ADVANCED EVOLUTIONARY THEORY
BIOL5322 CRN 28402
FALL 2020
(Modifications to the Syllabus are Possible)

Course Description –
The class covers the classic to contemporary topics in evolutionary theory, with assignments to incorporate an understanding of the fundamentals of evolution at a practical level. The first part of the course will consist of literature review and discussion of fundamental theory in Evolution thinking interspersed with assignments to provide a practical understanding of the evolutionary concepts. This will be followed in the second part of the course by discussion of topics in the current literature. Students will be expected to lead literature discussion sessions, participate in discussions, develop annotated bibliographies of the literature assigned, develop a paper relating evolutionary theory to their research, and complete assignments related to evolutionary theory. The target audience is graduate students concentrating in ecology and evolutionary biology, as well as individuals from other fields (molecular biology, bioinformatics, etc.) with an interest in evolutionary theory.

Class Meetings
T/TH 1:00-2:20 – online: Blackboard - Zoom

Instructors –
Michael Moody, B306 Biology Building, mlmoody@utep.edu
Liz Walsh, B218 Biology Building, ewalsh@utep.edu

Office hours by appointment - online

Textbook –
Required: None, readings from the literature will be assigned
Recommended references: Population Genetics, A Concise Guide by John Gillespie,
Evolutionary Theory by Sean Rice, Evolutionary Genetics (2d Edition), by John Maynard Smith

Prerequisites - It is expected that all students have had introductory undergraduate level courses that have included elements of genetics and evolutionary biology. While mathematics will be used in the class, virtually all of it will be at the level of high school algebra and elementary (first semester) calculus and statistics.

GRADING

Annotated bibliographies	15
Discussion leader x 2	15
Participation and quizzes	15
Simbio Labs	15
Final Paper & Elevator Talk	20
Final Exam	20

COURSE POLICIES

POLICY ON MAKE-UP EXAMINATIONS: No make-up exams will be given for reasons other than illness (doctor's note required), absence with the instructor's prior approval, or when a student is on official University business (documentation required). Make-up exam will be scheduled at the Instructor's convenience.

POLICY ON ACADEMIC HONESTY: Academic Dishonesty will not be tolerated. It includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. If you have any questions regarding the university policy on scholastic dishonesty please contact the Dean of Students.

POLICY ON ELECTRONIC DEVICES: Be courteous to your fellow students and lecturer. Turn off any cell phones, smart phones, Blackberries, etc. during lecture. You cannot text, surf the internet, watch movies, listen to music, etc. while class is in session.

ATTENDANCE POLICY: Regular virtual attendance will be necessary for success in this class.

POLICY ON DISRUPTIVE BEHAVIOR: Any student who disrupts the class will be asked to leave and will be referred to the Dean of Students.

DISABILITY STATEMENT: If a student has or suspects he/she has a disability and needs an accommodation, he/she should contact the Center for Accommodation and Support Services (CASS) at 747-5148 or at cass@utep.edu or go to Room 106 Union East Building. The student is responsible for presenting to the instructor any CASS accommodation letters and instructions.

MILITARY STATEMENT: If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact me at the beginning of the semester.

Advanced Evolutionary Theory Schedule

Week of	Topic	Instructor
Aug 25	Overview	Moody
Aug 27	Origin of Species - Darwin	Moody
Sep 1	Simbio – Evol for Ecol: exercises 1&2	Moody
Sep 3	Genetical Theory -Wright	Moody
Sep 8	Simbio – Dogs: exercises 1&2	Moody
Sep 10	Drift and Natural selection - Dobzhansky	Moody
Sep 15	Simbio - Sickle cell alleles: exercises 2&3	Moody
Sep 17	Nothing in Biology Makes Sense - Dobzhansky	Moody
Sep 22	Simbio – Evol for Ecol: exercise 3	Walsh
Sep 24	Species Concepts - Simpson	Walsh
Sep 29	Critique of Species Concept – Dobzhansky	Walsh
Oct 1	Ecology and the Origin of Species – Schluter	Walsh
Oct 6	Tree Thinking – Fitch; Doolittle	Walsh
Oct 8	Simbio – dogs exercise 3; flowers and trees	Walsh
Oct 13	Butterflies and Plants Coevol - Ehrlich	Walsh
Oct 15	Gaia – Williams	Walsh
Oct 20	The Spandrels of San Marco – Gould	Walsh
Oct 22	**Elevator Talks**	**Both**
Oct 27	Dispersal barriers – Waters et al.	Walsh
Oct 29	Experimental speciation – White et al.	Walsh
Nov 3	Sexual selection – Rowe et al.	Walsh

Nov 5	Evolution & Ecological Networks – Segar et al.	Walsh
Nov 10	Arctic Conservation Genomics – Colella et al.	Walsh
Nov 12	Eco-Evolutionary Models – Pontarp et al.	Moody
Nov 17	Genomics, Species, Climate Change – Waldvogel et al.	Moody
Nov 19	Predictive Value Pop. Genomics – Razgour et al.	Moody
Nov 24	Evolutionary Prediction – Shaw	Moody
Dec 1	Conservation and Genome Editing – Phelps et al.	Moody
Dec 3	**TBD & Paper Due**	Moody
Dec 10	**Take Home Final Exam Due – 5 pm**	

Assignments:

Annotated bibliographies (15%)
For each paper assigned and an additional 5 papers used towards your Project Final Paper, you will write annotated bibliography entries with short descriptions of (i) what the paper is about (short paragraph); (ii) how it is relevant to you, particularly with respect to your research interests (short paragraph). These components will be part of the general discussion during class and will be due before discussion begins. We will discuss these in class the first two weeks and what improvements will be needed. Each paper must also be put in an electronic citation database of your choice (EndNote, Zotero, Mendeley, etc)**.** These will all be initially turned in by **October 27 before the elevator talks so the overall format can be assessed** and you will receive feedback. Ultimately, the assignment is due **December 3.**

Project: Integrating Evolutionary Theory Into Your Research (20%)
For this project you will relate evolutionary theory to your research topic. You will need to incorporate the theory from at least one papers from the first (fundamentals) part of the class and one from the second (contemporary) part of the class. Choose the theory that is most directly related to your own thesis/dissertation project. If you have not yet chosen a project, or are not conducting a research project for your program, choose a theory that interests you and direct it towards a research topic you find interesting.

1) **Student Elevator Presentations: Oct. 22** – you will provide a short (5 min.) presentation to describe your project. You will present to the class 3-5 slides on your project and describe the evolutionary theory(-ies) of interest. This will allow the class and your professors evaluate your progress and provide feedback for the final paper.
2) **Final Paper: Dec. 3 -** For the paper (5-6 pages single-spaced + references) you will conduct a literature review addressing how fundamental evolutionary theories relate to

your research or a specific topic of interest that you intend to study. The paper and presentation will include:

- The theory – description, when and under what context was it developed, and how was it received historically.
- How has the theory developed over time and been related to your research topic of choice.
- How can the theory be tested in relation to your research topic.
- What modern methods can be utilized for testing the evolutionary concept in relation to your research. Provide examples.
- Future directions – integrating biology

Readings Part 1:

8/27 – On the origin of species by means of natural selection (excerpt) / C. Darwin (1859)
9/03 – The genetical theory of natural selection: a review / S. Wright (1930)
9/10 – An experimental study of interaction between genetic drift and natural selection / T. Dobzhansky and O. Pavlovsky (1957)
9/17 – Nothing in biology makes sense except in the light of evolution / T. Dobzhansky (1973)
9/24 – The species concept / G.G. Simpson (1951)
9/29 – A critique of the species concept in biology / T. Dobzhansky (1935)
10/1 – Ecology and the origin of species / D. Schluter (2001)
10/6 – Construction of phylogenetic trees / W.M. Fitch and E. Margoliash (1967)
10/13 – Butterflies and plants: a study in coevolution / P.R. Ehrlich and P.H. Raven (1964)
10/15 – Gaia, nature worship and biocentric fallacies / G.C. Williams (1992)
10/20 – The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme / S.J. Gould and R.C. Lewontin (1979)

Readings Part 2:

10/27 – Dispersal reduction causes, genomic mechanism & evol consequences / Waters et al. (2020)
10/29 – The past and future of experimental speciation / White et al. (2020)
11/3 – The reproductive microbiome an emerging driver of sexual selection, sexual conflict / Rowe et al. (2020)
11/5 – Deciphering the interdependence between ecol and evol networks / Segar et al. (2018)
11/10 – Conservation genomics in a changing Arctic / Colella et al. (2020)
11/12 – The Latitudinal Diversity Gradient: Novel Understanding through Mechanistic Eco-evolutionary Models / Pontarp et al. (2019)
11/17 – Evolutionary genomics can improve prediction of species' responses to climate change / Waldvogel et al. (2019)
11/19 – Considering adaptive genetic variation in climate change vulnerability assessment reduces species range loss projections / Razgour et al. 2019
11/24 – From the Past to the Future: Considering the Value and Limits of Evolutionary Prediction / Shaw 2019
12/1 – Transforming ecology and conservation biology through genome editing / Phelps et al. 2020