M. S. Degree Requirements

The Department of Molecular, Cellular, and Biomedical Science (MCBS) offers a Master of Science in Microbiology. Students admitted to the M.S. program are required to conduct an independent research project in conjunction with a faculty adviser and must submit a thesis based on this research to a graduate committee, which determines its acceptability. Specific coursework is determined in conjunction with the graduate committee.

A minimum of 30 credits, including 6-10 thesis credits (MCBS 899 Master’s Thesis), and a minimum of two other graduate level courses at the 800 or 900-level in the area of microbiology, are required. All M.S. students are required to enroll in and attend seminar (MCBS 997) every semester and present one seminar each year. A thesis and a formal defense are also required. In addition, the student must submit at least one manuscript for publication to a peer-reviewed journal.

Approved courses for the Microbiology Ph.D. and M.S. programs:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 804</td>
<td>Plant-Microbe Interactions</td>
<td>3</td>
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<tr>
<td>BIOL 805</td>
<td>Immunology</td>
<td>3</td>
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<tr>
<td>MCBS 997</td>
<td>Analysis of Ecological Communities and Complex Data</td>
<td>1</td>
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<tr>
<td>BIOL 902</td>
<td>Writing and Publishing Science</td>
<td>2</td>
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<tr>
<td>BIOL 853</td>
<td>Cell Culture</td>
<td>3</td>
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<tr>
<td>BCHM 825</td>
<td>Cell Phenotyping and Tissue Engineering Laboratory</td>
<td>4</td>
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<tr>
<td>ANFS 933</td>
<td>Design, Analysis, and Interpretation of Experiments</td>
<td>4</td>
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<tr>
<td>BCHM 854</td>
<td>Molecular Biology Research Methods</td>
<td>5</td>
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<tr>
<td>BIOL 811</td>
<td>Experimental Design &amp; Analysis</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 900</td>
<td>Scientific Communication</td>
<td>2</td>
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<tr>
<td>GEN 812</td>
<td>Programming for Bioinformatics</td>
<td>5</td>
</tr>
<tr>
<td>MCBS 901</td>
<td>Introduction to Research in the Life Sciences</td>
<td>2</td>
</tr>
<tr>
<td>MCBS 913</td>
<td>Applied Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>MCBS 910</td>
<td>Cell Signaling Networks Across the Kingdoms</td>
<td>3</td>
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<tr>
<td>MCBS 997</td>
<td>Seminar</td>
<td>1</td>
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<tr>
<td>NR 905</td>
<td>Grant Writing</td>
<td>2</td>
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<tr>
<td>NR 909</td>
<td>Analysis of Ecological Communities and Complex Data</td>
<td>4</td>
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<tr>
<td>LSA 900</td>
<td>College Teaching</td>
<td>2</td>
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<tr>
<td>MATH 835</td>
<td>Statistical Methods for Research</td>
<td>3</td>
</tr>
<tr>
<td>NR 900</td>
<td>Ethics in Research and Scholarship</td>
<td>2 or 3</td>
</tr>
</tbody>
</table>

Additional non-disciplinary courses to consider:

- ANFS 933: Design, Analysis, and Interpretation of Experiments
- BCHM 825: Cell Phenotyping and Tissue Engineering Laboratory
- BIOL 804: Plant-Microbe Interactions
- BIOL 805: Immunology
- MICR 815: Immunology Laboratory
- GEN 804: Genetics of Prokaryotic Microbes
- GEN 813: Microbial Ecology and Evolution
- GEN 817: Molecular Microbiology
- GRAD 891: National Science Foundation Graduate Research Fellowship Preparation
- GRAD 930: Ethics in Research and Scholarship
- LSA 900: College Teaching
- MATH 835: Statistical Methods for Research
- MCBS 901: Introduction to Research in the Life Sciences
- MCBS 913: Applied Bioinformatics
- MCBS 910: Cell Signaling Networks Across the Kingdoms
- MCBS 997: Seminar
- NR 905: Grant Writing
- NR 909: Analysis of Ecological Communities and Complex Data
- BCHM 854: Molecular Biology Research Methods
- BIOL 811: Experimental Design & Analysis
- BIOL 900: Scientific Communication
- GEN 812: Programming for Bioinformatics
- GRAD 891: National Science Foundation Graduate Research Fellowship Preparation
- GRAD 930: Ethics in Research and Scholarship
- LSA 900: College Teaching
- MATH 835: Statistical Methods for Research
- MCBS 901: Introduction to Research in the Life Sciences
- MCBS 913: Applied Bioinformatics
- MCBS 910: Cell Signaling Networks Across the Kingdoms
- MCBS 997: Seminar
- NR 905: Grant Writing
- NR 909: Analysis of Ecological Communities and Complex Data
Student Learning Outcomes

All MCBS graduates will be able to:

• Critically apply theories, methodologies, and knowledge to address fundamental questions in their primary area of study.
• Pursue research of significance in the discipline or an interdisciplinary or creative project. Students plan and conduct this research or implement this project under the guidance of an advisor while developing the intellectual independence that typifies true scholarship.
• Demonstrate skills in oral and written communication sufficient to publish and present work in their field and to prepare grant proposals.
• Follow the principles of ethics in their field and in academia.
• Demonstrate, through service, the value of their discipline to the academy and community at large.
• Demonstrate a mastery of skills and knowledge at a level required for college and university undergraduate teaching in their discipline and assessment of student learning.
• Interact productively with people from diverse backgrounds as both leaders/mentors and team members with integrity and professionalism.

Graduates of the Microbiology M.S. degree program will be able to:

• Demonstrate strong foundational knowledge in microbiology theory and practice, and sub-disciplinary and cross-disciplinary knowledge specific to the student’s research area.
• Critically analyze and interpretate the primary literature.
• Integrate knowledge by 1) synthesizing research questions and/or hypotheses, 2) designing, executing, and interpreting research and 3) contextualizing their contributions to the field of study.
• Demonstrate competency in laboratory safety, and specialized microbiological methods.
• Promote the importance of science, the discipline of microbiology, and microbes themselves to society by communicating the meaning and value of your scholarship across formal and informal forums.