Advanced Population Ecology (Bio 51): Fall 2010
Course description and grading policy

Instructor: Matthew P. Ayres (202 Gilman, 6-2788).
Office hours: Mon 4:00-5:00, Thurs 3:00-4:00, and by appointment

Meeting times: Lecture: Tuesday and Thursday 10:00-11:50 (10A), 101 Gilman
Laboratory: Wednesday 4:30-6:00; Remsen 214
Discussions of literature and term projects (to be arranged)

Readings: The textbook is Gotelli (2008), A Primer of Ecology, 4th edition. For further
background, see sections on population ecology in your textbook from Bio 16. There will be additional readings from the primary literature (usually accessible
at: http://www.dartmouth.edu/~bio21

Course overview:
This course explores theory and data regarding properties of biological populations. Topics of
lectures and analytical exercises include: descriptions of abundance, dispersion, and
demographic schedules; applying life tables and matrix models to understand population growth
and age structure; life history theory; influence of endogenous feedbacks and exogenous forces
on population dynamics; spatial patterns and processes; and contributions of population
ecology to applied issues in conservation, pest management, human demography, and the
management of harvested populations. Examples will be drawn from a diversity of taxa and
ecological systems. Throughout, this course will emphasize the development of verbal,
graphical, and mathematical models to describe populations, derive predictions about their
behavior, test hypotheses, and advance theory. Studies will include critical review of papers
from the primary literature and culminate in a project that applies the analytical tools of
population ecology to address an independently conceived research question.

Prerequisites:
Biology 15 or 16 and one upper level ecology course.

Grading policy:
Grading will be based on one midterm examination (25%), a comprehensive final exam (25%),
exercises (20%), a term project (20%), and contributions to discussion (10%). Late exercises
will be penalized 10% per day to a maximum of 50%. Late exams will not be given except
under extraordinary circumstances that are discussed with me by phone or in person prior to
the exam.

Students with Disabilities:
I encourage students with disabilities, including "invisible" disabilities like chronic diseases,
learning disabilities, and psychiatric disabilities to discuss what appropriate accommodations
might be helpful to them. Any student with a documented disability needing academic
adjustments or accommodations is requested to speak to me by the end of the second week of
the term, all discussions will remain confidential, although the Student Disabilities Coordinator
may be consulted to verify the documentation of the disability.

As with every course at Dartmouth College The Honor Principle applies to all work you
perform in this class.

Some students may wish to take part in religious observances that occur during this academic
term. If you have a religious observance that conflicts with your participation in the course,
please meet with me before the end of the second week of the term to discuss appropriate
accommodations.
**Bio 51 : Schedule for fall 2010**

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture topic</th>
<th>Textbook Readings¹</th>
<th>Exercise²</th>
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<tbody>
<tr>
<td>1. 23 Sept</td>
<td>History of population ecology</td>
<td></td>
<td>Treehole mosquitoes</td>
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<tr>
<td>2. 28 Sept</td>
<td>The nature of ecological models</td>
<td>Gotelli Ch 1</td>
<td>Population sampling</td>
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<td>3. 30 Sept</td>
<td>The description of populations</td>
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<td>Squirrel life table</td>
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<td>4. 5 Oct</td>
<td>Defining populations and individuals</td>
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<td>Squirrel demographics, cont.</td>
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<td>5. 7 Oct</td>
<td>Abundance</td>
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<td>6. 12 Oct</td>
<td>Dispersion</td>
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<td>7. 14 Oct</td>
<td>Mortality patterns</td>
<td>Gotelli Ch 2</td>
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<td>8. 19 Oct</td>
<td>Age- and stage-classified matrix model</td>
<td>Gotelli Ch 3 &amp; Appendix;</td>
<td>Rubus stage based model</td>
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<td>9. 21 Oct</td>
<td>Projections and sensitivity analyses</td>
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<td>10. 26 Oct</td>
<td>Recruitment patterns</td>
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<tr>
<td>28 Oct</td>
<td><strong>MIDTERM EXAM</strong></td>
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<td>11. 2 Nov</td>
<td>Life history theory</td>
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<td>Demographic model for chosen organism</td>
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<td>12. 4 Nov</td>
<td>The determination of abundance</td>
<td>Gotelli Ch 2;</td>
<td>Endogenous dynamics</td>
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<td>13. 9 Nov</td>
<td>Density-dependence &amp; population regulation</td>
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<td>Population regulation</td>
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<td>14. 11 Nov</td>
<td>Endogenous properties and exogenous forces</td>
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<td>15. 16 Nov</td>
<td>Pestilence</td>
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<td>16. 18 Nov</td>
<td>Spatial patterns and processes</td>
<td>Gotelli Ch 4 &amp; 7;</td>
<td>Student-initiated modeling project³</td>
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<td>17. 23 Nov</td>
<td>Harvested populations</td>
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<tr>
<td>18. 30 Nov</td>
<td>Conservation biology and human demography</td>
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**FINAL EXAM: To be announced**

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¹ Additional readings from the primary literature will be identified as the term progresses. These will be listed at [http://www.dartmouth.edu/~bio21](http://www.dartmouth.edu/~bio21).

For additional background see sections on population ecology from your textbook for Biol 16.

² Usually, exercises will be started each week during “lab”(on Wed) and due in class the following Tuesday. See “Analytical exercises” at course website for problem descriptions, worksheets, analytical templates, and supplementary materials.

³ Apply the theoretical and analytical tools of population ecology (defined broadly) to answer an interesting ecological question that you identify. The best projects tend to be those that are creative, interesting, and relatively easy. Plan to invest more time in thinking about the problem than in writing code, manipulating equations, or studying literature. Aim for projects that are relevant to your interests and that could grow beyond this course. More details under “Analytical exercises” at course website.