

Biology 313 - Advanced Mendelian and Population Genetics
Spring 2010 - Lecture Syllabus

PROFESSOR INFORMATION

Professor: Dr. Richard Kliman
Office: MB 24
Office Hours: Tuesday 4-5, Wednesday 3-4
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GENERAL COURSE INFORMATION

Course: Biology 313, Advanced Mendelian and Population Genetics; Spring 2010

Number of credits: 3

Required materials: Hamilton, M.B., *Population Genetics*, John Wiley & Sons, West Sussex, UK, 2009.

Course description (from catalog): The course deals with advanced concepts in the inheritance of genes and traits. Extensions of Mendelian genetics include gene interaction, recombination, and quantitative genetics. Topics in population genetics include Hardy-Weinberg equilibrium and its extensions, Wright-Fisher populations, the coalescent, linkage disequilibrium, and molecular population genetics. The course emphasizes theory and applications, the latter including conservation, biomedical, and forensic genetics.

Format of course: Lecture (3 hours).

Course objectives: The purpose of this course is to provide you with a historical and modern perspective of classical, population and quantitative genetics.

COURSE OUTCOMES/ASSESSMENT

In addition to demonstrating understanding of the fundamental concepts of modern Mendelian, population, and quantitative genetics, you will demonstrate critical thinking and quantitative reasoning. The professor will monitor your progress in classroom activities; the professor will also evaluate your performance on formal exams related to the course material.

STUDENT ASSESSMENT/EVALUATION

Grading: The final course grade is based on percentage of points earned:

| | | | | |
|------------|------------|------------|------------|------------|
| ≥ 93% = A | ≥ 90% = A- | ≥ 87% = B+ | ≥ 83% = B | ≥ 80% = B- |
| ≥ 77% = C+ | ≥ 73% = C | ≥ 70% = C- | ≥ 67% = D+ | ≥ 60% = D |

Take-home Exams 1 and 2: 25% each. Exam will generally use an essay format. The exams are not explicitly comprehensive, though understanding some material covered on a previous exam may be required. You will have one week to complete each exam. If the exam is not turned in on its due date, it will not be accepted and you will be assigned a grade of 0.

Class Participation: 25%. Regular class participation is essential. You should expect to be called on, and you should come to class prepared to discuss the material. See details below.

Final Exam: 25%. The final exam will be taken during the scheduled final exam time.

STUDENT RESPONSIBILITIES

Lecture attendance: Attendance in lecture is strongly recommended. **Attendance on exam days is required.**

- If you must miss class for a Cedar Crest-sanctioned activity, provide appropriate proof in advance; this should be done as soon as you are aware of the conflict. Otherwise, your absence will be considered unexcused.
- If you must miss class for a legitimate, but unforeseen, reason, let me know as soon as possible; **your absence will be considered unexcused until I receive notification from the Dean of Student Affairs that the absence was judged to be unavoidable due to serious illness/medical emergency**

or family emergency. Please note that the Dean of Student Affairs only certifies that the absence was unavoidable and due to one of the above reasons. This is to maintain student confidentiality. It is solely up to the professor to excuse an absence.

Policy on make-up exams: If I agree that you missed an exam for a legitimate reason, I will prepare a makeup exam if the exam has already been returned. You should expect the exam to be essay-format.

CEDAR CREST COLLEGE HONOR CODE (INCLUDING THE CLASSROOM PROTOCOL)

The Department of Biological Sciences fully supports the Cedar Crest College Honor Code. The Honor Code is explained in the College Catalog; we recommend that you review it.

Disruptive behavior will not be tolerated. Any incidences will be noted and you risk being penalized 1/3 of your final letter grade for each incidence (e.g., B to a B-). Generally, disruptive behavior in the classroom is any behavior that interferes with the process of learning. At Cedar Crest College, it is the right of every student and faculty member to engage in a classroom experience free from disruptive behavior. What is disruptive to one person might not be disruptive to another, so the final authority on disruptive behavior is the faculty member. Faculty members have the authority to address disruptive behavior in the manner they see fit under the guidelines set forth in the College Catalog (please see the section on “Classroom Protocol”).

POLICY REGARDING LEARNING DISABILITIES

Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.

LECTURE TOPICS

| Topic | Reading to be done before class |
|--|---------------------------------|
| 1) Review of Mendelian Genetics | |
| 2) Introduction to Population Genetics | Ch. 1 |
| 3) Genotype Frequencies | Ch. 2 |
| 4) Genetic Drift and the Coalescent | Ch. 3 |
| EXAM 1 on TOPICS 1-4 | |
| 5) Population Structure and Gene Flow | Ch. 4 |
| 6) Mutation | Ch. 5 |
| 7) Natural Selection | Ch. 6-7 |
| 8) Molecular Evolution | Ch. 8 |
| EXAM 2 on TOPICS 5-8 | |
| 9) Special Topic: Forensic Applications | TBA |
| 10) Special Topic: Conservation Applications | TBA |
| 11) Quantitative Genetics | Ch. 9 |
| 12) Quantitative Genetics and Mendelian Genetics | Ch. 10 |
| 13) Special Topic: Biomedical Applications | TBA |
| FINAL EXAM on TOPICS 9-13 | |

Your obligations for this course include attendance at the final exam, on the day and time scheduled by the Registrar's Office. You should not make travel arrangements until the final exam schedule is published; if you must make plans early, you should schedule your travel after the last final exam day.

ANTICIPATED SCHEDULE

| Tuesday | Thursday |
|---|--|
| Jan 19 - Topic 1 | Jan 21 - Topic 2 |
| Jan 26 - Topic 3 | Jan 28 - Topic 3 |
| Feb 2 - Topic 3 | Feb 4 - To be determined |
| Feb 9 - Topic 4 | Feb 11 - Topic 4 |
| Feb 16 - Topic 4; Exam 1 distributed in class | Feb 18 - Topic 5 |
| Feb 23 - Topic 5; Exam 1 due at start of class | Feb 25 - Topic 6 |
| Mar 2 - Topic 6 | Mar 4 - Topic 7 |
| Mar 16 - Topic 7 | Mar 18 - Topic 7 |
| Mar 23 - Topic 8 | Mar 25 - Topic 8; Exam 2 distributed in class |
| Mar 30 - Topic 9 | Apr 1 - Topic 9; Exam 2 due at start of class |
| Apr 6 (no class, follows Monday schedule) | Apr 8 - Topic 10 |
| Apr 13 - Topic 10 | Apr 15 - Topic 11 |
| Apr 20 - Topic 11 | Apr 22 - Topic 11 |
| Apr 27 - Topic 12 | Apr 29 - Topic 12 |
| May 4 - Topic 13 | |

GRADING OF CLASS PARTICIPATION

A-range: You demonstrate excellent preparation; you show evidence of having identified and considered the key points in the readings. You volunteer contributions to class discussions, and your contributions are on-topic and demonstrate thoughtful consideration of the issues.

B-range: You demonstrate good preparation; you show evidence of having identified and considered the key points in the readings. You contribute to class discussions mainly when called upon, and your contributions are on-topic and demonstrate thoughtful consideration of the issues.

C-range: You demonstrate adequate preparation; you show evidence of being familiar with the key points in the readings. You contribute to class discussions mainly when called upon, and your contributions demonstrate familiarity with, but not a thorough understanding of, the issues.

D-range: You demonstrate minimal preparation; you show evidence of being familiar with some of the key points in the readings. You contribute to class discussions mainly when called upon, and your contributions rarely demonstrate understanding of the issues.

F: You demonstrate minimal preparation; you show no evidence of being familiar with the key points in the reading. You do not contribute to class discussions when called upon. You are frequently absent from class.

The following penalties will be applied to your class participation grade for recurrent, unexcused absences:

- 1 absence: 1 step (*e.g.*, A dropped to A-, A- dropped to B+)
- 2-3 absences: 1 full letter grade (*e.g.*, A dropped to B)
- 4-5 absences: 2 full letter grades (*e.g.*, A dropped to C)
- 6-8 absences: 3 full letter grades (*e.g.*, A dropped to D)
- >8 absences: you will be assigned a grade of 0