnormally regulated in disease states. In addition, we will cover current topics related to control of metabolism including aging and circadian rhythms. Methodologies leading to scientific discoveries and potential preventive and therapeutic agents will also be discussed. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 250, MCB 252, or consent of instructor.

MCB 471 Cell Structure and Dynamics  credit: 3 Hours.
Molecular basis of cellular organization focusing on how cells secrete, move, adhere, divide, communicate, and die. Material will emphasize critical analysis of experiments, current controversies and hypothesis testing. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 250 and MCB 252 or consent of instructor. Prior or concurrent enrollment in MCB 354 desirable.

MCB 480 Eukaryotic Cell Signaling  credit: 2 Hours.
General principles of molecular signaling regulating membrane, cytoplasmic, and nuclear events in eukaryotic cells with emphasis on mammalian systems. Contemporary methods of investigation and the principles of identifying and solving problems related to signal transduction will be emphasized. 2 undergraduate hours. 2 graduate hours. Prerequisite: MCB 252 or consent of instructor.

MCB 481 Developmental Neurobiology  credit: 3 Hours.
Principles of vertebrate invertebrate development control neurobiology with emphasis on the molecular and cellular mechanisms controlling neuronal determination, axon pathfinding, synapse formation, and plasticity. Same as NEUR 481. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 400 or MCB 461 or consent of instructor.

MCB 492 Senior Thesis  credit: 3 to 5 Hours.
Research conducted under the direction of a faculty member in the School of Molecular and Cellular Biology. Normally, the student enrolls in MCB 492 during the last semester on campus prior to graduation. In the semester preceding enrollment, interested students should consult with their faculty advisors concerning enrollment procedures. A minimum of 3 credit hours is required, and a thesis must be presented for credit to be received. Successful completion of MCB 492 is required in order to be eligible for graduation with distinction in MCB. 3 to 5 undergraduate hours. No graduate credit. Prerequisite: Two consecutive semesters of at least 2 credit hours of MCB 290 under the guidance of the same faculty member, or consent of instructor.

MCB 493 Special Topics Mol Cell Biol  credit: 1 to 4 Hours.
Discussion of current topics of interest within the broad domain of molecular and cellular biology; seminar or lecture format. Topics vary. May be repeated to a maximum of 12 hours. Prerequisite: Junior standing and consent of instructor.

MCB 501 Advanced Biochemistry  credit: 4 Hours.
Focuses on how to analyze and function of biomolecules and the chemical and evolutionary foundations of metabolic networks. Emphasis is on research methodology and current problems.

MCB 502 Advanced Molecular Genetics  credit: 4 Hours.
An advanced course in molecular genetics. Emphasis is on research methodology and current problems.

MCB 508 Intro to Systems Neuroscience  credit: 4 Hours.
Same as NEUR 508 and PSYC 508. See PSYC 508.
MCB 509 Cur Cur Topics Mol & Int Physiol credit: 2 Hours. Advanced seminars in current physiological research. May be repeated once for credit. Prerequisite: Consent of instructor.

MCB 511 Mol Bio of Microbe-Plant Inter credit: 3 Hours. Same as PLPA 509. See PLPA 509.

MCB 512 Advanced Endocrinology credit: 2 Hours. Seminars, lectures, student reports, and discussions of recent advances in endocrinology. Same as ANSC 530 and CB 512. May be repeated to a maximum of 8 hours. Prerequisite: Consent of instructor.

MCB 513 Survey of Neurobiology credit: 1 Hour. Overview of the functional and organizational principles of the mammalian nervous system. Intended for graduate students with little or no prior coursework in neurobiology. Students will read and discuss current scientific papers from the neurobiological literature. Same as NEUR 513.

MCB 520 Advanced Molecular Biology credit: 1 Hour. Advanced graduate level, primary literature-based discussion course on molecular microbiology. Graduate level companion course for MCB 430. Prerequisite: Concurrent registration in MCB 430 or consent of instructor.

MCB 521 Advanced Microbial Genetics credit: 1 Hour. Advanced level, primary literature-based discussion course on microbial genetics. Graduate level companion course for MCB 421. Prerequisite: Concurrent or prior enrollment in MCB 421 or consent of instructor.

MCB 526 Adv Bacterial Pathogenesis credit: 1 Hour. Advanced primary literature-based discussion course on bacterial pathogenesis. Graduate level companion course for MCB 426. Prerequisite: Concurrent or prior enrollment in MCB 426 or consent of instructor.

MCB 529 Special Topics Cell Devel Biol credit: 1 to 4 Hours. Discussion of current topics of interest in higher eukaryotic cellular and molecular biology, development, neurobiology; seminar or lecture format. Topics vary. May be repeated to a maximum of 8 hours. Prerequisite: Consent of instructor.

MCB 530 Reproductive Physiol Seminar credit: 1 Hour. Presentation and discussion of current literature as well as graduate student and staff research proposals and findings in reproductive physiology. May be repeated to a maximum of 4 hours. Prerequisite: Consent of instructor.

MCB 532 Advanced Microbial Physiology credit: 1 Hour. Advanced primary literature-based discussion course on microbial physiology. Graduate level companion course for MCB 431. Prerequisite: Concurrent or prior registration in MCB 431 or consent of instructor.

MCB 533 Repro Physiology Lab Methods credit: 1 to 3 Hours. Same as ANSC 533 and CB 533. See ANSC 533.

MCB 534 Advanced Microbial Metabolism credit: 1 Hour. Advanced primary literature-based discussion course on microbial metabolism. Graduate level companion course for MCB 424. Prerequisite: Concurrent or prior enrollment in MCB 424 or consent of instructor.

MCB 539 Advanced Cellular Microbiology credit: 1 Hour. Advanced primary literature-based discussion course on cellular microbiology and underlying infectious diseases. Graduate level companion course for MCB 429. Prerequisite: Concurrent or prior enrollment in MCB 429 or consent of instructor.

MCB 540 Scientific Writing credit: 3 Hours. Study of scientific communication, geared toward biologists. Topics include writing mechanics, grammar and sentence structure, abstracts for different audiences and purposes, grant writing, manuscript preparation, figure construction, oral presentations, and the grant-review process. Class consists of both lectures and time working in small groups to revise writing assignments. Assignments include weekly writing exercises, a full NIH-style grant proposal and grant reviews for a mock study section. 2 graduate hours. No professional credit.

MCB 545 Functional Genomics in Principle and Practice credit: 3 Hours. Experimental and analytical foundations of functional genomics, tailored to experimental biologists who are using high-throughput sequencing technologies to analyze function in animal genomes. Lectures cover experimental methods and tools available for bioinformatics analysis; students will gain experience in the use of online or command-line bioinformatics tools through weekly assignments. Advanced knowledge in eukaryotic molecular genetics is needed but bioinformatics skills are not required. 3 graduate hours. No professional credit. Students must have access to a networked computer on which they can load software in order to complete required assignments for the course. Prerequisite: MCB 502 or equivalent or consent of instructor.

MCB 550 Biomolecular Physics credit: 4 Hours. Same as BIOP 550 and PHYS 550. See PHYS 550.

MCB 553 Enzyme Reaction Mechanisms credit: 3 or 4 Hours. Same as CHEM 572. See CHEM 572.

MCB 555 Anlys Biochemical Literature credit: 2 Hours. Discussions of current research and literature. Required of all graduate students whose major is biochemistry. Same as BIOM 555. Prerequisite: Second year graduate standing in biochemistry or consent of instructor.

MCB 561 Mechanisms Viral Pathogenesis credit: 3 Hours. Same as PATH 519. See PATH 519.

MCB 571 Bioinformatics credit: 4 Hours. Same as ANSC 543, CHBE 571, and STAT 530. See CHBE 571.

MCB 580 Res Ethics & Responsibilities credit: 1 Hour. Lecture/discussion course focusing on research ethics and a variety of related issues that can influence success in graduate school in the biological sciences, including scientific integrity and compliance with regulations for laboratory research. Approved for letter and S/U grading. Prerequisite: Consent of instructor.

MCB 581 Laboratory Rotation I credit: 3 Hours. Laboratory research methods; familiarization of first-year graduate students with experimental methods used in molecular and cellular biology research. Required of all first-year students entering MCB. Meets first five weeks of each term. Approved for S/U grading only. Prerequisite: First-year graduate status and consent of MCB graduate programs; concurrent registration in MCB 582.

MCB 582 Laboratory Rotation II credit: 3 Hours. Laboratory research methods; familiarization of first-year graduate students with experimental methods used in molecular and cellular biology research. Required of all first-year students entering MCB. Meets second five weeks of each term. Approved for S/U grading only. Prerequisite: First-year graduate status and consent of MCB graduate programs; concurrent registration in MCB 581.
MCB 583  Laboratory Rotation III  credit: 3 Hours.
Laboratory research methods; familiarization of first-year graduate students with experimental methods used in molecular and cellular biology research. Required of all first-year students entering MCB. Meets third five weeks of each term. Approved for S/U grading only. Prerequisite: First-year graduate status and consent of MCB graduate programs; concurrent registration in MCB 581 and MCB 582.

MCB 585  Current Topics in Microbiology  credit: 1 Hour.
Discussions, reviews, and appraisal of special topics in microbiology and molecular biology; seminar or lecture. Topics vary. Approved for S/U grading only. May be repeated to a maximum of 8 hours. Prerequisite: Consent of instructor.

MCB 586  Concepts/Topics Immunology  credit: 2 Hours.
Same as PATH 518. See PATH 518.

MCB 595  MCB Graduate Seminar  credit: 1 Hour.
Advanced seminars on current topics of interest in molecular and cellular biology. Approved for S/U grading only. May be repeated in separate terms to a maximum of 4 hours. Prerequisite: Consent of instructor.