BIOMEDICAL SCIENCE
MAJOR: MEDICAL
MICROBIOLOGY OPTION (B.S.)

https://colsa.unh.edu/molecular-cellular-biomedical-sciences/program/bs/biomedical-science-major-medical-microbiology-option

Description

The Biomedical Science: Medical Microbiology (BMS:MM) program explores the world of microorganisms and how they interact with both humans and animals. This major provides you with excellent academic training and laboratory experiences in the areas of microbiology, infectious disease, and public health. BMS:MM graduates are prepared for successful careers in biotechnology or public health, or entry into graduate school or health professional programs.

The BMS:MM program includes course work and laboratories in:

- infectious disease
- immunology
- epidemiology and community health
- molecular biology
- microbial ecology and evolution

Students in the BMS:MM program may participate in a variety of experiential learning activities including:

- independent research experiences in laboratories of UNH biomedical science faculty
- work at the NH Veterinary Diagnostic Laboratory located on the UNH campus
- internships at biotechnology companies in the Greater Boston area
- internships at the NH Department of Public Health Laboratories

BMS:MM graduates have been successful in attaining careers as:

- research scientists/laboratory technicians
  - biotechnology and pharmaceutical companies
  - academic biomedical research programs
  - brewing industry
- primary and secondary school educators (requires additional coursework in education)
- state and federal government employees
  - public health laboratories
  - regulatory agencies (e.g., U.S. Food and Drug Administration)

BMS:MM graduates are prepared for post-baccalaureate education in:

- professional health programs
  - medical school (https://colsa.unh.edu/academics/pre-professional-health-advising)
  - dental school (https://www.unh.edu/uac/premed-advising/explore-dentistry)
- allied health programs (physician assistant (http://www.unh.edu/uac/premed-advising/explore-physician-assistant), pharmacist (http://www.unh.edu/uac/premed-advising/explore-pharmacy), nursing, or pathologist’s assistant (http://www.pathassist.org) programs)
- graduate programs
  - biomedical science
  - public health
  - forensic science

Requirements

Students in the Medical Microbiology (MM) option take seven Foundation courses, five Bioscience Core courses, four BMS:MM Core courses, and five BMS:MM Major Elective courses. One capstone experience, supervised and approved within the major, is required of all seniors. In addition, all other University academic requirements must be completed, including those for the Discovery Program (http://catalog.unh.edu/undergraduate/university-academic-requirements/discovery-program) and the University Writing Requirement (http://catalog.unh.edu/undergraduate/university-academic-requirements/writing).

A grade of C- or better is required in all Bioscience Core, BMS:MM Core, and Major Elective courses.

Foundation Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 403</td>
<td>General Chemistry I</td>
<td>4</td>
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<tr>
<td>CHEM 404</td>
<td>General Chemistry II</td>
<td>4</td>
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<tr>
<td>CHEM 545</td>
<td>Organic Chemistry</td>
<td>5</td>
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<tr>
<td>&amp; CHEM 546</td>
<td>Organic Chemistry Laboratory</td>
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<tr>
<td>MATH 424B</td>
<td>Calculus for Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 528</td>
<td>Applied Biostatistics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 401</td>
<td>Introduction to Physics I</td>
<td>4</td>
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<tr>
<td>PHYS 402</td>
<td>Introduction to Physics II</td>
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Bioscience Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>BIOL 411</td>
<td>Introductory Biology: Molecular and Cellular</td>
<td>5</td>
</tr>
<tr>
<td>BIOL 412</td>
<td>Introductory Biology: Evolution, Biodiversity and Ecology</td>
<td>4</td>
</tr>
<tr>
<td>or BMS 508</td>
<td>Human Anatomy and Physiology II</td>
<td></td>
</tr>
<tr>
<td>BMS 503</td>
<td>General Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>&amp; BMS 504</td>
<td>General Microbiology Laboratory</td>
<td></td>
</tr>
<tr>
<td>GEN 604</td>
<td>Principles of Genetics</td>
<td>4</td>
</tr>
<tr>
<td>BMCB 658</td>
<td>General Biochemistry</td>
<td>5</td>
</tr>
<tr>
<td>&amp; BMCB 659</td>
<td>General Biochemistry Lab</td>
<td></td>
</tr>
</tbody>
</table>

1 CHEM 403 fulfills the Physical Science Discovery requirement
2 Students applying to health profession schools need a full year of English, a full year of Organic Chemistry, and a full year of Introductory Biology. ENGL 502 or ENGL 503 should be taken in addition to ENGL 401; CHEM 651/653 and CHEM 652/654 should be taken in place of CHEM 545/546.
3 MATH 424B fulfills the Quantitative Reasoning Discovery requirement.
**Biomedical Science Major: Medical Microbiology Option (B.S.)**

- PSYC 402 and SOC 402 are acceptable alternatives.
- BIOL 411 fulfills the Biological Science Discovery requirement, Discovery Laboratory requirement, and the Discovery Inquiry requirement.

**BMS-MM Core Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS 401</td>
<td>Professional Perspectives in Biomedical Sciences</td>
<td>1</td>
</tr>
<tr>
<td>BMS 602</td>
<td>Pathogenic Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>&amp; BMS 603</td>
<td>Pathogenic Microbiology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BMS 705</td>
<td>Immunology</td>
<td>5</td>
</tr>
<tr>
<td>&amp; BMS 715</td>
<td>Immunology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BMS 706</td>
<td>Virology</td>
<td>5</td>
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<tr>
<td>&amp; BMS 708</td>
<td>Virology Laboratory</td>
<td></td>
</tr>
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</table>

- Required for first-year students only.

**BMS-MM Major Elective Courses**

A total of five unique major elective courses is required. At least one course must be taken in each of the following subject areas: Host-Microbe Interaction Electives, Molecular Biology Electives, and Community Electives. Two additional courses are taken from any of the major elective subject areas.

**Host-Microbe Interaction Electives**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BMS 655</td>
<td>Human and Animal Parasites</td>
<td>3</td>
</tr>
<tr>
<td>BMS 703</td>
<td>Infectious Disease and Health</td>
<td>4</td>
</tr>
<tr>
<td>BMS 704</td>
<td>Pathologic Basis of Disease</td>
<td>4</td>
</tr>
<tr>
<td>BMS 719</td>
<td>Host-Microbe Interactions</td>
<td>4</td>
</tr>
<tr>
<td>BMS 720</td>
<td>Mycology, Parasitology, and Virology</td>
<td>3</td>
</tr>
<tr>
<td>BMS 740</td>
<td>Human Microbiome</td>
<td>4</td>
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**Molecular Biology Electives**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BMS 623</td>
<td>Histology, Microscopic Cellular Structure and Function</td>
<td>4</td>
</tr>
<tr>
<td>BMS 650</td>
<td>Molecular Diagnostics</td>
<td>4</td>
</tr>
<tr>
<td>BMS 655</td>
<td>Human and Animal Parasites</td>
<td>3</td>
</tr>
<tr>
<td>BMS 711</td>
<td>Toxicology</td>
<td>4</td>
</tr>
<tr>
<td>BMS 719</td>
<td>Host-Microbe Interactions</td>
<td>4</td>
</tr>
<tr>
<td>BMS 740</td>
<td>Human Microbiome</td>
<td>4</td>
</tr>
<tr>
<td>BMCB 605</td>
<td>Principles of Cell Biology</td>
<td>4</td>
</tr>
<tr>
<td>BMCB 753</td>
<td>Cell Culture</td>
<td>5</td>
</tr>
<tr>
<td>BMCB 754</td>
<td>Molecular Biology Research Methods</td>
<td>5</td>
</tr>
<tr>
<td>BMCB 763</td>
<td>Biochemistry of Cancer</td>
<td>4</td>
</tr>
<tr>
<td>GEN 704</td>
<td>Genetics of Prokaryotic Microbes</td>
<td>5</td>
</tr>
<tr>
<td>GEN 705</td>
<td>Population Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GEN 713</td>
<td>Microbial Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>GEN 717</td>
<td>Molecular Microbiology</td>
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</tr>
<tr>
<td>GEN 721</td>
<td>Comparative Genomics</td>
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**Community Electives**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BMS 716</td>
<td>Public Health: Food- and Water-borne Diseases</td>
<td>4</td>
</tr>
<tr>
<td>BMS 730</td>
<td>Ethical Issues in Biomedical Science</td>
<td>4</td>
</tr>
<tr>
<td>ANTH 685</td>
<td>Gender, Sexuality and HIV/AIDS in Sub-Saharan Africa</td>
<td>4</td>
</tr>
<tr>
<td>HMP 501</td>
<td>Epidemiology and Community Medicine</td>
<td>4</td>
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</tbody>
</table>

**Other Major Electives**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS 795</td>
<td>Investigations in Biomedical Science (4-credit minimum)</td>
<td>1-8</td>
</tr>
<tr>
<td>BMS 795W</td>
<td>Investigations in Biomedical Science (4-credit minimum)</td>
<td>1-8</td>
</tr>
<tr>
<td>BMS 799</td>
<td>Senior Thesis (4-credit minimum)</td>
<td>1-4</td>
</tr>
<tr>
<td>BMS 799H</td>
<td>Senior Honors Thesis (4-credit minimum)</td>
<td>1-4</td>
</tr>
<tr>
<td>INCO 790</td>
<td>Advanced Research Experience (4-credit minimum)</td>
<td>1-4</td>
</tr>
</tbody>
</table>

**BMS:MM Capstone**

The capstone explores areas of interest based on the integration of prior learning. The capstone requirement may be satisfied through a course, created work or product, or some form of experiential learning (e.g., honors thesis, mentored research project, or other special student activity). The capstone requirement can only be fulfilled once a student has senior standing in the major.

**Approved BMS:MM Capstone Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BMS 635</td>
<td>Preceptorial in Prehospital Care (4-credit minimum)</td>
<td>2</td>
</tr>
<tr>
<td>BMS 716</td>
<td>Public Health: Food- and Water-borne Diseases</td>
<td>4</td>
</tr>
<tr>
<td>BMS 719</td>
<td>Host-Microbe Interactions</td>
<td>4</td>
</tr>
<tr>
<td>BMS 730</td>
<td>Ethical Issues in Biomedical Science</td>
<td>4</td>
</tr>
<tr>
<td>BMS 740</td>
<td>Human Microbiome</td>
<td>4</td>
</tr>
<tr>
<td>BMS 795</td>
<td>Investigations in Biomedical Science (4-credit minimum)</td>
<td>1-8</td>
</tr>
<tr>
<td>BMS 795W</td>
<td>Investigations in Biomedical Science (4-credit minimum)</td>
<td>1-8</td>
</tr>
<tr>
<td>BMS 799</td>
<td>Senior Thesis (4-credit minimum)</td>
<td>1-4</td>
</tr>
<tr>
<td>BMS 799H</td>
<td>Senior Honors Thesis (4-credit minimum)</td>
<td>1-4</td>
</tr>
<tr>
<td>INCO 790</td>
<td>Advanced Research Experience (4-credit minimum)</td>
<td>1-4</td>
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</tbody>
</table>

For a Capstone experience not listed above, such as an internship, submit a Capstone Experience Approval form (https://colsa.unh.edu/sites/default/files/bms_major_noncapstoneexperienceapprovalform.pdf) prior to beginning the experience.
# Degree Plan

## SAMPLE Course Sequence for Medical Microbiology

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMS 401</td>
<td>Professional Perspectives in Biomedical Sciences</td>
<td>1</td>
</tr>
<tr>
<td>BIOL 411</td>
<td>Introductory Biology: Molecular and Cellular</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 401</td>
<td>First-Year Writing</td>
<td>4</td>
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<tr>
<td>CHEM 403</td>
<td>General Chemistry I</td>
<td>4</td>
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<tr>
<td>Discovery Course</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Credits</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
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<tr>
<td>BIOL 412</td>
<td>Introductory Biology: Evolution, Biodiversity and Ecology</td>
<td>4</td>
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<tr>
<td>MATH 424B</td>
<td>Calculus for Life Sciences</td>
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<tr>
<td>CHEM 404</td>
<td>General Chemistry II</td>
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<td>Discovery Course</td>
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<td><strong>Credits</strong></td>
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<td><strong>Fall</strong></td>
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<tr>
<td>BMS 503</td>
<td>General Microbiology</td>
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<td>&amp; BMS 504</td>
<td>and General Microbiology Laboratory</td>
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</tr>
<tr>
<td>GEN 604</td>
<td>Principles of Genetics</td>
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<tr>
<td>CHEM 545</td>
<td>Organic Chemistry</td>
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<tr>
<td>&amp; CHEM 546</td>
<td>and Organic Chemistry Laboratory</td>
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<td><strong>Credits</strong></td>
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<tr>
<td>BMS 602</td>
<td>Pathogenic Microbiology</td>
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</tr>
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<td>and Pathogenic Microbiology Laboratory</td>
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<tr>
<td>Major Elective</td>
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<td>4</td>
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<tr>
<td>Discovery Course</td>
<td></td>
<td>4</td>
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<td>BIOL 528</td>
<td>Applied Biostatistics I</td>
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<td><strong>Third Year</strong></td>
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<td>BMS 705</td>
<td>Immunology</td>
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<tr>
<td>PHYS 401</td>
<td>Introduction to Physics I</td>
<td>4</td>
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<tr>
<td>BMCB 658</td>
<td>General Biochemistry</td>
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</tr>
<tr>
<td>&amp; BMCB 659</td>
<td>and General Biochemistry Lab</td>
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<td><strong>Credits</strong></td>
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<tr>
<td><strong>Spring</strong></td>
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<tr>
<td>BMS 706</td>
<td>Virology</td>
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</tr>
<tr>
<td>&amp; BMS 708</td>
<td>and Virology Laboratory</td>
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</tr>
<tr>
<td>PHYS 402</td>
<td>Introduction to Physics II</td>
<td>4</td>
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<td>Major Elective</td>
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<td>4</td>
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<tr>
<td>Discovery Course</td>
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<td>4</td>
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<td><strong>Credits</strong></td>
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## Fourth Year

<table>
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<tr>
<th>Term</th>
<th>Course Options</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
<td>Major Elective (possible Capstone course)</td>
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<td>Major Elective</td>
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<td>Elective (any course)</td>
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<tr>
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<td>Elective (any course)</td>
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<td><strong>Credits</strong></td>
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<td><strong>Credits</strong></td>
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<td><strong>Total Credits</strong></td>
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