Fall 2018 **BIMM101—Recombinant DNA Techniques** **Andrew Cooper**

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Lecture Meeting: TuTh 8:00-9:20 am CSB 004

Lab Meeting: TuTh 9:30-1:20 pm YORK 3306/3406

Office Hours: Tuesday and Thursday 2:10-3:10 pm in HSS 1145B (or by appointment)

Course Learning Objectives:
By the end of this course, you should be able to:

1. Demonstrate proficiency with basic molecular biology techniques.
2. Apply knowledge of molecular biology concepts and techniques to plan and troubleshoot experiments.
3. Interpret results in a biological context and report them in a coherent and accurate written form.
4. Explain the importance of proper controls in designing experiments and interpreting results.
5. Perform basic lab math skills, statistical analysis, and generate graphs.

Contacting Me: Please ensure that all e-mails include BIMM101 in the subject line and if the matter requires immediate attention include URGENT in the subject line as well. If I do not respond to an e-mail within 24 hours please send it again.

Required Materials: Lab Manual (purchase at the bookstore), carbonless copy notebook (bookstore or use one from a previous course with remaining pages), knee-length lab coat, and UV-blocking safety glasses or goggles. Long pants and closed-toe/heel shoes are required in lab (no visible skin from the waist down, including ankles). Fine-tipped sharpie pen in a dark color for labelling. iClicker for lecture participation, registered on TritonEd. (Optional): Calculator, you will not be allowed to use cellphones on the quizzes.

Computers: We will often use computers for data analysis and other exercises. There is access to a limited number of computers in lab, therefore if you have your own laptop it is recommended that you bring it on days scheduled for computer activities.

TritonEd: All course related information will be posted on our TritonEd site. The lecture slides will usually be posted either before lecture or immediately after. Please check the TritonEd site and your UCSD e-mail regularly for any announcements.

Podcast: Each lecture will be podcasted.

iClickers: iClickers are required for this course. The frequency in this classroom is AC. You must register your clicker on TritonEd by Thursday, October 4th. Clicker participation will be counted beginning with Lecture 2 (10/2).

Instructional Assistants (IAs):

Li, Yingcong	yil689@ucsd.edu
Lin, Hu-An	hul043@ucsd.edu

Pre-Lab Quizzes: There will be on-line quizzes due before lab each section covering the protocols that will be performed that day. These will be available on the course TritonEd site.

In-Class Quizzes: Throughout the quarter there will be 8 in-class quizzes that will be based on material from previous labs. These quizzes will take place immediately at the start of lecture and can not be made up if missed.

Lab Notebook: You will be required to maintain a complete and organized lab notebook. Before the class begins you need to obtain a carbon-less copy lab notebook. For each lab there should be a dated entry containing an outline of the experiments/protocols being done that day, the goals of the experiments, prediction about the outcome, as well as observations made throughout the experiments and clearly labeled results and analysis. Throughout the quarter the lab notebooks will be collected and graded at random, with no advance warning.

Professionalism: Activities in a lab environment should be undertaken with caution and maturity, as careless actions can quickly result in injury or damage to equipment. The assumption is that all students will act with appropriate maturity and are automatically given 50 points at the start of the semester. Deductions can be made by the instructor or IAs for unprofessional activities in lab, through one-on-one conversations, or electronic interactions.

Lab Reports: There will be 7 written reports throughout the quarter. Lab reports must be uploaded to Turnitin on TritonEd before lab begins on the day the assignment is due. Additionally, a print copy of the lab report must be handed in within the first 10 minutes of lab. Assignments turned in after the first 10 minutes of lab will have a 5% deduction. Lab reports turned in within 24 hours of the due date will have a 20% deduction. After 24 hours late reports will not be accepted.

Report 1: Writing in your own voice (50 pts)	Due: October 4th
Report 2: Agarose Gel Analysis (50 pts)	Due: October 11th
Report 3: PCR Variations (50 pts)	Due: October 18th
Report 4: RFP Ligation (50 pts)	Due: November 11th
Report 5: Mutagenesis (100 pts)	Due: November 29th
Report 6: *C. elegans* RNAi (50 pts)	Due: December 6th
Report 7: PTC Analysis (50 pts)	Due: December 10th

More details will be provided for each report.

Final: There will be a cumulative final exam during the final lab section (Thursday, December 6th).

Regrades: If you find an error on your quiz you should submit a written re-grade request, along with the quiz, to the Instructor within one week of the quiz being returned. In this re-grade request you should explain both the perceived error and your justification of why it is an error. No re-grades will be allowed for quizzes written in pencil or non-permanent ink. Students that submit a quiz for regrade understand that (1) the entire quiz may be re-graded and (2) the quiz will be compared to a copy to ensure no alterations have been made. Any alterations made to quizzes submitted for regrades will be considered academic dishonesty and will be handled accordingly.

In-Class Participation Points: There will be 20 lectures throughout the semester where clicker participation will be monitored. Each lecture has 5 participation points possible, based on clicker questions and participation in small-group discussions. Clicker points will be counted starting Tuesday, October 2nd. For each class where you answer $\geq$75% of the questions, you will get participation points, if you do not then you will get a zero for the day. You do not need to get the correct answer. For a majority of clicker questions, you will have to submit answers twice (once before and once after discussion) and both of these submissions are required.

Grading: Grading in this course is on a straight point scale so in theory, every person could earn an A! You are not competing with each other for grades, so work together!

	Points
Lecture Participation	100
Pre-Lab Quizzes	60
In-Class Quizzes	240
Lab Notebook	50
Professionalism	50
Lab Reports	400
Final	100
Total	**1000**

Letter grades are assigned as follows:

90-100: A

80-89: B

70-79: C

60-69: D

Below 60: F

+/- grades are given to those close to the next grade level.

Late Work Policy: Pre-lab quizzes will automatically close when the lab begins and late submissions will not be accepted. A lab report turned in within 24 hours of the due date will be accepted but with a deduction of 20% of the possible points. Reports submitted more than 24 hours after the due date will not be accepted. If you experience extenuating circumstances (e.g., you are hospitalized) that prohibit you from submitting your assignments on time, please let me know. I will evaluate these instances on a case-by-case basis.

Disability Access: Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact me

privately) and to the OSD Liaison in the department in advance so that accommodations may be arranged.
Contact the OSD for further information:
858.534.4382 (phone) osd@ucsd.edu(email) http://disabilities.ucsd.edu(website)

Title IX Compliance: The University recognizes the inherent dignity of all individuals and promotes respect for all people. Sexual misconduct, physical and/or psychological abuse will NOT be tolerated. If you have been the victim of sexual misconduct, physical and/or psychological abuse, we encourage you to report this matter promptly. As a member of this community, I am interested in promoting a safe and healthy environment, and should I learn of any sexual misconduct, physical and/or psychological abuse, I must report the matter to the Title IX Coordinator. If you want to speak confidentially you may contact the Counseling Center.

The Office for the Prevention of Harassment & Discrimination (OPHD) provides assistance to students, faculty, and staff regarding reports of bias, harassment, and discrimination. OPHD is the UC San Diego Title IX office. Title IX of the Education Amendments of 1972 is the federal law that prohibits sex discrimination in educational institutions that are recipients of federal funds. Students have the right to an educational environment that is free from harassment and discrimination.

Students have options for reporting incidents of sexual violence and sexual harassment. Sexual violence includes sexual assault, dating violence, domestic violence, and stalking. Information about reporting options may be obtained at OPHD at (858) 534-8298, ophd@ucsd.edu or http://ophd.ucsd.edu. Students may receive confidential assistance at CARE at the Sexual Assault Resource Center at (858) 534-5793, sarc@ucsd.edu or http://care.ucsd.edu or Counseling and Psychological Services (CAPS) at (858) 534-3755 or http://caps.ucsd.edu.

Students may feel more comfortable discussing their particular concern with a trusted employee. This may be a student affairs staff member, a department Chair, a faculty member or other University official. These individuals have an obligation to report incidents of sexual violence and sexual harassment to OPHD. This does not necessarily mean that a formal complaint will be filed. If you find yourself in an uncomfortable situation, ask for help.

Academic Integrity: Students are expected to do their own work, as outlined in the UCSD Policy on Academic Integrity. Cheating will not be tolerated, and I will fail any student caught engaging in academic dishonesty. All exams will be closed-book and closed-notes, so all personal materials must be stowed under your seat. Only exams written in nonerasible pen will be considered for regrades. Exams will be photocopied for comparison with submitted regrades. Any student caught cheating on an exam will receive a failing grade for the course. They may also be suspended from UCSD.

Week	Dates	Lecture	Lab Exercises	Lab Manual Section	
0	9/27	Intro, Talk about first report, Dilutions, Molecular Biology review	Calibration, Pipetting, Dilutions	Lab 1, Additional info "working in the lab" sections E, F, G	
1	10/2	Mol Bio Review, Agarose Gels	Agarose gel electrophoresis on two DNA samples of unknown size and concentration (estimating using standard curve)	Experiment 1, 1A-1D	
	10/4	Talk about Agarose Report, Analyzing Agarose Gels, Intro Promoter Project	Computer Lab: Image Studio Lite Analysis of Agarose Gel & Graphing. Set-up liquid cultures of RFP and control promoter	Starting Experiment 2, 2A, Appendix A & B	"Writing in your own voice" Report
2	10/9	Quiz 1, Promoter Project, Plasmid Extraction	Extract plasmids. Check plasmids with AGE & nanodrop.	2B	In-Class Quiz
	10/11	Talk about PCR Report, Restriction Enzymes, PCR and Variables	Design and set up RFP PCR experiment. Start computer lab - plasmid map, restriction enzymes, designing primers	Sub-experiment 2-1. 2C, Appendix D	Agarose Gel Report
3	10/16	Quiz 2, Primer Design	Run gel of PCRs, repeat if needed. Clean up PCR. Set up digest of Pro1 plasmid and RFP PCR product. Finish Appendix D computer lab if needed	Finish 2C, 2D, 2E	In-Class Quiz
	10/18	Transformations, Ligations and Variables	Clean stuffer from Pro1 - heat inactivate PCR digest and run gel. Plan ligations.	2F, Sub-experiment 2-2: part of 2G	PCR Reports
4	10/23	Quiz 3, Site-Directed Mutagenesis (SDM)	Set-up ligations & transform bacteria with ligations. Computer Lab: Design mutagenesis primers	2H, 2K	In-Class Quiz
	10/25	Talk about Ligation Report, Analyzing Ligation Data	Count colonies. Plan how to analyze ligation data. Pick red colony from plate and start liquid culture.	2I	
5	10/30	Quiz 4, CRISPR	Purify recombinant Pro1-RFP plasmid and run gel. Set-up mutagenesis PCR. Computer lab: analyze ligation data	2J, 2L	In-Class Quiz
	11/1	FRET	Gel of PCR mutagenesis, repeat PCR. Kinase/ligase/dpn treatment. Transform cells.	2M, 2N	Ligation Report
6	11/6	Quiz 5	Check repeat PCRs, KLD and transformation if needed. Analyze transformations. Computer lab: Bioinformatics Intro to GenBank (optional)	2O, Appendix F	In-Class Quiz

	11/8	Sequencing Process and Results Analysis	Analyze transformations from repeats (if done). Set-up liquid cultures: three colonies from mutagenesis	2O	
7	11/13	Quiz 6, Paper Discussion	Streak cultures to maintain. Purify plasmids from 3 cultures and check using AGE & send for sequencing	2P, 2Q	In-Class Quiz
	11/15	RNAi, *C.elegans* as a model	Computer lab: analyze sequencing results. Use streaked bacteria to measure RFP and plan how to analyze data.	2R, 2S, 2T	
8	11/20	Quiz 7, Talk about Mutagenesis Report	Computer Lab: Analzye RFP data. Observe *C.elegans* and induce RNAi.	2T, Experiment 3. 3A	In-Class Quiz
	11/22	No Class	No Labs, Thanksgiving Holiday		
9	11/27	Quiz 8, qPCR	Observe worm phenotypes. Extract RNA and set up RT-qPCR.	3B, 3C	In-Class Quiz
	11/29	Talk about RNAi Report, PTC	PTC extraction & PCR. Computer Lab: Analyze qPCR data	Experiment 4. 4A	Mutagenesis Report
10	12/4	Talk about PTC Report, Analyzing PTC data	Digest PTC PCRs, check with agarose gel, PTC taste-test (phenotyping). Pool genotype/phenotype data. Computer Lab: Analyze PTC data	4B	
	12/6	Review	Clean-up & Final		*C.elegans* RNAi and PTC Analysis Reports