MBS - Molecular Biosciences

Molecular Biosciences: MBS

Lower-Division Courses

MBS 119S, 219S, 319S, 419S, 519S, 619S, 719S, 819S, 919S. Topics in Molecular Biosciences.

This course is used to record credit the student earns while enrolled at another institution in a program administered by the University's Study Abroad Office. Credit is recorded as assigned by the study abroad adviser in the Biology Instructional Office. University credit is awarded for work in an exchange program; it may be counted as coursework taken in residence. Transfer credit is awarded for work in an affiliated studies program. May be repeated for credit when the topics vary.

Upper-Division Courses

MBS 320. Cell Biology.

Explore principles of eukaryotic cell structure and function. Examine macromolecules, membranes, organelles, cytoskeleton, signaling, cell division, differentiation, motility, and experimental methodologies. Three lecture hours and one discussion hour a week for one semester. Biology 320 and Molecular Biosciences 320 may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 320L. Cell Biology Laboratory.

Explore the complex structures and functions of cells through direct observation and experimentation. Discuss regulation of gene transcription and translation, protein sorting, organelles and membrane trafficking, cytoskeletal dynamics, and cell division. Use a combination of modern molecular biology, biochemistry, and microscopy techniques, with a strong emphasis placed on hypothesis-driven approaches, proper experimental design, and clear scientific writing and presentation. One lecture hour and five laboratory hours a week for one semester. Biology 320L or Molecular Biosciences 320L may not both be counted. Prerequisite: The following with a grade of at least C-: Biology 325 or 325H, and Biology 206L, Integrative Biology 208L (or Biology 208L), Molecular Biosciences 226L (or Biology 226L), or Environmental Sciences 311.

MBS 325T. Human Genetics.

Examine genomics, cancer genetics, identification and analysis of human disease genes, and monogenic and multifactorial traits in humans. Three lecture hours a week for one semester. Biology 325T and Molecular Biosciences 325T may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 226L. General Microbiology Laboratory.

Introduction to microbiology laboratory techniques and experimental demonstration of principles of microbiology. One lecture and three laboratory hours a week for one semester. Biology 226L and Molecular Biosciences 226L may not both be counted. Prerequisite: Credit with a grade of at least C- or registration for Molecular Biosciences 326M (or credit with a grade of at least C- for Biology 326M) or 326R (or credit with a grade of at least C- for Biology 326R).

MBS 326M. Introductory Medical Microbiology and Immunology.

Designed primarily for nursing and pre-pharmacy students. Explore an overview of the structure, function, and genetics of bacteria, viruses, and fungi, with emphasis on the interactions between micro-organisms and the human host. Examine principles of microbial pathogenesis, the host's innate and adaptive immune responses to infection, epidemiology, laboratory diagnosis, and antimicrobial chemotherapy and vaccines. Three lecture hours and one discussion hour a week for one semester. Biology 326M and Molecular Biosciences 326M may not both be counted. Prerequisite: Biology 311C; Biology 325 or 325H with a grade of at least C-; Chemistry 301 with a grade of at least C-; and one of the following with a grade of at least C-: Mathematics 408C, 408K, 408N, 408R.

MBS 326R. General Microbiology.

Examine an overview of the major areas of microbiological study, including cell structure and function, genetics, host-microbe interactions, physiology, ecology, diversity, and virology. Three lecture hours and one discussion hour a week for one semester. Biology 326R and Molecular Biosciences 326R may not both be counted. Prerequisite: Credit with a grade of at least C- or registration for Biology 325 or 325H, and Chemistry 302, 302C, or 302H with a grade of at least C-.

MBS 327D. Emerging Infectious Diseases.

Examine genomic and proteomic tools used to understand the causes of human infectious diseases. Discuss genome sequencing, community sequencing, proteomics, microarrays, and human polymorphism analysis; and how these technologies have been applied to the study of important human viral diseases. Explore extensive coverage of the molecular and clinical biology of these diseases. Three lecture hours a week for one semester. Only one of the following may be counted: Biology 327D, 337 (Topic: Emerging Infectious Diseases), Molecular Biosciences 327D. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 327G. Genomics.

Examine genome structure, organization, and function of model organisms; theory and methodology of genetic and physical mapping; sequencing analysis and annotation; genome duplication and evolution; and ethics for biotechnology and cloning. Three lecture hours a week for one semester. Only one of the following may be counted: Biology 327G, 337 (Topic: Genomics), Molecular Biosciences 327G. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 328. Introductory Plant Physiology.

Examine general principles of the mineral nutrition, water relations, metabolic activities, growth, and development of green plants. Three lecture hours a week for one semester. Biology 328 and Molecular Biosciences 328 may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-, and Chemistry 302, 302C, or 302H.

MBS 328D. Discovery Laboratory in Plant Biology.

Discuss methods of experimental design, data gathering, data interpretation, and data presentation, including original experiments relating to questions of current interest in plant physiology. Five laboratory hours a week for one semester. Only one of the following may be counted: Biology 328D, 337 (Topic: Discovery Laboratory in Plant Biology), Molecular Biosciences 328D. Prerequisite: The following with a grade of at least C-: Biology 325 or 325H, and Biology 206L, Integrative Biology 208L (or Biology 208L), Molecular Biosciences 226L (or Biology 226L), or Environmental Sciences 311.

MBS 128L. Laboratory Experiments in Plant Physiology.

Introduction to experimental techniques used in the study of the mineral nutrition, water relations, metabolic activities, growth, and development of green plants. Three laboratory hours a week for one semester. Biology 128L and Molecular Biosciences 128L may not both be counted. Prerequisite: Credit with a grade of at least C- or registration for Molecular Biosciences 328 (or credit with a grade of at least C- in Biology 328); and the following with a grade of at least C-: Biology 206L,

Integrative Biology 208L (or Biology 208L), Molecular Biosciences 226L (or Biology 226L), or Environmental Sciences 311.

MBS 129S, 229S, 329S, 429S, 529S, 629S, 729S, 829S, 929S. Topics in Molecular Biosciences.

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MBS 330. Molecular Biology of Animal Viruses.

Examine mechanisms by which viruses replicate and kill or transform cells. Three lecture hours a week for one semester. Biology 330 and Molecular Biosciences 330 may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 230L. Virology Laboratory.

Examine basic experimental techniques applied to selected bacteriophages and animal viruses. Four laboratory hours and one discussion hour a week for one semester. Biology 230L and Molecular Biosciences 230L may not both be counted. Prerequisite: Molecular Biosciences 226L (or Biology 226L) with a grade of at least C-, and credit with a grade of at least C- or registration for Molecular Biosciences 330 (or credit with a grade of at least C- in Biology 330).

MBS 331L. Laboratory Studies in Molecular Biology.

Explore molecular biology methods, experimental design, and analyses applicable to both research and fields such as healthcare, biotechnology, and genetic analyses. Conduct experiments in a research project format. One lecture hour and four and one-half laboratory hours a week for one semester. Biology 331L and Molecular Biosciences 331L may not both be counted. Prerequisite: The following with a grade of at least C-: Biology 325 or 325H, and Biology 206L, Integrative Biology 208L (or Biology 208L), Molecular Biosciences 226L (or Biology 226L), or Environmental Sciences 311.

MBS 336. Tumor Biology.

Discuss core aspects of cancer pathology, treatment, epidemiology, the discovery of oncogenes and tumor suppressors, and the molecular genetics underlying the characteristic features of malignant tumors (including metastatic behavior, genomic instability, angiogenesis, cell cycle regulation, and apoptosis). Examine the biochemical functions of cancer-related proteins and enzymes and therapeutic approaches based on our understanding of these proteins. Explore important experimental approaches that have influenced our current understanding of cancer. Three lecture hours a week for one semester. Biology 336 and Molecular Biosciences 336 may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-; and one of the following with a grade of at least C-: Biochemistry 339F, Biochemistry 369, Molecular Biosciences 330 (or Biology 330), or Molecular Biosciences 360K (or Biology 360K).

MBS 137, 237, 337, 437. Topics in Biology.

Examine recent developments and research methods in the biological sciences. For each semester hour of credit earned, one lecture hour a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Biology 325 or 325H with a grade of at least C-; additional prerequisites vary with the topic.

MBS 339M. Bacterial Behavior and Signaling Mechanisms.

Examine molecular, cellular, organismal, ecological, and evolutionary biology of bacteria. Focus on a large number of bacteria, both Gram-positive and Gram-negative from four major phyla, that live and survive both as free-living microbes, in groups, and in both beneficial and pathogenic associations with eukaryotic hosts. Explore evolution of organelles and behaviors, including receiving and transducing signals that produce a variety of outcomes such as chemotaxis and motility, morphogenesis and development, secretion and virulence, quorum sensing and biofilms, bacterial warfare, and antibiotic production and tolerance. Three lecture hours a week for one semester. Biology 339M and Molecular Biosciences 339M may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-, and Molecular Biosciences 326R (or Biology 326R) with a grade of at least C-.

MBS 343. Advanced Cell Biology.

Explore current research in eukaryotic cell biology including vesicle trafficking, cytoskeletal dynamics, cell movement and organization within tissues, and cellular signal transduction and information processing. Focus on experimental reasoning, quantitative methods for studying cells, and reading primary literature. Three lecture hours per week for one semester. Biology 337 (Topic: Advanced Cell Biology) and Molecular Biosciences 343 may not both be counted. Prerequisite: Biochemistry 369 or 339F, and Molecular Biosciences 320 (or Biology 320) with a grade of at least C-.

MBS 344. Molecular Biology.

Examine molecular basis of cellular processes: gene structure and function, DNA replication, RNA and protein synthesis, viruses, molecular aspects of immunology and cancer, and recombinant DNA. Three lecture hours and one discussion hour a week for one semester. Biology 344 and Molecular Biosciences 344 may not both be counted. Prerequisite: Biology 325 or 325H, and Biochemistry 369 or 339F with a grade of at least a C-.

MBS 349L. Experiments in Developmental Biology.

Discuss methods and principles of developmental biology in a laboratory context, with emphasis on animal embryology using molecular techniques and microscopy. One lecture hour and six laboratory hours a week for one semester. Biology 349L and Molecular Biosciences 349L may not both be counted. Prerequisite: The following with a grade of at least C-: Biology 325 or 325H, and Biology 206L, Integrative Biology 208L (or Biology 208L), Molecular Biosciences 226L (or Biology 226L), or Environmental Sciences 311.

MBS 350. Developmental, Stem Cell, and Regenerative Biology.

Explore the principles and mechanisms of embryonic development and the processes guiding stem cell differentiation and tissue repair. Three lecture hours a week for one semester. Biology 350 and Molecular Biosciences 350 may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 350M. Plant Molecular Biology.

Discuss the fundamentals of plant molecular biology, including structure and expression of the chloroplast and mitochondrial genomes. Three lecture hours a week for one semester. Biology 350M and Molecular Biosciences 350M may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 355. Microbial Biochemistry.

Study the function of bacterial proteins and their complexes, including their role in inter-bacterial interactions that shape multi-species communities. Three lecture hours a week for one semester Biology 355 and Molecular Biosciences 355 may not both be counted. Prerequisite: Molecular Biosciences 326R (or Biology 326R); and Biochemistry 369 or 339F with a grade of at least C-.

MBS 356E. Epigenetics and Epitranscriptomics.

Explore epigenetic mechanisms that involve covalent modifications of the three major biomolecules: DNA, RNA, or proteins in the context of gene expression and genome stability. Examine how environmental and intrinsic factors regulate these mechanisms to impact normal and diseased cell functions, particularly as they relate to human health, aging, and behavior. Three lecture hours a week for one semester. Only one of the following may be counted: Biology 327E, 337 (Topic: Epigenetics), 356E, Molecular Biosciences 356E. Prerequisite: Molecular Biosciences 344 (or Biology 344) with a grade of at least C-.

MBS 360K. Immunology.

Discuss the basic concepts of humoral and cell-associated immune phenomena, including innate immunity; the molecular basis of T cell and B cell antigen recognition; hematopoiesis and the development of lymphocytes; cellular and humoral immune responses; and the basics of immunodeficiency, autoimmunity, immunotherapy, and vaccination. Three lecture hours a week for one semester. Biology 360K and Molecular Biosciences 360K may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 260L. Immunology Laboratory.

Examine current techniques in experimental cellular and humoral immunology. One hour lecture and four laboratory hours a week for one semester. Biology 260L and Molecular Biosciences 260L may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-; Biology 206L, Integrative Biology 208L (or Biology 208L), Molecular Biosciences 226L (or Biology 226L), or Environmental Science 311 with a grade of at least C-; and credit or registration for Molecular Biosciences 360K (or credit for Biology 360K).

MBS 361. Human Infectious Diseases.

Examine etiology, pathogenesis, diagnosis, and immunobiology of the major microbial diseases, with emphasis on their prevention. Three lecture hours a week for one semester. Biology 361 and Molecular Biosciences 361 may not both be counted. Prerequisite: Biology 325 or 325H, and Molecular Biosciences 326M (or Biology 326M) or 326R (or Biology 326R) with a grade of at least C- in each.

MBS 361L. Clinical Bacteriology Laboratory.

Discuss techniques required for independent work in diagnostic and epidemiological bacteriology. Two lecture hours and five laboratory hours a week for one semester. Biology 361L and Molecular Biosciences 361L may not both be counted. Prerequisite: The following with a grade of at least C- in each: Biology 325 or 325H; Molecular Biosciences 226L (or Biology 226L); and 326R (or Biology 326R) or 326M (or Biology 326M).

MBS 366. Microbial Genetics.

Examine molecular biology of nucleic acids. Explore biosynthesis of macromolecules, transfer of genetic material from cell to cell, recombination, mutagenesis, and regulatory mechanisms. Three lecture hours a week for one semester. Biology 366 and Molecular Biosciences 366 may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-, and Molecular Biosciences 326R (or Biology 326R) with a grade of at least C-.

MBS 366R. Molecular Genetics and Medicine.

Discuss the implementation of molecular genetics techniques in medicine. Explore the application of diagnostic and therapeutic techniques for several genetic disorders and infectious diseases. Three lecture hours a week for one semester. Biology 366R and Molecular Biosciences 366R may not both be counted. Prerequisite: Biology 325 or 325H with a grade of at least C-.

MBS 367C. Cellular and Molecular Bases of Neural Development.

Same as Neuroscience 367C. Introduction to the principles by which the neural tube (brain and spinal cord) forms during embryonic development. Discuss the cellular and molecular mechanisms underlying the formation of a three-dimensional neural tube and its division into forebrain, midbrain, hindbrain, and spinal cord. Three lecture hours a week for one semester. Only one of the following may be counted: Biology 367C, Neuroscience 367C, Molecular Biosciences 367C. Prerequisite: One of the following with a grade of at least C-: Biology 325, Neuroscience 330.

MBS 368C. Supervised Literature Review.

Restricted to students pursuing the Bachelor of Science in Biology degree in a track focusing on microbiology, infectious disease, cell biology, molecular biology, plant biology, genetics, or genomics. Conduct supervised literature review and written capstone thesis on a selected subject in biology by individual arrangement with the instructor. Three lecture hours a week for one semester. Prerequisite: Molecular Biosciences 320 with a grade of at least C, concurrent registration for Molecular Biosciences 175C, consent of the instructor and consent of the capstone thesis adviser.

MBS 368R. Supervised Capstone Research.

Restricted to students pursuing the Bachelor of Science in Biology degree in a track focusing on microbiology, infectious disease, cell biology, molecular biology, plant biology, genetics, or genomics Conduct supervised independent research and written capstone thesis on a selected subject in Biology by individual arrangement with the instructor. Three class hours a week for one semester. Prerequisite: Biology 325 or 325H with a grade of at least C, concurrent registration in Molecular Biosciences 175C and consent of instructor.

MBS 175C. Capstone Seminar.

Restricted to students pursuing the Bachelor of Science in Biology degree in a track focusing on microbiology, infectious disease, cell biology, molecular biology, plant biology, genetics, or genomics. Document and reflect on the capstone experience, present capstone work in a professional venue, and discuss plans for transitioning to post-graduation careers. The equivalent of one lecture hour a week for one semester Prerequisite: Concurrent registration for Molecular Biosciences 368C or 368R.

MBS 177, 277, 377. Undergraduate Research.

Perform laboratory or field research in the various fields of biological science under the supervision of one or more faculty members. Supervised individual research. May be taken three times for credit. May be repeated for credit. Prerequisite: Biology 325 or 325H with a grade of at least C-, and written consent of instructor.

MBS 379H, 679H. Honors Tutorial Course.

Conduct an original laboratory or field research project under the direction of a faculty mentor, leading to a thesis or research presentation for students in the honors program in biology. For each semester hour of credit earned, the equivalent of one-and-one-half lab hours a week for one semester. Only one of the following may be counted: Biology 379H, 679H, Integrative Biology 379H, 679H, Molecular Biosciences 379H, 679H. Prerequisite: Consent of the student's research supervisor and the departmental honors adviser.

Graduate Courses

Professional Courses