**Microbiology and Molecular Genetics (MMG)**

**Department of Microbiology and Molecular Genetics**

**College of Natural Science**

**141 Introductory Human Genetics**

Fall, Spring. 3(3-0) R: Not open to students in the Biochemistry and Molecular Biology major or in the Biological Science Major or in the Biomedical Laboratory Science Major or in the Clinical Laboratory Sciences Major or in the Environmental Biology/Microbiology Major or in the Environmental Biology/Plant Biology Major or in the Environmental Biology/Zoology Major or in the Genomics and Molecular Genetics Major or in the Human Biology Major or in the Lyman Briggs Microbiology Major or in the Neuroscience Major or in the Physiology Major or in the Plant Biology Major or in the Zoology Major and not open to students in the Lyman Briggs Biochemistry and Molecular Biology Coordinate Major or in the Lyman Briggs Biological Science-Interdepartmental Coordinate Major or in the Lyman Briggs Biomedical Laboratory Science Coordinate Major or in the Lyman Briggs Environmental Biology/Plant Biology Coordinate Major or in the Lyman Briggs Environmental Biology/Zoology Coordinate Major or in the Lyman Briggs Genetics and Molecular Genetics Coordinator Major or in the Lyman Briggs Human Biology Coordinate Major or in the Lyman Briggs Neuroscience Major or in the Lyman Briggs Microbiology Coordinate Major. SA: BS 141 Not open to students with credit in MB 341.


**161 Cell and Molecular Biology**

Fall, Spring, Summer. 3(3-0) Interdepartmental with Biochemistry and Molecular Biology and Biological Science. Administered by Biological Science. P: (CEM 141 or concurrently) or (CEM 151 or concurrently) or (CEM 181H or concurrently) or (LB 171 or concurrently) SA: BS 111, BS 149H Not open to students with credit in BS 181H or BS 145. Macromolecular synthesis. Energy metabolism. Molecular aspects of development. Molecular genetics.

**171 Cell and Molecular Biology Laboratory**

Fall, Summer. 2(1-3) Interdepartmental with Biochemistry and Molecular Biology and Biological Science. Administered by Biological Science. P: (BS 161 or concurrently) or (BS 181H or concurrently) SA: BS 111L, BS 159H Not open to students with credit in BS 191H or LB 145. Principles and applications of common techniques used in cell and molecular biology.

**181H Honors Cell and Molecular Biology**

Spring. 3(3-0) Interdepartmental with Biochemistry and Molecular Biology and Biological Science and Lyman Briggs. Administered by Biological Science. P: (CEM 141 or concurrently) or (CEM 151 or concurrently) or (CEM 181H or concurrently) or (LB 171 or concurrently) SA: BS 149H, BS 111 Not open to students with credit in LB 145. Physiologic, chemical and molecular organization of cells as the unifying framework for genetics, evolution, and the social relevance of biology.

**191H Honors Cell and Molecular Biology Laboratory**

Spring. 2(1-3) Interdepartmental with Biochemistry and Molecular Biology and Biological Science and Lyman Briggs. Administered by Biological Science. P: BS 181H or concurrently SA: BS 159H Not open to students with credit in LB 145. Basic techniques of cellular and molecular biology including experimental design and hypothesis formulation; biochemistry, molecular biology and genetics.

**201 Fundamentals of Microbiology**

Spring. 3(3-0) RB: (CEM 141 or ISP 207 or ISP 209 or ISP 217 or LB 171) and (BS 161 or BS 181H or LB 145) SA: MMG 105, MMG 205. Microbial structure, function, growth, control, and diversity. Role of microbes in health, industry, and the environment.

**301 Introductory Microbiology**

Fall, Spring. 3(3-0) P: (BS 161 or LB 145 or BS 181H) and ((CEM 251 or concurrently) or (CEM 251 or concurrently) or (CEM 145 or concurrently)) SA: MIC 301. Fundamentals of microbiology, including microbial structure and function, nutrition and growth, death and control. Importance and applications of major microbial groups.

**302 Introductory Laboratory for General and Allied Health Microbiology**

Spring. 1(0-3) P: (MMG 201 or concurrently) or (MMG 301 or concurrently) SA: MIC 302. Methodology of microbiology. Microscopy, staining, aseptic technique, media, quantification, diagnostics, and laboratory safety.

**365 Medical Microbiology Laboratory**

Spring. 1(0-2) Interdepartmental with Biochemical Laboratory Diagnostics. Administered by Microbiology and Molecular Genetics. P: (MMG 265 or concurrently) and (MMG 201 or MMG 301) Not open to students with credit in MMG 464. Practical experience in safely and accurately performing standard clinical microbiology tests to diagnose disease-causing microbes.

**401 Introduction to Bioinformatics**

Fall of even years. 3(2-2) Interdepartmental with Biochemistry and Molecular Biology and Plant Biology. Offered by Plant Pathology. P: (STT 200 or STT 201 or STT 231 or STT 421) and (PLB 203 or MMG 201 or BMB 200 or BS 161) RB: An introductory bioinformatics course covering basic genetics, macromolecules, evolution, energy metabolism, genetic materials, and signal transduction is recommended for non-biology majors. A statistics course covering random variable, distributions, and basic probability theory is recommended for biology majors.

Managing and analyzing biological data with bioinformatic tools, basic programming, and statistics.

**404 Human Genetics**


**408 Advanced Microbiology Laboratory (W)**

Fall. 3(3-4) P: (MMG 302 and (MMG 431 or concurrently)) and completion of Tier I writing requirement R: Open to students in the Department of Microbiology and Molecular Genetics or in the Genetics Major or in the Environmental Biology/Microbiology Major or in the Microbiology Major. SA: MPH 408. Microbiological techniques and procedures to study physiology and genetics of bacteria and pathogenic microorganisms. Collection and critical assessment of quantitative data and written communication of results.

**409 Eukaryotic Cell Biology**

Spring. 3(3-0) P: (BS 161 or LB 145 or BS 181H) and (BMB 401 or concurrently) or (BMB 462 or concurrently) SA: MIC 403, MPH 403. Structure and function of nucleated cells. Emphasis on the molecular mechanisms that underlie cell processes.

**410 Bioinformatics and Computational Biology**

Spring. 3(2-2) Interdepartmental with Biochemistry and Molecular Biology and Computational Mathematics, Science, & Engineering and Plant Biology. Offered by Computational Mathematics, Science, & Engineering. P: ((CMSE 201 and LB 144 and LB 145) or (CMSE 201 and BS 161 and BS 162) or (CMSE 201 and BS 181H and BS 182H)) and (STT 200 or STT 201 or STT 231 or STT 421 or STT 351 or ECE 280) Not open to students with credit in CSE 415. Computational approaches in modern biology with a focus on applications in genomics, systems biology, evolution, and structural biology.

**411 Computational Medicine**

Fall of odd years. 3(3-0) Interdepartmental with Biochemistry and Molecular Biology and Computational Mathematics, Science, & Engineering. Administered by Computational Mathematics, Science, & Engineering. P: (CMSE 201 and LB 144 and LB 145) or (CMSE 201 and BS 161 and BS 162) or (CMSE 201 and BS 181H and BS 182H) Computational approaches in biology with a focus on medicine.
MMG—Microbiology and Molecular Genetics

413 Virology
Fall. 3(3-0) P: (BMB 462 or concurrently) or BMB 401

421 Prokaryotic Cell Physiology
Fall. 3(3-0) P: (MMG 301 and (BMB 461 or concurrently)) or (MMG 301 and (BMB 401 or concurrently)) SA: MIC 401, MPH 401
Prokaryotic cell structure and function. Growth and replication. Macromolecular synthesis and control.

425 Microbial Ecology
Spring. 3(3-0) Interdepartmental with Crop and Soil Sciences. Administered by Microbiology and Molecular Genetics. RB: MMG 301 SA: MPH 425
Microbial population and community interactions. Microbial activities in natural systems, including associations with plants or animals.

431 Microbial Genetics
Fall. 3(3-0) P: (BMB 461 or concurrently) or (BMB 401 or concurrently) RB: MMG 301 or ZOL 341 SA: MIC 401, MPH 401
Genetics of bacteria, their viruses, plasmids, and transposons. Emphasis on genetic principles.

433 Microbial Genomics
Spring. 3(3-0) P: (MMG 431) RB: (MMG 421 or BMB 461) and CSE 101

434 Laboratory in Genomics and Molecular Genetics (W)
Spring. 4(1-8) P: (MMG 301 and (MMG 433 or concurrently)) and completion of Tier I writing requirement R: Open to students in the Genomics and Molecular Genetics Major or in the Lyman Briggs Genomics and Molecular Genetics Coordinate Major.
Genomics and molecular genetic techniques using microbes. Collection and critical assessment of quantitative data and written communication of results.

435 Geomicrobiology
Fall. 4(3-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences. RB: GLG 201 or MMG 201 or BS 161 or LB 145 R: Open to juniors or seniors or graduate students in the College of Natural Science or in the Lyman Briggs College.
Geological and microbiological perspectives on microbial activities in diverse environmental settings, including geological change mediated by microorganisms, microbial evolution driven by geologically diverse habitats, including the evolution of life on Earth, the search for life on other planets, the study of life in extreme environments, and industrial applications of geomicrobiology.

440 Food Microbiology
Fall. 3(3-0) Interdepartmental with Food Science. Administered by Food Science. P: (MMG 201 or MMG 301) and completion of Tier I writing requirement. R: Not open to freshmen.
Major groups of microorganisms of importance to the food industry. Ecological, physiological, and public health aspects.

441 Food Microbiology Laboratory
Fall. 2(0-4) Interdepartmental with Food Science. P: (MMG 301 and completion of Tier I writing requirement) RB: MMG 302 SA: MPH 441
Methods for studying major groups of microorganisms important to the food industry. Isolation, enumeration, characterization, identification, and use of microorganisms.

445 Microbial Biotechnology (W)
Fall, Summer. 3(3-0) P: (MMG 301 or BMB 461 or BMB 401) and completion of Tier I writing requirement SA: MIC 445
Applications of microbial products and processes in areas such as biopharmaceuticals, biomediation, biocatalysis and other green chemistries.

451 Immunology
Fall. 3(3-0) P: (BS 161 or LB 145 or BS 181H) and (BMB 401 or concurrently) or (BMB 461 or concurrently) Not open to students with credit in BLD 434.

461 Molecular Pathogenesis
Spring of even years. 3(3-0) P: (MMG 301) RB: MMG 431 SA: MPH 461
Molecular basis of microbial virulence. Nature of determinants and their role in overcoming host defense mechanisms.

465 Advanced Medical Microbiology
Fall. 3(3-0) Interdepartmental with Biomedical Laboratory Diagnostics. Administered by Microbiology and Molecular Genetics. P: MMG 365 Not open to students with credit in MMG 463.
Advanced laboratory diagnosis, epidemiology, and prevention of infectious diseases using an anatomical system specimen approach to study a comprehensive set of human pathogens and microbiota.

465L Advanced Medical Microbiology Laboratory
Fall. 2(0-6) Interdepartmental with Biomedical Laboratory Diagnostics. Administered by Microbiology and Molecular Genetics. P: MMG 365L and (MMG 465 or concurrently) Not open to students with credit in MMG 464. C: MMG 465 concurrently.
Practical experience in safely and accurately performing standard clinical microbiology tests to process clinical specimens, identify pathogens and perform and interpret susceptibility testing.

490 Special Problems in Microbiology
Fall. Spring. Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department.
Library research or tutorial instruction in advanced laboratory techniques.

491 Current Topics in Microbiology and Molecular Genetics
Spring. 3(4-0) R: Open to seniors in the Lyman Briggs College or in the Department of Microbiology and Molecular Genetics or in the Lyman Briggs Genomics and Molecular Genetics Coordinate Major. SA: MIC 491
Capstone experience for microbiology majors. Presentation and discussion of journal articles. Writing of position papers. Topics such as microbial physiology, ecology, genetics, molecular biology, virology, immunology, or pathogenesis.

492 Undergraduate Research Seminar
Spring. 1(2-0) P: MMG 499 or MMG 499H R: Open to students in the Department of Microbiology and Molecular Genetics or in the Lyman Briggs Genomics and Molecular Genetics Coordinate Major or in the Lyman Briggs Microbiology Coordinate Major. SA: MIC 492
Participation in a laboratory research project.

499H Honors Research
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open to students in the Department of Microbiology and Molecular Genetics or in the Lyman Briggs Environmental/Biology/Microbiology/Molecular Genetics Coordinate Major or in the Lyman Briggs Genomics and Molecular Genetics Coordinate Major or in the Lyman Briggs Microbiology Coordinate Major. SA: MIC 499H
Research project with thesis and oral report. A portion of Microbiology and Genetics and Molecular Genetics capstone experience.

522 Medical Microbiology and Immunology
Spring. 5(4-2) R: Open to graduate-professional students in the College of Osteopathic Medicine or in the College of Human Medicine.
Basic principles of microbiology (bacteriology, virology, mycology and parasitology) and immunology and their relation to disease in humans.

531 Medical Immunology
Fall. 2(2-0) R: Open to graduate-professional students in the College of Osteopathic Medicine.
Basic principles of immunology. Overview of concepts and terminology in relation to human disease defenses.
890 Special Problems in Microbiology
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 16 credits in all enrollments for this course. R: Open to master's students in the Department of Microbiology and Molecular Genetics. SA: MIC 890
Individualized laboratory or library research.

892 Seminar
Fall, Spring. 1(1-0). A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Human Medicine or College of Natural Science or College of Osteopathic Medicine or College of Veterinary Medicine. SA: MPH 892
Student review and presentation of selected topics in microbiology and public health.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to graduate students in the Department of Microbiology and Molecular Genetics. SA: MPH 899
Master's thesis research.

991 Topics in Microbiology
Fall, Spring. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. SA: MPH 991
Topics are selected from traditional subdisciplines such as bacteriology, virology, cell biology, and immunology or from transecting subdisciplines such as microbial genetics, physiology, molecular biology and ecology.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open to graduate students in the Genetics Major or in the Microbiology and Molecular Genetics Major. SA: MPH 999
Doctoral dissertation research.