Cell and Molecular Biology (BIO358)
Syllabus: Fall 2009

Instructor: Ron Kaltreider, Ph.D.
Office: LS229
Office Phone: 815-1956

Office Hours: M-F	2:00-3:00pm	
Email: rkaltrei@ycp.edu		
Lecture Hours:	T and R	8:00-9:15am CH223
Laboratory Hours:	F	11-1:45am LS224

Textbooks:

Text: Molecular Cell Biology 6^{h} edition: Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh, and Matsudaira; W. H. Freeman and Company (2008).

Lab Manual: None required.

Web Sites:

Textbook: http://www.whfreeman.com/lodish/ This site contains links to a variety of web-based resources, including a very helpful animations, videos, links, classical experiments, and MCAT/GRE practice exams.

Instructor: http://faculty.ycp.edu/~rkaltrei/ My site contains notes, assignments, class resources, announcements, and a link to the textbook website.

Prerequisites:

You should have received a grade of C or better in Biology I (Bio150) and Genetics (BIO240). To prepare for this class, you should also review your Genetics (Bio240) notes concerning Protein and DNA structure, Transcription, and Translation; an understanding of many of these principles will be assumed during lectures and labs.

Course Description and Objectives:

An understanding of biology is dependent upon an understanding of the diverse cellular components (structure and function) at a molecular level that compose multicellular organisms. In this course, we will examine the molecular mechanisms of eukaryotic cells. The relationship between structure and function at the molecular and cellular level will be discussed for topics ranging from transcription and translation to cellular communication. As we discuss and develop an understanding of cellular and molecular biology, we will integrate aspects of cytology, protein and nucleic acid chemistry, genetics, molecular genetics, pharmacology, enzymology, and immunology. This class will provide you with an understanding of cellular structure, synthesis and function of diverse macromolecules; mechanisms of nuclear control of cellular processes; and cellular communication and interactions.

Examinations and Grades:

Grading Scheme: Lecture (60%) and Lab (40%)

1st Exam:	150 pts	4=90% and higher
2nd Exam:	150 pts	3.5 = 85-89%
3rd Exam:	150 pts	3=80-89%
4th Exam:	150 pts	2.5 = 75-79%
Laboratory:	400 pts	2=70-74%
Total:	1000 pts	D (1)=60-69%
		F (0)=59% and below

Exams:
The lecture schedule shows the approximate date of the first 3 exams. The 4th exam will be given during the 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. All make up exams will be given at the end of the semester during a single time period.

Attendance:

Lecture: All students are expected to attend all scheduled classes. Conceptual understanding of molecular cell biology, like all science courses, requires students to actively engage and interact with their colleagues. Although I will not take daily attendance, I will monitor and note excessive absenteeism (greater than 2 Un-excused absences). Chronic tardiness to class or lab is very disruptive to the class, so 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). 3) In class assignments cannot be made up.
Lab: Attendance for lab is mandatory.

Assignments:

Perspectives from the Literature: An understanding the literature is very important for understanding the concepts of molecular cell biology, because of its reliance on experimental data and observations. During the semester, I will present a few key papers that shed light on the presented concepts. I will be assigning many of these papers during the semester, which we will then discuss and analyze during class.

Problems: Problems will be assigned for many chapters covered during lecture periods. These problems will not be collected or graded, but students are strongly advised to work through the problems. Material from these problems may be included on the exam.

Lab Reports: A short write-up (abbreviated lab report) will be required at the completion of laboratory exercises. This will include three sections: **1) Introduction**: Briefly, describe the Rationale and Objective of your study; **2) Results**: A description of your observation and data collected during the lab (presented in Figure or Table format); and **3) Conclusions/Discussion**: An explanation of your results (*i.e.* What does it mean? What conclusions can be drawn from these data?), which should be tightly written (Say what you mean and mean what you say). These write-ups will be collected at the beginning of the following lab period.

Original Lab Research Presentation: Students, working within a group, will be required to conduct original research during the semester and present their findings to the class at the end of the semester. In addition to the oral component, a written report of your experiment (IMRAD) will also be collected after your presentation.

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 (12/15/09); 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 primary 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 essay, short answer, problem based questions from material covered in class. Included but not limited to assigned text readings, scientific papers, experimental interpretations and evaluations. Test questions may also come from related information that was not directly covered during lecture.

Lab Notebooks: All students must keep a laboratory notebook. Notebooks must be bound, pages numbered (no missing pages), and all entries dated. This 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 of tabular format; written or taped into the book), a short summary and/or conclusion to the experiment (based upon your findings; *i.e.* what it all means). Ending questions of the experiment (included in certain labs) will help to guild you towards the appropriate conclusions. Notebooks will be collected and graded at the end of the semester.

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.

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**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.

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Lecture Sequence and Assignment Information: This course will encompass four main areas of molecular cell biology: A) Cell Organization and Biochemistry (Chapters 3, 10, and 9), B) Genetics and Molecular Biology (Chapters 5-8), C) Cell Signaling (Chapters 15-16), and D) Cell-Cycle and Cell-Growth Control (Chapters 20, 21, and 21). We will examine many topics within each of these areas in both lecture and laboratory exercises. This is only an outline of the information covered during lecture periods. Please refer to my website to get any specific reading and assignments information.

Chapter and Lecture Topics

Chapter 3: Protein Structure and Function
Chapter 10: Biomembrane Structure
Chapter 9: Visualizing, Fractioning, and Culture Cells

Exam #1 9/20

Chapter 5: Molecular Genetic Techniques
Chapter 6: Genes, Genomics, and Chromosomes
Chapter 7: Transcriptional Control of Gene Expression

Exam #2 10/18

Chapter 8: Post-Transcriptional Gene Control
Chapter 15: Cell Signaling I: Signal Transduction
Chapter 16: Cell Signaling II: Signaling Pathways That Control Gene Activity

Exam #3 11/15

Chapter 20: Regulating the Eukaryotic Cell Cycle
Chapter 25: Cancer
Chapter 21: Cell Birth, Lineage, and Death

Exam #4 Finals Week

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

Lab Schedule

Lab#1 Week of 8/31:

Safety; Notebooks; Requirements
Micropipetting, Solution Preparation (Molarity), Quantification of Nucleic Acids and Proteins

Lab#2 Week of 9/7:

Cell Culture Techniques: Growth, Maintenance, Quantification (Hemocytometer), and Treatment. Start Eukaryotic cell cultures.

Lab#3 Week of 9/14:

1) Setup Cell Culture Experiment: Protein Localization (2 days prior lab)
2) Treat Cells for Protein Localization Experiment
3) Isolate proteins Cyoplasmic and Nuclear fractions

Lab#4 Week of 9/21:

Detection and Quantification of an Individual Protein (Part A): Immunoblotting (Western blotting): Electrophoresis and Transfer to membrane (Block overnight and place into PBS until the following week).

Lab#5 Week of 9/28:

1) Detection and Quantification of an Individual Protein (Part B): Immunoblotting (Western blotting): Immuno-Detection 1) Block overnight (2 days before lab), 2) Wash then Add primary antibody and incubate overnight (night before lab), 3) Wash, incubate with 2nd antibody, and Develop blot (Day of lab).
2) Setup Cells for Gene Expression Experiment (2 days prior to lab) and treat day of lab

Lab#6 Week of 10/5:

Detection and Quantification of an RNA transcript: RNA Isolation, Quantification, and Amplification (RT-PCR).

Lab#7 Week of 10/12:

Cellular Chemical Cytotoxicity: Dose-Response (Cell will be treated day before experiment)

Lab#8 Week of 10/19:

Introduction to the *C. elegans* model system: Growth, Maintenance, Seeding, Picking, Transfer and Identification of Mutants. Start *C. elegans* cultures.

Lab#9 Week of 10/26:

1) Examining RNAi Mechanism: Streak bacteria and transfer worms
2) Bioinformatics: ID *C. elegans* homolog and design RNAi Primers

Lab#10 Week of 11/2:

Examining RNAi Mechanism: Transfer (Tuesday), Isolate DNA and Amplify/Analysis (Friday)

Lab#11 Week of 11/9:

Create RNAi Feeding Vector: PCR, Recombine with vector, Transform, Isolate DNA

Transform bacteria with plasmid and place C. Elegans onto cultures. Determine phenotype and gene expression of RNAi cultures.

Lab#12 Week of 11/16:

Create RNAi Feeding Vector: PCR, Recombine with vector, Transform, Isolate DNA

Transform bacteria with plasmid and place *C. Elegans* onto cultures. Determine phenotype and gene expression of worms.

Lab#13 Week of 11/23:

Break and Student Project Research

Lab#14 Week of 11/30:

Student Project Research

Lab#15 Week of 12/7:

Student Presentations

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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) _____