

BIOLOGY 112: Organisms, Evolution, and Ecosystems COURSE SYLLABUS, FALL 2008

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web: <http://www.bio.davidson.edu/courses/bio112/112cp/bio112.html>
Office hours: Monday 11:30-12:30; Tuesday 10:00-11:00; Friday 10:00-12:00, or by appt.

Class meets on Tuesday and Thursday, 8:30-9:45, Chambers 1003

Laboratory meets on Tuesday (a) and Thursday (b) 1:00-3:45, Watson 119

Prerequisite: Biology 111

DESCRIPTION:

This course is intended to be an introduction to biological facts, concepts, and principles at and above the level of the organism. It is the second half of a year long introduction to biology, Biology 111 being the first half. Please inform me if you've not taken Bio 111. Topics in this course include evolution, ecology, and physiology, and they will be explored at the organismal, population, community, and ecosystem levels.

Biologists are motivated by a search for answers to several fundamental questions – some that we will delve into are: why are there so many species? What is the evolutionary history of life? How do organisms work? What do species do in ecosystems?

IMPORTANT: I use e-mail as a regular form of communication – check your e-mail regularly!

REQUIRED READINGS:

Sadava D, Heller HC, Orians GH, Purves WK, Hillis DM (2008) Life: The Science of Biology, 8th edition. Sinauer Associates & W.H. Freeman and Co., Sunderland, MA

Pechenik JA (2007) A Short Guide to Writing About Biology, 6th edition. Longman, New York.

Paradise CJ (ed; 2007). Organisms, Evolution, and Ecosystems Laboratory and Field Manual. Obtain online at <http://www.bio.davidson.edu/courses/bio112/112cp/bio112labpage.html>.

Articles assigned periodically and put on reserve in the library or online (see list below).

OBJECTIVES:

- To develop an appreciation for the biological sciences at and beyond the organismal level.
- To become familiar with current issues in organismal biology, diversity, ecology, & physiology.
- To provide hands-on experience in developing questions in organismal biology, developing investigations to answer those questions, and presenting those results to others.
- To develop the ability to think critically about problems in organismal biology and write about them in an effective manner.
- To develop and use skills such as quantitative analysis, use of computers, experimental design, dissection, and data analysis and presentation that transcend course content.

GRADING:

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| • Reviews (3, each closed book, take-home assignments) | 45% |
| • Short Essays (2, 10% each) | 20% |
| • Laboratory (short report, full report and presentations) | 30% |
| • Participation and Attendance | 5% |

Grading Scale:

A:	93.0-100%	A-:	90.0-92.9%
B+:	87-89.9%	B-:	80.0-82.9%
C+:	77-79.9%	C-:	70.0-72.9%
D+:	66-69.9%	D:	60.0-65.9%
		F:	< 60%

REVIEWS:

The reviews will cover material from the lectures, readings, and textbook. All reviews will be take-home, closed book/closed notes, PLEDGED assignments. See the syllabus for the date on which I will pass out the Reviews and plan your schedule accordingly. The third review will be passed out in the last week of class, and will be due prior to the end of finals. These assignments will not be accepted late unless extreme circumstances prevent turning in the review on time and I have been notified before the due date. Unacceptable reasons include, but are not limited to, athletics, other reviews or papers due, and weekend getaways.

The reviews will cover material presented in lecture from the beginning of the course or since the previous review and through the lecture period when the review is handed out. The final review will be weighted in favor of material presented after the second review. To be successful in this course you must be able to evaluate material critically and apply problems and concepts. Scores will be available in class one week (or less) after each exam.

EVOLUTIONARY ESSAYS:

During the course of the semester you will be asked to write two short essays on evolutionary topics. These essays should be no more than 2 pages, single-spaced (excluding any graphics and references). To research each essay, begin with the textbook, lecture material, discussions with me, and review articles to get you started. More instruction will be provided for each individual essay.

CLASS PARTICIPATION AND ATTENDANCE:

Active participation cannot occur when you are not in class. I expect you to be present, on time, and prepared each class period. However, unavoidable absences may occur, and in such cases, will require a legitimate excuse. The first absence for which there is no valid excuse will result in a 10% deduction from your Attendance point total. Each subsequent unexcused absence will result in a further 20% deduction. In addition, to receive a passing grade in this class, you cannot be absent for more than four lecture classes without a legitimate reason. If you are going to be absent for a legitimate reason (including illness or death in family), you should contact me.

We will discuss the fundamental questions in class - I will lead these discussions, and to prepare for these discussions I expect you to keep up with the readings and, at the very least, be ready to provide your thoughts on the question. Volunteers to answer these questions are appreciated, but I will also rely on a random selection system so that everyone has a chance to participate. Be prepared!

TENTATIVE LECTURE SCHEDULE: The schedule may change as the class progresses, but I'll keep you informed of changes. You should stay at least one class period ahead in your readings.

DATES	QUESTION	TEXT READING / NOTES
8/26 & 28	Introduction to course; what is the extent of biodiversity on Earth?	Chapter 1; Quammen (2004)
9/2 & 4	How do organisms evolve? How do biotic interactions shape evolution? Are humans evolving?	Chapter 22; Pechenik, Chs. 1, 2, 3, 5, 6, and 8; Short Essay on Evolution assigned
9/9 & 11	How do new species form? What's a species, anyway?	Chapter 23
9/16 & 18	What is the evolutionary history of life?	Chapters 21 & 25 O'Brien & Johnson (2007)
9/23 & 25	What is the origin of eukaryotic organisms? What is the history of the animal kingdom?	Chs. 27 (skip 27.4 & 27.5), 31, 32 (pp. 691, 693-top of 694, 698-702, 705-714) & 33 (skip 33.2); Short Essay 1 DUE 9/25
9/25	REVIEW 1 handed out	DUE by Tuesday (9/30)
9/30 & 10/2	How do animals work (function)?	Chapter 40

DATES	QUESTION	TEXT READING / NOTES
	How do animals maintain homeostasis?	
10/7 & 9	How is homeostasis maintained in the context of the environment? Does homeostasis have an evolutionary basis?	Chapter 53 (read only 53.3 & 53.6) Nesse & Williams (1998)
10/14	FALL BREAK	NO CLASS
10/16	How do animals use insulin to maintain homeostasis?	Duncan (2005)
10/21 & 23	How do animals maintain homeostasis?	Chapters 48 & 49
10/28 & 30	How do animals maintain homeostasis?	Chapters 50 & 51
10/30	REVIEW 2 handed out	DUE by Tuesday (11/4)
11/4 & 6	How do animals maintain their populations? How are population sizes regulated?	Chapters 42 (skip 901-left side of 903), 52.1, & 54
11/11 & 13	What is an ecosystem? Is global climate changing?	Chs. 52 (52.2 & 52.4), 55 (55.1 & 55.4), 56; Grossman (2004); Short Essay on Global Climate Change assigned (review Pechenik Chs. 1-3, 5, 6, & 8)
11/18 & 20	What role do plants play in ecosystems? What do species do in communities?	Chapters 29.1, 29.4, 29.5, 36, 39.3 & 39.4; Chapter 20 of ISB
11/25	What determines the outcome of competition? How does energy flow and nutrients cycle in ecosystems?	Chapter 20 of ISB Vitousek et al. (1997)
11/27	Thanksgiving Break	NO CLASS
12/2 & 4	Does biodiversity affect ecosystem function? How does exploitation of natural resources affect biodiversity and ecosystem function?	Chapters 55, 56.4 Pauly et al. (2000) Short Essay on Global Climate Change DUE 12/4
12/9	How can we, and why should we, conserve biodiversity?	Chapter 57 Pimm & Jenkins (2004)
12/9	REVIEW 3	Hand out on 12/9, due by 5 p.m. on 12/16.

Readings – On reserve at the library or may be available at internet links:

Duncan DE (2005) The covert plague: have you got it? Discover, Dec 2005, 26(12):60-67.

<http://www.discover.com/issues/dec-05/features/diabetes-insulin-resistance/>

Grossman D (2004) Spring forward. Scientific American, Jan 2004:84-91.

<http://www.bio.davidson.edu/courses/bio112/112cp/articles/springforward.pdf>

Nesse R & Williams GC (1998) Evolution and the origins of disease. Scientific American, Nov 1998, 269:86-93.

<http://www.bio.davidson.edu/courses/bio112/112cp/articles/evoldiseaseorigin.pdf>

O'Brien SJ & Johnson WE (2007) The evolution of cats. Scientific American, Jul 2007, 297:68-75.

http://www.bio.davidson.edu/courses/bio112/112cp/articles/cat_evolution.pdf

Pauly D, Christensen V, Froese R, & Palomares ML (2000) Fishing down aquatic food webs. American Scientist, 88:46-51.

<http://www.bio.davidson.edu/courses/bio112/112cp/articles/marinefoodwebs.pdf>

Pimm SL & Jenkins C (2005) Sustaining the variety of life. Scientific American, Sep 2005:66-73.

<http://www.bio.davidson.edu/courses/bio112/112cp/articles/sustainingvariety.pdf>

Quammen D (2004) Was Darwin wrong? No. National Geographic, 206(5):2-35. Text ONLY:

<http://magma.nationalgeographic.com/ngm/0411/feature1/fulltext.html>

Vitousek PM, Aber J, Howarth RW, Likens GE, Matson PA, Schindler DW, Schlesinger WH, & Tilman GD (1997) Human alteration of the global nitrogen cycle: causes and consequences. Issues in Ecology 1. Published by the Ecological society of America.

BIOLOGY 112: LABORATORY SYLLABUS, SPRING 2008

GRADING: Thirty percent (30%) of your course grade is based on your performance in the laboratory. That 30% is broken down into the following categories:

- Laboratory Report Results 15%
- Full Laboratory Report 40%
- Presentations 45%

LABORATORY REPORTS:

You will write one full report on Population Genetics. Prior to that, you will write a results to gain expertise in presenting results. Please note the following:

- Drafts – Produce multiple drafts as you go. Follow the guidelines and instructions in the Laboratory Manual Appendices. Be sure that your format follows the example in the Manual. Also consult the Pechenik chapters referenced below.
- General formatting (again, see Manual for all instructions): 12 pt. font, with single-line spacing and 2.5 cm margins all around, a minimum of two references.

Presentations: Each team will present three 10-12 minute presentations on various exercises throughout the semester. This will be a group effort (group size = 2-3), and everyone in a group will receive the same grade for the group.

LABORATORY SCHEDULE

Date	Activity	Notes
8/26 & 28	Lab Safety; Hardy-Weinberg Population Exercise; Graphing Results	<ul style="list-style-type: none"> • Ex. 1 & 2 (1st half); Safety Agreements • Introduction to Excel
9/2 & 4	Evolutionary Mechanisms –simulations Planning for Pop. Gen. Lab	<ul style="list-style-type: none"> • Ex. 2; Pechenik, Chs. 4 & 9 • Read beginning of Ex. 3 in lab
9/9 & 11	Population Genetics of the Lap locus	<ul style="list-style-type: none"> • Exercise 3 • Results section due
9/16 & 18	Population Genetics of the Lap locus – data analysis and construction of lab report	<ul style="list-style-type: none"> • Exercise 3 • Pechenik, Chs. 2, 4, 5, 6, 9
9/23 & 25	Phylogenetic Analysis Goldfish Respiration – plan experiment	<ul style="list-style-type: none"> • Exercise 4 • Read beginning of Ex. 5 in lab
9/30 & 10/2	Goldfish Respiration – data collection and analysis, preparation of presentation	<ul style="list-style-type: none"> • Exercise 5 • Pechenik, Chs. 2, 4, 14
10/7 & 9	Goldfish Respiration presentations	<ul style="list-style-type: none"> • Peer review of Lap lab report
10/14	NO LAB THIS WEEK	<ul style="list-style-type: none"> • Fall Break
10/21 & 23	Plant Defenses – introduction/campus walk	<ul style="list-style-type: none"> • Dress for outdoors • Laboratory report due
10/28 & 30	Plant Defenses bioassay	<ul style="list-style-type: none"> • Exercise 6
11/4 & 6	Plant Defenses – data analysis and preparation of results and group presentation	<ul style="list-style-type: none"> • Exercise 6 • Pechenik, Chs. 2, 4, 14
11/11 & 13	Fetal Pig Anatomy	<ul style="list-style-type: none"> • Exercise 7 (1st half)
11/18 & 20	Fetal Pig Anatomy	<ul style="list-style-type: none"> • Exercise 7 (2nd half) • Pechenik, Chs. 2, 4, 14
11/25	NO LAB THIS WEEK	<ul style="list-style-type: none"> • Thanksgiving Break
12/2 & 4	Fetal Pig and Human Physiology – Systems Analysis presentations	<ul style="list-style-type: none"> • Discussion and presentations of comparative physiology