MBIO-MICROBIOLOGY

MBIO 2124 Cornerstone Research Experience 4 Credit Hours
Prerequisite: permission of instructor. Hands-on course targeted toward freshmen and sophomores; therefore there are no prerequisite courses required. The goal is to provide students with an authentic laboratory research experience building and experimentally testing hypotheses, collection and processing of data, and oral and written presentation of research results. The skills learned in this course will be beneficial during and beyond an undergraduate career. (F, Sp) [II-NS].

MBIO 2815 Introduction to Microbiology 5 Credit Hours
Prerequisite: one course in college chemistry. Introduction to microorganisms as biological entities. Survey of the roles of microorganisms in the ecosystem. Application of microorganisms to industrial and environmental problems. Discussion of microorganisms as causes of human disease and response of hosts to microbial invasion. This course does not count for major credit in Microbiology or Botany. Laboratory (F, Sp, Su) [II-NSL] .

MBIO 2970 Special Topics/Seminar 1-3 Credit Hours
1 to 3 hours. Prerequisite: Permission of instructor; May be repeated, maximum credit nine hours. Special topics or seminar course for content not currently offered in regularly scheduled courses. May include library and/or laboratory research and field projects. (Irreg.)

MBIO 3113 Cell Biology 3 Credit Hours
(Crosslisted with BOT and BIOL 3113) Prerequisite: Botany 1114, or Biology 1134, or Biology 1114 and 1121, or Biology 1124; and Chemistry 3053. Introduction to the cell as a unit of life. A chemical and physical comparison of procaryotic and eucaryotic cells to include a discussion of cell metabolism, types of metabolic regulation and an analysis of ultrastructure. Emphasis will be placed on the dynamic changes in metabolism and ultrastructure which occur during the life of a cell. (F, Sp)

MBIO 3440 Mentored Research Experience 3 Credit Hours
0 to 3 hours. Prerequisite: ENGL 1113 or equivalent, and permission of instructor; May be repeated, maximum credit 12 hours. For the inquisitive student to apply the scholarly processes of the discipline to a research or creative project under the mentorship of a faculty member. Student and instructor should complete an Undergraduate Research & Creative Projects (URCP) Mentoring Agreement and file it with the URCP office. Not for honors credit. (F, Sp, Su)

MBIO 3673 Practical Bioinformatics 3 Credit Hours
(Crosslisted with PBIO 3673) Prerequisite: MBIO 2815, or MBIO 3813, or PBIO 1114, or BIOL 1005, or BIOL 1114, or equivalent introductory biology course, and junior standing, or instructor permission. Study of the use of computers to analyze and interpret various types of biological data. Topics covered will include accessing genomics databases, aligning DNA and protein sequences, searching genomic databases for similar sequences, analyzing protein structure, and building molecular phylogenies. Classes will emphasize group work and in-class computer exercises in a highly interactive environment. (Sp)

MBIO 3812 Fundamentals of Microbiology Laboratory 2 Credit Hours
Prerequisite: credit or concurrent enrollment in 3813. Fundamental microbiological methods: aseptic technique, culture methods, microscopy, metabolic and physiological tests, bacterial isolation and identification, environmental microbiology. Laboratory (F, Sp, Su)

MBIO 3813 Fundamentals of Microbiology 3 Credit Hours
Prerequisite: BIOL 1005 or BIOL 1114 or BIOL 1124 or BIOL 1134 or PBIO 1114; and CHEM 1315 and CHEM 1415, or CHEM 1335 and CHEM 1435. Cell structure and phylogeny of bacteria, archaea, and eukaryotic microorganisms; growth, metabolism and ecological roles; symbiotic relationships; gene expression, genetic exchange, genomics. (F, Sp, Su)

MBIO 3960 Honors Reading 1-3 Credit Hours
1 to 3 hours. Prerequisite: admission to Honors Program; May be repeated, maximum credit six hours. Consists of topics designated by the instructor in keeping with the student's major program. The topics will cover materials not usually presented in the regular courses. (F, Sp, Su)

MBIO 3970 Honors Seminar 1-3 Credit Hours
1 to 3 hours. Prerequisite: admission to Honors Program; May be repeated, maximum credit six hours. Projects covered will vary. Deals with concepts not usually presented in regular coursework. (F, Sp, Su)

MBIO 3980 Honors Research 1-3 Credit Hours
1 to 3 hours. Prerequisite: admission to Honors Program and departmental permission; May be repeated, maximum credit six hours. (F, Sp, Su)

MBIO 3990 Independent Study 1-3 Credit Hours
1 to 3 hours. Prerequisite: one course in general area to be studied and permission of instructor and department; May be repeated, maximum credit six hours. Contracted independent study for topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. (F, Sp, Su)

MBIO 4313 Biotechnology Applications 3 Credit Hours
(Crosslisted with PBIO 4313) Prerequisite: PBIO/BIOL 3113, or PBIO/BIOL 3333, or PBIO/BIOL/MBIO 4843, or PBIO/MBIO 4873, or CHEM 3653, or permission of instructor. For students who possess a working knowledge of molecular biology. Focus on developing familiarity with methods used in biotechnology to address societal challenges. Students will put into practice central methods of biotechnology, gaining practical skills for use in future careers in laboratory science, particularly methods relevant to pharmaceutical production, agricultural improvement, bio-fuel production, and medical and forensic diagnostics, among others. (Sp)

MBIO 4630 MBIO Internship 1-6 Credit Hours
1 to 6 hours. (Crosslisted with PBIO 4630) Prerequisite: MBIO major; must have completed at least 30 hours; permission of instructor.
This course is a planned hands-on work experience that will provide students with the opportunity to earn college credit while engaging in a valuable learning opportunity within the field of microbiology. Through an internship, students can explore microbiology-related career paths prior to graduation and apply the knowledge obtained from their MBIO coursework. (F, Sp, Su)

MBIO 4693 Environmental Sampling Methods 3 Credit Hours
(Slashlisted with MBIO 5693; Crosslisted with METR and PBIO 4693) Prerequisite: diverse STEM background; permission of instructor; senior standing. The course gives students from diverse STEM backgrounds experience and knowledge of environmental sampling techniques, analysis of data generated, and interpretation of results in a scientific field outside their primary area of study. The multi-disciplinary structure helps students develop an understanding of different sampling techniques based on assumptions and perspectives on the environment at different spatial scales. No student may earn credit for both 4693 and 5693. (Sp)

MBIO 4783 Introduction to Python Programming for Data Analytics 3 Credit Hours
(Slashlisted with MBIO 5783; Crosslisted with PBIO 4783) Prerequisite: Senior standing. This course will introduce students, who have no prior programming experience, to Python programming. It will cover data analysis and visualization methods in Python. Real-world examples will be used to teach general concepts in data analytics and practical coding skills in Python. No student may earn credit for both 4783 and 5783. (F)

MBIO 4810 Special Topics 3 Credit Hours
0 to 3 hours. (Slashlisted with MBIO 5810) Prerequisite: two courses in Microbiology and permission of instructor; May be repeated with change of content, maximum credit three hours per semester, nine hours total. Topics will include newly developing areas of the discipline. Taught at an upper-division level based on previous course background. No student may earn credit for both 4810 and 5810. (Irreg.)

MBIO G4813 Pathogenic Microbiology Laboratory 3 Credit Hours

MBIO G4823 Pathogenic Microbiology and Infectious Disease 3 Credit Hours
Prerequisite: MBIO 3812 and MBIO 3813. Introduces the basic methods for pathogenic microbiology and infectious disease epidemiology. Topics covered include definitions and nomenclature, outbreak investigations, disease surveillance, case-studies, laboratory diagnosis, immunology, molecular epidemiology, dynamics of transmission, and vaccine effectiveness. Emerging pathogens, their effects on society and the health care services will also be addressed. (F)

MBIO 4833 Basic Immunology 3 Credit Hours
Prerequisite: one semester of organic chemistry, and an introductory biology course, plus one of the following: 3813 and 3812, Zoology 2124, 3113, 3204, 3333 or biochemistry or graduate standing and permission. Fundamentals of immunochemistry, cellular immunology, immunogenetics and clinical immunology. (Sp)

MBIO 4843 Molecular Biology 3 Credit Hours
(Slashlisted with MBIO 5843; Crosslisted with PBIO and BIOL 4843) Prerequisite: MBIO 3812 and MBIO 3813, or Plant Biology 1114, or Biology 1114, or Biology 1124, or Biology 1134, and one course in organic chemistry. Introduction to the characteristics and biological functions of nucleic acids and proteins in living cells with emphasis on nucleic acid replication, transcription, translation and regulation; also emphasis on the molecular aspects of microbial genetics transformation, transduction and conjugation; and emphasis on molecular immunology and genetic engineering/recombinant DNA technology. No student may earn credit for both 4843 and 5843. (F, Sp)

MBIO G4853 Physiology of Microorganisms 3 Credit Hours
Prerequisite: MBIO 3813, MBIO 3812 and a course in organic chemistry, or graduate standing. Diversity, metabolism, energetics and physiology of microorganisms. (Sp)

MBIO 4864 Geomicrobiology 4 Credit Hours
(Slashlisted with MBIO 5864) Prerequisite: 3813 or permission of instructor. Life below the earth's surface. Bacterial degradation of pollutants. Petroleum microbiology. Role of microorganisms in geochemical cycling of carbon, sulfur, and metals. No student may earn credit for both 4864 and 5864. (F) [II-NS] .

MBIO 4873 Microbial Physiology and Molecular Biology Laboratory 3 Credit Hours
Prerequisite: MBIO 3812 and MBIO 3813. Current techniques to explore molecular aspects of gene expression and regulation. Experiments include: plasmid and phage propagation, nucleic acid purification, DNA and protein manipulation, and gene analysis. (F, Sp) [II-NSL].

MBIO G4883 Water Microbiology Laboratory 3 Credit Hours
Prerequisite: MBIO 3812 and MBIO 3813. Focuses on the causes and prevention of waterborne microbial diseases and the use of microorganisms to improve water quality. Topics include: waterborne diseases, detection of waterborne pathogens, epidemiology, indicator organisms, water quality standards, treatment of drinking water and sewage, and groundwater contamination. The laboratory provides training in the standard methods used to detect microbial contamination. (F)

MBIO 4893 Capstone in Microbiology 3 Credit Hours
Prerequisite: three hours of calculus; 3813, 3812 and corequisite or prerequisite 4843. Combines laboratory research experiences, primarily in the areas of microbial diversity, physiology, and genetics, with an introduction to how research in microbiology is carried out. Laboratory (F, Sp) [V] .

MBIO 4950 Senior Thesis - Capstone 1-6 Credit Hours
1 to 6 hours. Prerequisite: MBIO 3813 and permission of instructor; May be repeated for credit; maximum credit six hours. A minimum of six hours is required. This is a capstone course allowing students to carry out individual research projects under a faculty mentor. Students will present research results orally in a poster session, and by writing a senior thesis. Honors research credit may substitute for some or all of the senior thesis credit hours. (F, Sp, Su) [V].

MBIO 4960 Directed Readings 1-4 Credit Hours
1 to 4 hours. Prerequisite: good standing in University; permission of instructor and dean; May be repeated, maximum credit four hours. Designed for upper-division students who need opportunity to study a specific problem in greater depth than formal course content permits. (Irreg.)

MBIO 4970 Special Topics/Seminar 1-3 Credit Hours
1 to 3 hours. Prerequisite: Senior standing or permission of instructor; May be repeated, maximum credit nine hours. Special topics or seminar course for content not currently offered in regularly scheduled courses. May include library and/or laboratory research and field projects. (Irreg.)

MBIO 4990 Independent Study 1-3 Credit Hours
1 to 3 hours. Prerequisite: three courses in general area to be studied and permission of instructor and department; May be repeated, maximum credit six hours. Contracted independent study for topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. (F, Sp, Su)

MBIO 5364 Transmission Electron Microscopy 4 Credit Hours
(Crosslisted with PBIO and BIOL 5364) Prerequisite: permission. Introduction to the theory of transmission electron microscopy and practical instruction in specimen preparation, ultramicrotomy, instrument operation, photography and quantitative methods. Laboratory (F)

MBIO 5374 Scanning Electron Microscopy 4 Credit Hours
(Crosslisted with PBIO and BIOL 5374) Prerequisite: basic chemistry; basic physics; demonstrated need; graduate standing and permission of instructor. Principles of scanning electron microscopy combined with training in the operation of the SEM and ancillary equipment. Students will be certified in the operation of all equipment. Sample preparation on a variety of samples and darkroom procedures will be performed. Independent project with oral report and poster required. Laboratory .

MBIO 5394 Advanced Light Microscopy 4 Credit Hours
(Crosslisted with BIOL and PBIO 5394) Prerequisite: permission of instructor and graduate standing; Corequisite: Lab section. Focuses on theory and techniques in light microscopy covering principles including confocal laser scanning microscopy, multiple photon imaging, FLIM/FCS, FRET, fluorescence microscopy, phase contrast, DIC, 3D rendering, and other advanced optical technologies. Also includes a lab section where students will learn to use advanced epifluorescence and confocal microscopes. (F)

MBIO 5471 Seminar in Ecology & Evolutionary Biology 1 Credit Hour
(Crosslisted with PBIO and BIOL 5471) Prerequisite: graduate standing; May be repeated, maximum credit 2 hours. Two semesters of enrollment are required for students in the ecology and evolutionary biology doctoral program. An intensive, student-based seminar in which students present both proposals and ongoing progress reports on doctoral level research projects in ecology and evolutionary biology. (F, Sp)

MBIO 5620 Investigations in Microbiology 1-6 Credit Hours
1 to 6 hours. Prerequisite: 15 hours of microbiology or permission of instructor; May be repeated with change of subject matter, maximum nine hours for a Masters student and twelve hours for a Ph.D. student. Maximum of six hours allowed with one professor, unless approved by Department Chair by petition. Fields of study: environmental microbiology, immunology, industrial microbiology, medical microbiology, medical mycology, microbial ecology, microbial genetics, microbial physiology, ultra-structural morphology, virology and molecular biology. (F, Sp, Su)

MBIO 5693 Environmental Sampling Methods 3 Credit Hours
(Slashlisted with MBIO 4693; Crosslisted with METR and PBIO 5693) Prerequisite: Graduate standing and permission of instructor. The course gives students from diverse STEM backgrounds experience and knowledge of environmental sampling techniques, analysis of data generated, and interpretation of results in a scientific field outside their primary area of study. The multi-disciplinary structure helps students develop an understanding of different sampling techniques based on assumptions and perspectives on the environment at different spatial scales. No student may earn credit for both 4693 and 5693. (Sp)

MBIO 5821 Graduate Professional Development Seminar 1 Credit Hour
(Crosslisted with PBIO 5821) Prerequisite: Graduate standing and permission of instructor. This course will cover various topics and involve activities that are targeted at helping graduate students succeed in their first year of study, while also providing an opportunity to build a sense of community with other incoming students. (F)

MBIO 5864 Geomicrobiology 4 Credit Hours
(Slashlisted with MBIO 4864) Prerequisite: 3813 or permission of instructor. Life below the earth's surface. Bacterial degradation of pollutants. Petroleum microbiology. Role of microorganisms in geochemical cycling of carbon, sulfur, and metals. No student may earn credit for both 4864 and 5864. (F)

MBIO 5953 BioWriting 3 Credit Hours
(Slashlisted with MBIO 4953; Crosslisted with BIOL and PBIO 5953) Prerequisite: permission of instructor. This course provides students engaged in research with the information and skills needed to effectively communicate as professional biologists. Students will learn to report the results of their own research in the format of a journal article, conference-style presentation, and poster. Graduate students have additional assignments beyond those completed by undergraduates. No student may earn credit for both 4953 and 5953. (Irreg.)

MBIO 5960 Directed Readings 1-3 Credit Hours
1 to 3 hours. Prerequisite: graduate standing and permission of department. May be repeated; maximum credit twelve hours. Directed readings and/or literature reviews under the direction of a faculty member. (F, Sp, Su)

MBIO 5970 Special Topics/Seminar 1-3 Credit Hours
1 to 3 hours. Prerequisite: graduate standing or permission of instructor; May be repeated, maximum credit nine hours. Special topics or seminar course for content not currently offered in regularly scheduled courses. May include library and/or laboratory research and field projects. (Irreg.)

MBIO 5971 Seminar in Microbiology 1 Credit Hour
(Crosslisted with PBIO 5971) Prerequisite: graduate standing, permission of instructor. Required of all graduate students in microbiology. May be repeated; maximum credit two hours for the master's degree, three hours for the doctor's degree. Topics are selected from various areas of microbiology, and each student is called upon for discussion or formal presentations. No laboratory. (F, Sp)

MBIO 5980 Research for Master's Thesis 2-9 Credit Hours
2 to 9 hours. Variable enrollment, two to nine hours; maximum credit applicable toward degree, six hours. (F, Sp, Su)

MBIO 5990 Special Studies in Microbiology 1-3 Credit Hours
1 to 3 hours. Prerequisite: Graduate standing, 15 hours of microbiology, permission of instructor; May be repeated, Maximum credit of six hours with one professor, unless approved by Department Chair by petition. The student selects an area in which the student desires to read intensively, selects a staff member who is an authority in that field, and together they plan a program for investigation of the literature. (F, Sp, Su)

MBIO 6960 Directed Readings 1-3 Credit Hours
1 to 3 hours. Prerequisite: graduate standing or permission of instructor; May be repeated, maximum credit six hours. Directed readings and/or literature review under the direction of a faculty member. (Irreg.)

MBIO 6970 Special Topics/Seminar 1-3 Credit Hours
1 to 3 hours. Prerequisite: graduate standing or permission of instructor; May be repeated, maximum credit 12 hours. Special topics or seminar course for content not currently offered in regularly scheduled courses. May include library and/or research and field projects. (Irreg.)

MBIO 6980 Research for Doctoral Dissertation 2-16 Credit Hours
2 to 16 hours. Prerequisite: Graduate standing and permission of instructor; may be repeated. Directed research culminating in the completion of the doctoral dissertation. (F, Sp, Su)

MBIO 6990 Independent Study 1-3 Credit Hours
1 to 3 hours. Prerequisite: Graduate standing and permission of instructor; May be repeated, maximum credit nine hours. Contracted independent study for a topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. (Irreg.)