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

Fall 2007 Syllabus

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

INSTRUCTOR: Gaston M.U. Pfluegl (drpfluegl@gmail.com)
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TEACHING TEAM: Karen Flummerfelt (karenf@microbio.ucla.edu)

COURSE ADMINISTRATOR: Lily Yanez (lyanez@lifesci.ucla.edu)
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LECTURE & LAB MEETINGS:

M	3:00 pm – 4:00 pm (Lab Meeting)	SH 2834
W	3:00 pm – 4:00 pm (Presentation)	Rolfe 3134
F	3:00 pm – 4:00 pm (Lecture)	Rolfe 3135

LABORATORY RESEARCH: TR or WF 8:00am – 12:00pm
3336 Young Hall South
(310) 825-0171

URI website: www.lsic.ucla.edu/uri/
Course website: www.lsic.ucla.edu/classes/fall07/
Lab website: http://lslab.lscore.ucla.edu/

RESEARCH PROJECT.

Life Sciences 187 offers you the opportunity to participate in research in microbrial and mouse genomics by a.) sequencing the genome of *Ammonifex degensii*, a thermophilic bacterium and b) by genotyping genotypic variations of six homozygous mouse strains by using microsatelitte.. 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. UGRI is a collaborative, cross-disciplinary effort among undergraduates in lower and upper division life science courses. The UGRI intends to be the first group of undergraduates to produce an annotated microbial genome. For regular updates of our activities, link to www.lsic.ucla.edu/ugri/

RESEARCH REQUIREMENTS.

LS187A students must conduct six hours of laboratory research per week. In addition, students are required to attend weekly lectures on Fridays from 3-4PM in Rolfe 3135 and group meetings on principles and techniques held at 3-4 PM on Mondays in SH 2834 and Wednesday in Rolfe 3134. Teamwork is essential for a successful genotyping 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

- White lab coat worn at all times in lab
- 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

LECTURES, LAB MEETINGS and LABORATORY RESEARCH

Lectures (F 3-4 PM, Rolfe 3135). We discuss sequencing theory and practice. Please complete assigned readings prior to lecture. PowerPoint slides can be downloaded from the course website.

Lab Meetings (M3-4 PM, Slichter Hall 2834, W3-4, Rolfe 3134). 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. Please note that there will be five *unannounced* quizzes given at the beginning of the Wednesday lab meetings.

Laboratory Research (TR or WF, 8AM – 12PM, 3336 YHS). This is when your research will be conducted, which primarily consists of sequencing and preliminary annotation of *A. degensii's* genome.

GRADING

	Pts	%
Conduct and Initiative (50 pts each) ……..….	100	20%
Quizzes (5 at 20 pts each) ……..…	100	20%
Midterm ……..……	100	20%
Final Exam ……...……..……	100	20%
Open Seminar Report ……...…....…..……..	50	10%
Lab Notebook ……..…...	50	10%
Total Points	500	100%

Attendance at Monday and 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 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.

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.

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 15,2007.**

QUIZZES AND EXAMS

Quizzes will relate to the preceding Friday lecture and any assigned reading, including articles. Quizzes are approximately 20 minutes long and are taken by all students at the beginning of Wednesday meetings. No extra time given for tardiness. Each quiz is worth 20 points, and is UNANNOUNCED. The midterm is scheduled for **Nov 7, 2007** and the comprehensive final exam is on **Dec 12, 2007.**

PRESENTATIONS DURING LAB MEETINGS

Presentations are an integral part of the research learning experience. Each research group will be required to give a presentation during the quarter (see schedule and your group assignment). PowerPoint presentations are to be 25 minutes in length (inclusive of Q & A). Your presentation must be reviewed by the Instructional Team PRIOR to presentation, so please make advance arrangements.

Date		**Group**	**Presentation Topic**
Wed	Oct 10	A	Mini-prep Basics
Wed	Oct 17	F	Restriction Enzymes & Agarose Gel Basics
Wed	Oct 24	B	Project Progess & Troubleshooting
Wed	Oct 31	G	BLAST Basics
Wed	Nov 14	C	Ammonifex degensii BLAST Results
Mon	Nov 21	H	Microsatellites and Primer Design
Wed	Nov 28	D	Primer Design Results
Mon	Dec 5	I	TBA

FRIDAY LECTURE SCHEDULE

Week 1	**Fr, Oct 5**	**Microbial Genomes: Sequencing the genome of *Ammonifex degensii***
	Readings:	Huber et al., "Formation of ammonium from nitrate … *Ammonifex degensii*"
Week 2	**Fr, Oct 12**	**Sequencing basics I: Library, PCR, and DNA sequencing**
	Readings:	DvS1: Gene cloning (pp 28-9); Purif/Separ nucleic acids (pp 48-53); Vectors and plasmids (pp 65-6); Transformation (pp 71-3); Genomics/cDNA libraries (pp 99-110); PCR (pp 143-9); and DNA sequencing (pp 161-175)
Week 3	**Fr, Oct 19**	**Sequencing basics II: Technology for sequencing genomes**
	Readings:	Middendorf et al. "Enhanced throughput for infrared automated sequencing"
Week 4	**Fr, Oct 26**	**Jake Lusis: Introduction to Mouse Genetics**
MRL3248 2-3pm	Readings:	Genetic Variation in Inbred Mice, Claire M Wade & Mark J Daly
Week 5	**Fr, Nov 2**	**Bioinformatics: using BLAST to search for sequence similarity Basic Genetics Primer** DvS 2: 195 – 207; and Altschul et al. "Basic local alignment search tool."
Week 6	**Fr, Nov 9**	**Basic Genetics**
	Readings:	TBA
Week 7	**Fr Nov 16**	**Anatole Ghazalpour: Current findings in mouse genomic rsearch**
MRL3248 3-4pm	Readings:	Mouse Genetics, Lee Silver, Oxford Press 1995 selected chapters
Week 9	**F, Nov 30**	**Annotating a genome; Preliminary findings for *A. degensii***
		DvS 3: 177-180 and 182-187; and Parkhill, "Annotation of microbial genomes"
Week 10	**Fr, Dec 7**	**Summary Lecture**
Finals	**W, Dec 12**	**Final Exam – 101 LaKretz (subject to change)**

LS187A Fall 2007		Dr. Pfluegl
Lab Meeting	M	3:00 - 4:00 pm SH 2834
Lab Presentations	W	3:00 - 4:00 pm Rolfe 3134
Lecture	F	2:00 - 3:00 pm Rolfe 3135

Week	Su	Mo	Tu	We	Th	Fr
			ABCDE	FGHIJ	ABCDE	FGHIJ
1	1-Oct	1-Oct	2-Oct	3-Oct	4-Oct	5-Oct
			ABCDE	FGHIJ	ABCDE	FGHIJ
		Lec 1		LabMeet		Lec 2
2	7-Oct	8-Oct	9-Oct	10-Oct	11-Oct	12-Oct
			ABCDE	FGHIJ	ABCDE	FGHIJ
		LabMeet		Present A		Lec 3
3	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
			ABCDE	FGHIJ	ABCDE	FGHIJ
		LabMeet		Present F		Lec 4
4	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct
			ABCDE	FGHIJ	ABCDE	FGHIJ
		LabMeet		Present B		Lec 5
5	28-Oct	29-Oct	30-Oct	31-Oct	1-Nov	2-Nov
			ABCDE	FGHIJ	ABCDE	FGHIJ
		LabMeet		Present G		Lec 6
6	4-Nov	5-Nov	6-Nov	7-Nov	8-Nov	9-Nov
			ABCDE	FGHIJ	ABCDE	FGHIJ
		LabMeet		**Midterm**		Lec 7
7	11-Nov	12-Nov	13-Nov	14-Nov	15-Nov	16-Nov
		Holiday	ABCDE	FGHIJ	ABCDE	FGHIJ
		Veteran		Present C		Lec 8
8	18-Nov	19-Nov	20-Nov	21-Nov	22-Nov	23-Nov
			ABCDE	FGHIJ	Holiday	Holiday
		Present 6		Present H	Tksgv	Tksgv
9	25-Nov	26-Nov	27-Nov	28-Nov	29-Nov	30-Nov
			ABCDE	FGHIJ	ABCDE	FGHIJ
		Present 8		Present D		Lec 9
10	2-Dec	3-Dec	4-Dec	5-Dec	6-Dec	7-Dec
			ABCDE	FGHIJ	ABCDE	FGHIJ
		LabMeet		Present I		Lec 10
Finals	9-Dec	10-Dec	11-Dec	12-Dec	13-Dec	14-Dec
				Final		