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

4-Credit Lecture + Lab course | Lecture meeting time: MWF 9:00-9:50 | Location: MNS 200
Instructor: Dr. Loren B. Byrne | Phone: X 3890 | Email: lbyrne@rwu.edu
Office: MNS 227 | Office Hours: Mon & Wed 11-12; Mon & Thurs 1-2; or by appt.

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
"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

Required texts:

Freeman, S. 2016. Biological Science, 6th ed. Pearson-Benjamin Cummings Publishers. *(5th ed. is acceptable)*

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 depends on:
  - 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
  - describe the patterns and mechanisms of population distribution, growth and regulation
  - describing the major global biological communities and biomes
  - understanding the flow of matter & energy through natural systems from molecules to ecosystems
  - understanding significant interactions and dependencies between human and natural systems
- Apply & synthesize evolutionary & ecological vocabulary, principles & research to examine scientific questions and data, and 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.

Important dates: Feb 19 - last day to drop the course without receiving a W **March 20** - last day to drop 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.) 12
- 4 Exams (1, 2, 3 are 12%; Final is 14%) 50
- 2 mini-literature review papers (1st=3%, 2nd=5%) 8
- Laboratory grade 30

Grading scale and the meaning of grades:

A= ≥ 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= ≤59.9% Failure

Note: Failure of the lab section due to a failing grade or ≥3 absences will result in failure of the whole course.

Essential info. about the following topics is provided on the electronic version sent via email and located in Bridges. You are fully responsible for reviewing this information and will be held accountable to all official policies provided there: Assignment submission, class communications; attendance policy; academic integrity; academic support services.

Critical Reminder: Do NOT plagiarize! This course uses a program in *Bridges* to identify it and will document any instances of academic dishonesty in any student's permanent file and/or will allow a student to fail the course. *You are fully responsible for knowing what constitutes all types of plagiarism, as described here:* https://www.turnitin.com/static/plagiarism-spectrum/.

BIO 104 Semester schedule

Week	Lecture/discussion topic	**Readings** (pp. are in Freeman 6th ed. textbook)
1	1/22: Introductions, expectations and warm-up 1/24: How are systems thinking, life & biodiversity related?	 1/24: Handout & pp. 2-6, 1140-1142
2	**PART 1: What are the patterns & processes of evolution?** 1/27: What's so important about Darwin anyway? 1/29: What do we need to know about "population systems" to begin? 1/31: What genetics insights led to the modern synthesis?	 1/27: Quammen 2009 (online), pp. 435-437 1/29: p. 1071, TBD 1/31: pp. 5-6, 94-102, Ch. 13, 14, 16 & 17
3	2/3: What promotes variability among individuals in a population? 2/5: What is the process of evolution by natural selection? 2/7: How do the processes of sexual selection work?	2/3: pp. 475-477, review Ch. 13 & 14 2/5: pp.445-453, 462-465 2/7: pp. 466-468, 1057-1058
4	2/10: How do genetic drift & gene flow cause evolution? 2/12: What evidence (data, patterns) supports the theory of evolution? 2/14: What are examples of recent evolutionary research?	2/10: pp. 469-474 2/12: pp. 437-444, 503-504, 673-679 2/14: Jigsaw papers
5	2/17: No class 2/19: *Exam 1* **PART 2: How are taxonomy, speciation & phylogenetics related?** 2/21: How are species recognized, named and classified?	 2/21: pp. 8-9, 481-485
6	2/24: How and when does speciation occur? 2/26: What is phylogenetics? And what do those trees mean? 2/28: Why are cichlid fish a good focus for phylogenetics?	2/24: pp. 485-493, 507-510 2/26: pp. 47-48; 497-503 2/28: Jigsaw papers
7	**PART 3: What are key events in the history of life?** 3/2: When, where and how might life have begun? 3/4: How have life, biodiversity and the biosphere changed? 3/6: What are some diverse adaptations of various taxa? *Who cares?*	 3/2: pp. 70-73, 103-104, Capra handout 3/4: pp. 504-506, 509-513, 546-549 3/6: Assigned chapter from Unit 5
8	**PART 4: What do ecologists study?** 3/16: What is the current state of the planet & humanity? 3/18: What is ecology? How does it differ from environmentalism? 3/20: Where do organisms live? Why there and nowhere else?	 3/16: MEA, pp. 1084-1086, 1154-1155, 3/18: pp. 1029-1031, IES website 3/20: pp. 1031-1035
9	3/23: *Exam 2* 3/25: What are the global patterns of biodiversity? 3/27: What causes abiotic heterogeneity? I. Climate & soils	 3/25: pp. 1039-1043, 1113 3/27: pp. 1036-1038, 751-754
10	3/30: What causes abiotic heterogeneity? II. Aquatic & marine 4/1: What affects a population's dispersion, density & size? 4/3: How do populations vary over time?	3/30: pp. 1043-1048 4/1: Handout (Also see Freeman Ch 51) 4/3: Handout (Also see Freeman Ch 51)
11	4/6: How do life histories & reproduction patterns vary among orgs? 4/8: How do orgs. interact with each other? I. comp. & consump. 4/10: No class	4/6: Handout: pp. 1179-1181 4/8: pp. 1093-1101
12	4/13: How do orgs. interact with each other? II. mutualism 4/15: What are the characteristics & dynamics of food webs? 4/17: *Exam 3*	4/13:pp. 1101-1103, 599-602, 756, 758-760 4/15: pp. 1117-1120, Jigsaw papers
13	4/20: What are patterns & mechanisms of community structure? 4/22: How do disturbance & succession affect communities? 4/24: How does energy move through ecosystems?	4/20: pp. 1103-1106, 1111-1113 4/22: pp. 1107-1110 4/24: pp. 1117-1122
14	4/27: What are the key pools & fluxes of C? 4/29: What are the key pools & fluxes of N? **Part 5: How do humans impact & manage BD & resources?** 5/1: What's happening to biodiversity & ecosystems? *Who cares?*	4/27:pp. 593, 602-603, 1123-1125, 1128-1136 4/29: pp. 532-533, 758-760, 1123-1128 5/1: pp. 1145-1156
15	5/4: Conservation success: What makes a difference? 5/6: What about human ecology? What are lessons for our sustainability?	5/4: pp. 1087-11089, 1156-1159, WWF wbst 5/6: TBD

Final exam period –Comprehensive Final Exam – TBA during Multi-section Exam Time

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