

WIDENER UNIVERSITY
DEPARTMENTS OF BIOLOGY and BIOCHEMISTRY

BIO/BCH 388: Introduction to Genomics

Spring 2009

Lecture: Monday, Wednesday, Friday 11:00-11:50 PM
Room: Kirkbride 335

Laboratory: Wednesday 2:00-4:50
Room: Kirkbride 335

Instructors:

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Thurs 1:30-3:30, Fri 1-2

& by appt

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Course Description: BIO/BCH 388 is an inquiry-based genomics course that combines lectures and a computer lab research experience on genome annotation and cross-species evolutionary analysis. Designed as part of the Genomics Education Partnership (GEP), funded in part by the Howard Hughes Medical Institute, the course is intended for upper division Biology and Biochemistry undergraduates. Each student is expected to prepare his or her annotated sequence information for publication in a professional journal. In order to prepare students for a task of this magnitude, we will lecture, assign readings and exercises from the course packet and collect homework at regular intervals. An expected outcome, among others listed below, will be the students' names on a collaborative publication involving members of the GEP nationwide. Students will do a cross-species protein domain and structure analysis comparing the proteins in their sequence to the twelve sequenced *Drosophila* genomes and other model organisms across the biota including *Saccharomyces*, *Arabidopsis*, *C. elegans*, *Danio* and vertebrates such as mice, chicken and human.

Course Objectives: At the conclusion of this course, the student will be able to:

1. Use genome analysis software to develop sequence data into an annotated genome segment.
2. Search sequence databases and identify the putative function of genes as well as their structure and organization within the genome.
3. Identify protein functional domains and examine their conservation across the biota.
4. Communicate clearly and professionally, both in oral and written format, the details of a scientific investigation.

Required Materials: Bound laboratory notebook and course packet of readings to be purchased from instructors. It is imperative that you document your findings and failure to do so will prevent authorship on any publication that arises from this course.

Prerequisite: Permission of instructor

Course Communications: Campus Cruiser is the main method of communication outside of class time. Email will be sent to your Campus Cruiser account; forward your messages to the account that you use most often. Power Points of lectures, homework assignments and additional course materials will be posted in Shared Files on the Campus Cruiser course web site. Assignments and papers must be submitted electronically on Campus Cruiser by the specified time and date; paper copies or emailed submissions will not be accepted unless Campus Cruiser is down.

Attendance: Attendance is required and records will be kept. Your presence is essential for completing assignments and participating in class discussions. Read the *Undergraduate Student Handbook* regarding school policies on attendance: "A student may receive a failing grade, if the number of absences in a semester exceeds **twice** the number of weekly class meetings." This policy is in effect for BIO/BCH 388.

*The Science Division and the Biology and Biochemistry Departments strictly enforce the University's policy on cheating and other forms of academic fraud. Cheating includes any of the following: copying from someone else's paper, using another student's work for an assignment, paraphrasing someone else's published work as your own or failing to properly cite references. **You will be conducting original research during this course and are expected to operate under ethical standards.***

Assignments: At the completion of the GEP-required annotation portion, students will give a 10 minute oral presentation. Additionally, a standard report file must be completed for submission to the GEP. Students will also be required to present a poster at Student Projects Day on April 17, 2009. The major written portion of this course involves a final paper written in the style of a professional publication. The drafts and final paper will be double spaced with 1-inch margins in 12-point Times or Times New Roman font and appropriately cited. A rubric outlining the expectations of these assignments will be distributed in class.

Laboratory notebooks: Each student is required to keep a bound laboratory notebook. The notebook will be checked by the instructors periodically and will count for more than 10% of your final grade in this course. It is imperative that the notebook be updated consistently and thoroughly as this data will be used for a scientific publication! The first 5 pages initially will be left blank for completion of a table of contents at the end of the semester. All pages will be numbered and entries will be recorded in permanent ink not pencil. At the beginning of each class period, you will start an entry in the notebook with the date (day/month/year) and write down each procedure that you perform (i.e., which Blast algorithm you use, what website you found it at, etc.) and the results that you obtain (i.e., coordinates of splicing junctions, potential gene names, etc.). Any printouts of data that you collect throughout each class period will be stapled into the notebook. Primary data not entered into the notebook like digital files or images should be indexed in the lab notebook and their location and labeling clearly noted. Your notebook will serve as a permanent record of the work that you have completed as well as a reference for any questions that may come about during the data analysis and preparation for final publication by the GEP. It is essential that you document your findings and failure to do so will prevent authorship on any publication that arises from this course.

Grading: The course will be graded on the +/- system and weighted as follows:

Laboratory Notebook	50 points
Annotation	
Blast Exercise 1	15 points
Blast Exercise 2	15 points
Oral Presentation	50 points
GEP File	20 points
Cross-species Protein Analysis	
Poster	50 points
Oral Presentation	50 points
Paper	
Draft	50 points
Writing Group Work	50 points
Final Paper	100 points
Total Points	450 points

Grievance policy: Please refer to the student handbook, the science office or one of the Widener instructors if you have a problem.

Course content and schedule: Below is a **tentative** schedule of topics that will be covered. Lectures will be held as needed. Alterations to the schedule may be made as necessary and will be announced in class; you are responsible for knowing those changes whether or not you attend class.

Date	Topic/Task	Laboratory
Week of January 12	Research Question/Heterochromatin; Sequencing Chemistry and Methods	Introduction to Databases; Blast Exercise 1
Week of January 19	Gene Structure; Genome Organization	Blast Exercise 2; Claim Project
January 19	No class – MLK day	
Week of January 26	Specifics of <i>D. mojavensis</i> Fosmids & GEP Annotating Reports	Annotate
Week of February 2		Annotate
Week of February 9		Annotate
Week of February 16		Annotate
Week of February 23	Oral presentations on annotation	Complete GEP File
Week of March 2	Spring Break	
Week of March 9	Conserved Protein Domains	Cross-species protein analysis
Week of March 16	Phylogeny trees	Cross-species protein analysis
Week of March 23		Cross-species protein analysis
Week of March 30		Cross-species protein analysis
Week of April 6	Submit Poster	
April 10	Spring Holiday	No class
Week of April 13	Oral presentations on cross-species protein analysis	
April 17	Student Project's Day	Present poster
Week of April 20	Work on final paper	Writing Group draft review
Week of April 27	Work on final paper	Must fill out both Widener and GEP evaluations before leaving class today!
April 29	Last Day of Class	
Finals Week	Final Paper Due	