BIO 335/435: CONCEPTS IN EVOLUTION

Online: Hybrid Course
Meeting Hours: Mon & Wed 6:00 – 7:00 pm

Instructor: Dr. Windsor Aguirre
Email: waguirre@depaul.edu

Office Hours: By appointment

Introduction: "Nothing in biology makes sense except in the light of evolution", said one of the most prominent evolutionary biologists of the 20th century, Theodosius Dobzhansky. An understanding of evolutionary biology will provide you with a much broader grasp of biology and greater perspective on the relationships among all living organisms including human beings. In this course, we will cover advanced topics in evolutionary biology including the relationship between evolution and religion, human evolution, evolutionary medicine, zoonosis (transmission of diseases between animals in humans), evolutionary developmental biology (Evo-Devo), adaptive radiation, and evolutionary genomics.

In the first part of the course, we will review the basics of evolutionary theory working through original research articles as case studies. We will also cover topics that are of critical importance for achieving a proper understanding of evolution like the relationship between evolution and religion. The second part of the course will be run as a hybrid between a typical lecture course and a seminar. Topics will be covered over two lectures. In this first lecture, there will be a broad overview of the topic including a review paper to read so that we have a common language and understanding of the topic. In the second lecture, small groups of students (~4 students) will give a short presentation and lead a discussion on the topic based on an original scientific paper. Each student will participate in one presentation (see below for more details).

Online Component: This course will be conducted online for this quarter. You will be expected to do some of the work on your own time including reading papers, preparing presentations, and going over lecture slides. We will meet within our scheduled course period using the video conferencing program Zoom (https://zoom.us/) to review material and hold class discussions.

Readings: This is an upper level class so you must be prepared to invest substantial time on the reading assignments. ***We will be reading 1-2 scientific papers per week.*** Scientific papers are difficult to read so you will have to organize your schedule to ensure that you have enough time to complete the reading assignments. You must keep up to date with the readings to participate and perform well on quizzes and tests. If you need to review basic concepts, I recommend *Evolution 4th Edition* by Futuyma and Kirkpatrick or similar textbooks.

Grading Scale: The following grading scale will be used:

A	93-100%	C+	77-79%
A-	90-92%	C	73-76%
B+	87-89%	C-	70-72%
B	83-86%	D	60-69%
B-	80-82%	F	≤59%

Evaluations and Grades:

Undergraduate:		Graduate:	
Participation	100pts	Participation	100pts
Quizzes	200pts	Quizzes	200pts
Group Presentation	100pts	Group Presentation	100pts
Presentation Questions	50pts	Presentation Questions	50pts
Evolution and Society Essay	100pts	Evolution and Society Essay	100pts
Midterm Exam	150pts	Midterm Exam	150pts
Final Exam	300pts	Final Exam	200pts
		Individual Presentation	100pts
Total	1000pts	Total	1000pts

Participation: I greatly value participation in class and frequently ask questions or call on students. You will be assigned a weekly participation grade based on your involvement in class discussions and activities. Participation will account for 10% of your final grade. Please try to participate. Do not be shy; remember that you are here to learn. There is no penalty for answering a question wrong and I will appreciate your efforts. Being absent will result in an automatic loss of half your participation grade for the week. **Do not be late for class!** Students joining programmed meetings late will lose participation points and will be considered absent after 10 minutes. **You will be allowed to drop your lowest participation grade.**

Quizzes: Throughout the quarter, we will have short quizzes to test your understanding of the material being covered. These will be conducted online via D2L and are based on recorded lecture materials and assigned readings. Quizzes will be averaged and **you will be allowed to drop two quizzes.** Note that technical problems, illness, and other emergencies count towards this two-dropped quiz quota so do not miss quizzes unless you absolutely have to in case you have to miss quizzes late in the quarter.

Group Presentation: In the second part of the course, students will work in small groups (typically 4 students) to create a presentation and lead discussion on weekly topics covered in class. For each topic, we will typically have two readings. The first will usually be a review paper and will provide a general overview of the topic. I will provide some background

information and we will discuss the topic and the paper as a class. The student group leading discussion will select an additional paper that will be posted on D2L. Therefore, you can expect to have two reading assignments per week. Scientific papers are difficult to read. *Because our reading load will be heavy, it will be very important for you to* ***organize your schedule*** *properly to make sure that you have enough time to read the papers.*

The presentations will be based on one original research paper that the group will select after consultation with the instructor. I have posted a potential article as a default so you have something to fall back on if you do not find a suitable article, but you should search for your own article. All students will present and the total group presentation time should be approximately 20 minutes. The paper should be divided into the following sections for the group presentation:

1. Background- What is the context of the study? Why this model system? What do we know about the system? What were the objectives of the study?
2. Methods- How were the hypotheses tested? The experimental design and methods of analysis (including statistical tests) should be explained carefully.
3. Results – What were the results of the study? You should go over the tables and graphs explaining them and indicate what the outcome of the experiment or analysis was.
4. Discussion – Why do results matter? Did they match expectations? What are the broader impacts of the study?
5. Summary – Provide a BRIEF overview. How does it tie in with the class topic that we are studying? Flaws? What would you do differently? Future directions?

Students leading the discussion should meet as a group well before the presentation to coordinate its preparation. Besides the presentation, the group leading discussion should come up with **four potential quiz/exam questions**. I will select some of these questions for the Final Exam. The presentation will be graded over 100 points (10% of your final grade). Half will be based on their mastery of the material presented and half will be based on the ability of the group to lead a good discussion and come up with insightful exam questions. Missing class the day that your group discusses the presentation is an automatic zero. You either presented or you did not and there is no excuse for missing your presentation day other than a severe medical emergency. If you have a valid, medical emergency and have written documentation for it, an alternate assignment will be arranged. During our assigned class period, the group will lead a discussion based on the questions they developed and the questions that other students have.

Group Presentation Questions: Every student not in the presentation group should submit a typed discussion topic/question with a justification of its importance to the designated Submission folder on D2L. Students presenting do not have to upload presentation questions the week they present. You will be allowed to drop one item from this category.

Evolution and Society Paper: Science has greatly impacted all aspects of human society. As the central concept unifying the life sciences, evolutionary biology has also made key contributions to our lives. You will write a short essay (3-5 pages single-spaced) on how

evolutionary biology has impacted human society. The emphasis should be on positive contributions although you can include text on the negative uses of evolution like the eugenics movement of the early 20th century. The essay should be divided into four major sections: (A) Introduction (setting up the paper), (B) What is Evolution? (define what evolution is and talk about the development of the theory) (C) Evolution's Contributions to Society (the core of the paper, discuss different ways in which evolutionary biology provides benefits/impacts human society), (D) References (at least 10). You can add subsections to help organize your text. The Evolution and Society paper is due at the start of week 9, **Monday May 24 by 11:59pm**.

Midterm and Final Exams: There will be a midterm exam and a final exam that combined will be worth 50% (undergraduate students) or 40% (graduate students) of your grade. The midterm exam will cover the material from the first part of the course on evolutionary basics and evolution and religion. The final exam will be comprehensive although most of the material will correspond to the material covered after the midterm. I will provide the option of making the final exam optional for students that are satisfied with their grade. If you must miss a test, make arrangements with me beforehand. The Midterm and Final Exams will take place on D2L and be available from 8am until 11:59pm on the day listed on the course schedule. You will have 90 minutes to complete the midterm exam and 135 minutes to complete the final exam. Questions will be taken from a test bank and randomized so that every exam is unique.

Individual Presentations on Special Topics: This assignment is **only for graduate students registered in BIO 435**. Each graduate student will prepare an individual 10 minute presentation on a special topic that will be worth 10% of their final grade. These presentations are intended to introduce the class to special topics that we will not have time to cover as full modules. The presentations should be prepared in Powerpoint format and will be fair game for the final exam. They will be given during our designated class period using the video conferencing program Zoom. The presentations should (a) define the topic (clearly explain what it is about), (b) provide historical context on the development of the topic highlighting the main scientist(s) involved, (c) highlight the importance of the topic (why should we care?), (d) provide a brief case study illustrating how scientists conduct research on this topic, and (e) include two potential exam questions based on the topic on the last slide. A draft of the presentation is due one week prior to the presentation date and you should plan on discussing it with me. A list of topics and available dates will also be posted.

Academic Integrity: Academic integrity entails absolute honesty in one's intellectual efforts. The DePaul Student Handbook details the facets and ramifications of academic integrity violations, but you should be especially aware of the policies on cheating and plagiarism. **Cheating** is any action that violates University norms or an instructor's guidelines for the preparation and submission of assignments. Such actions may include using or providing unauthorized assistance or materials on course assignments, or possessing unauthorized materials during an examination. **Plagiarism** involves the representation of another's work as your own, for example: (a) submitting as one's own any material that is copied from

published or unpublished sources such as the internet, print, computer files, audio disks, video programs or musical scores without proper acknowledgement that it is someone else's; (b) paraphrasing another's views, opinions or insights without proper acknowledgement or copying of any source in whole or in part with only minor changes in wording or syntax even with acknowledgement; (c) submitting as one's own work a report, examination, paper, computer file, lab report or other assignment which has been prepared by someone else. If you are unsure about what constitutes unauthorized help on an exam or assignment, or what information requires citation and/or attribution, please ask your instructor. Violations may result in the failure of the assignment, failure of the course, and/or additional disciplinary actions. For more information, visit DePaul's Academic Integrity Website: https://offices.depaul.edu/academic-affairs/faculty-resources/academic-integrity/Pages/default.aspx

Respect for Diversity and Inclusion: At DePaul, our mission calls us to explore "what must be done" in order to respect the inherent dignity and identity of each human person. We value diversity because it is part of our history, our traditions, and our future. We see diversity as an asset and a strength that adds to the richness of classroom learning. In my course, I strive to include diverse authors, perspectives and teaching pedagogies. I also encourage open dialogue and spaces for students to express their unique identities and perspectives. I am open to having difficult conversations and I will strive to create an inclusive classroom that values all perspectives. If at any time the classroom experience does not live up to this expectation, please feel free to contact me via email or during office hours.

Writing Center: I strongly recommend you make use of the Writing Center throughout your time at DePaul. The Writing Center provides free peer tutoring for DePaul students, faculty, staff, and alumni. Writing Center tutors work with writers at all stages of the writing process, from invention to revision, and they are trained to identify recurring issues in your writing as well as address any specific questions or areas that you want to talk about. Visit www.depaul.edu/writing for more information.

Students with Disabilities: Students seeking disability-related accommodations are required to register with DePaul's Center for Students with Disabilities (CSD) enabling you to access accommodations and support services to assist your success. There are two office locations: Loop Campus - Lewis Center #1420 - (312) 362-8002; Lincoln Park Campus - Student Center #370 - (773) 325-1677. Students can also email the office at csd@depaul.edu . Students registered with the Center for Students with Disabilities can contact me privately to discuss how I may assist in facilitating the accommodations you will use in this course.

University Counseling Services: DePaul University Counseling Services (UCS) is committed to providing a range of culturally aware and sensitive clinical services to help currently enrolled DePaul students remove barriers to academic and personal success by addressing emotional, psychological, and interpersonal concerns through multiple treatment modalities. Services offered include: group counseling, individual counseling, couples counseling, crisis management, consultation, referrals, and telereach/outreach workshops. To connect with the counseling center, contact their main number at (773) 325-7779 during regular business hours (Monday-Friday, 9am-5pm) to schedule an initial consultation, which is typically scheduled within 1-2 business days of your call.

Class Schedule:

DATE	TOPIC	READINGS	ASSIGNMENT
Mar 29	Introduction to Course		
Mar 31	Evolution Basics - Overview		
Apr 5	Phenotypic Plasticity: Non-Evolutionary Phenotypic Change	Appleton & Palmer (1988)	Quiz 1 (Introduction to Evolution) Quiz 2 (Phen. Plast.)
Apr 7	Evolution Basics: Adaptive Evolution	Chan et al. (2010)	Quiz 3 (Ad. Evol.)
Apr 12	Evolution Basics: Genetic Drift	Kolbe et al. (2012)	Quiz 4 (Gen. Drift)
Apr 14	Evolution and Religion	Miller et al. (2006); Pew (2013); PBS Video: Judgment Day- Intelligent Design on Trial	
Apr 19	**MIDTERM EXAM Available Mon April 19 – 8:00am-11:59 pm**		
Apr 21	Human Evolution	Maslin et al. (2015)	Quiz 5 (Hum. Evol.)
Apr 26	Human Evolution Group Presentation	Assigned Group Reading	
Apr 28	Evolutionary Medicine	Stearns (2012)	Quiz 6 (Evol. Med.)
May 3	Evolutionary Medicine Group Presentation	Assigned Group Reading	
May 5	Zoonosis: Viral Evolution and Human Disease	Karesh et al. (2012)	Quiz 7 (Zoonosis)
May 10	Zoonosis Group Presentation	Assigned Group Reading	
May 12	Evo-Devo	Muller (2007)	Quiz 8 (Evo-Devo)
May 17	Evo-Devo Group Presentation	Assigned Group Reading	
May 19	Adaptive Radiation	Losos (2010)	Quiz 9 (Ad. Rad.)
May 24	Adaptive Radiation Group Presentation	Assigned Group Reading	***Evolution and Society Paper***
May 26	Evolutionary Genomics	TBA	Quiz 10 (Evol. Genom.)
May 31	**MEMORIAL DAY - NO CLASSES**		
Jun 2	Evolutionary Genomics Group Presentation	Assigned Group Reading	
	FINAL: Available Mon June 7 – 8:00am-11:59 pm		