SPECIAL TOPICS MODULE: CLASSIC PAPERS IN EVOLUTION –SYLLABUS

INSTRUCTOR

Murray

MEETING INFORMATION

6 sessions, dates and times TBA

COURSE GOALS

Our goal is to provide students with a broad introduction to classic ideas, concepts, and theories in evolution. We will accomplish this goal by having students read classic papers on various topics, from across the breadth of evolution. These readings will provide students with a solid foundation in the field that enables them to identify the central questions that evolutionary biologists are striving to resolve.

Students will develop oral skills by presenting and leading discussions on 1-2 papers. Grant writing and critical thinking skills will be promoted through the writing of one short grant structured around addressing a classic question with modern techniques.

LEARNING OUTCOMES

By the end of the course students are expected to obtain the following learning outcomes:

1) Gain a broad understanding of some classic questions, ideas, and knowledge in evolution.
2) Improve grant writing skills.
3) Developing oral skills in relation to the presentation and discussion of scientific ideas.

PROPOSED ASSIGNMENTS AND GRADING

The assignments for the course will be designed to evaluate whether students are obtaining the expected learning outcomes. Specifically, final grades will be comprised of four components. These are the assignments and grades:

1) **DISCUSSION LEADER** – Prepare a presentation of a classic paper. The leader will also lead the class through a discussion of the scientific problem, the questions/hypotheses, methods used, results and conclusions in the context of classic ideas in the field. About 60% of the presentation should cover key points from the paper. The other 40% should be "value added" by the presenter by connecting it to subsequent work, including modern/current manifestations, and discussing the impact and influence of the focal paper. The remaining time should be for discussion, led by the discussion leader. The number of times a student serves as Discussion leader will be dependent on enrollment.

   20% of final grade

2) **SHORT GRANT** – Either a) Write a one page grant that addresses a classic problem in evolution in the style of an application for a Sigma Xi Grant in Aid of Research (https://www.sigmaxi.org/programs/grants-in-aid-of-research). OR b)Write a 2-3 page grant that addresses a classic problem in ecology or evolution in the style of an application for one of the EEB Department's Graduate Research Award Grants, or the Society for the Study of Evolution's Rosemary Grant Awards (https://bit.ly/32TCrOC). Details will be provided at the first meeting.

   20% of final grade

3) **DIVERSIFYING THE CLASSICS.** The initial list of papers below skews heavily towards male scientists. Some of this reflects the biases in who could participate in science at the time, some reflects biases in who became authors of work they did (women frequently did work that today would be worthy of authorship, but were denied it at the time), and some bias in our recollections and recognition. For each general topic represented by a paper below, students will identify another classic paper, "should-be" classic paper, overlooked contribution, or prominent early paper in the same topic area authored by scientists from a currently under-represented group. Students will prepare a 1-page executive summary / brief making the case for their paper. I predict that this assignment will be challenging, requiring both a deep reading of the original paper and a thorough dive into the literature. **To be prepared for up to 6 papers (for each session, each student will submit either a synopsis or a diversifying assignment on one of the two papers).**

   20% of the final grade

4) A **BRIEF SYNOPSIS** of the paper. A 1 page summary of the paper, its main contribution, the logic of how it arrived at its conclusion, and the key contributions. **To be prepared for up to 6 papers (for each session, each student will submit either a synopsis or a diversifying assignment on one of the two papers)**, not overlapping with the **DIVERSIFYING THE CLASSICS** assignments**.** As a class, I will ensure there is a relatively even distribution of papers receiving synopses versus diversifying briefs.

   20% of the final grade

5) **PARTICIPATION** – Students will be evaluated on engagement and contribution to discussions in class.

   20% of final grade

COURSE TOPICS

Below, there is a list of recommended topics for each sub-discipline and associated classic readings. These topics are considered central components of each field. As a class, you will choose among the topics to cover a good breadth of knowledge while also tailoring them to your specific interests.

If you are interested in proposing a different topic or a different paper on one of the listed topics, feel free to do so but the topic will have to be of general interest to most of the rest of the class and you will

need to come up with two potential papers that have been important in the field (500+ citations) and that will be approved by the Course Instructor.

For students who wish to accompany these readings with background reading or a review of the topic we suggest the following sources which are also the suggested review materials for the EEB PhD appraisal exams:

Evolution:
Futuyma, D. 2013. *Evolutionary Biology.* 3rd ed. Sinauer Assoc.
Freeman, S. & Herron, J.C. 2014. *Evolutionary Analysis*. 4th ed. Prentice Hall.
Ecology
Levin SA (ed.) 2009. *The Princeton Guide to Ecology*. Princeton University Press

READING LIST

EVOLUTION (CHOOSE 12 OF THIS LIST)
1. Co-evolution Ehrlich & Raven 1964
2. Kin-selection and social evolution Hamilton 1964
3. Neutral theory of evolution Kimura 1970
4. Comparative phylogenetics Felsenstein 1985 Amer Nat
5. Sexual selection Bateman 1948 Heredity
6. Speciation Mayr 1942
7. Evolution of sex Crow & Kimura 1965
8. Drift, Adaptation, & the Shifting-Balance Theory Wright 1932
9. Local adaptation Turreson 1923 Hereditas
10. Molecular and genomic evolution Maynard Smith 1970 Nature
11. Natural selection on correlated traits Lande and Arnold 1983
12. Evolution on two levels King and Wilson 1975
13. Trade-offs and life history van Noordwijk and de Jong 1986

14. Phenotypic plasticity
    Via and Lande 1985