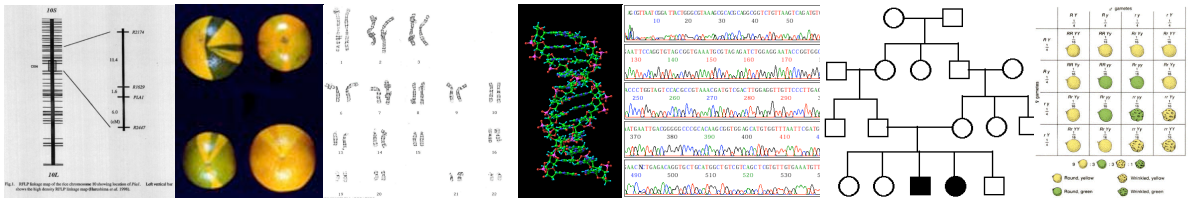

BIOL 255: Genetic Analysis

Fall 2008 Dr. Karen Hicks
Fischman 102, 427-5379, hicksk@kenyon.edu
Office hours: MWF 2-3 PM, T 9-11 AM, and by appointment

Course description

This intermediate* course introduces both principles and experimental approaches related to heredity in a wide variety of organisms from bacteria to humans. Topics will include classical transmission genetics, chromosomal structure, extranuclear heredity, epigenetics, population and evolutionary genetics, and molecular analysis of genes and chromosomes. As genetic analysis can be used to dissect many biological processes, we will also address how geneticists approach problems and advance scientific understanding, focusing our discussions around primary literature. Prerequisite: BIOL114.

* knowledge of material covered in Biology 114 (Genetics and Development of Organisms) will be assumed. Please review this material in your intro textbook or using the webnotes and/or see me if you require help with this material.

Reading

Required textbook: Transmission and Population Genetics, B. A. Pierce 2009.
Journal articles will be available via Moodle.

Course requirements and grading scheme

Evaluation will include assessment of both the understanding of the course content and the clarity of presentation in written or oral form. Your course grade will be determined as follows:

- The best way to learn genetics is by doing genetics. Therefore, daily problem sets based on current material will be assigned. Problem sets will be graded for completeness and a random subset of problems will be graded for accuracy. — 20%
- There will be three in-class mid-term exams and a two-hour final examination (to be held Monday, December 15 at 8:30 AM). In preparing for exams, remember that material from the beginning of the course will form a foundation on which later understanding will depend. — Midterms: 10% each; Final: 20%
- Mini-proposal project. To apply your understanding of genetic analysis, you will design a genetic approach to address a biological question of your choice. — 15%
- Class attendance and participation are a critical responsibility in this course, and will be included in determining your grade. More than three unexcused absences will result in point deductions. To participate fully in class, it is essential that you read and thoughtfully consider the assigned material before each class session, and complete all problem sets. Included in this grade are four brief (two paragraph) response papers related to assigned journal articles. — 15%

Course policies

Attendance

Class attendance is expected, and more than three unexcused absences will negatively affect your grade. If you are an athlete or a member of another organization that travels, it is your responsibility to make arrangements with me concerning missed classes well in advance. Rescheduling of exams due to excused absences must be arranged at least one week in advance. Coursework missed due to unexcused absences may not be made up.

Timeliness

Please be respectful of deadlines, keeping in mind that extensions will not be granted, and that a penalty of 5% per day will apply to late papers. Problem sets are due each day at the beginning of the class period, and late problem sets will not be accepted. If you know that you will be missing class for some reason (e.g., an athletic event), turn in your assignment BEFORE you leave. Under extenuating circumstances extensions may be granted, but this should be discussed with me in advance.

Group work

I strongly encourage you to exchange information, discuss class material, work problems, and bounce ideas off of one another (and me). **However**, all work submitted for evaluation must be your own. If you work on problem sets together, be sure that you write them up for submission in your own words, and acknowledge those with whom you have collaborated.

Academic honesty

This class will follow the official Kenyon College position on academic honesty**.** Please review the College policy, and ask if you have questions!

Students with Disabilities

If you have a disability and feel that you may have need for some type of academic accommodation in order to participate fully in this class, please feel free to discuss your concerns with me in private and also contact Erin Salva, Coordinator of Disability Services at PBX 5453 or via e-mail at **salvae@kenyon.edu**.

Course Outline: reading and problem assignments will be updated throughout the semester

Date	Topic	Reading	Assignments/Exams
8/29	Course introduction/review	Ch 1 & 2 (background/review)	
9/1	Basic principles of heredity	Ch 3 & 4 (mostly review)	Ch 2: 20, 25, 28, 32
9/3	Predicting & evaluating crosses	Ch 3 pp 50-54, 59-64	Ch 3: 14, 22, 29; Ch4: 22, 28, 35
9/5	Gene interaction	Ch 5 pp. 99-113	Ch 3: 26, 32, 33, 36, 37
9/8	Gene interaction	Ch 5 pp. 113-117, 122-125	Ch 5: 15, 16, 18, 22
9/10	Pedigree analysis & human genetics	Ch 6 pp.134-142 & review Ch 4	Ch 5: 12, 27, 28, 30, 40
9/12	Pedigree analysis & human genetics	Ch 6 pp.142-152	Ch 6: 18, 20, 26
9/15	Pedigree analysis & human genetics	Case study in class	Ch 6: 28, 29
9/17	Journal article discussion	TBA	Response paper
9/19	Synthesis/summary/catch-up		
9/22	**------exam------**		**Exam 1**
9/24	Linkage, recombination & mapping	Chapter 7	
9/26	Linkage, recombination & mapping		
9/29	Linkage, recombination & mapping		
10/1	Bacterial and viral genetics	Chapter 8	
10/3	Bacterial and viral genetics		
10/6	Bacterial and viral genetics		
10/8	Extranuclear inheritance & imprinting	Chapter 5 pp. 117-122	
10/10	October reading day – NO CLASS		
10/13	Journal article discussion	TBA	Response paper
10/15	Synthesis/summary/catch-up		
10/17	**------exam------**		**Exam 2**
10/20	Chromosome variation	Chapter 9	
10/22	Chromosome variation		
10/24	Chromosome variation		
10/27	Mutations and repair	Chapter 10	
10/29	Mutations and repair		
10/31	Mutations and repair		
11/3	Quantitative genetics	Chapter 11	
11/5	Quantitative genetics		
11/7	Quantitative genetics		Preliminary proposals due
11/10	Journal article discussion	TBA	Response paper
11/12	Synthesis/summary/catch-up		
11/14	**------exam------**		**Exam 3**
11/17	Population genetics	Chapter 12	
11/19	Population genetics		
11/21	Population genetics		
THANKSGIVING BREAK			
12/1	Evolutionary genetics	Chapter 13	
12/3	Evolutionary genetics		
12/5	Evolutionary genetics		Mini-proposal due
12/8	Journal article discussion		Response paper
12/10	Synthesis/summary/catch-up	TBA	
12/12	Course summary/evaluation		
12/15	**------final exam------**		**Final exam at 8:30 AM**