

**Welcome to BIMM 101 Recombinant DNA Techniques!**  
**Sections G01, G02, G03, G04 Fall 2018**

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Office Hours: will vary,  
depending on the week. Office  
hours schedule is posted on  
TritonEd/Calendar tool. Also, feel  
free to talk to me during the lab.

**LECTURE:** Tue, Thu 8 – 9:20AM, Center Hall 214

**LAB:** Tue/Thu: 10:00AM-1:50 PM, York Hall 4318 (section G01), 4332 (section G02)  
Wed, Fri: 9:00 – 12:50pm, York Hall 3306 (section G03), 3406 (section G04)

Section	TA	TA email
G01, York 4318	Keim, Alexander	<a href="mailto:apkeim@ucsd.edu">apkeim@ucsd.edu</a>
G02, York4332	Hsieh, Lance	<a href="mailto:lyhsieh@ucsd.edu">lyhsieh@ucsd.edu</a>
G03, York 3306	Diaz, Brienna	<a href="mailto:b3diaz@ucsd.edu">b3diaz@ucsd.edu</a>
G04, York 3406	Chai, Albert	<a href="mailto:alchai@ucsd.edu">alchai@ucsd.edu</a>

**BRING TO LAB EACH DAY:**

1. Lab Manual
2. Lab coat (the bookstore has cheap ones)
3. UV blocking safety glasses (also at bookstore)
4. Lab notebook (regular, no need for carbon copies)
5. Pen (lab notes must be in ink)
6. Calculator
7. Proper attire (long pants, closed-toed shoes - see safety notes in Lab Manual)

**LAB SCHEDULE:** on TritonEd/Schedule of labs

**COURSE WEBSITE:** [Tritoned.ucsd.edu](http://Tritoned.ucsd.edu)

Please check the TritonEd site before each lab! Important announcements, pre-lab quizzes, required reading, guidelines for lab reports/assignments, class handouts, exam study guides, links to websites, etc., will be posted on the website.

**LEARNING OBJECTIVES**

- Understand the theory behind molecular techniques, and the applications of the methodologies in biological research
- Be able to perform basic molecular biology techniques
- Understand and follow basic rules of lab safety and sterility techniques
- Be able to maintain proper records of your experiments, observations and conclusions
- Be able to perform basic bioinformatics analyses
- Demonstrate lab math skills and ability to graph data correctly
- Be able to interpret results and make logical conclusion from experimental data
- Be able to identify and interpret controls
- Demonstrate clear, thoughtful, and concise scientific writing
- Demonstrate the ability to design your own recombinant DNA experiments, including proper controls

**COURSE POLICIES**

**LAB SAFETY TRAINING** – Enrolled and waitlisted students **MUST** successfully complete the Biology Lab Safety Training and Assessment before the first lab session (even if you have taken it in previous quarters): <https://biolabclass-safetyquiz.ucsd.edu/> (also accessible from this

webpage: <https://biology.ucsd.edu/education/undergrad/course/ug-labs.html>). Please note that courses offered by other departments (Chemistry, for example) may have additional safety training requirements.

**ATTENDANCE** – Enrolled and waitlisted students **MUST** attend the first lab session. Additional details: <http://biology.ucsd.edu/go/ug-labs>. **Remember that lab attendance is required – if you miss two labs, you will be dropped from the course.** Missing one lab without a documented emergency will result in 3% reduction of your final grade. What are documented emergencies? These are serious illnesses or family emergencies that require you to be away from the lab. In both cases, in order to be fair to other students, you must bring a doctor’s note or another official means to verify your emergency. In case of such an emergency, you must leave a message with me, not your IA, and make up the lab in a way that I will determine. If you have graduate schools interviews during lab times that cannot be rescheduled, talk to me about the possibilities to make up the lab. More than one unexcused absence will result in you failing the course. You must be on time for lab: the IAs go over the experiments and safety considerations at the beginning of lab. Lateness for labs will result in grade deduction.

**ADD/DROP DEADLINES** are different for lab courses than lecture courses. Students who drop a Biology lab class after the end of the second class meeting will be assigned a “W”. Additional details: <http://biology.ucsd.edu/education/undergrad/course/ug-labs.html> PLEASE NOTE: beginning fall 2018 quarter, the withdrawal deadline is changing from the end of Week 9 to the end of Week 6.

**REQUIRED TEXTS:**

- Lab manual “Fall 2018 BIMM 101 Recombinant DNA Lab Manual”, sold at UCSD Bookstore (Winter 2018 and Spring 2018 versions are also OK)

**GRADING:**

- 35% Final exam (completely comprehensive, covers everything we did). If the Final exam grade is higher than the Midterm, it replaces the Midterm grade
- 20% Five experimental summaries (one worst grade is dropped, must submit all summaries)
- 15% Midterm
- 10% online pre-lab quizzes (one worst dropped)
- 10% Written assignments other than experimental summaries (bioinformatics, data analysis, etc.)
- 5% lab skills, attendance, performance (this grade is determined by the IA’s)
- 3% In-class participation (iClickers)
- 2% In-class group work (grade assigned to the group as a whole)

**1. Final exam: Please note the change in the final exam: as discussed in class in week 5, to give you more time to complete this exam, it will take place in labs, during the last scheduled lab (Thu, Dec. 6 for Tue/Thu sections, Fri, Dec 7 for Wed/Fri sections), 10am-1pm.** The final exam will be cumulative. Midterm: **October 25, in class.** All students are expected to take their exam at the scheduled time. The only valid excuses for missing an exam are documented severe illness or family emergency. You must notify the instructor prior to the scheduled exam in order to be considered for a make-up exam. Reasons for make-up examinations must be clearly documented (e.g., doctor’s note) and requested in writing. If justified, a 30 min oral exam will be scheduled by the instructor.

**2. Pre-lab quizzes:** due before each lab. Will become available at least 24 hrs before the lab.

**3. Written assignments other than experimental summaries:** there will be several bioinformatics labs and data analysis exercises. These will be submitted on TritonEd, one per group of two students: you and your lab partner will work together on the assignment and will receive the same grade.

**4. Experimental summaries**

-Brief summary of the experiments from the previous lab/s, with all data labeled and analyzed. This will help you to follow the sequence of the experiments. Most summaries will be graded. The due dates for the summaries will be posted in the course calendar. I strongly recommend starting writing the summaries on the day of, if not during the lab. One worst experimental summary grade will be dropped; you must submit all experimental summaries.

**5. Lab skills, attendance, performance.** This grade will be assigned primarily by the IA's, based on your attendance and performance on the following criteria:

- a. Attendance, being on time, and participation: starting and finishing on time, following IA's instructions, participating in discussions.
- b. Preparedness: knowing what experiments you are about to perform, being able to answer IA's and instructor's questions about them
- c. Consistent use of sterility techniques
- d. Ability to plate and streak bacteria, perform transformations
- e. Ability to assemble restriction digests, ligation, and PCR reactions (includes pipetting skills)
- f. Ability to perform agarose gel electrophoresis and interpret its results
- h. Ability to extract genomic, plasmid, and mitochondrial DNA
- i. Maintain clear records of experiments (lab notebook)
- j. Work as part of a team with your immediate partner and with another group you share the bench with
- k. Answer the questions posed by the IA and the instructor, participate in the in-lab discussions

**6. In-class group work.** You will sit together with your lab partner and the group next to you (sharing the same bench). In-class, you will work together to solve problems and answer questions. The instructor will record the quantity and the quality of your group's participation. All members of the group that consistently participate will share the group's grade.

**7. iClickers:** click in 85% questions to earn an A in this category

**LATE POLICY:** lab reports and homework assignments are due on TritonEd on the assigned date and time. For each day thereafter (including weekend days), you will lose 10% off the lab report grade. Please talk to the instructor if emergency or illness precludes you from submitting these on time. **Important:** you can use **two days of grace per quarter** on any one of the written assignments: that is, you can turn in one assignment two days late without the penalty. Use those two days wisely!

**REGRADE POLICY: All** requests for regrades must be submitted in writing first to your TA, then (if problem is not resolved) to me. To submit for a regrade, you must write a cover letter specifying which specific problem should be looked at and fully describing why you think it was wrongly graded. The regrade request must be delivered within 1 week after the assignments are returned.

**POLICY ON CHEATING:** anyone caught cheating (includes plagiarizing experimental summaries, cheating on a test, or changing an answer for a regrade) will be reported to the Academic Integrity Office. Each student is required to read and sign the Academic Integrity Policy Regarding Written Assignments.

#### **STUDENTS WITH DISABILITIES**

Reasonable accommodations will be provided for qualified students with disabilities. If you have any disability that may impair your ability to complete the course successfully, please contact me during the first week of the course.

#### **LETTERS OF RECOMMENDATION:**

As a general rule, I will write letters only for those who receive an A or above in this course. If you think you may want me to write you a letter of recommendation, be sure to not only very actively participate in the in-class discussions, but also talk to me during the lab and my office hours: ask questions, offer your own ideas and interpretations of your results, bring interesting facts/papers that are connected to the material we are studying. By doing so, you will allow me to observe your way of thinking, which in turn will allow me to write a more meaningful letter of recommendation for you. Also, please save your lab reports and tests, for I will ask for some of them to review. If you never spoke to me, I will not be able to write a meaningful letter for you.

#### **OPPORTUNITIES TO GET TO KNOW YOUR CLASSMATES, IA'S AND THE INSTRUCTOR:**

This lab offers more personal settings than some of the big classes at UCSD. I encourage you to take this opportunity and talk to your TA's and to me about any course- or career-related issues. It is also a great idea to exchange email

addresses/phone numbers with a few people in your class (for example, your bench-mates), in case you'll have questions or would like to form a study group – always a good idea!

Week	Dates	Lab Exercises	Lab Manual Section	Experimental summaries
0	Sept 27/28	Calibration of a pipette		No experimental summary due
Lab 1		Pipetting	Lab 1	
		Dilutions	Additional info "working in the lab" sections E, F, G	
Week 1 Lab 2	Tue/Wed Oct 2/3	Agarose gel electrophoresis on two DNA samples of unknown size and concentration (estimating using standard curve)	Experiment 1, 1A-1D	
Lab 3	Thu/Fri, Oct 4/5	<b>Computer Lab</b> Image Studio Lite Analysis of Agarose Gel Graphing Set-up liquid cultures of RFP and control promoter	Appendix A Appendix B, C Starting Experiment 2, 2A	
Week 2	Tue/Wed Oct 9/10	Extract plasmids		Exp summary 1 is due on Turnitin/TritonEd before 8am on the day of Lab 4
Lab 4		Check plasmids with AGE & nanodrop	2B	

Lab 5	Thu/Fri Oct 11/12	Design and set up RFP PCR experiment <b>Start computer lab - plasmid map, restriction enzymes</b>	Sub-experiment 2-1. 2C Appendix D, up to and including question 14	
3 Lab 6	Tue/Wed Oct 16/17	Run gel of PCRs, repeat if needed Clean up PCR Set up digest of Pro1 plasmid and RFP PCR product <b>Finish Appendix D computer lab (up to and including Q14)</b>	Finish 2C 2D 2E	Computer lab is due before midnight, one per group
3 Lab 7	Thu/Fri Oct 18/19	Clean stuffer from Pro1 - heat inactivate PCR digest  Run gel of digest  Plan LIGATIONS	2F 2F Sub-experiment 2-2: part of 2G	Experimental summary 2 is due on Turnitin/TritonEd before 8am on the day of Lab 7
Week 4 Lab 8	Tue/Wed Oct 23/24	Set-up ligations & transform bacteria with ligations  Computer Lab: Design mutagenesis primers	2H 2K	Mutagenesis primer assignment is due before the end of the lab. Check your primers with your IA before submitting the assignment
Lab 9	Thu/Fri Oct 25/26	Count colonies Plan how to analyze ligation data Pick red colony from plate and start liquid culture	2I start 2I 2I	In class: Midterm
Week 5 Lab 10	Tue/ Wed Oct 30/31	Purify recombinant Pro1-RFP plasmid and run gel Set up mutagenesis PCR <b>Computer lab: analyze ligation data</b>	2J 2L plan previously developed	Computer lab: ligation data analysis, due before midnight, one per group of two
5 Lab 11	Thu/Fri Nov 1/2	Gel of PCR mutagenesis, repeat PCR Kinase/ligase/dpn treatment Transform cells	2M 2N 2N	

Week 6 Lab 12	Tue/Wed Nov 6/7	Check repeat PCRs, KLD and transformation if needed  Analyze transformations <b>Computer lab: Bioinformatics Intro to GenBank (optional)</b>	2O Appendix F	Experimental summary 3 is due before 8am on the day of Lab 12
Lab 13	Thu/Fri Nov 8/9	Set-up liquid cultures: three colonies from mutagenesis Analyze transformations from repeats (if done)	2O	In lab: practice exam
Week 7 Lab 14	Tue/Wed Nov 13/14	Streak cultures to maintain the bacteria Purify plasmids from 3 cultures and send for sequencing Check plasmids using gel electrophoresis	2P 2Q 2Q	
Lab 15	Thu/Fri Nov 15/16	Computer lab: analyze sequencing results Use streaked bacteria to measure RFP Plan how to analyze RFP data	2R 2S start 2T	Computer lab: sequencing analysis, due before midnight, one per group of 2  Lecture 15: Problem solving session for exam
week 8 Lab 16	Nov 20/21	Observe <i>C.elegans</i> and induce RNAi  <b>Computer Lab: Analyze RFP data</b>	Experiment 3. 3A  2T	Computer lab: RFP analysis
	Thu/Fri, Nov 22/23	No lab, Happy Thanksgiving!		Lecture 16: RFP analysis and RNAi
Week 9 Lab 17	Tue/Wed, Nov 27/28	Observe worm phenotypes  Extract RNA and set up RT-qPCR	3B 3C	Experimental summary 4 is due before 8am on the day of Lab 17
Lab 18	Thu/Fri, Nov 29/30	PTC extraction & PCR  Computer Lab: Analyze qPCR data	Experiment 4. 4A  Brief instructions at end of Exp. 3.	Computer lab: analysis of qRT-PCR data
10	Tue/Wed, Dec 4/5	Digest PTC PCRs, check with agarose gel, PTC taste-test (phenotyping)	4B	Experimental summary 5 is due Sun, Dec 10, before midnight: RNAi

<b>Lab 19</b>		Pool genotype/phenotype data Computer Lab: Analyze PTC data	4B	
	<b>Thu/Fri, Dec 6/7</b>	Clean-up		Final exam on Thu 12/6 in class