MICROBIOLOGY AND MOLECULAR GENETICS
OVERVIEW
https://www.med.uvm.edu/mmg/home

OVERVIEW
The goal of the Microbiology and Molecular Genetics Master’s Programs is to prepare students for careers in science. The program provides an increased knowledge base in both microbiology and molecular genetics as well as the ability to think critically, communicate scientific knowledge clearly and perform independent scientific research. In addition to the Microbiology and Molecular Genetics M.S. and Accelerated Master’s Program (AMP), the MMG faculty participate in the interdisciplinary doctoral program in Cellular, Molecular, and Biomedical Sciences.

DEGREES
• Microbiology and Molecular Genetics AMP
• Microbiology and Molecular Genetics M.S.

FACULTY
Diehl, Sean; Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, University of Vermont
Doublie, Sylvie; Professor, Department of Microbiology and Molecular Genetics; PHD, University of North Carolina Chapel Hill
Kirkpatrick, Beth Diane; Professor, Department of Microbiology and Molecular Genetics; MD, Albany Medical College
Lee, Andrea J.; Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, University of Wisconsin-Madison
Li, Dawei; Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Shanghai Jiao Tong University
Mintz, Keith Peter; Associate Professor, Department of Microbiology and Molecular Genetics; PHD, University of Rochester
Pederson, David Scott; Professor, Department of Microbiology and Molecular Genetics; PHD, University of Rochester
Thali, Markus Josef; Professor, Department of Microbiology and Molecular Genetics; PHD, University of Zurich
Ward, Gary E.; Professor, Department of Microbiology and Molecular Genetics; PHD, University of California San Diego
Wargo, Matthew; Associate Professor, Department of Microbiology and Molecular Genetics; PHD, Dartmouth College

Courses
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.
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.

MM 220. Environmental Microbiology. 3 Credits.
The activities of microorganisms, primarily bacteria, in air, soil, and water. Prerequisites: MMG 065 or MMG 101 or equivalent or Instructor permission.

MMG 222. Advanced Medical Microbiology. 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 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 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 310. Current Topics in MMG. 2 Credits.
Seminar to focus on specific issues at the forefront of current research in molecular genetics. Meetings will involve student presentation and discussion of research articles. Prerequisite: Permission of Coordinator.

MMG 312. Eukaryotic Molecular Genetics. 3 Credits.
The use of lower eukaryotes, such as the yeasts Saccharomyces cerevisiae and Schizosaccharomyces pombe, as model genetic systems to answer questions of basic biological importance. Prerequisites: Instructor permission; MMG 233 and CLBI 301, or equivalent.

MMG 320. Cellular Microbiology. 4 Credits.
Utilizes primary literature to explore the cellular and molecular basis of microbial pathogenesis caused by viruses, pathogenic bacteria and protozoan parasites. Alternate years. Spring.

MMG 332. Critical Reading. 1 Credit.
Students will participate in group discussions to critically evaluate and interpret the experimental data from one assigned paper from the scientific literature per week. Prerequisite: Permission of Coordinator. Fall.

MMG 333. Genetics and Genomics. 3 Credits.
Integrated entry into both genome science and modern genetic analysis. Together, genetic and genomic information provide unprecedented insights into biological functions, pathways and systems. Emphasizes skills needed to access, organize and interpret emerging genomic information. Graduate students only. Prerequisite: Graduate enrollment in a program within the biomedical or biological sciences.

MMG 352. Protein:Nucleic Acid Interact. 3 Credits.
Structure of DNA and RNA, and the structure and assembly of nucleoprotein complexes will be described using examples from prokaryotes, yeast, viruses, and mammalian cells in culture. Prerequisite: MMG 211 or equivalent; AGBI 201 or BIOC 301; BIOC 302 or equivalent. Cross-listed with: BIOC 352. Alternate years. Spring.

MMG 391. Master's Thesis Research. 1-18 Credits.

MMG 393. Graduate Teaching Practicum. 3 Credits.
Required practicum for all Microbiology and Molecular Genetics Masters Students. Students will be exposed to and mentored in the fundamentals of undergraduate teaching and learning in the laboratory setting.

MMG 396. Advanced Special Topics. 1-18 Credits.
See Schedule of Courses for specific titles.

MMG 491. Doctoral Dissertation Research. 1-18 Credits.

MMG 496. Advanced Special Topics. 1-18 Credits.
See Schedule of Courses for specific titles.