

Theory and Methods in Ecology and Evolutionary Biology

EBIO2020 - Fall 2018

Instructor: Dr. Renata Durães Ribeiro

Professor of the Practice, Ecology and Evolutionary Biology Dept., Tulane University

E-mail: rduraes@tulane.edu (email is the best way to set-up appointments or communicate with me outside of class)

Office Hours: 428 Boggs (inside the 400 Boggs EEB suite), Mondays 11:00-1:00, Wednesdays 1:00-3:00, unless indicated. During these times, always feel free to drop by. If these times do not work for you, email me to make an appointment.

Teaching Assistant: Lydia Crawford - Contact lcrawfo2@tulane.edu for appointments as needed.

Class Time and Location: Tu, Th 9:30-10:45 am, Stern 2002 (Building #19)

Course Description

EBIO2020 is an introduction to the fundamental theories and methods in ecology and evolutionary biology for EBIO and ENVB majors. You will acquire the knowledge and skills needed to succeed in your major through direct, active experiences evaluating and communicating scientific evidence. The course topics are designed to reflect current research interests in the department, as well as some classic case studies in the discipline. Irrespective of topic, the course emphasizes a practical understanding of the scientific process and will focus on developing the skills needed for upper-level courses in EBIO. The course also provides opportunities for you to become familiar with the research interests and experiences of our faculty members, and identify potential research opportunities.

Prerequisites: EBIO1010/1015

Required materials: One 1-inch, 3-ring **soft** binder and a personal laptop with Microsoft Excel installed

Learning Objectives

Building upon what you learned in EBIO1010/1015, you will continue to develop a practical understanding of the scientific process and acquire an increased breadth of knowledge of the theories and principles of ecology and evolutionary biology by:

- Developing and critiquing logical arguments in ecology and evolutionary biology based upon principles and theories in the disciplines.
- Using the scientific literature to acquire, evaluate and communicate scientific evidence.
- Analyzing data using appropriate statistics to test hypotheses.
- Demonstrating written and oral communication skills for careers in science and related disciplines.

The course is based on the scientific teaching method and focuses on skill development through daily activities, including:

- Conducting thorough and unbiased observations.
- Developing testable questions and hypotheses.
- Reading, discussing, and critically evaluating scientific literature that reflects diversity in the field.
- Analyzing data to test hypotheses.
- Using Excel spreadsheets to evaluate and graphically represent observations and trends.
- Developing written and oral communication skills.
- Communicating an understanding of concepts in EBIO in short writing assignments that may be revised in response to instructor or peer feedback.
- Integrating knowledge and understanding via weekly assessments and active learning activities.

Course Outcomes

Upon completion of this course you will be better prepared with the necessary knowledge and skills to succeed and excel in your upper level EEB courses, and beyond.

GET READY! This semester you will have to come to terms with the fact that EBIO2020 may be different from other science courses you've taken. There is rarely one right answer or one right way to do things in here. I understand that this can be a bit frustrating, but it is also liberating and allows you to demonstrate creativity and resourcefulness. Most professions do not come with 'how to' manuals or a set of solutions to every problem you're likely to encounter. In life, and in this course, you need to decide what 'quality work' is, set your own standards, and modify with feedback. **I ask, minimally, that your work be organized, neat, complete, and well thought out.** We will try to be helpful guides, and I ask that you keep an open mind and communicate with us when you have questions or need clarification.

Course website: The course website will be hosted on **Canvas** (access at tulane.instructure.com). There you will find materials covered in class, required readings, supplemental materials, homework assignments, as well as other relevant information (syllabus, important dates, grades). Most course materials will be found posted under 'Assignments'.

Grading: The points you earn will be regularly posted on Canvas, typically within a week of the due date. **You are responsible for checking your grades regularly throughout the semester.** If you feel like a received grade is in error, you must notify the teaching assistant **in writing** within **TWO WEEKS** of the posting of the grade, with a brief justification of why you believe the grade is incorrect. Requests submitted beyond this deadline will not be considered.

How to use and interpret the gradebook: The Canvas gradebook for this course (look under 'Grades') will be based on weights and percentages, hence the "total points" values are often higher or lower than your raw score. These values will change as new assessments are added.

Weighting of assessments: Different assignments and exams will be associated with different numbers of points (e.g., the two exams are not necessarily worth the same number of points). The final point totals for each category will be summed, converted to a percentage, and weighted as follows:

CREATE packets (4 total)	50%
Midterm exam (1)	15%
Final exam	15%
Participation	20%

Estimate your grade: Estimate your grade at any time using the following equations:

First, calculate the % of total points you earned for each item

$$\% \text{ Mid-term Exam} = (\text{points you earned on the midterm}) / (\text{points possible on midterm}) \times 100$$

Next, multiply the % values for each item by its weight and then sum

$$\begin{aligned} & (\% \text{CREATE packets})(0.50) \\ & + (\% \text{Participation})(0.20) \\ & + (\% \text{Midterm Exam})(0.15) \\ & + (\% \text{Final Exam})(0.15) \\ & = \text{final percent for the course} \end{aligned}$$

Grading Scale (based on percentage of total points earned):

A = 93-100%, A- = 90-92%, B+ = 87-89%, B = 83-86%, B- = 80-82%, C+ = 77-79%, C = 73-76%, C- = 70-72%, D+ = 67-69%, D = 63-66%, D- = 60-62%, F < 59%

Participation

Be prepared for **active participation** in every class meeting. Active participation includes completion of assignments **and** engagement in class and small group discussions. Your participation grade will be based on the **level and quality** of your participation in class and completion of assigned classwork and homework. If you are not present in class, or not contributing to the conversation, then you will get a zero for participation for the day. Your participation grade may also include grades from homeworks, reflections, and pop quizzes on assigned readings. Homework will be posted on Canvas and is due at the **beginning** of class on the due date. **Missed homework will receive a zero and late homework will not be accepted.**

Cell phone and laptop use in class is a distraction to yourself and others and is **not OK**. Keep electronic devices out of sight and mind for the entire class period, unless you are specifically required to work on a class activity on your laptop.

CREATE

To hone your skills at reading, understanding, and evaluating scientific papers we will be following the CREATE method (Hoskins et al. 2007). This method is outlined below; if interested, you can find the original paper in Canvas. For each of the departmental research areas we investigate, you will essentially build your own textbook with the following components. Do good work, as you will use this textbook as a reference for exams and in future courses in the EBIO department, such as Ecology and Evolution. There may be modifications to what you are required to submit based on how our work develops. Due dates are provided in the syllabus. Expect to do work both in groups and individually, both in and out of class.

- 1) **Consider.** Construct a concept map of the Introduction of the paper by listing and defining key terms (either provided by me or your own list) and creating informative linkages between them.
- 2) **Read.** *Part I. Methods.* Diagram the experiments described in the Methods in cartoon format. Write descriptive titles for each cartoon. Try to physically represent what was done in the study, rather than simply showing the results or repeating the author's description of the experiment in words.
Part II. Results. Compare the figures you created to those presented in the paper. Go through the Results figure by figure, determining how the results were obtained (e.g., what experiments were performed?). Annotate the figures by adding clarifying labels. Examples of annotations include: identifying patterns, trends and statistics as well as labeling treatment groups, axes, etc. Write your own descriptive titles for each figure.
- 3) **Elucidate Hypotheses.** Identify each individual experiment and define the specific hypotheses that it tested or question that it addressed. Write your own hypotheses (if not specifically provided in the paper) above the figure or table to which they apply. Hypotheses should include the independent and dependent variables and the mechanism.
- 4) **Analyze and Interpret Data.** *Part I.* Analyze each figure using the provided templates. Compare control and experimental treatments identified during the figure annotation above, relate results to hypotheses or questions, and begin to draw conclusions. How do the findings link back to the hypotheses? How convincing are the data? In your opinion, what has the study shown? Are there any questions you would like to ask the authors?
Part II. Discussion. Make another list based on the author's points and compare to your list using the template provided. Compare and contrast.
Part III. Construct a summary concept map, using figures and tables as central concepts and creating linkages between them that indicate the logical flow of ideas (the big picture).
Part IV. Abstract. Write an abstract for the paper and indicate the logical flow of ideas in the paper (the big picture).
Part V. Come up with your own title for the paper.
- 5) **Think of the Next Experiment.** Diagram two proposed experiments in cartoons. The class will collaboratively devise criteria for judging proposals and then divide into "grant panels" to select which experiment to "fund".
- 6) **What does a biologist look like?** Prepare a list of questions for the visiting professor. While we will certainly generate questions relevant to the study, you are also welcome and encouraged to ask more personal questions about what it's like to be a scientist, how they got to where they are, what their greatest success or worst failure was...get the idea?

Attendance Policy, Honor Code and Student Support

Students must attend class and complete assignments independently (unless otherwise indicated) and on time.

If you have a learning disability or health concern, please notify Dr. Ribeiro **at the beginning** of the semester and register with the ERC (Educational Resources & Counseling) at <http://tulane.edu/studentaffairs/disability/students.cfm> so that your needs can be accommodated.

Students must adhere to the Tulane Honor Code <http://www.tulane.edu/~uc/honorcode.htm>. Violations of this code are unacceptable. If you violate the code, then you will have a hearing with the Tulane Honor Board. If you are unsure how a particular assignment is affected by the honor code, it is your responsibility to consult with me for clarification.

Tulane University recognizes the inherent dignity of all individuals and promotes respect for all people. As One Wave, Tulane is committed to providing an environment free of discrimination and sexual harassment, including sexual assault, domestic and dating violence, and stalking. If you or someone you know has experienced gender-based violence, know that you are not alone. Learn more at onewave.tulane.edu.

Strictly Confidential	Mostly Confidential
<i>Except in extreme circumstances, involving imminent danger to one's self or others, nothing will be shared without your explicit permission.</i>	<i>Conversations are kept as confidential as possible, but information is shared with key staff members so the University can offer resources and accommodations and take action if necessary for safety reasons.</i>
Counseling & Psychological Services (CAPS): (504) 314-2277	Coordinator of Violence Prevention: (504) 314-2161
Student Health Center: (504) 865-5255	Tulane University Police (TUPD): (504) 865-5911
SAPHE Hotline: (504) 654-9543	Office of Institutional Equity: (504) 862-8083

Schedule-in-progress (subject to modification)

Weekly readings and assignments will be announced in class and posted on Canvas.

Week	Class	Date	Topic	Activities, Assignments, Reminders	
1	1	Aug 28	<i>What are we doing here?</i> Organization and orientation	Activities: Class survey, Pre-test	
	2	Aug 30	<i>How Darwin keeps on keeping on:</i> Understanding Evolution Intro to concept mapping	Read: Introduction to concept mapping Due: Syllabus quiz Activities: Evolution is, Mapping evolution (First draft, Peer feedback)	
2	3	Sep 4	Applying concept maps	Due HW: Peer feedback evolution CM, Read Evolutionary Gem Activities: Dinosaur cartoon paragraph, Evolutionary Gems	
	4	Sep 6	Presenting and interpreting data	Due HW: Evolution concept map (2 nd version) Activities: Reading a graph in two steps	
3	5	Sep 11	CREATE Unit 1. <i>Brother, Where Art Thou?</i>	Due HW: Peer review on evolution CM (2 nd version) Activities: Graphing for Darwin, ASK	
	6	Sep 13		CREATE 1 Due HW: Introduction CM Activities: A bit about hypothesis development, Diagram the methods, A little bit of stats	
4	7	Sep 18		CREATE 1 Due HW: Stats Activities: Reporting Results	
	8	Sep 20		CREATE 1 Due HW: Discussion template (Part I) Activities: Discussion Template (Part II), Abstract Handout, TONE	
5	9	Sep 25		Grant Panel Due HW: TONE, Questions for author Activities: Grant Panel, Chat with PI (me!)	
	10	Sep 27		Activities: ASK DUE: CREATE 1 packet <i>Sep/28: Last day to drop without record</i>	
6	11	Oct 2		CREATE Unit 2. TBA	CREATE 2
	12	Oct 4			CREATE 2
7	13	Oct 9			CREATE 2
		Oct 11		FALL BREAK - NO CLASS	
8	14	Oct 16	CREATE Unit 2. TBA (cont.)	Grant panel, Chat with PI DUE: CREATE 2 packet	
	15	Oct 18	CREATE Unit 3. TBA	Activities: ASK Take-home Midterm Exam made available	

Week	Class	Date	Topic	Activities, Assignments, Reminders
9	16	Oct 23	CREATE Unit 3. <i>TBA</i> (cont.)	CREATE 3
	17	Oct 25		CREATE 3 DUE: <i>Take-home midterm</i> <i>Oct/29: Last day to drop courses</i>
10	18	Oct 30		CREATE 3
	19	Nov 1		Grant panel, Chat with PI
11	20	Nov 6	CREATE Unit 4. <i>TBA</i>	Activities: ASK DUE: <i>CREATE 3 packet</i>
	21	Nov 8		CREATE 4
12	22	Nov 13		CREATE 4
	23	Nov 15		CREATE 4
13		Nov 20	NO CLASS	
		Nov 22	THANKSGIVING BREAK - NO CLASS	
14	24	Nov 27	CREATE Unit 4. <i>TBA</i> (cont.)	Grant panel, Chat with PI
	25	Nov 29	<i>What next?</i> Future Directions in EEB	DUE: <i>CREATE 4 packet and Final Notebooks</i>
15	26	Dec 4	<i>Tales from the trenches</i> Meet and greet with seniors	DUE: Generate a list of at least five things you'd like to know about being an EEB student from here on out
	27	Dec 6	Review for final exam	Top five tips
			Take-home Final exam due at midnight of Sunday, December 16th	