Spring 2021 Registration

[Check SPIRE for your enrollment start date. It will be in one of the date ranges listed below.]

<table>
<thead>
<tr>
<th>Seniors (87 credits &amp; above)</th>
<th>Nov 2-5 (M,T,W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juniors (57-86 credits)</td>
<td>Nov 5-9 (Th,F,M)</td>
</tr>
<tr>
<td>Sophomores (27-56 credits)</td>
<td>Nov 10-12 (T,W,Th)</td>
</tr>
<tr>
<td>Freshmen (26 credits &amp; below)</td>
<td>Nov 13-18 (F,M,T,W)</td>
</tr>
</tbody>
</table>

**Note:** Enrollment start times and eligibility to register for courses that are restricted by level are determined by a student’s potential credit total, which includes the credits he or she is enrolled in currently (i.e. Fall 2020 courses). The Biology Department does not assign a specific advisor to our majors. Biology Majors do not need advisor permission to enroll. Advising is NOT mandatory but we are happy to meet with you and help with your course selection.

UNDERGRADUATE ADVISING OFFICE:
PLEASE SCHEDULE ADVISING APPOINTMENTS EARLY
https://umass.campus.eab.com/
Morrill Science Center III, Room 216
413.545.2287

**Biology Peer Advising Fall 2020**
Monday – 2 PM-3 PM
Tuesday –11 AM-5 PM
Wednesday – 9 AM-1 PM and 2:30-4 PM
Thursday – 8:30AM-11 AM
Friday – 9 AM-11 AM

*To schedule an appointment with a peer advisor:*
Use this link —> [https://umass.campus.eab.com/](https://umass.campus.eab.com/) You will need to log in with your NET ID and password and then click on the blue make appointment button in the upper right corner of the screen. Select you would like to make an appointment with a biology peer advisor.

*To drop in with a peer advisor:*
You can access the Peer Advising meeting in Zoom using this link: [https://umass-amherst.zoom.us/s/96882561838](https://umass-amherst.zoom.us/s/96882561838). Peers will only be available through this link at the times listed above.

**REGISTRATION TIPS**

**COURSE OVERRIDE PERMISSION FORMS:** If you would like to enroll in a class that is full, monitor the course on SPIRE to see if someone drops. Some instructors may accept “extra” students. If an instructor agrees to an override, have him or her sign a course override form. Send the completed form, including a signature or other indication of approval from the faculty supervisor, to Sue Clevenger ([suec@bio.umass.edu](mailto:suec@bio.umass.edu)).

*To help us efficiently process your override, please drop all conflicting courses and apply for credit overload if the course you would like to add will put you over 19 credits.*

**SPECIAL NOTE:** SPIRE WILL STOP PROMOTING STUDENTS FROM WAITLISTS TO COURSE OPENINGS AFTER THE FIRST DAY OF CLASSES (Tuesday, January 21, 2020).
Deans of the College of Natural Sciences
Morrill II Room 220
413.545.1969

Elizabeth Connor, Associate Dean
Rebecca Schneider, Life Sciences Academic Advisor
Wilmore Webley, Director Pre-Med/Pre-Dent/Pre-Health
Cathy Eden, Associate Director Pre-Med/Pre-Dent/Pre-Health

You need a dean’s approval for:
**Credit Overload:** Apply online [https://secure.cns.umass.edu/webforms/credit-overload-petition](https://secure.cns.umass.edu/webforms/credit-overload-petition)

**Withdrawal from a course after mid-semester:** Apply online [https://secure.cns.umass.edu/webforms/late-withdrawal-petition](https://secure.cns.umass.edu/webforms/late-withdrawal-petition)

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**CHANGING YOUR MAJOR**

To change your major, contact a representative in the undergraduate department of the **NEW** major. They will change your record in SPIRE and/or inform you of any additional steps in the process.

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**TRANSFER STUDENTS**

**Transfer credit BIOL 151/152/153**

Students who have transfer credit from another school for these Introductory Biology courses may not be able to add courses for which the intro courses are prerequisites (for example: Biology 283, 285, 287). If you encounter this problem, please call or stop by the undergraduate office (413-545-2287, 216 Morrill). We will verify that you have satisfied the prerequisites and then manually add the course you desire to your class schedule, as long as the course is not full.

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**TRANSCRIPTS/TRANSFER CREDIT**

If you have completed courses at another University but they do not appear on your UMass transcript, please have the school at which you took the courses send a transcript to the Records Office, 207 Whitmore Administration Building.

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**PARTICIPATE IN A RESEARCH LAB FOR INDEPENDENT STUDY CREDIT OR JUST FOR THE EXPERIENCE.**

It’s up to you to first make arrangements with a faculty member who will sponsor your project. Check out our Biology faculty and their research interests at [http://www.bio.umass.edu/biology/faculty/faculty-listing](http://www.bio.umass.edu/biology/faculty/faculty-listing). When you’re ready to enroll in independent study credits, fill out the **Independent Study Form** (for Biology majors and students working with a Biology faculty member only). Send the completed form, including a signature or other indication of approval from the faculty supervisor, to Sue Clevenger (suec@bio.umass.edu). If you’re a sophomore sign up for BIOL 296; if you’re a junior, BIOL 396; seniors sign up for BIOL 496. You may sign up for the same Independent Study number during multiple semesters. It is always a good idea to check your student enrollment list (classes you are enrolled in) prior to the end of the add/drop period to make sure it is correct. Also, if you need to get credit overload approval you should apply for it promptly ([http://www.cns.umass.edu](http://www.cns.umass.edu)) and notify the staff in the Undergraduate Advising Office so they are aware of it and will place a note on your course permission form. They can’t add you until your Academic Dean has approved your credit overload.
The Biology Undergraduate Research Apprenticeship (BURA) advertises research positions beginning on the first day of classes each semester. The BURA website allows Biology undergraduates to see and apply to research opportunities in faculty laboratories focusing on biological research. Undergraduates at any stage of their training and interest can apply. BURA has matched over 100 undergraduates and research projects since fall 2010! Visit BURA at https://www.bio.umass.edu/bura/. BURA positions for the upcoming semester will be posted at the beginning of the semester.

NOTE: If you’re doing research for an Honor’s thesis, you should contact the Honor’s Program to register. It is also important that you then notify the staff in the Biology Undergraduate Advising office so they will know which faculty member should deliver your grade.

**Integrative Experience - Required for Biology majors**

1. Take Biology 494 LI, Life After Biology (1-cr seminar, offered every semester)

2. Make sure that your upper-level elective courses include at least one of the following courses:

   - Biology 383H Gene and Genome Analysis
   - Biology 421 Plant Ecology
   - Biology 422H Experimental Methods in Ecology
   - Biology 477H Bioimaging
   - Biology 487H Tropical Field Biology
   - Biology 514 Population Genetics
   - Biology 523 Histology
   - Biology 540 Herpetology
   - Biology 550 Animal Behavior
   - Biology 551 Animal Communication
   - Biology 572 Neurobiology
   - Biology 582 DNA to Diversity
### Spring 2021 BIOLOGY COURSES

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course No.</th>
<th>Section</th>
<th>Course Name</th>
<th>Instructor</th>
<th>Day</th>
<th>Time</th>
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<tbody>
<tr>
<td>BIOL</td>
<td>105</td>
<td>LEC 1</td>
<td>Biology of Social Issues</td>
<td>Phillips, Podos, Riley</td>
<td>MWF</td>
<td>1:25</td>
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<td>BIOL</td>
<td>105H</td>
<td>LEC 1</td>
<td>Biology of Social Issues</td>
<td>TBA</td>
<td>TuTh</td>
<td>10:00-11:15</td>
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<td>BIOL</td>
<td>110</td>
<td>LEC 1</td>
<td>Intro Biology for Science Majors</td>
<td>Zehnder</td>
<td>MW</td>
<td>8:30-9:45</td>
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<tr>
<td>BIOL</td>
<td>151</td>
<td>LEC 1</td>
<td>Intro Biology 1</td>
<td>Lane</td>
<td>TuTh</td>
<td>10:30-11:30</td>
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<tr>
<td>BIOL</td>
<td>152</td>
<td>LEC 1   &amp; 2</td>
<td>Intro Biology 1 &amp; 2</td>
<td>Rounds</td>
<td>MW</td>
<td>2:30-3:45</td>
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<td>BIOL</td>
<td>152</td>
<td>LEC 2</td>
<td>Intro Biology 2</td>
<td>Houlihan</td>
<td>TuTh</td>
<td>8:30-9:45</td>
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<tr>
<td>BIOL</td>
<td>152</td>
<td>LEC 3</td>
<td>Intro Biology 2</td>
<td>Zehnder</td>
<td>MWF</td>
<td>9:05</td>
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<tr>
<td>BIOL</td>
<td>152</td>
<td>LEC 5</td>
<td>Intro Biology 2 (BioPioneers RAP)</td>
<td>Zehnder</td>
<td>MWF</td>
<td>11:15</td>
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<td>BIOL</td>
<td>153</td>
<td>LAB 1-36</td>
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<td>BIOL</td>
<td>162H</td>
<td>LEC 1</td>
<td>Quantitative Systems Biology</td>
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<td>TuTh</td>
<td>1:00-2:15</td>
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<td>Evolution</td>
<td>Porter</td>
<td>MWF</td>
<td>12:20</td>
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<td>BIOL</td>
<td>283</td>
<td>LEC 1</td>
<td>General Genetics</td>
<td>Loomis</td>
<td>MWF</td>
<td>9:05</td>
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<td>BIOL</td>
<td>283</td>
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<td>General Genetics</td>
<td>Moscarella</td>
<td>MWF</td>
<td>1:25</td>
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<td>BIOL</td>
<td>284</td>
<td>LAB 1</td>
<td>Genetics Lab</td>
<td>Loomis</td>
<td>Tu</td>
<td>1:00-5:00</td>
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<tr>
<td>BIOL</td>
<td>284</td>
<td>LAB 2</td>
<td>Genetics Lab</td>
<td>Loomis</td>
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<td>1:00-5:00</td>
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<tr>
<td>BIOL</td>
<td>285</td>
<td>LEC 1</td>
<td>Cell &amp; Molecular Biology</td>
<td>Francis</td>
<td>MWF</td>
<td>11:15</td>
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<tr>
<td>BIOL</td>
<td>285</td>
<td>LEC 2</td>
<td>Cell &amp; Molecular Biology</td>
<td>Rounds</td>
<td>TuTh</td>
<td>10:00-11:15</td>
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<tr>
<td>BIOL</td>
<td>287</td>
<td>LEC 1</td>
<td>Intro Ecology</td>
<td>Seidler</td>
<td>MWF</td>
<td>10:10</td>
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<td>BIOL</td>
<td>288</td>
<td>LEC 2</td>
<td>Intro Physiology</td>
<td>Gerson</td>
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<td>11:30-12:45</td>
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<td>BIOL</td>
<td>312</td>
<td>LEC 1</td>
<td>Writing in Biology</td>
<td>Spracklen</td>
<td>TuTh</td>
<td>11:30-12:45</td>
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<tr>
<td>BIOL</td>
<td>312</td>
<td>LEC 2</td>
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<td>Normark</td>
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<td>2:30-5:15</td>
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<td>312</td>
<td>LEC 3</td>
<td>Writing in Biology</td>
<td>Spracklen</td>
<td>M,W</td>
<td>2:30-3:45</td>
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<td>312</td>
<td>LEC 4</td>
<td>Writing in Biology</td>
<td>Okusu</td>
<td>Tu</td>
<td>8:30-11:15</td>
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<td>BIOL</td>
<td>312</td>
<td>LEC 5</td>
<td>Writing in Biology</td>
<td>Spracklen</td>
<td>TuTh</td>
<td>1:00-2:15</td>
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<td>BIOL</td>
<td>312</td>
<td>LEC 7</td>
<td>Writing in Biology</td>
<td>Brewer</td>
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<td>12:45-3:45</td>
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<td>BIOL</td>
<td>379H</td>
<td>LEC 1</td>
<td>Genomics and Bioinformatics</td>
<td>Babbitt</td>
<td>TuTh</td>
<td>2:30-3:35</td>
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<td>BIOL</td>
<td>383H</td>
<td>LAB 1</td>
<td>Gene and Genome Analysis</td>
<td>Hazen</td>
<td>MWF</td>
<td>1:25-4:25</td>
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<tr>
<td>BIOL</td>
<td>383H</td>
<td>LAB 2</td>
<td>Gene and Genome Analysis</td>
<td>TBA</td>
<td>TuTh</td>
<td>1:00-4:00</td>
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<td>BIOL</td>
<td>397E</td>
<td>LEC 1</td>
<td>Intro Neurobiology</td>
<td>Fenelon</td>
<td>MWF</td>
<td>12:20</td>
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<tr>
<td>BIOL</td>
<td>397E</td>
<td>LEC 2</td>
<td>Intro Neurobiology</td>
<td>Jensen</td>
<td>TuTh</td>
<td>1:00-2:15</td>
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<tr>
<td>BIOL</td>
<td>397H</td>
<td>LAB 1</td>
<td>Cell and Molecular Biology Lab</td>
<td>Laney</td>
<td>MW</td>
<td>1:25-4:25</td>
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<td>BIOL</td>
<td>397N</td>
<td>LAB 3</td>
<td>Neuro and Physiol Lab</td>
<td>Karlstrom</td>
<td>Tu</td>
<td>1:00-5:00</td>
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<td>BIOL</td>
<td>397N</td>
<td>LAB 4</td>
<td>Neuro and Physiol Lab</td>
<td>Karlstrom</td>
<td>Th</td>
<td>1:00-5:00</td>
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<tr>
<td>BIOL</td>
<td>401</td>
<td>LEC 1</td>
<td>Great Papers in Biology</td>
<td>Schwartz, Pallas</td>
<td>TuTh</td>
<td>2:30-3:45</td>
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<tr>
<td>BIOL</td>
<td>424</td>
<td>LEC 1</td>
<td>Marine Biology</td>
<td>Okusu</td>
<td>MWF</td>
<td>11:15</td>
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<tr>
<td>BIOL</td>
<td>475</td>
<td>LEC 1</td>
<td>Plant Cell Biology</td>
<td>Facette</td>
<td>MWF</td>
<td>9:05</td>
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<td>BIOL</td>
<td>484</td>
<td>LEC 1</td>
<td>Cancer Genetics</td>
<td>Phillips</td>
<td>TuTh</td>
<td>10:00-11:15</td>
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<td>BIOL</td>
<td>494LI</td>
<td>LEC 1</td>
<td>Life After Biol: Biol Integrated Exp</td>
<td>Pallas</td>
<td>W</td>
<td>4:00-4:50</td>
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<tr>
<td>BIOL</td>
<td>497G</td>
<td>LEC 1</td>
<td>Human Genome Analysis</td>
<td>Blanchard</td>
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<td>2:30-5:15</td>
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<td>BIOL</td>
<td>510</td>
<td>LEC 1</td>
<td>Plant Physiology</td>
<td>Baskin</td>
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<tr>
<td>BIOL</td>
<td>514</td>
<td>LEC 1</td>
<td>Population Genetics</td>
<td>Caicedo</td>
<td>TuTh</td>
<td>1:00-2:15</td>
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<tr>
<td>BIOL</td>
<td>523</td>
<td>LEC 1</td>
<td>Histology</td>
<td>Long</td>
<td>MWF</td>
<td>4:00-5:15</td>
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<tr>
<td>BIOL</td>
<td>544</td>
<td>LEC 1</td>
<td>Ornithology</td>
<td>Byers</td>
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<td>11:30-12:45</td>
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<td>BIOL</td>
<td>548</td>
<td>LEC 1</td>
<td>Mammalology</td>
<td>Moscarella</td>
<td>TuTh</td>
<td>1:00-2:15</td>
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<td>BIOL</td>
<td>550</td>
<td>LEC 1</td>
<td>Animal Behavior</td>
<td>Houlihan</td>
<td>TuTh</td>
<td>11:30-12:45</td>
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<td>BIOL</td>
<td>559</td>
<td>LEC 1</td>
<td>Cell Biology II</td>
<td>Fritz-Laylin</td>
<td>TuTh</td>
<td>1:00-2:15</td>
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<td>BIOL</td>
<td>564</td>
<td>LEC 1</td>
<td>Human Physiology</td>
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<td>10:00-11:15</td>
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<td>BIOL</td>
<td>566</td>
<td>LEC 1</td>
<td>Comparative Physiology</td>
<td>Irschick</td>
<td>TuTh</td>
<td>2:30-3:45</td>
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<td>BIOL</td>
<td>572</td>
<td>LEC 1</td>
<td>Neurobiology</td>
<td>Vazey</td>
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<td>2:30-3:45</td>
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<td>BIOL</td>
<td>580</td>
<td>LEC 1</td>
<td>Developmental Biology</td>
<td>Bartlett</td>
<td>TuTh</td>
<td>10:00-11:15</td>
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<tr>
<td>BIOL</td>
<td>597CD</td>
<td>LEC 1</td>
<td>Cell Biology of Disease</td>
<td>Wadsworth</td>
<td>TuTh</td>
<td>8:30-9:45</td>
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<tr>
<td>BIOL</td>
<td>597NE</td>
<td>LEC 1</td>
<td>Neural Basis of Animal Behavior</td>
<td>Katz</td>
<td>MW</td>
<td>2:30-3:45</td>
</tr>
</tbody>
</table>
Biology Course Descriptions
Spring 2021

105/105H—Biology of Social Issues (4 cr.)
105 - (BS) Phillis Morrill3 404A; Podos, Morrill2 332A; Riley, Morrill3, 304A
105H - (BS) TBA
In this course we examine biological principles that underlie important and sometimes controversial issues in today's society. All of these issues are connected to questions of public policy, but public policy is not a primary focus of this course. Topics to be covered include biological bases of human health, environmental degradation, biotechnology, and the biology of agriculture. This course is intended for non-science majors, but we welcome the participation of science majors as well. Not for Biology major credit.

110—Introductory Biology for Science Majors (4 cr.)
(BS) Zehnder, Morrill2 348C
This is a course for non-biology majors with two components, lecture and discussion section. We will explore biological principles at all levels of organization, from molecules, cells, and organs to individuals, populations and the biosphere. Have you ever wondered...how basilisk lizards can literally run on water?...why we don't yet have a vaccine against the HIV/AIDS virus?...why there is no rainforest in New England?...how bacteria help the Gulf ecosystem recover after the Deepwater Horizon oil spill? We will explore these and other questions to better understand how the living world works. Assessment includes evening exams, quizzes, and written assignments. Not for Biology major credit.
Prerequisites: None

151—Introductory Biology (4 cr.)
(BS) Laney, Morrill2 432; Francis, Morrill2 348A
First semester of a full year course for majors in the life sciences. Introduction to the biochemical basis of living systems, cell biology, mitosis and meiosis, principles of genetics, developmental biology. Includes lecture and discussion sections. Required for biology majors. (Gen. Ed. BS)

152—Introductory Biology (3 cr.)
(BS) Houlihan, Morrill2 352
The course will cover the following broad subject areas: 1) Physiology - We will explore how the nervous system functions to collect, analyze, and respond to information from inside and outside the body. 2) Evolution - We will discuss the meaning, mechanisms, and importance of the central organizing concept in biology. 3) Ecology - We will talk about how organisms interact with their abiotic and biotic environment. 4) Applied Ecology & Evolution - We will develop a sense of how evolution and ecology are important to other sub-disciplines in biology, other fields of science, medicine, and engineering. We will not cover any of these areas exhaustively. You will have those opportunities in mid and upper-level classes on these subjects. Instead, I will pick subjects areas and model systems from each of these subjects that illustrate the major concepts in each of these sub-disciplines. The two common themes that will link these subject areas are the idea of evolution and global change biology. Although we will not be discussing evolution in depth until several weeks into the semester, we will start thinking about physiological systems within an evolutionary framework. In addition, we will focus on how research is conducted and evaluated.
Prerequisite: A grade of C or better in BIOL 151 (strictly enforced)

152—Introductory Biology (3 cr.)
153—Introductory Biology Lab (2 cr.)
This course is a 2-credit laboratory experience that allows students to apply the biological concepts covered in Biology 151 and 152 Introductory Biology in laboratory and field settings. Students will develop and practice scientific research skills while exploring the areas of genetics, cell and molecular biology, evolution, and ecology. To enroll, students must be co-enrolled in Biology 152 (Introductory Biology II) or have completed the 2 semester Introductory Biology Sequence (Biol 151 and 152).

162H—Quantitative Systems Biology (4 cr.)
Riley, Morrill1 304A
The second semester first-year course for students in the BIOTAP program, Quantitative Systems Biology examines core concepts in evolution, physiology and functional morphology, and ecology. Cutting-edge research in each of these fields relies heavily on basic math and physics to understand how organisms function, interact with their environments, and change over evolutionary time. This course uses a combination of lectures that address organism-level systems and labs in which students investigate those systems in detail. The course will be organized into three modules that flow naturally from one to the next: evolution (the genotype), comparative physiology and functional morphology (the phenotype), and ecology (organismal and environmental interactions).

280—Evolution: Diversity of Life Through Time (3 cr.)
Porter, Morrill1 N 440
We will investigate the process of biological evolution and the evolutionary history of life on Earth. Topics to be covered include natural selection, speciation (the formation of new species), and other causes of evolutionary change; the methods that evolutionary biologists use to investigate evolutionary processes and history; and an overview of life's history, focusing on major evolutionary innovations and transitions.
Prerequisites: C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H.

283—General Genetics (3 cr.)
Loomis, ISB 241D; Moscarella, Morrill 2 350
This course covers classic Mendelian genetics and extensions to quantitative traits, emphasizing the application of mathematical and statistical approaches to problem solving; it also includes modern aspects of molecular genetics such as regulation of gene expression, epigenetics, and cancer genetics, as well as methods of genetic manipulation and other molecular genetic techniques.
Prerequisites: C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H

284 – General Genetics Lab
Loomis, ISB 241D
Various classical and molecular genetic techniques using prokaryotic and eukaryotic systems. Laboratory projects include genetic mapping via recombination and P element-mediated mutagenesis in Drosophila, plasmid-mediated transformation of bacteria, yeast 2-hybrid assays for protein/protein interactions, and detection of human DNA polymorphisms. Also, bioinformatics tools to perform DNA and protein sequence similarity searches and characterize the organization of specific genes.
**Prerequisites:** C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H; BIOL 283 (C or better)

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**285—Cell & Molecular Biology (3 cr.)**
Francis, Morrill2 348A; Rounds, Morrill2 354
Course designed for sophomores in Biology, Biochemistry, or Microbiology. Building upon concepts learned in Biology 100/101, consideration is given to structure and function. The course is equally divided between aspects of molecular and cellular biology.  
**Prerequisites:** C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H.

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**287—Introductory Ecology (3 cr.)**
Seidler, Morrill1N 239B
An introduction to basic concepts and societal applications in the science of the relationships between living organisms and their physical and biological environments. Topics include the resources and conditions needed for life, how populations grow or shrink over time, interactions between species, the state and future of biodiversity, and the functions of ecological systems.  
**Prerequisites:** C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H.

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**288—Introductory Physiology (3 cr.)**
Gerson, Morrill3 318A
The physiology of humans and other vertebrates on a system-by-system basis (e.g., circulatory, respiratory, digestive, etc.). Emphasis on understanding fundamental physiological concepts. Concentrates primarily on human physiology, but examples from other vertebrate animals used to illustrate some physiological phenomena.  
**Prerequisites:** C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H.

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**Biology 312—Writing in Biology (3 cr.)**

Section 1 Spracklen, Morrill2 348B  
Section 2 Normark, Fernald 104/204B  
Section 3 Spracklen, Morrill2 348B  
Section 4 Okusu, Morrill2 140  
Section 5 Spracklen, Morrill2 348B  
Section 6 TBA, Morrill2 350  
Section 7 Brewer, Morrill3 311A

Satisfies Junior Year Writing requirement for Biology majors. Students write and revise short papers on subjects likely to be encountered by biologists. Class discussion of papers. **Prerequisites:** 3 biological science courses, for declared Biology majors only.

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**379H—Genomics and Bioinformatics (3 cr.)**
Babbitt, Morrill4S 362
A practical, hands-on approach to subjects within computational molecular biology. Recently, there have been huge advances in our ability to understand the genome and how different genomes interact in an environment using next-generation sequencing. Analyzing these revolutionary new datasets will be essential for molecular biology in the future. Foundational topics will include analysis of whole transcriptome, whole genome, and microbiome sequencing. No coding experience required.  
**Prerequisites:** Open to Honors Students ONLY, C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H; BIOL 285 OR BIOCHEM 275 OR BIOL 283 (C or better).

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**383H—Gene and Genome Analysis (4 cr.)**
In this class we will consider the methods and ideas of modern molecular genetics with a particular emphasis on the use of ‘bioinformatics’ tools. Topics such as methods for gene identification using molecular and genetic techniques, DNA sequencing and sequence analysis, similarity searching, microarrays, PCR, and database tools will be covered in the context of a semester-long project-based laboratory course. In this course, teams of two-four students will investigate an ‘orphan’ gene of unknown function. The unknowns in this class are real – the student teams that investigate them will be the first ever to do so. Using a combination of bioinformatics and laboratory techniques including mutant analysis, teams will endeavor to identify the biological function of their gene. This course is intended for Sophomores and Juniors. Admission to the course is by application, and preference for admission is given to students in their sophomore and junior years of college. This course fulfills the Biology major requirement for a plant course AND fulfills one laboratory course requirement.

**Prerequisites:** Instructor Consent Required; C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H; BIOL 285 OR BIOCHEM 275 (C or better)

### 397E—Intro Neurobiology (3 cr.)
Fenelon, LSL N233; Jensen, Morrill3 414A
This course functions as an introductory survey to neurobiology with a focus on cellular neuroscience. It provides a knowledge base for future advanced neuroscience courses. Topics within neuronal anatomy and physiology will be covered, including membrane potentials and neural transmission, sensory and motor systems, neuromodulatory and homeostatic systems.

### 397MH—Cellular & Molecular Biology Lab (3 cr.)
Laney, Morrill2 432
Cellular and Molecular Biology Lab is a hands-on project-based course where students explore aspects of cell biology, particularly how proteins within cells are targeted to their correct intracellular location. The class will focus on targeting proteins to intracellular organelles. To approach this cell biological question, students will be using a host of current tools in the life sciences including, bioinformatics, DNA cloning, cell transformation, and microscopy. This course is application based; you can find the application on the Biology Website.

**Prerequisites:** Instructor Consent Required. C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H; BIOL 285 or 283 AND CHEM 261 (C or better)

### 397N—Neurobiology and Physiology Lab (2 cr.)
Karlstrom, Morrill2 337E
This project-based laboratory course will expose students to a range of techniques that are used by neurobiologists and physiologists, including electrophysiology, imaging, and molecular biology. Research projects and exercises will focus on the mechanisms that facilitate the development and physiological activities of the nervous and endocrine systems using model animal systems like zebrafish. We will also study human sensory physiology through non-invasive participatory lab exercises. Students may also have the opportunity to pursue projects examining tissue- and cell-physiology in non-neural tissues.

**Prerequisite:** BIOL 288 with a grade of “C” or better.

### 401—Great Papers in Biology (3 cr.)
Schwartz, Morrill3 417; Pallas, Morrill2 418B
Most courses present the prevailing wisdom of the field as artistically rendered figures that summarize a large body of information and present it as dogma. However, that’s not how the field actually advances. Breakthroughs occur when researchers publish original research papers in peer-reviewed journals. Sometime the importance of the work is obvious at the time of publication and sometimes it takes many years for the true significance of the work to be appreciated. The Great Papers in Biology
course is designed to allow students to read seminal papers in biology with the goals of: 1) understanding, in detail, how the experiments were conducted; 2) how the results were interpreted; and 3) how the work changed scientists' understanding of biology. Papers to be discussed will represent a wide range of fields within Biology, including: developmental biology, genetics/genomics, neuroscience, cell biology, and the mechanisms of disease.

**Prerequisites:** Open to Junior and Senior Biology Majors Only

**424—Marine Biology (4 cr.)**
Okusu, Morrill 2 140
This course introduces life in the sea from ecological and evolutionary perspectives. Specific topics will include primary and secondary production, interrelations of marine organisms and their environment (e.g. rocky intertidal, estuaries, interstitial communities, coral reefs, deep-sea communities), adaptations of marine organisms, human impacts on marine life, biodiversity, conservation, and aquaculture. Students will also learn about recent advances in marine research by reading primary literature on specific topics including metazoan body-plan evolution, development, paleontology and phylogeny. Grades C or better in Biology 151, 152, 153, and either Biology 280 or 287.

**475—Plant Cell Biology (3 cr.)**
Facette, Morrill4S 375D
This course will cover the cell biological aspects of several plant cellular processes, including cytokinesis, cell expansion, tip growth, cell-to-cell communication, and intracellular protein sorting. An emphasis will be made on experimental approaches used to understand these processes at the molecular level. A discussion of model organisms and cell types will be included. Formats will include lectures, discussions, and in-class student presentations.

**Prerequisites:** C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H; BIOL 283 OR 285 OR BIOCHEM 275 (C or better)

**484—Cancer Genetics (3 cr.)**
Phillis, Morrill3 404A
Cancer Genetics is a team-based learning course that requires students to create proposals for novel treatments for specific kinds of cancer. Students analyze the research literature to identify unaddressed opportunities for treatment based on specific criteria pertaining to the genetic defects causing disease. They then must design a novel treatment using accepted genetic methods and drug delivery systems currently used in research and clinically.

**494LI—Life After Biology (1 cr.)**
Pallas, Morrill2 418B
This 1-credit course fulfills one component of the General Education Integrative Experience requirement for Biology majors. The course is designed to help students appreciate what their academic training has been, and where it is leading them professionally. Students will learn about career options for life scientists and develop strategies and skills to position themselves to be successful. In order to satisfy the Integrative Experience requirement, BA-Biol and BS-Biol majors must also take one of the approved 3- or 4-credit Biology courses listed on their Academic Requirements Report.

**497G—Human Genome Analysis (3 cr.)**
Blanchard, Morrill 3 409A
Human Genome Analysis covers current topics in genetics and the social, ethical and legal issues surrounding genetic sequencing technology. Topics include genome structure and evolution, genetics of disease, personal genomics, human microbiomes and epidemiology. Students will have the opportunity to submit their DNA for genome-wide SNP and gut microbiome determination. Practical
skills for analyzing genetic and genomic data are taught through weekly bioinformatic sessions in the R statistical programming language.

510—Plant Physiology (4 cr.)
Baskin, Morrill4S 375F
Lecture, with discussion section. This course introduces concepts in physiology of plants, including transport of water and nutrients, photosynthesis, structure and function of cell walls, and growth. These topics are essential for plant life and have few if any direct analogs in animals. The course culminates in group presentations, where students present their answer to an important question relevant to the physiology of plants. Although not formal Prerequisites, students who have taken neither genetics nor cell biology generally have difficulty.
Prerequisites: C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H

514—Population Genetics (3 cr.)
Caicedo, LSL N425
This course focuses on the processes affecting the distribution of genetic variation in populations of organisms, through space and time. The processes studied are the ones that operate during evolutionary change. Topics covered will include the Hardy-Weinberg principle, gene flow, genetic drift, recombination and linkage disequilibrium, natural selection, the effect of mating systems on diversity, and the neutral theory of evolution. Examples illustrating key concepts will be drawn from various kingdoms of life. The course will consist of lectures and occasional in class discussion.
Prerequisites: BIOL 280 OR 283; MATH 127 OR 128 OR STATS 240 OR RES-ECON 212.

544—Ornithology (4 cr.)
Byers, Morrill3 216A
Lecture: speciation, diversity, flight, territory, migration, etc. Lab: bird identification, anatomy, field studies. Text and field guide required. Lab practicals, 2 lecture exams plus final.
Prerequisite: upper level biology course or consent of instructor.

548—Mammalogy (4 cr.)
Moscarella, Morrill2 350
Lecture, lab. Lectures and readings on comparative biology, phylogenetic relationships and evolution of mammalian groups. Lab involves a detailed introduction to the New England mammals and study of selected representatives of most mammalian orders, emphasizing systematics, function and morphology. 2-hour exams, 2 lab exams, written assignment, and final.
Prerequisites: any life science course beyond the introductory level; BIOL 280 & 287 highly recommended.

550—Animal Behavior (4 cr.)
Houlihan, Morrill2 352
Our first goal in this course will be to examine the mechanisms that underlie the expression of behavior. For example, how do predators locate prey, how do animals avoid becoming prey, and how do animals navigate through their worlds? To help answer these questions we will apply neurobiological, hormonal, genetic, and developmental perspectives. Our next goal in the course will be to examine the evolutionary bases of behavior, asking for example why animals move, forage, hide, communicate, and socialize as they do. To address these questions we make use of optimality theory and other behavioral ecological perspectives. Other topics in the course will include sexual selection, human behavior, and the role of behavior in establishing biodiversity. When taken with Biology 494LI, this course satisfies the Integrative Experience requirement for BA-Biol and BS-Biol students.
Prerequisites: An Introductory Level Biology or Psychology Course
559—Cell Biology II (3 cr.)
Fritz-Laylin, Morrill 2330
Discussion of cell structure and function; emphasis will be placed on the properties of individual molecules that contribute to cell function. Topics will include the mechanism and regulation of cell division; interactions of cells with each other and with the extracellular environment; cell motility; and the organization of membrane systems. Techniques used to study cells will also be discussed. Format will include both lectures and class presentations; quizzes, mid-term exams and written assignments will be included.
Prerequisites: BIOL 285 OR BIOCHEM 275 (C or better)

564—Human Physiology (3 cr.)
Padilla, LSL N227
Mechanisms underlying organ system function in vertebrates; nervous, endocrine, cardiovascular, respiratory, muscular, digestive, excretory, reproductive systems.
Prerequisites: BIOL 285 OR BIOCHEM 275/285 (C or better)

566—Comparative Physiology (3 cr.)
Irschick, Morrill 205C
Lectures cover the physiology of animals on a system by system basis (e.g. circulatory system, digestive system, etc.) with an emphasis on the vertebrates. Comparisons between animals within each system and adaptations to "extreme" environments are emphasized. Weekly problem sets provide practice in physiological reasoning for each system covered.
Prerequisites: C or better in BIOL 151 or 161H AND a C or better in BIOL 152 or 162H

572—Neurobiology (3 cr.)
Vazey, Morrill 4S 368A
This course explores the biology of nerve cells and cellular interaction in nervous systems. Lectures integrate structural, functional, molecular, and cellular approaches. Topics include membrane potentials and neuronal signaling, nervous system structure, sensory systems, control of movement, motivated behaviors, emotion, mental illness, and memory. Format includes lectures and in-class discussions. 4 exams, 2 papers, and participation in an online forum. Prerequisites: Biology 285 or Biochemistry 275, or both Psychology 330 and Biology 151.
Prerequisites: BIOL 285 OR BIOCHEM 275 (C or better) OR (both) PSYCH 330 AND BIOL 151

580—Developmental Biology (3 cr.)
Bartlett, Morrill 4S 374B
Biology of nerve cells and cellular interactions in nervous systems. Lectures integrate structural, functional, developmental, and molecular approaches. Topics include neuronal anatomy and physiology, membrane potentials, synapses, development of neuronal connections, visual system, control of movement, and neural plasticity. Text and reserve readings, 2 hour-exams, final, short critique paper.
Prerequisites: BIOL 285 OR BIOCHEM 275 (C or better)

597CD—Cell Biology of Disease
Wadsworth, Morrill 4S 456
In this new course, we will investigate the changes at the level of individual cells that lead to disease. To do this we will study basic cellular processes and how alterations in the normal process can result in disease. Students will work (in teams) to learn about a particular disease, starting with the cellular processes that are impacted, to possible treatments. Students will be expected to discuss and present their work to the class. The class requires successful completion of a course in Cell
Biology (biology 285 or equivalent); a course in Genetics (biology 283 or 283 laboratory) is also recommended.

597NE—Neural Basis of Animal Behavior
Katz, Morrill3 106C
Neuroethology is the study of the neural basis of natural behavior. This lecture course will cover topics that include the neural mechanisms underlying predatory behavior and prey escape responses, specialized senses such as magnetoreception and electroreception, echolocation, animal communication, and animal navigation.
**Prerequisites:** Biology 285 and 288, both with a grade of C or better.
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Click on Faculty

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