BIO 4200

INTRODUCTION EVOLUTIONARY BIOLOGY

SYLLABUS, WINTER 2017 (Course Ref. No. 21526, 23515)

Credits: 3
Time: M/W 10:00AM - 11:15AM
Place: 1117 Science Hall

Instructor: Dr. Markus Friedrich
Biological Sciences Building, room 3117
Phone: 313 577 9612

Goal: Introduction to essential concepts and methods in evolutionary biology

Contact and communication: After lecture or per email: friedrichm@wayne.edu

Office hours: After lecture or per appointment

Credit requirement policy: Note that prerequisite requirements as outlined here will be strictly enforced by the department: C- or better in BIO 3070 and one of the following successfully completed: BIO 3100, 3200 or 3500.

METHOD OF INSTRUCTION
Discussion initiated by lecture materials.

i>clicker participation is encouraged and will be incentivized. See Grading section for details.

Lectures are accessible online at
https://drive.google.com/#folders/0B6RXcc7dd6COUGRqVE5JTld1ak0

COURSE DESCRIPTION
This course is an in-depth introduction to major concepts, mechanisms, and case studies in evolutionary biology. Given the highly compressed nature of the spring/summer offering, students will be required to familiarise themselves with the study materials before lecture through study of textbook and posted lecture materials. The actual lectures will focus on discussion initiated by student questions or questions to the students.

TOPICS COVERED

1. Microevolution versus macroevolution
2. The mechanism and consequences of natural selection
3. The relationship between genetic and phenotypic variation
4. Understanding organismal diversification as descent with modification
5. Using tree visualization to study and describe evolutionary relationships and ancestries
6. Reconstructing phylogenetic trees using molecular and morphological information
7. Defining homology at the phenotypic and molecular level
8. The impact of selection, genetic drift, migration, inbreeding, and mutation on genetic change at the population level
9. The neutral theory of molecular evolution and the molecular clock
10. The importance of genetic recombination for adaptive evolutionary change
11. The evolution of linkage disequilibrium
12. The diagnostic power of linkage disequilibrium to study genes under selection
13. Molecular approaches to detect selection
14. Quantitative genetic approaches to analyze the adaptive evolution of complex traits including the mapping of quantitative trait loci
15. Recent human population history and its impact on genome evolution
16. Recent adaptive changes affecting human populations at the genetic level
17. Evolutionary forces affecting genome evolution
18. Species concepts
19. Speciation modes
20. The role of developmental genes and mechanisms in body plan evolution, phenotypic plasticity and phenotypic robustness
21. The role of co-option and modularity in the evolution of organismal complexity
22. Sexual selection
23. Kin selection and evolutionary game theory based approaches to study the evolution of social systems
24. Behavioral evolution
25. Primate evolution and ancestral human traits
26. Cultural evolution

LEARNING OBJECTIVES/OUTCOMES

As a result of mastering the material in this course, you will be able to:

1. Understand and study the mechanisms underlying the diversification of viruses, microorganisms, and multicellular systems by means of natural selection
2. Infer phylogenetic relationships using structural and genetic data
3. Apply comparative approaches to analyze and study patterns of genetic, organismal and cultural diversification
4. Study adaptive processes using molecular genetic tests

5. Understand the complementary nature of theoretical, modeling, and experimental studies of evolutionary change
6. Understand the role of kinship and reciprocity in the evolution of cooperative behavior
7. Apply game theoretical thinking
8. Understand the evolutionary origin of gender differences
9. Recognize the multiple levels of evolutionary change that affect the human sphere
10. Apply evolutionary insights to the development of biomedical and public policy

Recommended textbooks:

Evolutionary Analysis, 5th edition
Authors: Scott Freeman, Jon C. Herron
Publisher: Pearson

Evolution: Making Sense of Life
Authors: Carl Zimmer and Douglas Emlen
Publisher: Roberts and Company Publishers
ISBN: 9781936221172

Human Evolutionary Genetics, 2nd edition
Authors: Mark Jobling, Edward Hollox , Matthew Hurles , Toomas Kivisild , Chris Tyler-Smith
Publisher: Garland Science, ISBN: 9780815341482

Recommended complementary literature and online resources:

- http://en.wikipedia.org/wiki/Evolution
- Concepts of Genetics 9th edition
- Peter R. Grant, B. Rosemary Grant: *How and Why Species Multiply: The Radiation of Darwin's Finches*
- Neil Shubin: *Your Inner Fish: A Journey into the 3.5-Billion-Year History of the Human Body*
- Frans de Waal: *Our Inner Ape*

Grading:

- There will be three midterm exams. Each midterm exam will count for 25% of the grade. The midterm exam with the lowest numerical score can be dropped. If a midterm is not taken, that exam will receive a score of 0 (zero) and may be dropped. Only one midterm exam can be dropped, even if two or more midterm exams are missed.

- The final exam will count for 25% of the grade if none of the midterm exams is dropped.
- The final exam will count for 50% of the grade if one of the midterm exams is dropped.
- The final exam is mandatory.
- The final exam is not cumulative and will cover material presented in the final section of course and mandatory.
- Class participation and attendance is encouraged and will be incentivized as follows:
    - Three attended lectures per month ahead of each of the three midterm exam and the final exam will be rewarded with one bonus percentage point added to the final average exam percentage score. This can amount to a maximum of 4 bonus points.
    - Attendance will be scored by i>clicker 2 response during lectures
    - To enjoy this benefit, you will need to register your i>clicker on the blackboard course website
- Except for attendance rewards, there is no extra credit under any circumstances.
- Students with scheduling conflicts for any midterm exam must notify Dr. Friedrich in writing by class time by January 16th 2017. No makeup exams will be given unless Dr. Friedrich has been notified in writing by this date.
- Reasonable exceptions will be granted in cases of illness, which will require notification prior to the exam and must be followed up with an original signed note from a physician.

Exam formats:

- The exams may include questions that are multiple choice, fill-in-the-blank, problem solving, and short essays.
- All exams will be closed book and held in class.
- All you will need is a few sharp pencils and an eraser.
- No electronic devices of any other kind (calculator, smart phone, smart watch, etc)will be allowed.
- Cell phones and pagers must be turned off.
- Anyone who leaves the exam room will not be allowed back in.
- Late-arriving students should know that admittance into the exam room will not be allowed after the first student has left the room.
- Scantron forms will be supplied, i.e. do not bring your own scantron forms to the exams as you will not be allowed to use them.

The final letter grade will be determined by a straight scale as follows:

Total Percentage	Final Grade
90.00%- 100%	A
86.00%- <90%	A-
84.00%- <86%	B+
78.00%- <84%	B
76.00%- <78%	B-
74.00%- <76%	C+
68.00%- <74%	C

66.00%- <68%	C-
64.00%- <66%	D+
58.00%- <64%	D
56.00%- <58%	D-
<56%	F

Honors option: Students who want to complete this course with honors classification can do so by writing a term paper. Directions and topic will be decided on a case by case basis after discussion during a personal meeting.

EXAM GRADE DISPUTES / CHALLENGE OPTION

- Students are strongly encouraged to check graded exams for potentially overlooked points.
- Students will have one week after the return of an exam to challenge a grade. The grade rebuttal needs to be submitted together with the exam. The rebuttal document needs to provide detailed explanations why additional points should be granted for every answer requested to be reconsidered.
- Failure to challenge the grade within one week after the return of an exam constitutes acceptance of the exam grade as is.

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CHEATING

Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

- Cheating: Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student's test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.

- Fabrication: Intentional and unauthorized falsification of any information or citation.

Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

- Plagiarism: To take and use another's words or ideas as one's own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

- Other forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student's access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an unadministered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

POSTING OF EXAM GRADES

Exam grades will be posted on the Blackboard course website by student ID number. The distribution of scores will be provided and discussed in class.

SPECIAL CONSIDERATIONS FOR INDIVIDUALS WITH DISABILITIES

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

RELIGIOUS HOLIDAY CONFLICTS

- If you have a conflict with any of the scheduled class or exam times due to religious reasons, you must notify Dr. Friedrich in writing by class time on January 16th 2017.
- No makeup exams will be given unless s/he is notified in writing by this date.

UNEXPECTED UNIVERSITY CLOSURES

If the University is officially closed on an exam day, the exam will be held on the next regularly

scheduled class day. Closure of the University is announced by the following mechanisms:
1. the University Newsline (313) 577-5345 *
2. WSU Homepage (www.wayne.edu) *
3. WSU Pipeline (www.pipeline.wayne.edu) *
4. WDET-FM (Public Radio 101.9)
5. by other local radio and television stations
* Note: The information on closures and class cancellations is likely to be found at these locations before it is broadcast by local radio and television stations

OTHER

- I will write letters of recommendations for students who earn a grade of B+ and better.
- No cell phone or smartphone use during during class.
- Any specific issue not covered by this syllabus will be resolved using University policies.
- Disputes that cannot be resolved following the guidelines present in this syllabus will be resolved by following the guidelines of the University "Student Due Process".

ADD/DROP POLICY

- Add forms will not be signed after the second week of class.
- Drop forms must be signed before the end of "study day", which is the day after the last day of classes.

Wayne State has changed the grading policy. There are no more "X" grades. If you sign up for a class, stop attending, and fail to withdraw, you will receive an F for the course. In addition, if you drop the course after 5 weeks, you will be assigned one of the following three marks: WP (withdrew but was passing at the time), WF (withdrew but was failing at the time), WN (withdrew and never attended class or no graded work). Also, any "I" given to a student will automatically revert to "F" if the work is not completed within one calendar year. There are no exceptions. The failure notation has been changed from an "E" to an "F". Further information on the grading policy can be found at http://sdcl.wayne.edu/RegistrarWeb/Registrar/policies.htm.

Tentative lecture schedule:

Section I:

Mon Jan 9	10:00am – 11:00am	BIO4200: Introduction: Studying descent with modification (evolution) in 2017
Wed Jan 11	10:00am – 11:00am	BIO4200: Natural selection and viral resistance (EA Chapter 1)
Mon Jan 16	All day	Martin Luther King Day
Wed Jan 18	10:00am – 11:00am	BIO4200: Natural selection in Darwin's finches (EA Chapter 2)
Mon Jan 23	10:00am – 11:00am	BIO4200: Major transitions in the tree of life (EA Chapter xxx)
Wed Jan 25	10:00am – 11:00am	BIO4200: Homology (EA Chapter 2.4)
Mon Jan 30	10:00am – 11:00am	Midterm exam I

Section II:

Wed Feb 1	10:00am – 11:00am	BIO4200: Genetic variation, phenotypic variation, and the Hardy Weinberg equilibrium (EA chapter 5 and 6.1)
Mon Feb 6	10:00am – 11:00am	BIO4200: The population genetic effects of selection (EA Chapter xxx)
Wed Feb 8	10:00am – 11:00am	BIO4200: The evolutionary effects of mutation, migration, and inbreeding (EA Chapters 6.4, 7.1, and 7.4)
Mon Feb 13	10:00am – 11:00am	BIO4200: Genetic drift and the neutral theory of molecular evolution (EA chapter 7.3)
Tue Feb 14	All day	Valentine's Day
Wed Feb 15	10:00am – 11:00am	BIO4200: Genome evolution (EA Chapter 15.1-15.4)
Mon Feb 20	All day 10:00am – 11:00am	Presidents' Day BIO4200: Species concepts (EA Chapter 16.1)
Wed Feb 22	10:00am – 11:00am	BIO4200: Speciation mechanisms (EA Chpater 16.2-16.5)
Mon Feb 27	10:00am – 11:00am	Midterm exam II

Section III:

Wed Mar 1	10:00am – 11:00am	BIO 4200: Linkage equilibrium and the evolution of complex traits (EA 8.1, 8.2)
Mon Mar 6	10:00am – 11:00am	BIO4200: Evolutionary significance of sex (EA 8.3)
Wed Mar 8	10:00am – 11:00am	BIO4200: Evolution of sexual dimorphism, intersexual selection, and signaling selection (EA Chapter 11 and 19)
Sun Mar 12	All day	Daylight Saving Time starts
Mon Mar 20	10:00am – 11:00am	BIO4200: Intrasexual selection (EA Chapter 11)
Wed Mar 22	10:00am – 11:00am	BIO4200: Sexual conflict (EA Chapter 11)
Mon Mar 27	10:00am – 11:00am	Midterm exam III

Section IV:

Wed Mar 29	10:00am – 11:00am	BIO4200: Developmental evolution: Plasticity (EA Chapter xxx)
Mon Apr 3	10:00am – 11:00am	BIO4200: Developmental evolution: Robustness (EA Chapter xxx)
Wed Apr 5	10:00am – 11:00am	BIO4200: Evolution of social systems through kin selection (EA Chapter 12.1 and 12.2)
Mon Apr 10	10:00am – 11:00am	BIO4200: Evolution of social systems through direct reciprocity (EA Chapter 12.3-12.5)
Wed Apr 12	10:00am – 11:00am	BIO4200: Evolution of social systems through indirect reciprocity (EA Chapter 12.3-12.5)
Thu Apr 13	All day	Thomas Jefferson's Birthday
Sun Apr 16	All day	Easter Sunday
Mon Apr 17	10:00am – 11:00am	BIO4200: Evolution of sensory and cognitive capacities
Wed Apr 19	10:00am – 11:00am	BIO4200: Group selection
Mon Apr 24	10:00am – 11:00am	BIO4200: Coevolution (EA Chapter xxx)
Mon May 1	10:00am – 11:00am	BIO4200 Final exam