

BIO 104.03: Biology II (aka Introduction to Evolution & Ecology)

Time: MWF 10:00-10:50 Location: MNS 213

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Office Hours: Mon, & Wed. 11am-Noon, Thursday 1-2, or by appointment

Quotes that summarize Dr. Byrne's teaching & learning philosophy & frame the dynamics of this course:*"The mind is not a vessel to be filled but a fire to be kindled."* ~ Plutarch*"Teachers open the door. You must enter by yourself."* ~ Chinese proverb*"(Intelligence) is 1% inspiration and 99% perspiration."* ~ Thomas Alva Edison*"Today a reader, tomorrow a leader."* ~ W. Fusselman*"When we try to pick out anything by itself, we find it is tied to everything else in the universe."* ~ John Muir*"High-quality learning is absolutely essential for high-quality living."* ~ L. Dee Fink**Required texts:**Freeman, S. 2011. Biological Science, 4th ed. Pearson-Benjamin Cummings Publishers.

Other texts and primary literature papers as assigned.

Course description:

In this course, students will learn about foundational concepts of evolutionary and ecological science while continuing to train themselves to "see and think like a biologist." A central focus will be on helping students improve their understanding of biological vocabulary, theories and patterns across levels of ecological organization (population, community, ecosystem, landscape and biosphere) in both time (over the past ~3.8 billion years) and space (local to regional and global). In addition, the societal and liberal arts context and relevance of evolution and ecology will be discussed including controversies about evolution, biodiversity conservation, and ecological sustainability.

Course objectives/outcomes

After this course, students should be able to:

- Describe evolutionary and ecological patterns & processes related to the survival, diversity, relationships, distribution, abundance and interactions of organisms, their populations and environments. This includes:
 - *describing the patterns and mechanisms of evolution*
 - *understanding how phylogenetic relationships among taxa are determined*
 - *understanding the species concept and the factors affecting biodiversity*
 - *understanding the life history strategies of organisms*
 - *describing interactions among biotic and abiotic factors in natural systems*
 - *describing the major global biological communities and biomes*
 - *understanding the flow of matter & energy through natural systems from the molecular to ecosystem level*
 - *understanding significant interactions and dependencies between human and natural systems*
- Apply evolutionary & ecological vocabulary, concepts & data to the examination of scientific questions & contemporary socio-environmental problems facing humanity.

In addition, during this course students will be expected to:

- Improve their skills for critically reading, writing, discussing & thinking about biology
- Increase their understanding of and appreciation for the value (i.e., importance & relevance) of biological science in their own lives, society, & a liberal arts education
- *and hopefully* increase their interest in & motivation for learning about biology throughout their lives.

Assignment submission & class communications:The online system *Bridges* will be used for submission of assignments and to provide course materials.

Email (.rwu accounts only) is used to provide course information and communicate important reminders. Students are responsible for using these resources and should communicate any concerns to the professor ASAP.

Attendance policy:

Because we form a learning *community* in this course, the presence and participation of each student in each class benefits us all. Thus, attendance is expected (*read: required*) for all class meetings. Excused absences will be granted only for legitimate reasons (severe illness or other extenuating circumstances such as family emergencies) and only when the student informs the professor (by email is OK) in advance of the expected absence (ASAP or at least 12 hours notice for emergencies or illness).

- If you will miss class for legitimate religious observances, you must inform the professor ASAP.

- You will not receive credit for missed in-class work or exams due to unexcused absences.
- **NO MAKE-UP or extra credit** opportunities will be given in place of missed in-class work (including exams).
- Students are responsible for turning assignments in on time even if they miss the class period when the assignment is due. Points will be deducted from all assignments turned in late and dates will be established after which assignments will not be accepted and a score of zero will be assigned.
- Attendance is also required for the laboratory session. **Failure of the lab will result in your failure of the entire course.** The lab session is led by a different professor who will inform you of the laboratory attendance and grading policy. However, you will receive one combined final grade for the lecture and lab.

Academic integrity and classroom civility (including cell phone policy)

By becoming an RWU student, you have agreed to abide by the Academic Integrity pledge (“...to pursue the highest ideals of academic life... to be honest...”) which means that you will not cheat, fabricate information, plagiarize, be fraudulent or interfere with others’ work. The University Statement on Plagiarism in the Undergraduate Catalog reads: “A first offense may result in failure of the course involved, plus an entry on the student’s permanent record. A second offense is punishable by expulsion from the University.” **So don’t plagiarize!** The professor of this course is skilled in identifying plagiarism, uses a program in *Bridges* to identify it and will document this or any other instances of academic dishonesty in any student’s permanent file and/or will allow a student to fail the course.

In addition, maintaining academic integrity (e.g., civility) includes respecting others and learning how to disagree with ideas while not being disagreeable. All students should respect their classmates and the learning environment of a classroom; this includes not being disruptive by talking out of turn, texting on mobile devices or using computers for non-class purposes! **Such disruptions are distracting and disrespectful to the professor and other students and will not be tolerated.** Any student who violates these classroom policies will bear the consequences following the definitions, policies and procedures described in the University Catalog. In addition students engaging in such behaviors may be identified by name in the class, or be asked to leave the classroom if they do not conduct themselves civilly or cannot refrain from texting in class. In such instances, the student will receive an unexcused absence with loss of credit for in-class activities.

Academic support services

If you are a student with a disability and you wish to receive academic accommodations for any aspect of this course, you must first register with Disability Support Services on the second floor of the University Library in the Center for Academic Development. All students wishing to receive accommodations must inform the professor and submit required forms **7 days** (\pm 1 day) in advance of every date for which an accommodation is sought.

Important dates:

Feb 13 - last day to drop the course without receiving a W

March 26 - last day to drop the course and receive a W

Required work and grading (subject to modification by professor if needed)

Students’ grades will be based on the following assignments:	% Value of final grade
• Home & in-class work (half-sheets, quizzes, group work, etc.)	11
• One seminar summary and response essay	4
• 4 Exams (1, 2, 3 are 12%; Final is 14%)	50
• 2 mini-literature review papers (1 st =4%, 2 nd =6%)	10
• Laboratory grade	25

Grading scale and the meaning of grades:

A= \geq 93% Excellent	A- = 90-92.9% Great	B+ = 87-89.9% Very Good	B= 83-86.9% Good	B- = 80-82.9% Good
C+= 77-79.9% Average	C= 73-76.9% Average	C- = 70-72.9% Average	D= 60-69.9% Poor	F= \leq 59.9% Failure

Suggestions for improving your success in this (and all) classes:

- Actually do the readings! This will help increase your success as a student, citizen and biologist.
- Spend \geq 2 hours per class period outside of class (\geq 6 hrs per week) reading, studying and working on projects.
- Maintain a list of vocabulary words and their definitions; learning words and how to use them correctly is essential to becoming a successful and respected person/scientist/student!
- After each class, write down unclear points, questions and/or muddied points from the reading and info covered in class that you don’t fully understand; ASK about them discuss in class.
- Study for quizzes and exams by answering the questions listed 1) on the class schedule, 2) at the end of chapters in the textbook, and 3) that you have written in your notes.
- **Remember: Ultimately you are responsible for your own learning! No one else but you can rewire the neurons in your brain to generate personal understanding and knowledge.**

BIO 104.03 Semester schedule

Week	Lecture/discussion topic	Readings (pp. denotes pages in Freeman textbook)
1	1/25: Introductions & expectations 1/27: What are life, evolution, & biodiversity?	1/27: Handout & pp. 1-8, 1104-1108
2	PART 1: What are the patterns and processes of evolution? 1/30: What's so important about Darwin anyway? 2/1: What is the process of evolution by natural selection? 2/3: How do the processes of sexual selection work?	1/30: Quammen 2009 (online), pp. 414-416 2/1: pp.422-432, 440-443 2/3: pp. 452-455
3	2/6: What genetics insights led to the modern synthesis? 2/8: What promotes variability among individuals in a population? 2/10: What are genetic drift & gene flow?	2/6: pp. 62-69, review Ch. 12, 13, 14 & 15 2/8: pp. 448-450, review Ch. 12 & 13 2/10: pp. 443-448
4	2/13: What evidence (data, patterns) supports the theory of evolution? 2/15: What are examples of recent evolutionary research? PART 2: How are taxonomy, speciation & phylogenetics related? 2/17: How are species recognized, named and classified?	2/13: pp. 416-422, 479-481 2/15: Jigsaw papers TBA 2/17: pp. 6-8, 458-462
5	2/20: No class – President's Day 2/22: <i>Exam 1</i> 2/24: How and when does speciation occur?	2/24: pp. 462-471, 484-488
6	2/27: What is phylogenetics? And what's up with those trees? 2/29: Why are cichlid fish a good focus for phylogenetics? PART 3: What are key events in the history of life? 3/2: When, where and how might life have begun?	2/27: pp. 474-479; Bioskills B, pp. B4 - B6 2/29: Jigsaw papers TBA 3/2: pp. 29-34, 38-39, Capra handout
7	3/5: How have life, biodiversity and the biosphere changed? 3/7: What are the characteristics of various taxa? <i>Who cares?</i> 3/9: What is the current state of the planet & humanity?	3/5: pp. 363-364, 481-484, 488, 492, 526-528 3/7: Assigned chapters from Unit 6 3/9: MEA, Crutzen 2002, pp. 1052-1053
8	PART 4: What do ecologists study? 3/19: What is ecology? How does it differ from environmentalism? 3/21: Where do organisms live? Why there and nowhere else? 3/23: What are the global patterns of biodiversity?	3/19: pp. 993-995, IES website 3/21: pp. 1013-1017 3/23: pp. 1001-1008
9	3/26: <i>Exam 2</i> 3/28: What causes abiotic heterogeneity? I. Climate & soils 3/30: What causes abiotic heterogeneity? II. Aquatic & marine	3/28: pp. 1108-1012, 741-744 3/30: pp. 995-1001
10	4/2: What are the key characteristics of populations? 4/4: How do life histories & reproduction patterns vary among orgs? 4/6: No class	4/2: CR Ch 53 : pp. 1174-1179 4/4: CR Ch. 53: pp. 1179-1181, 1134-1135
11	4/9: What affects changes in a population's size? 4/11: How do orgs. interact with each other? I. comp. & consump. 4/13: How do orgs. interact with each other? II. mutualism	4/9: CR Ch. 53: pp. 1181-1190 4/11: pp. 1058-1068 4/13: pp. 586-589, 1068-1070
12	4/16: What are patterns & mechanisms of community structure? 4/18: What are the characteristics & dynamics of food webs? 4/20: How do disturbance & succession affect communities?	4/16: pp. 1070-1073, 1077-1080 4/18: pp. 1065-1066, 1087, Jigsaw papers 4/20: pp. 1073-1077
13	4/23: <i>Exam 3</i> 4/25: How does energy move through ecosystems? 4/27: What are the key pools & fluxes of C?	4/25: pp. 1083-1092 4/27: pp. 589-590, 1092-1094, 1096-1099
14	4/30: What are the key pools & fluxes of N? Part 6: How do humans impact & manage BD & resources? 5/2: What's happening to biodiversity & ecosystems? Who cares? 5/4: Conservation success: What makes a difference?	4/30: pp. 510-512, 748-750, 1096 5/2: pp. 1099-1102, 1110-1120 5/4: pp. 1053-1055, 1120-1123, WWF wbst
15	5/7: What are the ecological lessons for sustainability? 5/9: What's the ecology of the human population?	5/7: TBD 5/9: Cohen 2005

Final exam period –Comprehensive Final Exam – Time TBD

****The professor reserves the right to modify this schedule at any time as necessary****

Assignment and assessment details (Part 1):

A. Home and in-class work (e.g., quizzes, group activities, all half-sheet assignments; 15% of final grade) will assess students' recall and understanding of concepts and vocabulary from readings and class presentations and discussion (levels 1-2 of Bloom's taxonomy, on Blackboard) as well as develop higher-level critical thinking skills (Bloom's levels 3-6) including application of concepts to problems and self-reflection.

- **Assessment criteria** (*point values vary by assignment; no points given due to unexcused absences*)
 - Recall and comprehension questions: Correct answers will receive full credit and incorrect answers or "I don't know" will receive no credit.
 - Short-answer questions (application, interpretation or opinion-based) will be evaluated on evidence of higher-level critical thinking (refer to Bloom's table on blackboard for key words that provide evidence). Answers with clear evidence of synthetic, analytical or self-reflective thinking will receive full credit. If limited evidence of such thinking is indicated, partial credit will be given. Answers providing no evidence of critical thinking or that lack relevance to readings will receive no credit.
 - For group activities, all group members will receive the same score based on a group product. Groups completing the activity and providing a fully satisfactory written response providing evidence of critical engagement with the topic will receive full credit. Groups completing most of the activity and/or providing a less than satisfactory written response or product will receive partial credit. Groups failing to complete the activity or exhibiting behaviors that suggest a low level of engagement with the topic and providing an unsatisfactory written response will receive no credit.

B. An essay that summarizes and provides personal responses to a biology department **research-based** seminar is required so that students gain continued exposure to recent biological research and additional practice in critical thinking and writing. Students are required to attend one department seminar of their choosing that is about research (these will be identified for you) (or other relevant presentations on campus—discuss this with the professor beforehand) and then write a 1 to 1 ½ page summary of and brief personal response to the seminar. The following questions can be used to help guide the structure and content of the essay:

- **What general topic was the presentation about?**
- **What was the objective of the research and/or presentation?**
- **What methods were used and what were the general results?**
- **What was the presenter's conclusion?**
- **Does this work have societal relevance such as helping solve a socio-environmental problem?**
- **What do you think about the topic and research? Did it interest you? What did you learn?**
- **What were the strongest and weakest aspects of the presentation and presenter?**

The essays will be assessed and assigned points (out of 20) using the following guidelines:

- 18-20 points: The essay clearly answers all or most of the questions above, is well-organized and uses proper grammar and punctuation. The author obviously paid attention and is able to provide a critical self-reflection and response to the seminar.
- 15-17 points: The essay lacks some of the information above and the writing style, structure and grammar could be improved. It is somewhat unclear as to whether the author paid attention to the whole seminar and thought about it enough to provide a critical response.
- 10-15 points: The essay contains very limited relevant information about the seminar, was obviously written in a hurry because it lacks clear organization and/or has many writing mistakes. It is obvious that the author did not attend or pay attention to the seminar or engage in in-depth personal reflection about it.
- 0 points: No seminar essays are handed in.

C. Information about the mini-literature review papers will be provided later this semester.