7-2012

BIOB 272.60: Genetics and Evolution

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GENETICS and EVOLUTION

BIOB 272 Summer 2012

INSTRUCTOR: Dr. Cerisse Allen, cerisse.allen@mso.umt.edu
BRB 208, 243-5722
Office hours: M,T,Th, 2-3 PM, or by appointment

TA: Jennifer Smith, jennifer5.smith@umconnect.umt.edu

COURSE MEETS: MTuWTh 3:40-5:00 PM, Integrated Science Building 110 (ISB 110)

TEXTBOOKS (REQUIRED): *Genetics: Analysis & Principles*, Chs 1-8, R.M. Booker, 3rd ed., 2009
Evolutionary Analysis, S. Freeman & J.C. Herron, 4th edition, 2007

ONLINE RESOURCES: Class Moodle page- please check Moodle regularly.

Course Description – Evolution is the central organizing principle of the biological sciences. The renowned geneticist Theodosius Dobzhansky wrote, "nothing in biology makes sense except in the light of evolution" (1973). Evolutionary theory has the power to explain biological phenomena over many scales and situations using the same set of relatively simple mechanisms. This course is an introduction to those mechanisms, how they drive evolutionary change in populations, and how they lead to patterns of large-scale diversity among species. The study of evolution is all-inclusive, and draws upon many scientific disciplines including geology, chemistry, physics, mathematics, anthropology, botany, zoology, and computer science in order to develop a comprehensive understanding of the history and diversity of life on Earth.

The first part of our course is concerned with the basic principles of genetics. We will begin with the classic work of Mendel and continue through the discoveries of modern genomics. The second part of the course deals with evolutionary mechanisms and resulting patterns of diversity. These two topics, genetics and evolution, are treated as a single integrated field of scientific inquiry. Genetic change is the basis for evolutionary change. Our understanding of evolution therefore requires a basic understanding of genetics. However, the converse is also true - our understanding of genetics (including human and medical genetics) requires knowledge of the evolutionary processes that have shaped genomes and genetic diversity through time.

The sequence of the entire human genome was published in 2001 (Venter et al., 2001, Science 291:1304-1351), ushering in the age of large-scale genomics with broad implications for the study of human health and disease. Since this time, the genome sciences have come to dominate the fields of genetics and evolution. Complete genome sequences have been generated for 1,000s of species from a broad diversity of life, including dozens of mammals. Current efforts are underway to sequence 1,000 human genomes and 10,000 genomes from a diverse collection of animals. The basic principles of genetics and evolution form the foundation of these exciting frontiers in biology.

EXPECTED OUTCOMES – This course will emphasize biological principles, scientific concepts, and the synthesis of information. Expected outcomes are to understand the fundamental mechanisms of inheritance and evolution, and gain a basic understanding of the way evolutionary biologists and

CR/NCR) is not automatically approved after June 4th. Changes may be requested by petition, but the petition must be accompanied by documentation of extenuating circumstances. Requests to drop the course or change the grading status simply to benefit a student's grade point average will not be approved.

Student Behavior

To maximize their likelihood of success, students should attend each lecture, and complete assigned readings before class. It is unwise simply to rely on presentations posted on-line. When in class, students are expected to behave in a manner that is respectful of others. Cell phones, iPods and other electronic devices must be turned off during lecture, during Discussion and Review sessions as well as during exams. Texting during class is not permitted - you will be asked to leave and/or have points deducted from your grade. If you prefer, you may use laptops or eTablets to take notes during lecture – please be respectful of others when doing so. Written assignments are due at the start of class on the assigned day.

GRADING

Makeup exams in case of emergency or illness will only be administered if arrangements are made **prior** to the exam. You must contact Dr. Allen *at least one week before an exam* if you need to make other arrangements to take an exam because you will be off campus for other University activities (track, ROTC, etc.). Because ~15% of your grade (90 points) will be based on attendance and participation in class and weekly discussion groups, additional extra credit will not be offered.

Grades will be based how many of **625 points** you earn over the course of the semester.

(1) Two mid-term exams (110 points each; 220 points total)

(2) Discussion sessions (40 participation, 90 HW – 130 points total). Six problem sets worth 18 points each will be assigned throughout the semester. - you may drop the lowest score. The remaining 40 points will be based on attendance and participation in discussions.

(3) Three take-home exam questions (25 points each; 75 points total).

(4) In-class questions (50 points). These are strictly participation points- in-class questions will not be assigned grades.

(5) Comprehensive final exam (150 points). 50% of the Final Exam will focus on material covered in the last third of the course, and 50% will be comprehensive and test material covered throughout the semester.

Final grades will be based on your total points as a percentage of the 650 total points possible. Pluses (+) and minuses (–) will be used (**A, A–, B+, B, B–, C+, C, C–, D+, D,** and **D–**) in the assignment of letter grades. Grades will be determined by the distribution of total scores, following these guidelines (these cutoffs may or may not be adjusted downward, to the benefit of the student, to better reflect natural breaks in the class scores):

≥90% of points: A- or better
≥80% of points: B- or better
≥70% of points: C- or better
≥60% of points: D- or better