DEPARTMENT OF MICROBIOLOGY AND MOLECULAR GENETICS

http://www.uvm.edu/microbiology/

The College of Agriculture and Life Sciences shares this department with the College of Medicine (COM). Undergraduate studies are in CALS while graduate studies are in the COM. The department offers a B.S. in Microbiology or a B.S. in Molecular Genetics.

CALS MICROBIOLOGY AND MOLECULAR GENETICS MAJOR

Undergraduates who undertake studies in the Department of Microbiology and Molecular Genetics receive instruction in the classroom and in state-of-the-art teaching and research laboratories. If you are interested in attending medical school or graduate school, then majoring in Microbiology (MICR) or Molecular Genetics (MGEN) may be appropriate. Fascinating recent developments in medicine and biomedical sciences, such as stem cell research, emerging microbial infectious diseases, genetic engineering, and cancer therapeutics, have emerged from a detailed understanding of the molecular events that underlie the routine functions of cells and organisms. Microbiology majors study in detail the microbes involved in infectious disease, human health, industrial manufacturing, ecology, and basic science research. Molecular genetics majors investigate the chemical, biological, and genetic principles that underlie all living processes at the molecular level.

Small classes, hands-on/intensive classroom laboratory experiences, and a strong commitment to undergraduate advising give students many opportunities to interact with the faculty, including a First-year Colloquium in which students meet directly with the faculty to discuss on-going research projects and contemporary issues in microbiology and molecular genetics. Undergraduates are encouraged to get involved in cutting-edge research projects in the department and the College of Medicine in such areas as DNA repair, infectious diseases, bioinformatics, structural biology, developmental genetics, and other fields. Internship opportunities outside of UVM with the local hospital, The University of Vermont Medical Center, the Department of Health, and the Office of the Chief Medical Examiner are also available to pre-med students. Approximately 85 percent of MICR and MGEN majors take advantage of either research or internship opportunities.

The program is flexible enough to allow students to minor in another scientific discipline such as animal sciences, biochemistry, biological sciences, chemistry, computer science, mathematics, medical technology, nutrition, and pharmacology – or in a field that is altogether different. Students have graduated with minors in French, business administration, psychology, and statistics, allowing them to put together a career plan that spans a wide range of opportunities. The program is also flexible enough to allow students to experience a study abroad semester.

MAJORS

MICROBIOLOGY AND MOLECULAR GENETICS MAJORS

Microbiology B.S.
Molecular Genetics B.S.

MINORS

MICROBIOLOGY AND MOLECULAR GENETICS MINORS

Microbiology
Molecular Genetics

GRADUATE

Cellular, Molecular, and Biomedical Sciences M.S.
Cellular, Molecular, and Biomedical Sciences Ph.D.
Microbiology and Molecular Genetics M.S.
Microbiology and Molecular Genetics Ph.D.

See the online Graduate Catalogue for more information

Courses

MMG 001. First Year Colloquium. 1 Credit.
Colloquium is designed to enhance faculty-student interactions in Microbiology and Molecular Genetics and to inform first-year majors about the educational and research opportunities in MMG. Instructor’s permission for non-majors. Fall.

MMG 002. SU: Unseen Wrlds: Microbes & You. 3 Credits.
Examination of current topics in Microbiology, such as antibiotic resistance, vaccinations, sexually transmitted diseases, and the human microbiome, focusing on the impact of microbes on human and animal health, the environment, agriculture, and modern culture around the world.

MMG 065. Microbiology & Pathogenesis. 0 or 4 Credits.
Overview of microbiology, emphasizing the relationships between the structure, metabolism, and genetics of microorganisms and their roles in nature and in pathogenesis. Prerequisite: One semester chemistry. Not intended for students who have completed BIOL 001 and BIOL 002 or equivalent. Fall.

MMG 090. Internship. 1-3 Credits.
On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

MMG 095. Special Topics. 1-18 Credits.
An approved area of study or project under the guidance of an MMG faculty member and the Academic advisor.
MMG 096. Special Topics. 1-18 Credits.
An approved area of study or project under the guidance of an MMG faculty member and the Academic advisor.

MMG 101. Microbiol & Infectious Disease. 0 or 4 Credits.
An introduction to basic microbiology and microbes that cause infectious diseases, with a focus on microbial structure, function, metabolism, ecology, and pathogenesis. Pre/co-requisites: One semester Biology and Chemistry. Fall.

MMG 104. Intro Recombinant DNA Tech. 2 Credits.
Introduction to the basic principles and techniques used in recombinant DNA technology. Pre/co-requisites: BCOR 011/BCOR 012; Microbiology & Molecular Genetics major or minor. Alternate years. Fall.

MMG 190. Internship. 1-18 Credits.
On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

MMG 192. Independent Study. 1-18 Credits.
A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

MMG 193. Teaching Assistantship. 1-3 Credits.
Undergraduate student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

MMG 195. Intermediate Special Topics. 1-18 Credits.
An approved area of study or project under the guidance of an MMG faculty member and the Academic advisor. Prerequisite: Instructor permission. Credits negotiable.

MMG 196. Intermediate Special Topics. 1-18 Credits.
An approved area of study or project under the guidance of an MMG faculty member and the Academic advisor. Prerequisite: Instructor permission. Credits negotiable.

MMG 197. Undergraduate Research. 1-18 Credits.
Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Undergraduate Program Director approval. Offered at department discretion.

MMG 198. Undergraduate Research. 1-18 Credits.
Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Undergraduate Program Director approval. Offered at department discretion.

MMG 201. Molecular Cloning Lab. 4 Credits.
Intensive advanced laboratory course in the fundamentals of recombinant DNA technology through the isolation and characterization of a unique gene. Prerequisite: MMG 104 or BIOC 207 or Instructor permission. Fall.

MMG 203. Mamm Cell Cult:Molecular Biol. 0 or 4 Credits.
The basic principles and techniques of mammalian cell culture, as well as cell and mammalian molecular genetics. Prerequisite: BCOR 103 or MMG 104, Permission of Coordinator. Alternate years. Spring.

MMG 205. Biochemistry I. 3 Credits.
Introduction to chemistry and structure of biological macromolecules; examination of mechanisms of chemical processes in biological systems, including enzyme catalysis, biosynthesis, regulation, and information transfer. Prerequisite: CHEM 048 or CHEM 142 or CHEM 144. Cross-listed with: BIOC 205, CHEM 205. Fall.

MMG 206. Biochemistry II. 3 Credits.
Continuation of Biochemistry I. Biochemistry of nucleic acids; nucleic acid based processes, such as replication and transcription; cellular information transfer, genomics, and proteomics. Prerequisite: MMG 205. Cross-listed with: BIOC 206, CHEM 206. Spring.

MMG 207. Biochemistry Lab. 3 Credits.
Introduction to biochemical tools, including spectrometry, chromatography, and electrophoresis; natural and recombinant enzyme isolation; assays of DNA-modifying enzymes; computer-based structure/function exercises. Prerequisite: BIOC 205 or CHEM 205 or MMG 205. Cross-listed with: BIOC 207, CHEM 207.

MMG 211. Prokaryotic Molecular Genetics. 3 Credits.
The organization, replication, and expression of genes in prokaryotes, focusing on the genetics of Escherichia coli and its viruses. Prerequisite: Introductory microbiology, biochemistry, genetics, and/or cell biology courses. Fall.

MMG 220. Environmental Microbiology. 3 Credits.
The activities of microorganisms, primarily bacteria, in air, soil, and water. Prerequisites: MMG 101 and Organic Chemistry Alternate years.

MMG 222. Clinical Microbiology I. 0 or 4 Credits.
Comprehensive study of human pathogenic bacteria and their disease states in humans. Laboratory sessions provide practical experience in handling and identifying these pathogens. Alternate years. Spring. Prerequisites: MMG 065 or MMG 101 or equivalent or Instructor permission.

MMG 223. Immunology. 3 Credits.
Analysis of the immune response with respect to structure and function of immunoglobulins and the T-cell receptor, tolerance, innate and adaptive immunity, the Major Histocompatibility Complex, hypersensitivity states, transplantation, cancer, and AIDS. Prerequisite: Instructor permission. Alternate years. Spring.

MMG 225. Eukaryotic Virology. 3 Credits.
An in-depth analysis of eukaryotic virus-mammalian cell interactions emphasizing mechanisms by which viruses modulate gene expression in infected cells. Prerequisite: MMG 101 or MMG 104 or equivalent. Alternate years. Fall.
**MMG 230. D2:SU:Adv St Emerg Infec Dis. 3 Credits.**
Presents an interdisciplinary approach to understanding the emergence, and re-emergence, of infectious diseases in a rapidly changing global environment. Historical, cultural, environmental and biological perspectives are incorporated into the analysis of emerging bacterial, viral and protozoal pathogens. Prerequisites: MMG 101; MMG 225 recommended.

**MMG 231. QR:Prgrmmng for Bioinformatics. 3 Credits.**
Introductory course on computing (including scripting, database, and statistical analysis) for developing bioinformatics applications. Particular emphasis is given to comparative genomics and systems biology scenarios. Prerequisites: STAT 151, STAT 153, or Instructor permission. Cross-listed with: CS 231. Alternate Years. Spring.

**MMG 232. QR:Methods in Bioinformatics. 3 Credits.**
This course provides a methodological survey of bioinformatics. Particular emphasis is given to algorithms associated with sequential analysis, comparative genomics, structural biology, and systems biology. Prerequisites: STAT 151, STAT 153, or Instructor permission. Cross-listed with: CS 232. Alternate Years. Spring.

**MMG 233. Genetics and Genomics. 3 Credits.**
Integrated entry into both genome science and modern genetic analysis. Students will develop skills needed to access, organize and interpret emerging genomic information. Fall. Prerequisite: Junior/Senior/Graduate standing in biological or computational sciences.

**MMG 240. Macromol Struct Prot&Nucl Acid. 3 Credits.**

**MMG 284. Biochemistry Senior Seminar. 1 Credit.**
Oral and written presentation of a subject of current biochemical interest. Prerequisite: Audit of BIOC 381. Cross-listed with: BIOC 284, CHEM 284.

**MMG 290. Internship. 1-18 Credits.**
On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**MMG 292. Independent Study. 1-18 Credits.**
A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MMG 293. Teaching Assistantship. 1-3 Credits.**
Undergraduate student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**MMG 295. Advanced Special Topics. 1-18 Credits.**
Supervised investigations in microbiology or molecular genetics. Prerequisite: Instructor permission. Credit as arranged.

**MMG 296. Advanced Special Topics. 1-18 Credits.**
Supervised investigations in microbiology or molecular genetics. Prerequisite: Instructor permission. Credit as arranged.

**MMG 297. Undergraduate Research. 1-18 Credits.**
Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Undergraduate Program Director approval. Pre/co-requisite: MMG 197, MMG 198 or Advisor Permission. Offered at department discretion.

**MMG 298. Undergraduate Research. 1-18 Credits.**
Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Undergraduate Program Director approval. Pre/co-requisite: MMG 197 or MMG 198 or Advisor Permission. Offered at department discretion.

**MMG 299. Senior Seminar. 1 Credit.**
This required capstone course for Microbiology and Molecular Genetics majors involves written and oral presentations by graduating seniors on current topics in microbiology/molecular genetics. Prerequisites: MMG 101; second semester Senior standing. Spring.