# Biology (MS)

## Degree Requirements

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

Degrees earned will be distributed as: "Master of Science" without track specifications.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
<th>Counts towards</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEC 502</td>
<td>Introduction to Biological Research</td>
<td>3</td>
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<tr>
<td>PHI 816</td>
<td>Introduction to Research Ethics (or equivalent ethics course)</td>
<td>1</td>
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</table>

### Additional Courses

Additional Courses are determined in conjunction with the academic committee to meet the 30 total hours.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
<th>Counts towards</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEC 515</td>
<td>Fish Physiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEC 519</td>
<td>Freshwater Ecology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEC 624</td>
<td>Advanced Fisheries Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEC 592</td>
<td>Special Topics in Applied Ecology (Management of Small Impoundments)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEC 592</td>
<td>Special Topics in Applied Ecology (Advanced Biology of Fishes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEC 624</td>
<td>Advanced Fisheries Science</td>
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</tr>
<tr>
<td>AEC 710</td>
<td>Sampling Animal Populations</td>
<td></td>
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</tr>
<tr>
<td>AEC 726</td>
<td>Quantitative Fisheries Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMA 772</td>
<td>Biomathematics II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FW 511</td>
<td>Human Dimensions of Wildlife and Fisheries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEA 549</td>
<td>Principles of Biological Oceanography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR 595</td>
<td>Special Topics in Natural Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOX 715</td>
<td>Environmental Toxicology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZO 524</td>
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</table>

### Aquaculture and Aquatic Sciences Track

Select one of the following courses:

- ST 511 Statistical Methods For Researchers I
- ST 512 Statistical Methods For Researchers II
- BIT 815 Advanced Special Topics 2
- AEC 510 Machine Learning Approaches in Biological Sciences
- ST 505 Applied Nonparametric Statistics
- BMA 567 Modeling of Biological Systems

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
<th>Counts towards</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEC/ENT 509</td>
<td>Ecology and Conservation of Freshwater Invertebrates</td>
<td>3</td>
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</tbody>
</table>

### Restricted Elective

Select one of the following courses:

- AEC/ENT 509 Ecology and Conservation of Freshwater Invertebrates

### Molecular, Cellular and Developmental Biology Track

Select one of the following courses:

- ST 511 Statistical Methods For Researchers I
- ST 512 Statistical Methods For Researchers II
### Biotechnology Requirement

Select one course from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 592</td>
<td>Topical Problems (Capstone Course in Molecular, Cellular, and Developmental Biology)</td>
</tr>
<tr>
<td>GN 701</td>
<td>Molecular Genetics</td>
</tr>
<tr>
<td>GN 702</td>
<td>Cellular and Developmental Genetics</td>
</tr>
<tr>
<td>GN 750</td>
<td>Developmental Genetics</td>
</tr>
</tbody>
</table>

### Restricted Electives

Select one of the following courses determined in conjunction with the academic committee based on thesis research:

- **BIT 510** Core Technologies in Molecular and Cellular Biology
- **BIT 595** Special Topics

Total Hours: 10

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### Ecology and Evolution Track

#### Quantitative Requirement

Select one of the following courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST 511</td>
<td>Statistical Methods For Researchers I</td>
</tr>
<tr>
<td>or ST 512</td>
<td>Statistical Methods For Researchers II</td>
</tr>
<tr>
<td>AEC 510</td>
<td>Machine Learning Approaches in Biological Sciences</td>
</tr>
<tr>
<td>ST 505</td>
<td>Applied Nonparametric Statistics</td>
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</table>

#### Ecology or Evolution Requirement

Select one of the following courses from "Ecology" or "Evolution"

**Ecology**

- AEC 503 Foundations of Ecology
- AEC 519 Freshwater Ecology
- AEC 718 Community Ecology
- AEC 761 Conservation and Climate Science
- BIO/BMA 560 Population Ecology
- MEA 752 Marine Plankton Ecology

**Evolution**

- BIO 570 Evolutionary Ecology
- ENT 591 Special Topics In Entomology
- GN 703 Population and Quantitative Genetics
- GN 713 Quantitative Genetics and Breeding
- GN 740 Evolutionary Genetics
- GN 757 Quantitative Genetics Theory and Methods
- PB 503 Systematic Botany
- PB 545 Paleobotany

Total Hours: 6

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### Biology (MS)

2. BIT 815 or any Bioinformatics course determined in conjunction with the academic committee.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
<th>Counts towards</th>
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</thead>
<tbody>
<tr>
<td>BMA 567</td>
<td>Modeling of Biological Systems</td>
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</tr>
<tr>
<td>AEC 503</td>
<td>Foundations of Ecology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>AEC 519</td>
<td>Freshwater Ecology</td>
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<td></td>
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<tr>
<td>AEC 718</td>
<td>Community Ecology</td>
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<td></td>
</tr>
<tr>
<td>AEC 761</td>
<td>Conservation and Climate Science</td>
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<tr>
<td>BIO/BMA 560</td>
<td>Population Ecology</td>
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<tr>
<td>MEA 752</td>
<td>Marine Plankton Ecology</td>
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<td><strong>Ecology Requirement</strong></td>
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<tr>
<td>BIO 570</td>
<td>Evolutionary Ecology</td>
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<td>ENT 591</td>
<td>Special Topics In Entomology</td>
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<td>GN 703</td>
<td>Population and Quantitative Genetics</td>
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<td>GN 713</td>
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<td>GN 740</td>
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<td>GN 757</td>
<td>Quantitative Genetics Theory and Methods</td>
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<tr>
<td>PB 503</td>
<td>Systematic Botany</td>
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<td>PB 545</td>
<td>Paleobotany</td>
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<td><strong>Evolution Requirement</strong></td>
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<td><strong>Total Hours</strong></td>
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<tr>
<td>Code</td>
<td>Title</td>
<td>Hours</td>
<td>Counts towards</td>
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<td></td>
<td><strong>Restricted Electives</strong></td>
<td>4</td>
<td>MS/PhD students</td>
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<tr>
<td>BIO 520</td>
<td>Skeletal Biological Laboratory Methods in Human Identification &amp; Cold Cases</td>
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<tr>
<td>BIO 811</td>
<td>Forensic Sciences Seminar</td>
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<tr>
<td></td>
<td><strong>Quantitative Requirements</strong></td>
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<tr>
<td>ST 511</td>
<td>Statistical Methods For Researchers I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST 512</td>
<td>Statistical Methods For Researchers II</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Hours</strong></td>
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<td></td>
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</table>

**Other Requirements**

- Every student is required to complete training logs. Many of the modules can be completed while taking the BIO 520 course. Please contact the Forensic Sciences Concentration Chair for additional information.
- Students are also required to start the Training Case Record Form after their first year and/or after taking BIO 520, whichever comes first. Please contact the Forensic Sciences Concentration Chair for additional information.
- Forensic Anthropology Society of Europe Level II Certification is strongly recommended but not required - costs associated with this exam are the student's responsibility.

**Integrative Biology Track**

This concentration is open to MS and PhD students who do not fit academically within the other Biology concentrations, or who integrate across multiple concentrations. Coursework is determined in consultation with your PhD mentor and committee and is approved by the DGP.

David Derek Aday
Betty L. Black
Russell J. Borski
David Buchwalter
Jeffrey A. Buckel
Ignazio Carbone
Jaime A. Collazo
William Gregory Cope
Harry Valentine Daniels III
Robert R. Dunn
David B. Eggleston
John R. Godwin
Kevin Gross
Craig A. Harms
Jeffrey M. Hinshaw
Rebecca Elizabeth Irwin
Thomas J. Kwak
Thomas M. Losordo
Carolyn Jane Mattingly
Heather B. Patisaul
Luis Alonso Ramirez-Ulate
Ann Helen Ross
Mary Higby Schweitzer
David R. Tarpy
Scott M. Belcher
Shobhan Gaddameedhi
Adam Hartstone-Rose
Randall Brian Langerhans
John Edward Meitzen
Nanette M. Nascone-Yoder
Marianne Niedzlek-Feaver
Antonio Planchart
Reade Bruce Roberts
Jie Cao
Khara Deanne Grieger
Nathan James Hostetter
Kurt Marsden
Jamian Krishna Pacifici
Seema Nayan Sheth
Caitlin Suzanne Smukowski Heil
Joy Little Snowden
Bradley William Taylor
Christopher Scott Walker
Elsa Youngsteadt
Jennifer L. Campbell
Louis Broadus Daniel III
Miles Dean Engell
Miriam G. Ferzli
Jesse Robert Fischer
Terry Allen Gates
William Miller Johnstone III
Jane L. Lubischer
Erin Alison McKenney
Lisa M. Paciulli
Lisa D. Parks
Martha Burford Reiskind
Damian Shea
Adrian Alan Smith
Lindsay E. Zanno
Peter T. Bromley
Billy J. Copeland
Frederick T. Corbin
Phillip D. Doerr
William C. Grant
Robert M. Grossfeld
Thurman L. Grove
Harold F. Heatwole
Joseph E. Hightower
Richard A. Lancia
Richard L. Noble
Kenneth H. Pollock
James Alan Rice Jr.
John F. Roberts
Damian Shea
Theodore R. Simons
Herbert A. Underwood
John G. Vandenbergh
Thomas G. Wolcott
Robert R. Anholt
Tyler Ray Black
Arthur E. Bogan
Heather Evans
John G. Boreman Jr.
David T. Cobb
Louis Broadus Daniel III
Mitchell J. Eaton
John Jeffrey Govoni
Nicholas M. Haddad
Andrew Bittinger Heckert
Ryan J. Heise
Corinne J. Kendall
Reid W. Laney
Trudy F. MacKay
Alexa J. McKerrow
Gerard McMahon
James Adiel Morris Jr.
Jennifer R Runkle
Megan Elizabeth Serr
Rowland M. Shelley
Kyle W. Shertzer
Adrian Alan Smith
Seth Patrick Stapleton
Bryan Lynn Stuart
Adam J. Terando

Adjunct Professors
Christian Farrell Kammerer
Candice Small

Teaching Associate Professor
Jennifer Landin

Assistant Professors
Christa Baker
Natalia Dugue-Wilckens
Maria L. Rodgers