Important Summer Session 2009 Dates

	Session I	7-wk Sess	8-wk Sess	10-wk Sess	Session II
Last day to **enroll/add** online	June 27 (Sat) (11:59 pm)	June 27 (Sat) (11:59 pm)	June 27 (Sat) (11:59 pm)	July 4 (Sat) (11:59 pm)	Aug 1 (Sat) (11:59 pm)
Last day to **drop** online	June 28 (Sun) (11:59 pm)	June 28 (Sun) (11:59 pm)	June 28 (Sun) (11:59 pm)	July 5 (Sun) (11:59 pm)	Aug 2 (Sun) (11:59 pm)
Withdrawal Period at Summer Office (no refund)	June 29 – July 10 (8:00-4:00)	June 29 – July 17 (8:00-4:00)	June 29 – July 24 (8:00-4:00)	July 6 – July 31 (8:00-4:00)	August 3 – August 14 (8:00-4:00)
Note that during Summer Session there is no auditing of classes, no "Add by Petition" and no "Administrative Drop by Instructor". Failure to attend class does not constitute a "Drop". All deadlines are final.					

Bio 115: Eukaryotic Molecular Biology

Course Syllabus

Summer 2009

Instructor: Grant Hartzog
Office Phone: 459-5826 (use in case of emergencies, otherwise email is preferred)
email: hartzog@biology.ucsc.edu (include **Bio115** in the subject line!)
Course webpage: http://ic.ucsc.edu/webct

A. Course Description. This is a fast-paced course covering the organization of eukaryotic genes and genomes; mechanisms underlying synthesis of DNA, RNA, and proteins, with an emphasis on regulation; chromosome structure and organization; the application of the principles of molecular biology to recombinant DNA technology and the use of recombinant DNA technology in the study of these topics.

B. Prerequisites. Bio 100 (Biochemistry) or BMB 100A (Biochemistry), and Bio 105 (Genetics). See the course website for a more specific list of information and topics I expect you to be familiar with.

C. Organization. Students will be expected to complete reading assignments and to complete a short on-line quiz covering the reading material prior to each lecture. Lectures will focus on illustrating the "how we know aspect" of the subject material for that week. For example, in the lectures on transcription, your reading may describe the existence of general transcription factors and their function. The lecture on this subject will focus on the discovery of these factors and the ramifications of their mechanisms of action. A second focus of the lectures will be on the related issue of how experiments are conducted, what real data looks like and how it is interpreted. One goal for this class is that you gain an appreciation for the processes of science and data interpretation. Problem sets or paper reading assignments will be assigned each Friday. For most of you, this course is a capstone to your college experience. The successful student in this class will be able to do more than regurgitate facts; it is my hope that you will gain an understanding of the principles of molecular biology so that you can use them to solve new problems that were not necessarily discussed in class or your texts.

D. Course Objectives:

1. To reinforce the students understanding of the central dogma of molecular biology.
2. To introduce specific elaborations of the central dogma used by eukaryotes
3. To give a detailed description of the mechanisms eukaryotes use to regulate gene expression
4. To describe some of the principles underlying the organization and evolution of eukaryotic genomes and proteomes
5. To provide an understanding of how our understanding of the principles of molecular biology have been used to develop recombinant DNA technology and to show how these technologies are used to study biological phenomena.

E. Reading. Students are strongly encouraged to use the following textbook. In my experience, students who do not use a textbook often fail the course. Copies are on reserve at the Science and Engineering library. Reading assignments for both texts will be given each week.

Molecular Biology of the Gene, by Watson, *et al*. This book presents material at a conceptual level view of molecular biology.

Additional sources of information:

The Eighth Day of Creation, by Judson. This is a highly readable and gripping account of the beginnings of molecular biology. This is the book that convinced me to become a scientist. While this books does not focus on eukaryotes, it will provide a good discussion of the development and basic principles of molecular biology. Copies are available in the science librarty and cheap copies can often be found on Amazon.com.

Textbooks: In addition to the assigned text, several other textbooks have been put on reserve, under "biology permanent reserve", in the Science library.

These are:

Molecular Biology of the Cell (often abbreviated as MBOC) 4th ed., by Alberts et al.

Genes IX, by Lewin.

Molecular Cell Biology, by Lodish et al.

Principles of Biochemistry, 4th ed. by Lehninger et al.

From time to time, you may find that the alternative presentation of material in these texts helpful. Therefore, although reading these texts is not required, suggested readings from them will be listed as Further Reading on the lecture web pages.

Course website: http://bio.classes.ucsc.edu/bio115/

Additional information is listed on this website, particularly on the pages specific to each lecture. For example, look at the NHGRI Glossary (http://www.genome.gov/glossary.cfm) for definitions of unfamiliar terms.

F. Grading

Midterm 1	100 points
Midterm 2	120 points
Final Exam	180 points

Midterms and Final Exams will be a mix of multiple choice and short answer questions. Sample exams from past years will be posted on the course website. The final exam is cumulative. Although the class is graded on a curve, I do not have a goal of any particular grade distribution. I will announce cutoffs for A/B/C grades after each exam. The final grading scale will be determined by these cutoffs. Other grading policies and the policy on illness and missed exams are listed on the course website.

G. How to succeed in Bio115 The expectations in this course are high, as is the workload. It is important that you keep up with the reading and lecture material and attempt the problem sets, which will give you a feeling for the sorts of questions you are likely to see on the exams. In the past, many students have found it helpful to form study groups. If you just sit passively, waiting for me to give you facts or the answers to problems, you will not gain the deep understanding of the material required to do well in the course. Many other tips on studying and strategies for learning can be found on the course website. Look these over and decide what might be right for you.

H. Assistance with Disabilities

If you qualify for classroom accommodations because of a disability, please submit your Accommodation Authorization from the Disability Resource Center (DRC) to me during my office hours in a timely manner, preferably within the first two weeks of the quarter. Contact DRC at 459-2089 (voice), 459-4806 (TTY).

Basic expected knowledge

Your prerequisite courses in biochemistry and genetics laid the groundwork for the topics we will cover in Bio115. Look over the topics listed below and make sure that you are familiar with these concepts. In addition to reviewing your texts from biochemistry and genetics courses, you can read the first sections of the Watson textbook (Chapt.s 1-5, parts of chapt. 21) to review this material.

Methods:

- Molecular cloning methods
  - -restriction enzymes
  - -restriction maps
  - -ligation
  - -plasmids
  - -libraries
    - -genomic
    - -cDNA
- Molecular separation on gels
  - -DNA
  - -Protein
- Nucleic acid hybridization
  - -Southern blots
  - -Northern blots
- PCR

Genetics:

- Recessive and dominant mutations
- Mitosis and meiosis
- Consequences of mutations
- Role of recombination in re-assortment of genetic material
- Basic ideas of natural selection

Biochemistry and molecular biology:

- Basics of transcription, translation and DNA replication in bacteria
- Basic understanding of nucleic acid and protein structure
- Types of chemical interactions and their relative strengths
  - -covalent bonds
  - -ionic bonds
  - -hydrogen bonds
  - -van der Waals interactions
- Thermodynamics
  - -Gibbs free energy equation: $\Delta G=\Delta H-T\Delta S$
  - -role of enzymes in facilitating chemical reactions