BIMM 101 – Recombinant DNA Techniques Laboratory 2018 Fall Quarter Dr. Keefe Reuther

Dr. Keefe Reuther

Office hours: Office hours: Wed 10:30-11:30am in York 2300 and Fri 1:30p-3:00p Pacific Hall 3502

kdreuther@ucsd.edu Office: HSS 1145D

Lecture: TuTh 11am-12:20pm CSB 004

Schedule 0	Laborat	ory meetings	•		
Section #	Day	Time	Building	Room	IA
F01	TuTh	2-5:50pm	York	3306	Thomas
F02	TuTh	2-5:50pm	York	3406	Maya
Instruction	al Assista	ants:			
Name			email		
Maya Ellism	an	n	naellism@ucsd.edu		
Thomas Ku	ret	tk	kuret@ucsd.edu		

## Learning goals:

- Collaborate with one another to learn foundation biological concepts and laboratory skills
- Apply knowledge of molecular biology concepts and molecular techniques to plan experiments, explain and troubleshoot results.
- Demonstrate proficiency at the basic molecular biology techniques used in the lab.
- Explain the importance of proper controls in designing experiments and interpreting results.
- Perform basic lab math skills, statistical analysis, and graphing.
- Draw conclusions based on evidence and reasoning.
- Use basic bioinformatics databases and applications.
- Find, read, and evaluate primary literature.
- Collaborate with one another to learn foundation biological concepts and laboratory skills.

## **Required texts:**

1. BIMM 101 Lab Manual from University Readers

2. From Genes to Genomes by Dale (1<sup>st</sup>, 2<sup>cd</sup>, or 3<sup>rd</sup> edition)

electronic version of 3<sup>rd</sup> and 1<sup>st</sup> edition available on Roger

3. Readings on posted on TritonEd

## Required Materials – needed by second day of class:

Lab coat - must be to knees

UV blocking safety glasses (also at bookstore)

Lab notebook with carbon copies (bookstore or Grove general store)

Fine point Sharpie for labeling – get a dark color

Basic calculator – you cannot use a cell phone during quizzes!

Long pants, close-toed shoes, and socks

REMEMBER: NO SKIN MAY SHOW BELOW THE BOTTOM OF YOUR LAB COAT!

Remember that lab attendance is required – if you miss two labs, you will be asked

to drop the course. If you are ill, you must leave a message with your instructor, not your IA, and make up the lab in a way that we will determine. You must be on time for lab; the IAs go over the experiments at the beginning of lab, and also quizzes are administered then.

**CONTACT:** Your IA's and fellow students are your best resource for information and you should first attempt to answer your questions through them. Contact Dr. Reuther first only

for specific issues unrelated to course content. The best way to contact him is by email: kdreuther@ucsd.edu. On all emails PLEASE put BIMM 101 in the subject line to indicate that the email pertains to this course. Also, if you email a question the evening before an exam please send it before 5 PM. If you email about anything regarding your status in the course, please include your UCSD username, and PID.

**iCLICKERS**: Required. You must register your clicker on TritonEd during week 1. Beginning Tuesday, Week 2, you must answer at least 50% of the questions in a single lecture to receive participation points for that lecture. You may miss two lectures during the quarter and receive full participation credit. Forgotten remotes or dead batteries or any other similar issue will not be considered excuses for missed participation. It is the students' responsibility to make sure they have a working iClicker remote for all classes.

# VIDEOCASTING:

Whenever possible, class meetings will be recorded and made available online as a resource for learning (<u>http://podcast.ucsd.edu/</u>). However, participation and contribution are highly encouraged, as substantial portions of class meetings will be interactive. Many important concepts and ideas that are the result of collaborative learning cannot be easily captured on video. Therefore, podcasts are provided for the purpose of review and should not be used solely to substitute for active engagement in class meetings.

## **TECHNOLOGY:**

Students are welcome to bring laptop computers, tablets, or similar technology to class meetings and discussion sections for note-taking purposes. Please see this research study, which shows that multitasking on computers in class is likely to decrease not only your own grade but also the grades of people around you who can see your screen! For this reason, we ask that you do not flip between relevant course materials and irrelevant activities on the internet. The use of cell phones, computers, or other personal devices is not permitted in the laboratory for safety reasons.

Sana et al (2013) Computers and Education 62: 24-31

http://www.sciencedirect.com/science/article/pii/S0360131512002254

**WEBSITE:** Everything related to the class is kept on the TritonEd site (<u>https://tritoned.ucsd.edu/webapps/login/</u>). **Announcements** of exam room changes and many other important matters will be posted on the TritonEd site. Check the site often! **Grades** for the midterm exams will all be posted on the website. **GRADING:** 

## Participation 250 points:

- In-class activities and iClicker 100 points
- Lab notebooks, 120 points
- Professionalism 30 points

## Quizzes 350 points:

- Quizzes 50 points each Lowest score dropped
- Final exam 150 points

### Writing 400 points

- Assignment #1 50 points
- Assignment #2 60 points
- Assignment #3 70 points
- Assignment #4 80 points
- Assignment #5 70 points

Assignment #6 70 points

### Absences: If you miss one lab with no excuse, you will lose 5% from your final grade. If you miss two labs, you will receive an F for the course.

These guidelines will be used to assign grades:

> (90%) A (A-, A or A+)

> (80%) B (B-, B or B+)

> (70%) C (C-, C or C+)

### > (60%) D

There is NO rounding of grades. The ONLY recourse to receive a higher grade is to successfully submit a regrade request on an exam.

**RE-GRADES:** It is your responsibility to check your exam/quizzes for clerical errors in grading. If a grading error has been made, you should submit a re-grade request to Dr. Reuther at the end of a lecture within one week of return of the exam. The time and date of closing down the appeal process will be announced in class. Simply write "please re-grade Q #" or "arithmetic error on p. #" on the cover of your paper. Write a concise description of the alleged error on a separate, attached piece of paper. No re-grades are possible for exams written in pencil or nonpermanent ink. Students who submit exams for re-grading understand that we may (1) re-grade the entire exam, and (2) compare the submitted paper to a scanned copy of the original exam. Laboratory safety:

#### Safety precautions are crucial in the laboratory setting. Biology lab safety training and assessment (https://biology.ucsd.edu/education/undergrad/course/ug-labs.html) must be completed by the beginning of the first laboratory meeting. Students will not be allowed to participate in any laboratory section without completing this online training and assessment.

From the beginning of the first lab, appropriate laboratory attire is always required. Appropriate laboratory attire includes long pants or equivalent, long socks or equivalent, and closed-toe and closed-heel shoes. No skin should be exposed from the waist down at all times. Starting at the beginning of the second lab, personal protective equipment (PPE) is required. PPE includes laboratory coats that cover to the knees and UV-blocking safety glasses or goggles, both of which are available at the bookstore.

### Library guide:

## http://ucsd.libguides.com/bild4

A specific library guide has been designed for BILD 4. This website serves as the starting point for navigating campus library resources that support our needs in completing major assignments, such as the research proposal. Please feel free to schedule a consultation with Bethany Harris (bethany@ucsd.edu), our biomedical librarian, for further assistance. Writing and Critical Expression Hub:

## http://commons.ucsd.edu/students/writing/index.html

The Writing and Critical Expression Hub provides support for undergraduates working on course papers, i.e. laboratory reports and the research proposal, as well as other independent writing projects. Writing mentors can help at any stage of the writing process, from brainstorming to final polishing. The Writing and Critical Expression Hub offers: one-on-one writing tutoring by appointment; supportive and in-depth conversations about writing, the writing process, and writing skills; help with every stage in the writing process, walk-in tutoring; and workshops on writing.

## Accessibility and inclusion:

## http://disabilities.ucsd.edu | osd@ucsd.edu | 858-534-4382

Any student with a disability is welcome to contact us early in the quarter to work out reasonable accommodations to support their success in this course. 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). Students are required to present their AFA letters to faculty and to the OSD Liaison in the Division of Biological Sciences in advance so that accommodations may be arranged.

Whenever possible, we will use universal designs that are inclusive. For example, colors used in this syllabus are distinguishable by most colorblind and non-colorblind people, and this font is designed to be dyslexic friendly. If you have feedback on how to make the class more accessible and inclusive, please get in touch!

**Discrimination and harassment:** 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, <u>ophd@ucsd.edu</u>, or <u>http://ophd.ucsd.edu</u>. Students may receive confidential assistance at CARE at the Sexual Assault Resource Center at 858-534-5793, <u>sarc@ucsd.edu</u>, or <u>http://care.ucsd.edu</u>, 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 faculty member, a department chair, 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. The university is committed to upholding policies regarding nondiscrimination, sexual violence, and sexual harassment. **Academic integrity:** 

### https://students.ucsd.edu/academics/academic-integrity/index.html

Integrity of scholarship is essential for an academic learning community. In this course and at the university, we expect that both students and the instructional team will honor this principle and in so doing protect the validity of university intellectual work. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind. Instructors, for their part, will exercise care in planning and collaborating with students on academic work, so that academic integrity is upheld.

When people collaborate to work toward a common goal, shared values must be established so that everyone understands the acceptable ways for working together. In organizations, these are commonly called codes of conduct or ethics. In this course, we are using a statement of values<sup>4</sup> in support of codes of ethics, like the Policy on Integrity of Scholarship, to state explicitly our values and describe the behaviors for maintaining and protecting those values.

The following values are fundamental to academic integrity and are adapted from the International Center for Academic Integrity. In our course, these values are open to discussions and possible alterations based on mutual agreements among all students and the instructional team. In collaborative work, each group should discuss these values and must articulate the expectations for how they are made manifest within the group's work together.

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	As students, we will	As the instructional team, we will
Honesty	<ul> <li>Honestly demonstrate your knowledge and abilities according to expectations listed in the syllabus or in</li> </ul>	<ul> <li>Give you honest feedback on your demonstration of knowledge and abilities on assignments and exams</li> </ul>

	<ul> <li>relation to specific assignments and exams</li> <li>Communicate openly without using deception, including citing appropriate sources</li> </ul>	Communicate openly and honestly about the expectations and standards of the course through the syllabus and in relation to assignments and exams
Responsibility	<ul> <li>Complete assignments on time and in full preparation for class</li> <li>Show up to class on time and be mentally physically present</li> <li>Participate fully and contribute to team learning and activities</li> </ul>	<ul> <li>Give you timely feedback on your assignments and exams</li> <li>Show up to class on time and be mentally and physically present</li> <li>Create relevant assessments and class activities</li> </ul>
Respect	<ul> <li>Speak openly with one another while respecting diverse viewpoints and perspectives</li> <li>Provide sufficient space for others to voice their ideas</li> </ul>	<ul> <li>Respect your perspectives even while we challenge you to think more deeply and critically</li> <li>Help facilitate respectful exchange of ideas</li> </ul>
Fairness	<ul> <li>Contribute fully and equally to collaborative work, so that we are not freeloading off of others on our teams</li> <li>Not seek unfair advantage over fellow students in the course</li> </ul>	<ul> <li>Create fair assignments and exams and grade them in a fair and timely manner</li> <li>Treat all students and collaborative teams equally</li> </ul>
Trustworthiness	<ul> <li>Not engage in personal affairs while on class time</li> <li>Be open and transparent about what we are doing in class</li> <li>Not distribute course materials to others in an unauthorized fashion</li> </ul>	<ul> <li>Be available to all students when we say we will be</li> <li>Follow through on our promises</li> <li>Not modify the expectations or standards without communicating with everyone in the course</li> </ul>
Courage	<ul> <li>Say or do something when we see actions that undermine any of the above values</li> <li>Accept a lower or failing grade or other consequences of upholding and protecting the above values</li> </ul>	<ul> <li>Say or do something when we see actions that undermine any of the above values</li> <li>Accept the consequences (e.g. lower teaching evaluations) of upholding and protecting the above values</li> </ul>

All course materials are the property of the instructor, the course, and University of California, San Diego and may not be posted online, submitted to private or public repositories, or distributed to unauthorized people outside of the course. Any suspected instances of a breach of academic integrity will be reported to the Academic Integrity Office for review.

<sup>4</sup> This class statement of values is adapted from Tricia Bertram Gallant Ph.D.

	Dates	Lab Exercises	Lab Manual Section
0	27-Sep	Calibration of a pipettemen	
		Pipetting	Lab 1
		Dilutions	Additional info "working in the lab" sections E, F, G
	2-Oct	Agarose gel electrophoresis on two DNA samples of unknown size and concentration (estimating using standard curve)	Experiment 1, 1A- 1D
	4-Oct	Computer Lab	
1	4 000	Image Studio Lite Analysis of Agarose Gel	Appandix A
		Graphing	
			Starting
		Set-up liquid cultures of RFP and control promoter	Experiment 2, 2A
		Extract plasmida	
	9-Oct		
			28
2			
	11-Oct	Design and set up RFP PCR experiment	Sub-experiment 2- 1. 2C
		Start computer lab - plasmid map, restriction enzymes, designing primers	Appendix D
	16-Oct	Run gel of PCRs, repeat if needed	Finish 2C
		Clean up PCR	2D
		Set up digest of Pro1 plasmid and RFP PCR product	2E
2		Finish Appendix D computer lab if needed	
3		QUIZ 2	
	18-Oct	Clean stuffer from Pro1 - heat inactivate PCR digest	2F
		Run gel of digest	2F
		Plan ligations	2: part of 2G
	22.004		
	23-Oct	Set-up ligations & transform bacteria with ligations	2H
		Computer Lab: Design mutagenesis primers	2K
А			
-	25. Oct		21
	25-001	Plan how to analyze ligation data	start 2
		Pick red colony from plate and start liquid culture	21
		risk for oblight find plate and start liquid outdre	<u> </u>

	30-Oct	Purify recombinant Pro1-RFP plasmid and run gel	2J
		Set up mutagenesis PCR	2L
		Computer lab: analyze ligation data	plan previously
5		Quiz 4	
5	1-Nov	Gel of PCR mutagenesis, repeat PCR	2M
		Kinase/ligase/dpn treatment	2N
		Transform cells	2N
	6-Nov	Check repeat PCRs, KLD and transformation if needed	
		Analyze transformations	20
			Appendix F
6		Computer lab: Bioinformatics Intro to GenBank (optional)	
		Quiz 5	
	8-Nov	Analyze transformations from repeats (if done)	20
		Set-up liquid cultures: three colonies from mutagenesis	20
	13-Nov	Streak cultures to maintain	2P
		Purify plasmids from 3 cultures a	2Q
		Check plasmids using AGE & send for sequencing	2Q
7		Quiz 6	
	15-Nov	Computer lab: analyze sequencing results	2R
		Use streaked bacteria to measure RFP	2S
		Plan how to analyze RFP data	start 2T
		(analyze RFP as homework or complete in lab next week)	
	Nov 20/	Observe C elegans and induce RNAi	
	1407 20/		Experiment 3. 3A
8			21
	22-Nov	No Labs Thanksgiving Holiday	
	22-1101		
	27-Nov	Observe worm phenotypes	3B
		Extract RNA and set up RT-qPCR	3C
		Quiz 8	
	29-Nov	PTC extraction & PCR	Experiment 4. 4A
9			
			Brief instructions
			at end of Exp. 3.
		Computer Lab: Analyze qPCR data	

10	4-Dec	Digest PTC PCRs, check with agarose gel, PTC taste-test (phenotyping)	4B
		Pool genotype/phenotype data	
		Computer Lab: Analyze PTC data	4B
	6-Dec	Clean-up & final quiz	