

Life Sciences 187A: Principles and Practices of Genomic Research (4 credits)

Fall 2008 Syllabus

This course is designed for undergraduate students interested in research. This course has three hours of Lab meetings and/or lecture per week and six hours of laboratory research each week.

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LECTURE & LAB MEETINGS:

W	2:00 pm – 3:00 pm (Lecture)	La Kretz 100
W	3:00 pm – 4:00 pm (Lab Meeting)	La Kretz 100
F	2:00 pm – 3:00 pm (Presentations)	La Kretz 100

LABORATORY RESEARCH: TR, WF or WR 9:00am – 12:00pm (6 hours max)
3336 Young Hall South

Course website: www.lsic.ucla.edu/classes/fall2008/
Lab website: <http://lslab.lscore.ucla.edu/>

RESEARCH PROJECT.

Life Sciences 187 offers you the opportunity to participate in research in the annotation of the sequenced genome of the unicellular green alga *Chlamydomonas reinhardtii*. As student researchers, you will be members of the UCLA Undergraduate Genomics Research Initiative (UGRI), a precedent-setting undergraduate education in which students conduct cutting-edge research in genomic biology and biotechnology.

RESEARCH REQUIREMENTS.

LS187A students must conduct six hours of laboratory research per week. In addition, students are required to attend weekly lectures on Wednesday/Friday from 2-3PM in La Kretz 100 and group meetings on principles and techniques held at 3-4 PM on Wednesdays in La Kretz 100. Teamwork is essential for a successful annotation project. Accordingly you are expected to be professional, punctual, observant and alert to the day's activities, and willing to collaborate with your fellow researchers.

RESEARCH MATERIALS

- Lab notebook (any 8 × 11 bound type, college ruled) – you do NOT need the carbon paper type
- Download assigned readings and protocols from course website

IMPORTANT LAB RULES:

- Lab computers and printers may not be used for personal purposes
- No open toed shoes (i.e., no flip-flops, sandals, or bare feet)
- Punctuality is essential

IMPORTANT DUE DATES:

Deadline is 12:00 noon at the date specified delivered to 3336 YHS unless otherwise noted:

Paper 1	1 Page	Friday Sep	26, 2008
Paper 2	1 Page	Wednesday Oct	1, 2008
Worksheet 1	1 Page	Wednesday Oct	1, 2008 3pm
Worksheet 2	1 Page	Friday Oct	3, 2008
Paper 3	1 Page	Wednesday Oct	8, 2008
Worksheet 3	1 Page	Wednesday Oct	8, 2008
Worksheet 4	1 Page	Wednesday Oct	8, 2008 3pm
Worksheet 5	1 Page	Friday Oct	10, 2008
Paper 4	1 Page	Wednesday Oct	15, 2008
Worksheet 6	1 Page	Wednesday	15, 2008
Worksheet 7	1 Page	Friday Oct	17, 2008
Project Overview Report	5 Page	Wednesday Nov	5, 2008
Seminar Report	1 Page	Wednesday Nov	19, 2008
Project Summary Report	20 Page	Wednesday Dec10,	2008

LECTURES, LAB MEETINGS, WORKSHOPS and LABORATORY RESEARCH

- Workshops (W 2-3 PM, Science Learning Center 4340). We will join MCDB 172 for an introduction on the UCSD web-browser (Oct 1st) and on how to use BLAST (Oct 8th).
- Lectures (W/F 2-3 PM, La Kretz 100). We will discuss genomics theory and practice. Please complete assigned readings prior to lecture. PowerPoint slides can be downloaded from the course website.
- Lab Meetings (W 3-4, La Kretz 100). These are an important part of research: it's an opportunity to discuss findings and troubleshoot problems. As a group we also discuss theory, practice and our results.
- Laboratory Research (TR, WR, or WF, 9AM – 12PM, 3336 YHS). This is when your research will be conducted, which primarily consists of annotation of *Chlamydomonas*' genome.

GRADING

	<u>Pts</u>	<u>%</u>
Conduct	50	10%
Initiative	50	10%
Lab Notebook	50	10%
Open Seminar Report	50	10%
Paper summary	40	8%
Work-Sheets.....	60	12%
Project Overview	50	10%
Project Summary	<u>150</u>	<u>30%</u>
Total Points	500	100%

Attendance at Wednesday lab meetings (2 hrs/wk) and fulfillment of the required weekly research hours (6 hrs/wk) are both **MANDATORY** – unexcused absences from any of the foregoing shall result in a **demerit**. (Excused absences will be given for extenuating circumstances such as medical reasons, bereavement, MCAT testing, med school interviews, etc.) Demerits will result from behavior such as (without limitation): carelessly breaking equipment; repeated incorrect analyses of data despite instruction and/or mentoring; uncooperativeness; excessive tardiness; and/or unexcused absences. You will be notified if you incur a demerit.

Grades will be assigned by point totals: A, > 90%; B, >80% etc., and determined by the Instructor. Any You will be notified of any demerits you incur. Demerits will lower your grade.

Students are expected to be aware of the University of California policy on academic integrity pursuant to the UCLA Student Conduct Code (www.deanofstudents.ucla.edu). Please review sections on (1) plagiarism, (2) cheating and (3) use of unauthorized study aids. Violations are promptly referred to the Dean of Students. Penalties for violation are quite severe, will become a permanent part of your academic record, and will likely preclude entry to any graduate or professional school worth attending.

LS187 CODE OF CONDUCT

Teamwork is essential to the success of modern research. The success of each day's annotation experiment depends upon working together. In order to accomplish our annotation project, each student must take their role and responsibility seriously. This involves:

- Professional conduct, including punctuality. To be successful, each step in the experiment depends upon the timely and accomplishment of the preceding steps.
- The ability to accept guidance from more experienced students as well as from the teaching team. Other students can be a valuable resource
- Observation—be alert to the details of each day's experiment. Often discoveries are made when an anomaly is noted and communicated
- Communication—share your observations with others—The use of the daily log book is mandatory. In the log book it is essential that you record any unusual characteristics of a given day's experiment. This will enable us to troubleshoot or interpret unusual results.
- Mentoring

INITIATIVE

By enrolling in the course you have taken the initiative through research in a relatively unstructured setting. As for any research scientist, this opportunity is what you make of it. Thus you begin the quarter with 50 points for initiative. If the teaching team observes that you make poor use of your laboratory time or computer laboratory time, your 50 initiative points will be docked incrementally. Our progress depends on the quality and quantity of everyone's contribution.

LAB NOTEBOOK

You will log your observations, findings, results of experiments, changes to protocol, formulas, and unusual and pertinent findings or observations in your lab notebook. You do not need to restate the protocol. Your lab notebooks will be checked periodically during the quarter. Your lab notebook may not leave the laboratory and thus must be updated in lab.

OPEN SEMINAR REPORT

An important aspect of scientific research is your ability to effectively communicate your results. You are expected to write a one page summary of a seminar you attend at UCLA (see "Events in Molecular Biology" link at course website). This is due no later than 12:00 noon on **Nov 19, 2008**.

PRESENTATIONS DURING LAB MEETINGS

Presentations are an integral part of the research learning experience. Each research group will be required to give three presentation during the quarter (see schedule and your group assignment). One presentation is about selected topics and two presentation are for the Annotation Project Overview and the Annotation Project Results. PowerPoint presentations are to be 40 minutes in length (inclusive of Q & A). Your presentation must be reviewed by the Instructor PRIOR to presentation, so please make advance arrangement.

Date		Group	Presentation Topic
Wed	Oct 22	A, B	Annotation Project Overview
Fri	Oct 24	C	Annotation Project Overview
Fri	Oct 31	A	BLAST Basics
Fri	Nov 14	B	JGI Browser
Fri	Nov 21	C	UCSD Browser
Wed	Dec 3	A, B	Annotation Project Results
Fr	Dec 5	C	Annotation Project Results

PAPER SUMMARIES

On day of lecture of assigned readings, please submit a 1 page summary of the paper to the instructor. Summarize the main points of the paper in your own words.

WORKSHEETS

These worksheets are sample problem sets to work through. There will be two worksheets in the workshops and 5 worksheets during lab in week 1, 2 and 3. These worksheets are due after the workshop/Lab and you need to turn in these worksheets to the instructor or attendant before you leave the lab room.

PROJECT OVERVIEW PRESENTATION AND REPORT

You are expected to give a presentation about your Annotation Project in week 4. A five page report writeup on the project overview is due on **Wednesday November 5, 2008**. This will include your introduction for your project summary.

PROJECT SUMMARY PRESENTATION AND REPORT

You are expected to give a presentation about your Annotation Project Results in week 10. A twenty page report writeup on the project results is on **Wednesday December 10, 2008**.

REQUIRED READINGS

Paper 1: Due Friday Sep 26th;

“Novel metabolism in Chlamydomonas through the lens of genomics.”, Arthur R Grossman, et. Al., Current Opinion in Plant Biology 2007, 10:190-198.

Paper 2: Due Wednesday Oct 1st; “Exploring Genomes”, Web-Based Bioinformatics Tutorials. Paul G. Young, 2003, Freeman and Company.

Paper 3: Due Wednesday Oct 8th;

“Basic Local Alignment Search Tool”. Stephen F Altschul et al., J. Mol. Biol. (1990) 215, 403-410.

Paper 4: Due Wednesday Oct 15th;

“The Chlamydomonas Genome Reveals the Evolution of Key Animal and Plant Functions”. Sabeeha S. Merchant et al., Science, Vol 318, 2008 245-251, plus Supplement.

LS187A Fall 2008		Dr. Pfluegl		
Workshops	W	2 - 3 pm	SLC 4340	
Lecture	W /F	2 - 3 pm	3-4pm	LaKretz 100
Lab Presentations	F	2 - 3 pm	LaKretz 100	
Lab Meeting	W	3 - 4 pm	LaKretz 100	
Project Presentations	W	2 - 4 pm	F 2-3pm	LaKretz 100

Week	Meeting hours	Lecture Topic	Mo	Tu	We ABC	Th	Fr ABC	Presentation Topic
0	2:00-3:00 3:00-4:00	Paper 1				25-Sep Coordination Meeting	26-Sep Lec 1	27-Sep Introduction
1	2:00-3:00 3:00-4:00	UCSD Browser Paper 2	29-Sep	30-Sep	1-Oct WS 1 Lec 2	2-Oct	3-Oct	4-Oct Chlamydomonas
2	2:00-3:00 3:00-4:00	Blast Paper 3	6-Oct	7-Oct	8-Oct WS 2	9-Oct	10-Oct	11-Oct
3	2:00-3:00 3:00-4:00	JGI Browser/KEGG Paper 4	13-Oct	14-Oct	15-Oct Lec 3	16-Oct	17-Oct	18-Oct
4	2:00-3:00 3:00-4:00	Project Overview	20-Oct	21-Oct	22-Oct Present A Present B	23-Oct	24-Oct Present C	25-Oct
5	2:00-3:00 3:00-4:00	Eukaryotic Genomes	27-Oct	28-Oct	29-Oct Lec 4	30-Oct	31-Oct Present A	1-Nov Blast
6	2:00-3:00 3:00-4:00	Comparative Genomics	3-Nov	4-Nov	5-Nov Lec 5	6-Nov	7-Nov	8-Nov
7	2:00-3:00 3:00-4:00	cDNA Libraries	10-Nov	11-Nov Holiday	12-Nov Lec 6	13-Nov	14-Nov Present B	15-Nov UCSD Browser
8	2:00-3:00 3:00-4:00	Sequencing Technologies	17-Nov	18-Nov	19-Nov Lec 7	20-Nov	21-Nov Present C	22-Nov JGI Browser
9	2:00-3:00 3:00-4:00	Summary	24-Nov	25-Nov	26-Nov Lec 8	27-Nov Holiday	28-Nov Holiday	29-Nov
10	2:00-3:00 3:00-4:00	Project Results	1-Dec	2-Dec	3-Dec Present A Present B	4-Dec	5-Dec Present C	6-Dec
Final			8-Dec	9-Dec	10-Dec	11-Dec	12-Dec	