Microbiology (MS)

Degree Requirements

Students may choose from the Microbiology course tracks below to complete coursework within a focus area.

Degrees earned will be distributed as: "Master of Science in Microbiology" without focus area track specifications.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB 601</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>MB 670</td>
<td>Laboratory Research Methods</td>
<td></td>
</tr>
<tr>
<td>MB 686</td>
<td>Teaching Experience</td>
<td></td>
</tr>
<tr>
<td>MB 590</td>
<td>Topical Problems (Professional Development)</td>
<td></td>
</tr>
<tr>
<td>MB 695</td>
<td>Master's Thesis Research (6 credits minimum)</td>
<td></td>
</tr>
</tbody>
</table>

Microbiology Courses

See "Microbiology Courses" listed below

Professional Development course

"Professional Development Course" is determined in conjunction with the academic committee

Elective Courses

See "Elective Courses" listed below

Total Hours 30

Microbiology Courses

The field of Microbiology includes several specialized disciplines such as bacterial physiology, microbial genomics and metagenomics, microbiomes, environmental microbiology, immunology, host-pathogen interactions, molecular genetics and virology. At NC State, M.S. students can take courses that represent, and focus on, the various disciplines of Microbiology. Example courses, fitting into two microbiology “tracks” or focus areas are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB 520</td>
<td>Fundamentals of Microbial Cell Biotransformations</td>
<td>2</td>
</tr>
<tr>
<td>MB 532</td>
<td>Soil Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>MB 555</td>
<td>Microbial Biotechnology</td>
<td>3</td>
</tr>
<tr>
<td>MB 590</td>
<td>Topical Problems (Professional Development)</td>
<td>1-3</td>
</tr>
<tr>
<td>MB 505</td>
<td>Food Microbiology</td>
<td>3</td>
</tr>
</tbody>
</table>

MB 714 Microbial Metabolic Regulation 3
MB 725 Fermentation Microbiology 3
MB 758 Microbial Genetics & Genomics 3

Host-Pathogen Interactions Track

MB 535 Bacterial Pathogenesis 3
MB 718 Introductory Virology 3
MB 751 Immunology 3
BCH 553 Biochemistry of Gene Expression 3
BCH 705 Molecular Biology Of the Cell 3
BMA 771/772 Biomathematics I 3
CBS 712 Reproductive Management and Disease in Domestic Animals 1

ENT 582 Medical and Veterinary Entomology 3
PP 707 Plant Microbe Interactions 3
ST 511/512 Statistical Methods For Researchers I 3

Elective Courses

Selection of elective courses is done by the student, in consultation with and approval by the advisory committee.

Below are examples of elective courses available:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAE 525</td>
<td>Industrial Microbiology and Bioprocessing</td>
<td>3</td>
</tr>
<tr>
<td>BCH 553</td>
<td>Biochemistry of Gene Expression</td>
<td>3</td>
</tr>
<tr>
<td>BCH 701</td>
<td>Macromolecular Structure</td>
<td>3</td>
</tr>
<tr>
<td>BCH 703</td>
<td>Macromolecular Synthesis and Regulation</td>
<td>3</td>
</tr>
<tr>
<td>BCH 705</td>
<td>Molecular Biology Of the Cell</td>
<td>3</td>
</tr>
<tr>
<td>BIT 510</td>
<td>Core Technologies in Molecular and Cellular Biology</td>
<td>4</td>
</tr>
<tr>
<td>Course</td>
<td>Title</td>
<td>Credits</td>
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<tr>
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<tr>
<td>BIT 595</td>
<td>Special Topics</td>
<td>1-6</td>
</tr>
<tr>
<td>GN 701</td>
<td>Molecular Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GN 735</td>
<td>Functional Genomics</td>
<td>3</td>
</tr>
<tr>
<td>GN 850</td>
<td>Professionalism and Ethics</td>
<td>1</td>
</tr>
<tr>
<td>MB/PP 730</td>
<td>Fungal Genetics and Physiology</td>
<td>3</td>
</tr>
<tr>
<td>MB 610</td>
<td>Special Topics Microbiology</td>
<td>1-6</td>
</tr>
<tr>
<td>MB 620</td>
<td>Special Problems</td>
<td>1-6</td>
</tr>
<tr>
<td>MB 601/801</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>MB 690/890</td>
<td>Master’s Examination</td>
<td>1-9</td>
</tr>
<tr>
<td>MB 695/895</td>
<td>Master’s Thesis Research</td>
<td>1-9</td>
</tr>
<tr>
<td>MB/IMM 783</td>
<td>Advanced Immunology</td>
<td>3</td>
</tr>
<tr>
<td>MB 790</td>
<td>Topical Problems (Practical Digital Imaging)</td>
<td>1-3</td>
</tr>
</tbody>
</table>

**Additional Requirements**

- 18 credits must be graded
- All graduate students must maintain a minimum cumulative grade point average of 3.0
- The program is completed upon submission of a thesis and completion of all credit requirements

**Faculty**

**Full Professors**

- Prema Arasu
- Rodolphe Barrangou
- Frederick Breidt
- Dennis T. Brown
- Jose Manuel Bruno-Barcena
- Susan B. Carson
- Mari S. Chinn
- Marc A. Cubeta
- Francis De Los Reyes
- Robert R. Dunn
- Frederick J. Fuller
- Amy Michele Grunden
- Hosni Moustafa Hassan
- Christine Veronica Hawkes

- Shujin Hu
- Michael Hyman
- Lee-Ann Jaykus
- Sophia Kathariou
- Robert M. Kelly
- Matthew D. Koci
- Scott M. Laster
- Hsiao-Ching Liu
- John M. Mackenzie Jr.
- Eric S. Miller
- Ian T. Petty
- Barbara Sherry
- Siddhartha Thakur
- Jeffrey A. Yoder

**Associate Professors**

- Nicolas Emile Buchler
- Douglas Franklin Call
- Jonathan E. Fogle
- Reza A. Ghiladi
- Megan E. Jacob
- Cristina Lanzas
- Jonathan W. Olson
- Joshua Glenn Pierce
- Frank Scholle
- Michael L. Sikes
- Robert G. Upchurch
- Gavin John Williams

**Assistant Professors**

- Oliver Baars
- Benjamin John Callahan
- Wei-Chen Chang
- Nathan Crook
- Kevin Garcia
Angela Rose Harris
Manuel Kleiner
Aram Arshak Mikaelyan
Ryan William Paerl
Ilenys Muniz Perez Diaz
Casey Michelle Theriot

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**Emeritus Faculty**

Paul Edward Bishop
James W. Brown
Walter J. Dobrogosz
Gerald Hugh Elkan
Michael Carl Flickinger
Todd Robert Klaenhammer
Wesley Edwin Kloos
Geraldine Luginbuhl
Paul E. Orndorff
Leo W. Parks
Jason C. Shih

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**Adjunct Faculty**

James M. Ligon
Maria Andrea Azcarate Peril
Scott Harold Shore
Daniel van der Lelie