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>
<th>Counts towards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses</td>
<td></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>MB 601</td>
<td>Seminar</td>
<td></td>
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</tr>
<tr>
<td>MB 670</td>
<td>Laboratory Research Methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB 686</td>
<td>Teaching Experience</td>
<td></td>
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<tr>
<td>MB 590</td>
<td>Topical Problems (Professional Development)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB 695</td>
<td>Master’s Thesis Research (6 credits minimum)</td>
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</tr>
</tbody>
</table>

Microbiology Courses 6

See “Microbiology Courses” listed below

Professional Development course 1

“Professional Development Course” is determined in conjunction with the academic committee

Elective Courses 12

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>
<th>Counts towards</th>
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</thead>
<tbody>
<tr>
<td>Environmental / Industrial Track</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB 520</td>
<td>Fundamentals of Microbial Cell Biotransformations</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MB 532</td>
<td>Soil Microbiology</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MB 555</td>
<td>Microbial Biotechnology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MB 590</td>
<td>Topical Problems</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>MB 505</td>
<td>Food Microbiology</td>
<td>3</td>
<td></td>
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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
<th>Counts towards</th>
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<tbody>
<tr>
<td>MB 714</td>
<td>Microbial Metabolic Regulation</td>
<td>3</td>
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<tr>
<td>MB 725</td>
<td>Fermentation Microbiology</td>
<td>3</td>
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<tr>
<td>MB 758</td>
<td>Microbial Genetics &amp; Genomics</td>
<td>3</td>
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Host-Pathogen Interactions Track

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<th>Counts towards</th>
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<tbody>
<tr>
<td>MB 535</td>
<td>Bacterial Pathogenesis</td>
<td>3</td>
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<tr>
<td>MB 718</td>
<td>Introductory Virology</td>
<td>3</td>
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<tr>
<td>MB 751</td>
<td>Immunology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BCH 553</td>
<td>Biochemistry of Gene Expression</td>
<td>3</td>
<td></td>
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<tr>
<td>BCH 705</td>
<td>Molecular Biology Of the Cell</td>
<td>3</td>
<td></td>
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<tr>
<td>BMA 771/772</td>
<td>Biomathematics I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CBS 712</td>
<td>Reproductive Management and Disease in Domestic Animals</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
<th>Counts towards</th>
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</thead>
<tbody>
<tr>
<td>ENT 582</td>
<td>Medical and Veterinary Entomology</td>
<td>3</td>
<td></td>
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<tr>
<td>PP 707</td>
<td>Plant Microbe Interactions</td>
<td>3</td>
<td></td>
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<tr>
<td>ST 511/512</td>
<td>Statistical Methods For Researchers I</td>
<td>3</td>
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</table>

Elective Courses

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

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

Shuizin 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

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

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
Ilénys 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