BIO 102: Principles of Biology II

Spring 2015, University of Rhode Island

Instructor: Serena Moseman-Valtierra, Ph.D. (smoseman@uri.edu; 401-874-7474)

Meeting Times: M,W,F 10-10:50a in Chaffee Social Science Center 277

"Out of Office" hours: Thurs. in Browning Hall lobby 3-4:00p and also by appointment in CBLS 489 (email to request a meeting)

Pre-requisites: BIO 101/2

Goals: What I love most about being a biologist is being actively involved in the process of discovering scientific knowledge that is socially relevant. We currently face key social decisions about a range of issues from management of infectious diseases, genetic profiling and stem cell research, to alternative energy, bioremediation of pollutants, and climate change mitigation. To make informed decisions and to help lead and educate others, we all require a working literacy in biology and an ability to effectively address complex problems and consider potential solutions. My goal is to help you to think critically and quantitatively about basic biology at and above the level of organisms, and to learn foundational knowledge that will serve you in future courses and careers. I hope this course empowers you to facilitate your own learning, to develop your own knowledge, and to apply your knowledge of biology to address social challenges.

Respect: Respect is a core foundation of my teaching philosophy and a requirement for this course. An active and courteous dialog is important to promote learning. I encourage students to regularly ask me and their colleagues about questions regarding course content. Students are expected to be respectful of their peers and will often work with others in group settings.

Technology etiquette: Some class activities may require your smartphone, tablet or laptop use. Any use of the above devices during class time should be restricted to the assignment for that day. The TA and myself will monitor students who text, make or receive phone calls and/or go to websites that are irrelevant to the day's work. Such distracting behavior is unacceptable and is grounds for a lowered or failing grade in the class.

Course requirements:

(1) Text (Biological Science by S. Freeman, Volume 2 custom edition for BIO 102)
ISBN:978-1-269-93089-5 or 1-269-93089-3

(2) Electronic device (in class) for logging into Learning Catalytics (learningcatalytics.com)
For this to work, you must be registered in mastering biology (see below). Then create an account for yourself on the learning catalytic webpage. Each day that we use this system in class, I will provide you with a session ID.

(3) Access to Mastering Biology (www.masteringbio.com by Pearson Publishers).

To enroll, you need to register with an access code (*you can use the same one you purchased for BIO 101*) and use this course code: **MBMOSEMAN64688.** **Please register for Mastering Biology prior to first class if possible. Instructions on how to do so are posted on Sakai.**

We will be using the Mastering Biology online site for an assessment, weekly Reading Quizzes,

on-line assignments, and as a general supplement to our course.

(4) Enrollment in BIO 104 (the lab section for this course): If you need assistance finding an open section, please contact the Lab Manager for Biological Sciences, Linda Forrester (lindaforrester@uri.edu).

These requirements are essential for helping you to actively engage with the material in this course. Reading and memorizing the text is not enough to succeed in this course. Your participation in- and beyond- the lecture room is critical for your success in this course.

Course Grading

Your grade is based on the following 500 points:

Exams (100 points each, best 3 of 4 exams)	300 points
Activities in Class and Learning Catalytics (groups)	100 points
Homework in Mastering Biology	75 points
Quizzes in Mastering Biology	25 points

Guaranteed Grading Scale for the Course: A = 93%, A- = 90%, B+ = 88%, B = 83%, B- = 80%, C+ = 78%, C = 73%, C- = 70%, D+ = 68% D = 63%**,** D- = 60%, F < 60%

Tentative Schedule:

*Pro f MV will indicate specific sections to focus on within each chapter during class.

WEEK	**DATE**	**TOPIC**	**Reading ASSIGNMENT***
Unit 1: The Diversity of Life- a plant's perspective			
1	Jan. 21, 23	The History of Life, Phylogeny basics	28.2, 31.1-2,
2	Jan. 26,28,30	Bacteria, Archaea, Protists	BIO skill 7, 29, 30
3	Feb. 2,4,6	Green algae and Land plants	31
4	Feb 9,11,13	Plant form and function, Photosynthesis Photosynthesis	37
5	Feb. 18, 20	**Exam 1 on 2-20-15**	10
Unit 2: How it got here: What promotes biological diversity?			
6	Feb. 23,25,27	Evolution by natural selection	25
7	Mar. 2,4,6	Evolutionary processes	26
8	Mar. 9,11,13	Speciation	27
	SPRING BREAK		
		Phylogenies	
9	Mar. 23,25,27	**Exam 2 on 3-27-15**	28
Unit 3: Where it is going: Diversity now and in the future			
10	Mar. 30, Apr 1,3	Population ecology	54
11	Apr. 6,8,10	Community ecology	55
12	Apr. 13,15,17	Ecosystems and Biodiversity	56
13	Apr. 20,22,24	Biodiversity	57
		Exam 3 and review	
14	Apr.27, 29	**Exam 3 on 4-27-15**	
	6-May	FINAL EXAM 11:30a-2:30p	

Course Learning Objectives (G= group activity; large emphasis in homework= H)

Learning objectives for Exam 1

Lecture 1

- Define biological diversity.
- Read a phylogeny
- Recall tools and limitations for studying the history of life. G

Lecture 2

- Explain (from BIO 101) how cellular respiration generates energy. G
- Contrast the way that humans obtain energy with the ways that microorganisms obtain energy

Lecture 3

- Provide evidence for or against the endosymbiosis theory using a phylogeny (Ch. 30 p.560-561) G
- Determine whether plants arose from primary or secondary endosymbiosis using a phylogeny (Ch. 30. p 564-565)

Lecture 4

- Explain how plant cells get energy if they do not photosynthesize.
- Compare and contrast the starting and ending points of photosynthesis and cellular respiration G

Lecture 5

- Explain how light is converted to ATP during photosynthesis (and identify how O2 is produced) p.185-186. G
- Explain how tissue systems and cell types interact during photosynthesis in plants G

Lecture 6

- Relate structural properties of different plant cell types to the functions of tissues in which they are located.
- Define a meristem (distinguish SAM, RAM)
- Recognize the relationship between apical meristems, three primary meristems, and three major tissue types.

Lecture 7

- Distinguish between a spore and a seed.G
- Recall key environmental factors that control seedling growth
- Explain how animal dispersal of seeds impacts plant population diversity.

Lecture 8

- Apply knowledge of a gametophyte-dominate life cycle to identify where mitosis and meiosis occur in alternation of generations.G,
- Recall examples of organisms with these type of life cycles H
- Determine whether alternation of generations was a key adaption by plants to reproducing on land.

Lecture 9: REVIEW ACTIVITY

Learning Objectives for Exam 2

Lecture 10

-Distinguish the theory of evolution by natural selection from other ideas about how species change. (pg.444-453,459-462) H

-Recall examples of evidence regarding:

(1) whether species change through time

(2) whether they are related by common ancestry.

Lecture 11

-Explain how natural selection works (using Darwin's 4 postulates) (pg.453-454) G

Lecture 12

-Use Darwin's 4 postulates to test whether natural selection applies to antibiotic resistance in bacteria.

-Focus on Section 25.4 Case Study 1

-Evaluate potential approaches for addressing this challenge. (pg.454-456)G

Lecture 13

-Use Hardy Weinberg principle as a null hypothesis to determine whether evolution is occurring in a population. (pg. 465-470)G, H

Lecture 14

-Compare and contrast the following in terms of their impacts on diversity: H

-Inbreeding (pg. 470-472)

-Genetic Drift (pg.478-482)

-Gene flow (pg.482-483)

Lecture 15

-Contrast Mutation with other evolutionary processes: how does it affect genetic diversity and fitness? (pg. 483-486) H

-Distinguish among 4 types of natural selection (pg.472-475) H

Lecture 16

-Explain how the fundamental asymmetry of sex theory accounts for sexual dimorphism (Ch 26 pg.475-478)

-Speciation (Ch. 27):

-Predict the effect of gene flow on speciation.(pg.489-490) H

-Use different species definitions to determine the best strategy for species conservation.

-Seaside sparrow case study (pg. 492-493) G

Lecture 17

-Distinguish between allopatric and sympatric speciation- which occurs in one geographic location? (pg.494-499) H

-Identify how polyploidy can lead to speciation by explaining what causes polyploids to be genetically isolated. (pg. 497-499) G, H

Learning Objectives for Exam 3

Lecture 18 - Define parsimony (pg. 506-508)

- Use genetic data to build a phylogeny and to identify an unknown organism (G, H)

- Distinguish between homoplasy and homology. (pg. 508)H

- Apply parsimony to choose the best phylogeny Ex: Whale case study (pg. 510)

Lecture 19:

-Recall 4 processes that determine a population size. (pg.1103-1104)

-Relate fitness trade-offs to life history patterns (pg. 1105-1107)

-Predict how survivorship and fecundity differ in warm vs cold environments (pg. 1105-1106) H

Lecture 20:

-Use fecundity and survivorship (in a life table) to calculate a population growth rate (Box 54.2, pg.1104-1108) G
-Use a Life Table to make population projections (pg.1118-1120) G
-Evaluate social implications of contrasting age structures in human populations (pg. 1115-1118)

Lecture 21:

-Apply population growth equations to make predictions about future population sizes and growth rates (Box 54.3, p.1110-1111) G, H
-List density-independent and density-dependent factors that affect population growth (pg. 1107-1112)

Lecture 22:

-Define niche- distinguish between fundamental and realized niches (p.1125-1126) H
-Recall 4 types of species interactions (p. 1124) H
-Identify 3 ways that niches change in response to competition between species. (pg. 1124-1128) H
-Use niche theory to predict which communities are most susceptible to biological invasions. (pg. 1135-1138) G

Lecture 23 and 24:

-Define character displacement (pg. 1127)
-Design an experiment to test for competition between two species (pg.1126-1128) G

Lectures 25

-Distinguish between definitions of species richness and species diversity (p.1142) H
-Recall three hypotheses that aim to explain the latitudinal diversity gradient. (p.1144-1145)

Lecture 26

-Distinguish primary productivity from NET primary productivity (NPP) (p. 1149)
-Relate the productivity pyramid to biomagnification of pollutants. (P.1152-1153)
-Contrast the primary limiting factors for NPP on land vs in the ocean.(p.1154-1155) H

Lecture 27

-Explain how NPP is changing on land and in the ocean and why (p.1168-1169)
-List major factors affecting earth's climate p. 1065-1067 (note this is in Ch 52)
-Compare human sources of CO_2 with natural sources (how do we affect CO_2 and by how much?) p. 1163-1164 G

Lecture 28

-Use IPCC data to interpret future global temperatures. (p.1164) G
- Recall the purpose of the UN Climate Change convention
-Compare and contrast perspectives of different nations when establishing priorities for climate change action.

Lecture 29

-Distinguish between positive and negative feedbacks on climate.(p.1164-1165)
-Recall 4 general consequences of climate change for organisms (p.1166-1167) H
-Define ocean acidification (p.1167)

Two things to remember each week in Mastering Biology:
1. Each Friday by midnight (Starting Jan 30),
a reading quiz will be due.
What do they cover? Reading Quizzes cover material that will be addressed the following week (see syllabus, and listen for any changes to the reading schedule in lecture. The title of each quiz in Mastering Biology will also contain the chapter/sections that it covers for additional clarity.
Why do we have them? I will use the results of these pre-class reading quizzes to tailor my lectures to the most challenging part of the material rather than bore you with material you can learn by reading it on your own.
How are they graded? When grading quizzes, I will drop your lowest 3 quiz scores for the semester.

Your first quiz in Mastering Biology is due by midnight on Friday Jan 30. The assigned sections for each quiz will be announced in lecture each week.

2. Each Wed by 8a.m. (starting Jan 28)
on-line homework assignments will be due.
Homework will typically include material from the previous week and may also contain material from the Monday class prior to each due date. This is intended as a review of material and an opportunity to test your ability to meet learning objectives that are likely to appear in your exams. You are expected to complete this homework INDIVIDUALLY, and these assignments will be subject to time limits. If you require special accommodations for timed activities, then please contact Prof MV ASAP.

Your first homework assignment is a pre- assessment (due 1/28 by 8 a.m.) in Mastering Biology.

More about the Assessments:
Why? These assessments are helpful for me to quantitatively determine the effectiveness of my teaching strategies in this class relative to other classes in the past (and future). They cover multiple topics that we will mostly address in the last 2/3 of the course.
How will it be graded? Your assessment grades will be treated as a homework grade and will be included in the 75 points (out of 500 for your total grade). **You receive 100% for completing the pre-assessment (regardless of your correct answers) by the deadline (Jan 28 at midnight).** However, the post-assessment will be graded based on correct responses (like any other homework assignment).

How will the Learning Catalytics activities be graded? You earn points by showing up and working in your group to answer the questions to the best of your ability. One response per group is expected for most activities and roles in groups rotate weekly (one person will be assigned to report their answers each week). Full credit will be given to students who are regularly participating in group activities as determined by a combination of observations by the instructor, TA, and peer evaluations.
Accommodations for Students with Special Needs: Any student with a documented disability must contact me ASAP to arrange reasonable accommodations. As part of this process, please contact URI's Office of Disability Services, located in Room 330 of the Memorial Union, 874-2098.

Missed Exams: THERE ARE NO MAKE UP EXAMS. Except in cases of emergencies or major illness, each student is expected to be present for every exam. The lowest exam score is dropped in determination of

your overall course grade (but only one exam grade will be dropped). If you miss an exam due to any reason, then that score (and only that one) will be dropped.

Snow/Emergencies: If class is canceled on an exam day due to a storm or other emergency, the exam will be given during the next class period. Also check the Sakai site for this course for updates in case of snow days.

Re-grading:
Your exam grades are not negotiable. However, any math errors in the calculation of grades should be reported and will be corrected immediately. Students who feel their exam/or other material was graded incorrectly must submit a written justification for request for a re-grade along with any supporting material. We reserve the right to either increase or decrease the points earned for a given question for which you have requested a regrade, and, we may re-grade other parts of the exam as well. Requests for re-grades must be made within a week of the time that the grades were released.

Academic Integrity:
Students are expected to be honest in all academic work. Cheating & plagiarism are not acceptable and will be dealt with according to University guidelines. Any exam or assignment that Instructor has reason to believe is plagiarized *in whole or in part* will receive a zero and the student(s) involved will be reported to the Office of Student Life. Your work must be your own and accomplished without use of items such as notes or plagiarizing another student's work. We strongly encourage you to study in groups, but examinations, homework, and quizzes are to be completed individually. A student's name on any written work, quiz or exam (including electronic submissions on Mastering Biology from your accounts) shall be regarded as assurance that the work is the result of the student's own independent thought and study. URI's Student Handbook, in particular Section 1.4, provides guidelines concerning academic honesty. http://www.uri.edu/judicial/Student%20Handbook/ch1.html
Additional assistance is available at the Writing Center and the Academic Enhancement Center.

If you have read this syllabus, then you are on the right track to succeed in this class! Looking forward to an enjoyable semester in BIO 102.

DISCLAIMER: The contents of this syllabus are subject to change at the instructor's discretion