

## GENETICS (BIO240) Syllabus: Spring 2010

**Instructor:** Ron Kaltreider, Ph.D.

Email: [rkaltrei@ycp.edu](mailto:rkaltrei@ycp.edu)

Office: LS206

Office Phone: 815-1956

Office Hours: Monday-Friday

10:00-11:00 am

**Lecture Hours:**

Section 240.101 8:00-8:50 am MWF: LS302

Section 240.102 9:00-9:50 am MWF: CH232

**Laboratory Hours:**

Section 241.501 2:00-4:45pm M LS224

Section 241.502 2:00-4:45pm W LS224

Section 241.503 2:00-4:45pm F LS224 (Dr. Boehmler)

**Textbooks:**

**Text:** Concepts of Genetics 9<sup>th</sup> edition, Klug, Cummings, Spencer, and Palladino  
Pearson Benjamin Cummings, 2008.

**Lab Manual:** Laboratory DNA Science, Bloom, Freyer, and Micklos,  
Benjamin/Cummings Publishing Company, Inc., 1996.

**Websites:**

**Textbook:** Publishers website contains links to a variety of web-based resources,  
including a very helpful self-testing problem set for each chapter.

[http://wps.aw.com/wps/media/access/Pearson\\_Default/5255/5381217/login.html](http://wps.aw.com/wps/media/access/Pearson_Default/5255/5381217/login.html)

**Instructor:** My site (<http://faculty.ycp.edu/~rkaltrei/>) contains lecture notes,  
assignments, exam study guides, and a link to the textbook website. The assignments and  
lecture notes will be continually updated throughout the semester.

**Prerequisites:**

You should have received a grade of 2.0 or better in Biology I (BIO150) and General  
Chemistry I (CHM134).

**Course Description and Objectives:**

Although the principle concepts of genetics have been known for only 100 years, genetic  
selection has been conducted for many centuries on domesticated animals (*i.e.* dogs) and  
food crops (*i.e.* corn). The field of genetic research, although still in its infancy,  
represents a fundamental aspect of human biology. While recent advances in genetic  
research have provided a greater ability to diagnosis and treat various human  
abnormalities, such as cancer, they have also produced many ethical and political  
considerations, which are still hotly debated and remain unresolved. This class will  
provide you with an understanding of the principles and concepts of genetics. Specific  
objectives of this course are to provide an understanding and discuss ramifications of: 1)  
Inheritance, 2) Gene Structure, 3) Gene Function, 4) Gene Mutation, and 5) Ethical issues  
related to genetic research and its applications.

## Examinations and Grades:

### Grading Scheme: Lecture (60%) and Laboratory (40%)

First Exam:	100 pts	4 = 90% and above
Second Exam:	100 pts	3.5 = 85-89%
Third Exam:	100 pts	3 = 80-84%
Fourth Exam:	100 pts	2.5 = 75-79%
Laboratory:	480 pts	2 = 70-74%
Total:	880 pts	1 = 60-69%
		0 = 59% and below

### Exams:

The lecture schedule shows the approximate date of the first 3 exams. The 4<sup>th</sup> exam will be given during final exam week and is NOT a comprehensive exam. Barring documented illness or family emergency, failure to take the exam at the scheduled time will result in a grade of ZERO for that exam. Please try to contact me prior to the scheduled exam period, although if an emergency should arise (*i.e.* a 2 AM trip to the emergency room) do not “stress-out” about getting in touch with me immediately just inform me at your earliest convenience.

### Attendance:

**Lecture:** All students are expected to attend all scheduled classes. Conceptual understanding of Genetics, like all science courses, requires students to actively engage and interact with colleagues. Although I will not take daily attendance, I will monitor and note excessive absenteeism. Chronic tardiness to lecture or lab is very disruptive to the class. Please be on time. I will not directly penalize you for excessive absences or tardiness, although they may affect your grade through the following: 1) Student becomes responsible for obtaining the lecture notes and handouts from his/her fellow students, 2) Grades will NOT be rounded in the students favor (a 79.9 is a 2.5 not a 3.0), and 3) In class assignments (Quizzes) cannot be made up.

**Lab:** Attendance for lab is mandatory.

### Assignments:

**Lab Reports:** There will be one complete (*Brassica*) and one outlined lab (Flower Breeder) report for this course. The complete lab report will contain the following sections: Abstract, Introduction, Materials and Methods, Results including Figures and Tables with captions, Discussion, and References. The outlined report is based on computer-generated data and will prepare you for the interpretation of the Results section in your *Brassica* report.

**Lab Assignments:** Each of the genetics labs has an assignment that must be completed by the student. These will be collected at the beginning of the next lab period.

**Problem Sets:** Problem sets will be assigned for each chapter covered during lecture periods. These problems will not be collected and graded, but students are strongly advised to work through the problems. Material from the problem sets may be included on examinations.

**Late Work:** All assignments are due within the first 10 minutes of class on the date indicated. Grades on late assignments will reflect a 10% deduction per day late unless prior arrangements have been made with the instructor. **All assignments are due by the LAST day of classes (5/6/10); I will not accept assignments after this date.**

**Regrading Policy:** If you think that an error was made on your exam or lab report, **you may return it for regrading within one week of the return of the exam/report. No exceptions.** Also you must clip to the graded item a **typed** explanation of what you think the error in grading. Late regrades requests and requests that are not typed will not be regarded. Note: I routinely photocopy exam pages prior to returning them to you (See Academic Honor Principle).

### **Standards:**

**Writing standards:** You are expected to use proper English grammar and spelling on all written material submitted for this course. Content of your writing will be my main focus during grading, although your effectiveness at writing will also be considered in your overall grade. The Learning Resource Center is available to all students seeking to improve their writing and study skills.

**Exams:** Lecture exams will consist of short answer, problems, and multiple-choice problems. Questions will be based on material covered in class, which includes readings from the text. Test questions may also come from specific and assigned text readings, which were not covered in Lecture.

**Lab Notebooks:** All students must keep a laboratory notebook. Notebooks must be cloth bound and the pages numbered (no missing pages) and all entries dated. This book is a written account of all the experiments conducted by the student. It should contain: date experiment conducted, colleagues involved, experimental description (what the goals and/or objectives of this experiment), protocol followed (any changes to the protocol), data collected and observations (including raw data and analyzed data: graphical or tabular format) written or taped into the book, a short summary and/or conclusion to the experiment (an interpretation of all the collected; *i.e.* what it all the data means). The ending questions of the experiment will help to guide you towards the appropriate conclusions. Notebooks will be graded at the end of the semester for extra credit.

**Students with disabilities:** Students with disabilities, physical or learning, are encouraged to contact me within the first week of class so that we have time to implement any accommodations required. Through consultation with the Academic Advising and Learning Resource Center, we will plan an appropriate strategy for completing the academic requirements of the class.

**ACADEMIC INTEGRITY IN THE YORK COLLEGE  
DEPARTMENT OF BIOLOGICAL SCIENCES**

Science and the teaching of science represent a search for truth and they rest on ethical behavior and intellectual honesty. As such, both the Department of Biological Sciences and York College of Pennsylvania unequivocally condemn academic dishonesty. Academic dishonesty is defined in the York College Student Handbook as cheating, plagiarism, fabricating research, falsifying academic documents, etc. and includes all situations where students make use of the work of others and claim such work as their own. Because the Department of Biological Sciences maintains high expectations for all students and is committed to stringent standards of academic integrity, we contend that all published information, in any form, must not be used unless rigorously paraphrased and properly cited. Moreover, all tests, projects, assignments, and lab reports require a solo effort **unless specifically noted otherwise by the instructor**. This means that the sharing of text, images, tables, figures, or data analyses with classmates is a breach of academic integrity. Furthermore, providing such information to others will be considered as dishonest as accepting or taking the information.

Work done in lab may involve partners, but the formal partnerships end when the laboratory period ends. At the end of a lab, each partner should leave with his or her group's protocols, hypotheses, data, and any information about procedural problems. Once the in-lab work is completed, the work shifts from a group effort to a solo effort. This does not mean that students shouldn't discuss lab concepts, problems, and general strategies and broad interpretations. Talking about science is healthy and is encouraged. And, it is understood that lab groups may obtain similar or identical quantitative data for a given project. In the end, however, data analyses and report writing as well as the overall presentation and interpretation of these data are to be done independently by the individual and not by the group.

If work submitted by two or more students appears unexplainably and unreasonably similar, or if credit for previously published information or ideas is not given through literature citation, academic dishonesty will be assumed. In this event, the instructor will provide written notification to the student, the Department Chair, and the Dean of Academic Affairs of the charge and the sanction. Documentation related to instances of academic dishonesty will be kept on file in the student's permanent record. If the academic dishonesty is the student's first offense, the instructor will have the discretion to decide on a suitable sanction up to a grade of 0 for the course. The faculty member may request that the Student Welfare Committee conduct a hearing and decide on the sanction, which can involve academic suspension or dismissal from the College, if the faculty member believes the offense to be of an extremely egregious nature.

If the Dean of Academic Affairs determines that the breach of academic integrity is the student's second offense, the Dean will provide written notification to the student, the instructor, and the Department Chair. The Student Welfare Committee will automatically conduct a hearing to review the charge and decide on an appropriate sanction, which will involve academic suspension or dismissal from the College. Students are not permitted to withdraw from a course in which they have been accused of academic dishonesty.

If questions about academic integrity arise, see the course instructor before completing and submitting your work. In addition, specific information about the York College of Pennsylvania Academic Integrity Policy can be found in the most recent edition of the Student Handbook.

**Lecture Sequence and Assignment Information:** This is only an outline of the information covered during lecture periods. Please refer to my website to get the specific reading and problem set assignments.

**Chapter and Lecture Topics:**

**Chapters 1-4:** Mendelian Genetics and

Chapter 1: Introduction to Genetics

Chapter 2: Mitosis and Meiosis

Chapter 3: Mendelian Genetics

Chapter 4: Extensions of Mendelian Genetics

**Exam #1: 2/12/10**

**Chapters 5-7:** Linkage and Mapping, Sex Determination

Chapter 5: Chromosome Mapping in Eukaryotes

Chapter 6: Genetic Analysis and Mapping in Bacteria and Bacteriophages

Chapter 7: Sex Determination and Sex Chromosomes

**Exam #2: 3/17/10**

**Chapters 8 and 10-12:** Chromosomes and DNA Structure

Chapter 8: Chromosome Mutations

Chapter 10: DNA Structure and Analysis

Chapter 11: DNA Replication and Recombination

Chapter 12: DNA Organization in Chromosomes

**Exam#3: 4/16/10**

**Chapters 14-17:** Genetic Organization, Expression and Regulation

Chapter 14: Genetic Code and Transcription

Chapter 15: Translation into Proteins

Chapter 16: Gene Mutation and DNA

Chapter 17: Gene Expression: Prokaryotes

**Exam#4: During Finals week**

**Disclaimer: This course outline is tentative and subject to change.**

## Lab Schedule

### Lab#1: Week of 1/25/10

- A) Safety; Notebooks; Scientific Method; *Brassica* planting (water by hand until the end of the week); Micropipetting.
- B) Mitosis and Meiosis Microscope; Chromosome simulation: Allele segregation and sorting. Design of experiments; Chi Square tests; Flower Breeder.

**Assignment:** Questions and Flower Breeder Outline.

### Lab#2: Week of 2/1/10

- A) Pollinate the *Brassica*: Pinch off unopened flower buds for the next 35 days.
- B) Micklos DNA Science Lab 3: DNA restriction digest analysis. Genotypic vs. Phenotypic analysis; *Brassica* discussion; Prism.

**Assignment:** Questions and Standard Curve graph

### Lab#3: Week of 2/9/10

- A) Sampling observations, *Brassica* observations about P<sub>1</sub> and F<sub>1</sub>.
- B) Micklos DNA Science Lab 5: Rapid Colony Transformation of *E. Coli*.
- C) Plasmid Mapping Exercise

**Assignment:** Questions and Transformation efficiency graphs and Plasmid Maps.

### Lab#4: Week of 2/15/10

- A) Analyze Plates and determine transformation efficiency. Discuss Transformation efficiency. Discuss: Standard curves
- B) Micklos DNA Science Lab 6a: Purification and Identification of Plasmid DNA.

**Assignment:** Questions.

### Lab#5: Week of 2/22/10

- A) Micklos DNA Science Lab 6b: Lab 6b: Purification and Identification of Plasmid DNA. Restriction digest analysis of plasmid miniprep DNA.
- B) Isolation/Quantification of Genomic DNA

**Assignment:** Questions and *Brassica* paper (**Due: Week of 4/19/10**).

### BREAK No Labs: Week of 3/1/10

### Lab#6: Week of 3/8/10

- A) DNA Fingerprinting analysis. Comparison of suspect DNA with a crime scene sample.
- B) Amplification and Sequencing of Mitochondrial DNA
- C) Germinate F<sub>2</sub> plants.

**Assignment:** Short report with standard curve graph.

### Lab#7: Week of 3/15/10

Micklos DNA Science Lab 7: Recombination of Antibiotic Resistance Genes (Parts A and B).

**Assignment:** Questions.

**Lab#8: Week of 3/22/10**

- A) Micklos DNA Science Lab 8b: Recombination of Antibiotic Resistance Genes Prepare Competent Cell Transform Cells.
- B) Population Genetics: Allelic and Genotypic Ratios. Hardy-Weinberg Law and assumptions.

**Assignment:** Worksheet and Questions

**Lab#9: Week of 3/29/10: MONDAY and WEDNESDAY Labs meet**

**Week of 4/5/10: FRIDAY Lab meets**

- A) Micklos DNA Science Lab 10: Restriction Digest Miniprep (Parts A and B).
- B) Micklos DNA Science Lab 22: Detection of *Alu* Insertion by PCR (Parts I and II).
- C) Micklos DNA Science Lab 13: Southern Hybridization of  $\lambda$  DNA (Part AI)

**Assignment:** Worksheet and Questions.

**Lab#10 Week of 4/12/10**

- A) Micklos DNA Science Lab 22: Detection of *Alu* Insertion by PCR and Population Genetics
- B) Micklos DNA Science Lab 13: Southern Hybridization of  $\lambda$  DNA (Parts A and B)

**Assignment:** Questions.

**Lab#11: Week of 4/19/10**

- A) *Alu* Insertion Analysis
- B) Mitochondrial Sequence Analysis
- C) Micklos DNA Science Lab 13: Southern Hybridization of  $\lambda$  DNA (Parts C and D)
- D) Review for Lab Practical

**Assignment:** Questions.

**Lab Practical: Week of 4/26/10 (during normal lab period)**

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I, \_\_\_\_\_, have read this statement and the syllabus for this course and I understand and accept departmental and college expectations of academic integrity and ethical conduct.

Student's Name: (Please Print) \_\_\_\_\_