

## Biological Sciences 2B

Winter 2017

Rosenheim

### INTRODUCTION:

Welcome to Biological Sciences 2B for Winter Quarter 2017. BIS 2B is the second course in the Biological Sciences lower division core sequence that is designed to provide a foundation for the study of modern biology for a broad range of majors. Whereas BIS 2A introduced you to the fundamental molecular, cellular, developmental, physiological, and genetic building blocks of living organisms, and the origins of life itself, BIS 2B picks up the story by examining ecological and evolutionary processes that shape biological diversity. BIS 2C will examine the resulting biological diversity in detail.

This course covers the processes by which organisms have evolved and diversified over the ca. 3.5 billion years of life on Earth (**evolution**) and the present-day processes by which those species interact with each other and the environment to create the distribution and abundance of life on earth (**ecology**). Evolution and ecology are fundamentally linked: evolutionary history shapes a species' ecology, and present-day ecology can influence future evolutionary trajectories. This is why we present them here together.

What is Evolution? Probably no one put it better than Doug Futuyma, in his textbook on evolution:

"Biological evolution ... is change in the properties of populations of organisms that transcend the lifetime of a single individual . . . . The changes in populations that are considered evolutionary are those that are inheritable via the genetic material from one generation to the next. Biological evolution may be slight or substantial; it embraces everything from slight changes in the proportion of different alleles within a population (such as those determining blood types) to the successive alterations that led from the earliest protoorganism to snails, bees, giraffes, and dandelions."

And, as one of the great evolutionary biologists, Theodosius Dobzhansky, famously said in a 1973 essay, "*Nothing in biology makes sense except in the light of evolution.*"

What is Ecology? Ecology is the study of the interactions of organisms with each other and with the non-living parts of the environment. Ecological phenomena play out hierarchically through a series of nested levels: among individual organisms in populations of the same species, in communities of different species, and on a larger scale biogeographically and biogeochemically in ecosystems made up of the living and the non-living environment. Organisms and their interactions create and change environments and affect evolution profoundly.

## STAFF:

Your instructor is Jay Rosenheim, Professor in the Department of Entomology and Nematology.

**Office hours:** My office hours, always held in the Biology Learning Center (the “BLC” – 1089 Sciences Laboratory Building), are Monday 2:10-3:30 and Thursday 12:10-1:00. I am also generally available to answer questions immediately following class. Please do come to office hours with your questions! I can answer questions more effectively when we can discuss things in person than when using e-mail. BIS 2B is a large enrollment course, but office hours give me a chance to work with a smaller number of students. We can work problems together on the board, spend some extra time going over particularly challenging aspects of the course content, and generally address anything that is creating difficulties or confusion. You are welcome to come with questions, or just to listen – totally up to you. This is my 26<sup>th</sup> year teaching at Davis, and I’ve never bitten anyone yet – so please do come to the BLC.

The **course coordinator** is Dr. Pat Randolph (office is 1015 SLB). You can reach him by email ([rprandolph@ucdavis.edu](mailto:rprandolph@ucdavis.edu)), telephone (530-752-1117), or visit his office hours in the BLC (these will be posted later).

Meghan Munn ([mmunn@ucdavis.edu](mailto:mmunn@ucdavis.edu)) will handle all **enrollment problems**. She will hold office hours in 1084 SLB from 10-12 Monday to Friday for the first two weeks of class; thereafter, she will be available by appointment. During the first week of the quarter, she will also be in the hall outside the labs (1080, 1088 and 1090 SLB) at the beginning of each lab Tuesday (9 AM, 1:10 PM, 5:10 PM); Weds (9 AM, 5:10 PM); Thursday (9:00 AM, 1:10 PM), so look for her there.

## CLASS MEETINGS AND LABORATORY

**Lectures** are in Peter A. Rock Hall, Mondays, Wednesdays, & Fridays, 1:10 – 2:00 PM  
**Discussions** are in 138 Activities & Recreation Center, Wednesdays 4:10-5:00

Although the lecture and discussion sessions are listed separately in the university’s course catalogue, I will treat them essentially the same way: all class meetings will mix ‘lecture’ material with ‘discussion’ material.

Note that there are many different sections of the laboratory, each on a different day and time. Please check your class schedule to find the day and time that your lab meets.

## THE BIOLOGICAL LEARNING CENTER (BLC)

The Biological Learning Center (BLC) is in Room 1089 SLB. Instructors and teaching assistants hold office hours here, and additional reference material is available. This

room is a student resource where individual help is available from your instructor and from displays and books. It is a good place to study, meet other students, and keep up with the class. Hours are posted on the course web-site.

## ENROLLMENT, ATTENDANCE, AND GRADES:

The course is currently full. If you want to be placed on the waitlist, you must contact Meghan Munn ([mmunn@ucdavis.edu](mailto:mmunn@ucdavis.edu)) (see above). **Please do not be late to the first meeting of the laboratory**; if you are late, you will lose your place in lab and in the course. If space is available, permission-to-add (PTA) numbers will be given out in lab. Switching labs is not possible. The examinations will occur in the Wednesday sessions, 4:10-5:00, whole class meeting times (labeled as "Discussion" in the catalogue); it is essential that you attend these meetings (they are just as 'required' as the sessions called "Lecture" in the catalogue).

Unfortunately, the size of this class makes it impossible to set up alternative lab periods. If you miss your lab for any reason, you will not be able to make it up in any fashion. If you miss one laboratory written assignment, it will become the "dropped score" from your lab grade (see below and the lab manual for more details). More than one missed written assignment will result in no credit and a zero score for that assignment. **You must take the practical examination in the section in which you are enrolled.**

Your grade in Biological Sciences 2B is based upon your grades on two cumulative lecture midterms (100 points each), one comprehensive final lecture exam (150 points), and performance in the laboratory (150 points).

LECTURE EXAMS (100, 100, 150pts)	70%	350 pts
LAB	30%	150 pts
<b>TOTAL</b>	<b>100%</b>	<b>500 pts</b>
<b>Lab Points Breakdown:</b>		
8 Labs @ 15 pts		120 pts
Dropped lowest score		-15 pts
Lab practical		45 pts
Total		150 pts

Lecture exams will consist of multiple choice and fill-in questions. They are based upon the material covered in the whole-class meetings, the study questions, and readings (from the text and other sources) that are assigned for the whole-class meetings. Copies of exams from past years are also available on the course web-site, and I encourage you to use them as another set of useful study questions. I have also tried to write most of the study questions in the same format as the exam questions. Working the study questions will give you a feel for both the format of the exam and the sorts of things that I think are most important for you to learn.

Please bring a pen, pencil, eraser, and photo identification to each examination. I also recommend that you bring a calculator to the exam, BUT PLEASE ONLY A CALCULATOR THAT DOES BASIC ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION. So, please no graphing calculators.

We will entertain requests for re-grading of whole-class exams. Requests for re-grading require you to submit with your graded exam a description in writing of the problem or question. You must not alter the original examination in any way before you submit it for a re-grade. Attach your explanation of the re-grade request to the front of your exam and give it to the TA on duty in the BLC within a week of the date the exam was returned to you. We will process no requests for re-grading beyond this time. Replies to re-grade requests will be available in the BLC (ask the TA) when they are completed.

Grades: cut-offs for grades (points received out of a total possible of 500) will be as indicated below. If I write exams that turn out to be harder than I expect (it does happen sometimes . . .) then I will lower the cut-offs. I will never raise the cut-offs above what is described here:

<b>A-</b> : $\geq 90\%$	( $\geq 450$ pts.)
<b>B-</b> : $\geq 80\%$	( $\geq 400$ pts.)
<b>C-</b> : $\geq 70\%$	( $\geq 350$ pts.)
<b>D</b> : $\geq 60\%$	( $\geq 300$ pts.)
<b>F</b> : $< 60\%$	

I encourage you to help one another learn the material, to study together, and to work together in the laboratory portions of the course.

## LABORATORY

The laboratories for this class were designed to complement topics presented in whole-class meetings. Details of the lab are provided in the lab manual (see required texts, below). Labs are worth 15 points each: 5 points for the pre-lab and 10 points for the post-lab exercise. **Pre-Labs must be completed and turned in electronically by 9AM on Monday of the lab week.** Your first lecture is 1:10-2:00 on Monday, January 9. The first labs begin on January 10 for enrollment purposes but the first pre-lab is due the following week, Monday January 16 by 9am. This will be explained further in your first lab the week of January 9. **Attendance at the first lab is mandatory. If you do not turn in the pre-lab, you will not be allowed to attend lab and will forfeit all points for the week.** You are encouraged to discuss the pre-lab in a study group, but written answers should be entirely your own.

Pre-lab submission will be done electronically via the course web-site. Log on to the BIS 2B page on the course web-site and then click on the link for the pre-lab. Instructions regarding this will be emailed to all enrolled students before the beginning of the Winter Quarter.

BIS 2B has a Course Material Fee. Students who are unable to afford the fee may seek a waiver from the office of Evolution and Ecology (EVE). You may pick up a waiver form from the receptionist in Rm 2320 Storer Hall. Complete and return the waiver to the EVE Office before the 20<sup>th</sup> day of instruction. Only in extreme cases of financial hardship unaddressed through financial aid can the fee be waived. Further instructions are listed on the waiver form.

## **MAKE-UP EXAMINATIONS:**

Only for midterm examinations (and not for the final whole-class exam or the final lab practical) is there opportunity for makeup examinations. Make-up examinations for midterms are given at the discretion of the instructor, and only under exceptional circumstances that prevented you from taking the original exam. You should notify me as soon as is practical after you are aware that you will miss the exam. I will schedule the makeup as soon as possible after the original examination date.

## **TEXTBOOKS AND READING:**

**Lab Manual:** You **must** buy the Intro. to Biology Laboratory Manual for Biological Sciences 2B—a used copy is not acceptable because there are tear-out exercises in the lab manual.

**Textbook:** Life: the science of biology, 10<sup>th</sup> edition, by Sadava, Hillis, Heller, and Berenbaum. Required readings are listed on the class syllabus (see below). You should read this material before lecture so that the terms and concepts will be familiar to you as you listen to the lecture. Some material in the course is not covered in detail in the text. In some cases, supplementary reading will be assigned (see below). Podcasts of each lecture will be posted on the course web-site, in case you miss a lecture or wish to listen a second time. You can purchase EITHER the printed text (which also automatically and at no extra charge also gives you access to the e-book and the supplemental resources available through the BioPortal), OR you may opt to simply purchase access to the eBook + BioPortal. The e-book provides additional electronic study materials, but these are not required (I have not found them to be particularly useful, but some students may find otherwise). I think a used textbook, 9<sup>th</sup> edition, without access to the on-line materials, will work fine for the class; the reading assignments are exactly the same, except that for the first day of class (Jan 9), if you have the 9<sup>th</sup> edition, read section 16.3 instead of 16.1.

Instructions for the online portion of the course:

The online portion of our course is open for student registration.

To register for the course go to:

<http://www.macmillanhighered.com/launchpad/life10e/4890049>

PLEASE bookmark the page to make it easy to return to.

You have three options to enroll in the course: you can purchase direct access, you can buy an access code, or you can get free 21 day access while deciding.

To navigate and start using LaunchPad please consult the [Get Started guide](#) and/or [view this video](#).

If you have problems registering, purchasing, or logging in, please contact Customer Support. You can reach a representative during the hours of operation listed below by one of the following:

- through the [online form](#)
- by chat (via the online form, for student access and payment inquiries)
- Or by phone at 1 (800) 936-6899

Customer Support Hours of Operation:

Monday through Thursday 8:00 a.m. to 3:00 a.m.

Friday 8:00 a.m. to 12:00 a.m.

Saturday 12:00 p.m. to 8:00 p.m.

Sunday 12:00 a.m. to 3:00 a.m.

Supplemental Readings: I will, on occasion, place required supplementary readings on the course web-site (and I'll announce the posting of supplementary readings in class). Study questions (and answers) for each lecture will also be available on this site (under the "Files" tab). I strongly suggest that you work out all the study questions and arrive at your own answers *before* you check the answers. If you get something wrong and do not understand why, please do come to office hours and I'll be happy to work through the tough bits with you.

### LECTURE SCHEDULE FOR WINTER QUARTER, 2017

Lecture	Date	Topic	Readings
1	Mon, Jan 9	Introduction to course Evolution of antibiotic resistance	1, 12.6, 16.3 Levy 1998
		<b>LAB: enrollment logistics</b>	
2	Wed, Jan 11 (1:10-2:00)	Ecosystem services	54.1, 58.4-58.5
3	Wed, Jan 11 (4:10-5:00)	Biodiversity and ecosystem function	59
4	Fri, Jan 13	Interactions with the abiotic environment	8.3-8.5, 39.3-39.4, 40, 52.0-52.2
	<i>Mon, Jan 12</i>	<i>Holiday (MLK Jr. Day)</i>	
		<b>LAB 1: Discovering diversity</b>	
5	Wed, Jan 18 (1:10-2:00)	Global warming; Resource acquisition I: autotrophs	26.2, 30.0-30.1, 36.0- 36.3, 51.1
6	Wed, Jan 18 (4:10-5:00)	Resource acquisition II: limiting factors	31.3
7	Fri, Jan 20	Life tables: survival and	55

		reproduction	
8	Mon, Jan 23	Life history evolution: senescence	
		LAB 2: Resource acquisition	
9	Wed, Jan 25 (1:10-2:00)	Population regulation	
10	Wed, Jan 25 (4:10-5:00)	Intraspecific competition	
11	Fri, Jan 27	Historical perspective on evolution	21.0-21.1
12	Mon, Jan 30	Mendelian genetics	12.1
		LAB 3: Population growth	
13	Wed, Feb 1 (1:10-2:00)	Particulate versus blending inheritance	12.2-12.4
	Wed, Feb 1 (4:10-5:00)	Mid-term 1 (covers lectures/discussion 1-11)	
14	Fri, Feb 3	Hardy-Weinberg	15.1
15	Mon, Feb 6	Problem solving: Hardy- Weinberg	
		LAB 4: Competition and natural selection	
16	Wed, Feb 8 (1:10-2:00)	Selection	21.2-21.5
17	Wed, Feb 8	Genetic drift	
18	Fri, Feb 10	Quantitative genetics	
19	Mon, Feb 13	Evolution of resistance to transgenic crops	
		LAB 5: Mendelian & population genetics	
20	Wed, Feb 15 (1:10-2:00)	Interspecific competition - I	56.0-56.1, 56.4
21	Wed, Feb 15 (4:10-5:00)	Interspecific competition – II and Predator-prey interactions I	56.2
22	Fri, Feb 17	Predator-prey interactions - II	39.2, Koenig & Knops 2005
	Mon, Feb 20	Holiday (President's Day)	
		LAB 6: Succession in a marine fouling community	
23	Wed, Feb 22 (1:10-2:00)	Parasite-host interactions	
	Wed, Feb 22 (4:10-5:00)	Mid-term 2 (cumulative, but emphasizing lectures and discussions 12-22)	
24	Fri, Feb 24	Mutualisms	30.2, 36.4, 56.3
25	Mon, Feb 27	Food webs and trophic structure	57.2, Ostfeld 1997

		<b>LAB 7: Trophic interactions</b>	
26	Wed, Mar 1 (1:10-2:00)	Ecosystems and biogeochemistry	57.1, 58.0-58.3
27	Wed, Mar 1 (4:10-5:00)	Speciation - allopatric	23
28	Fri, Mar 3	Speciation - sympatric	
29	Mon, Mar 6	Symbiosis and anastomosis	5.5, 12.5, 27.1
		<b>LAB 8: Evidence for incipient speciation</b>	
30	Wed, Mar 8 (1:10-2:00)	Genome evolution	24
31	Wed, Mar 8 (4:10-5:00)	Extinction	
32	Fri, Mar 10	Evolution of sex	11.4, 43.0-43.2
33	Mon, Mar 13	Species diversity: ecological and evolutionary causes	57.3-57.5
		<b>LAB Practical Exam</b>	
34	Wed, Mar 15 (1:10-2:00)	Darwinian medicine	
35	Wed, Mar 15 (4:10-5:00)	Altruism	53
36	Fri, Mar 17	Sexual selection and human behavior	
	Wed, Mar 22	<b>FINAL Exam: 6:00 – 8:00 PM</b>	