WELCOME TO BIMM 101, WINTER 2017, UC SAN DIEGO

INSTRUCTOR: Steven Miller swmiller@ucsd.edu @NaturallySteve
OFFICE: 4121 Bonner Hall
OFFICE HOURS: Monday, 10 – 11 am, beginning Jan 16th.
I also strongly encourage you to find me during lab time.

INSTRUCTIONAL ASSISTANTS: A01 Gokhan Senturk gsenturk@ucsd.edu
A02 Justin Abadejos jabadejo@ucsd.edu

LECTURE: 9:00 – 9:50 am, MWF, CSB 005
LABS: 3:30 – 7:20 PM, TTH A01: YORK 3306
A02: YORK 3406

COURSE WEBSITE: http://tritoned.ucsd.edu

REQUIRED MATERIALS -- bring to lab each day, required by second day of lab:
1. Labcoat – must go to knees (available at bookstore)
2. UV blocking safety glasses (also at bookstore)
3. BIMM 101 Lab manual (includes notebook carbon copies) (available at bookstore)
4. Fine point Sharpie for labeling – get a dark color
5. Calculator – you cannot use a cell phone for quizzes!
6. iClicker (available at bookstore, version 2 preferred-**register on TritonEd**)
7. Long pants and closed-toed shoes are always required in lab (entire legs and feet covered)

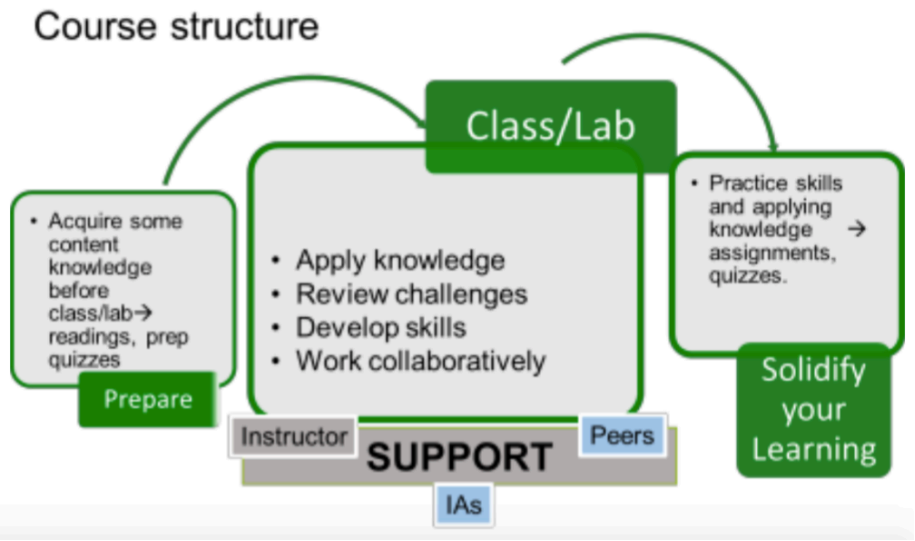
RECOMMENDED TEXT – *From Genes to Genomes* by Dale. On reserve at BML.
Electronic version available at (download from UCSD computer):
http://onlinelibrary.wiley.com/book/10.1002/0470856912

PURPOSE OF THIS COURSE – to develop an understanding of research in molecular biology through inquiry-based laboratory experiments. Students will work in groups to collect, analyze, and present research data while learning molecular and biological concepts and laboratory skills.

LEARNING GOALS:

- 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

LEARNING IN THIS COURSE



This course is designed to be a collaborative environment for everyone to learn together and construct a shared understanding of the material. Active participation both in class and lab is expected. Being able to communicate understanding, and confusion, is critical to success in any discipline, and is very useful for learning[1]. To encourage communication and collaboration, we will frequently use class time to work on problems in groups.

We like to use class time to work on applying knowledge, troubleshooting difficult topics, and practice solving problems. Hence, it is expected that you will prepare before coming to class, reviewing basic background information about the lab and/or relevant content. This will be encouraged through targeted readings and in-class quizzes. The more prepared you are for class and lab, the more fruitful our discussions can be.

Instead of memorization, we will focus on developing an understanding of fundamental concepts and as they apply to the experiments. Therefore, tests will include questions that are based on solving problems in new contexts or data interpretation and not necessarily on memorizing facts.

1 Smith et al., 2009. http://www.sciencemag.org/content/323/5910/122.short

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. If you have feedback on how to make the class more accessible and inclusive, please let us know!

GRADING -- BIMM101 has four grading components: participation & professionalism (20%), quizzes (35%), laboratory reports (35%). Because different people may excel in different aspects, the laboratory reports or quizzes, whichever is higher for each individual, will be scaled to 45% instead of 35%, bringing the total to 100%. The following grading scheme will be used.

A+	97-100%	B+	87-90%	C+	77-80%	D+	67-70%	F	0-60%
A	93-97%	B	83-87%	C	73-77%	D	63-67%		
A-	90-93%	B-	80-83%	C-	70-73%	D-	60-63%		

The course is not graded on a curve (i.e. 20% of students getting A, B, C, and such). Thus, the ability to do well in this course is not dependent on others doing poorly.

There are no opportunities for extra credit beyond what is assigned as part of the course by the instructor.

PARTICIPATION AND PROFESSIONALISM (20%) – Success in this course depends upon the willingness of student to engage in both individual and team-oriented activities that foster the mindset of scientific research environments. This portion of the grade consists of the following:

pre-lecture activities (4%) – will include but not be limited to reading assignments, quizzes, or problem sets. Material for these activities will be posted on TritonEd.

lecture activities (5%) – will occur on a regular basis and will include i>clicker questions.

pre-laboratory activities (2%) – prior to coming to lab, students are to create a flow chart outlining the procedures that will be performed in lab that day, written on the carbon paper from the lab manual. The flow charts will be collected during the first 10 minutes of the lab.

laboratory notebooks (7%) – dedicated, professional record keeping of work done in the laboratory is critical to success in this course and your future career. On the lab report due dates students will submit the carbon copies of the relevant notebook sections. In addition, notebooks will be subject to spot-checking during the course of the quarter.

professionalism (2%) – The laboratory environment is a collegial, collaborative, professional community and student behavior toward their peers and instructors is expected to reflect as much. This portion of the grade reflects upon both the actions of the student as an individual and the class as a whole. As such 1% accounts for the initial assumption of each student as dedicated, collaborative professionals, and chronic deviations of individual students will result in points being deducted. The remaining 1% reflects upon the class community and refers to surveys and evaluations. If 90% of the class responds to such material designed to provide feedback for the improvement of the course and the instructors and assistants, all students will earn these points.

QUIZZES (35%) – There will be a total of 5 quizzes throughout the quarter, with the dates noted on the course schedule. Each quiz will be cumulative but will emphasize the most recent material from both lecture and laboratory sessions. The first 4 quizzes are each worth 5%, with the final quiz worth 15% of the total grade.

LABORATORY REPORTS (35%) – Students will submit a total of 5 mini reports describing the results of their laboratory work. Specific instructions will be posted on TritonEd, but they will generally follow the format of peer-reviewed scientific research publications (you can use Saltman Quarterly as a guide).

- Gel Electrophoresis Report – 4%
- PCR Variations Report – 6%
- Ligation Efficiency Report – 7%
- Promoter Mutants Report – 8%
- RNAi Report – 10%

These reports are to be submitted electronically over TritonEd through TurnItIn before coming to lab. In addition, at the beginning of lab you will turn in a hard copy with the carbon sheets from the relevant notebook pages attached.

EXPERIMENTAL SUCCESS – student grades do not depend upon whether the experiment "worked," but instead upon the critical analysis of the results (or lack thereof). Recognizing where problems in the experiment arose, and presenting evidence to support your conclusions is a critical part of being an successful scientific researcher. Note, however, that chronic carelessness is still noted in the Participation and Professionalism portion of the grade.

ACADEMIC INTEGRITY -- (https://students.ucsd.edu/academics/academic-integrity/index.html) Integrity of scholarship is essential for an academic community. The University expects that both faculty and students 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(s) to whom it is assigned, without unauthorized aid of any kind. Anyone caught cheating (includes plagiarizing lab reports, cheating on a test, or changing an answer for a re-grade) will be reported to the Academic Integrity Office.

All course materials are the property of the instructor, the course, and the 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.

LATE ASSIGNMENTS AND QUIZZES Late assignments will be subject to a 10% deduction per day (note that assignments handed in after the first 5 minutes of lab are considered late) up to a maximum of 2 days late (after which you will receive a 0). There are no make-up quizzes offered except in the case of a documented medical or family emergency (in which case the instructor will decided how to go about the make-up testing). No late participation items will be accepted, and no make-up quizzes will be offered, as only up to 80% of these grades are counted.

LABORATORY ATTENDANCE – Enrolled and waitlisted students MUST attend the first lab session. Additional details: http://biology.ucsd.edu/go/ug-labs.

Attendance in laboratory is required. Missing one laboratory session without a documented excuse (documented illness or serious family emergency), will automatically result in a 5% deduction in your final course grade. If you miss two labs for undocumented reasons, you will be asked to drop the course. Please be on time for laboratory sessions. Two late attendances will be counted as one absence. Additional policies are available online (https://biology.ucsd.edu/education/undergrad/course/waitlist.html).

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/go/ug-labs.

LAB SAFETY TRAINING – Enrolled and waitlisted students MUST successfully complete the Biology Lab Safety Training and Assessment before the first lab session: https://dbsportal3.ucsd.edu:3443/safety-training/. Please note that courses offered by other departments (Chemistry, for example) may have additional safety training requirements.

If a student arrives at the first lab session having not passed the safety assessment they may be allowed to complete the lab at the discretion of the instructor if the planned activities and environment do not pose any lab safety hazards. Students are not allowed into the lab for the second lab session unless they have successfully passed the safety assessment.

WRITING CENTER -- https://writingcenter.ucsd.edu/
The Writing Center provides support for undergraduates working on course papers (i.e. laboratory reports and the research proposal) and independent writing projects. Writing mentors can help at any stage of the writing process, from brainstorming to final polishing. The Writing Center offers: one-on-one appointments for undergraduates with peer writing mentors; group workshops addressing a variety of writing projects, genres, and issues; and Drop-In Zone for quick questions, targeted assistance, and a comfortable writing space.

TECHNOLOGY POLICY: Laptop computer policy: Students are welcome to bring laptops to lecture for note-taking purposes. Please see this research study that shows "multi-tasking" on computers is likely to decrease your grade, but it also decreases the grades of people around you who can see your screen[2]! For this reason, we ask that you do not flip between lectures notes and the internet. The use of cell phones, computers, or any other electronic devices is not permitted during exams. Use of a cell phone or other similar electronic devices during an exam or quiz is grounds for receiving a failing grade.

2 Sana et al. 2013. http://www.sciencedirect.com/science/article/pii/S0360131512002254

Week	Date	Class or Lab	Section of Lab Manual
1	10-Jan	**LAB 1** A. Pipetting B. Dilutions C. Calibration of a pipettemen D. Mol. Bio. Review	Dilutions and Calibration, Page 19-21
	12-Jan	**LAB 2 *Computer labs available for anyone who wants them*** Agarose gel electrophoresis on two DNA samples of unknown size and concentration (estimating using standard curve)	Experiment 1A-D
2	17-Jan	**LAB 3 *Computer Lab* All rooms available** Image analysis of gel electrophoresis results & graphing	Experiment 1E-G
	19-Jan	**Lab 4** Part 1 : Isolation of chromosomal DNA from *Vibrio fischeri*	Experiment 2A
3	24-Jan	**LAB 5 *Computer Labs available*** DNA Extraction Part 2 Spectrophotometric analysis of *Vibrio* DNA **Computer Lab -** Bioinformatics Part I: exploring the Lux operon and identifying primers	 Experiment 2B Experiment 2D Bioinformatics Lab A (back of manual)
	26-Jan	**LAB 6 *Computer labs available*** Plan PCR experiment Set up PCRs (amplifying *V. fischeri luxAB* genes) Optional: Bioinformatics part I: Lux operon and identifying primers	 Experiment 2E Bioinformatics Lab A (back of manual)
4	31-Jan	**Lab 7 *Computer Labs available*** Checking the success of the PCR reaction by gel electrophoresis **Computer Lab:** Using Image J to analyze PCR results + make graph Repeat PCRs as needed	 Experiment 2F Experiment 2G Experiment 2H
	2-Feb	**Lab 8** Run gel of repeats (if necessary) and use Image J to analyze Clean up best *lux*AB PCR product from lab 6 Restriction digest of *lux*AB PCR products and pGEM with *Xba*I and *Eco*RI	 Experiment 2I Experiment 3A Experiment 3B
5	7-Feb	**LAB 9 *Computers available*** A. Clean up *Xba*I and *Eco*RI digest of pGEM B. Quantification of digests from gel C. Ligation of pGEM and *lux*AB inserts D. **Computer Lab:** Bioinformatics Part II: Restriction digestio and primer design	 Experiment 3C Experiment 3D Experiment 3E Bioinformatics B
	9-Feb	**Lab 10** A. Transformation of competent cells with ligation products	Experiment 3F
6	14-Feb	**Lab 11 *Computer Labs available*** Counting blue/white colonies & screening for clones containing *luxAB* by adding exogenous aldehyde Pool data and do statistical analysis (ligation efficiency). Plan promoter mutants project (synthetic biology) Set up promoter mutant cultures	 Experiment 3G No instructions in manual, provided separately Experiment 4 Introduction: 4A & B Experiment 4C
	16-Feb	**Lab 12** C. Alkaline lysis miniprep: purification of plasmid DNA from overnight cultures (promoter mutants project) A. Setting up digests of Biobrick plasmids	 Experiment 4E

7	**21-Feb**	**Lab 13** A. Removing the stuffer fragment from the plasmids containing the promoter sequences B. Gel purification of the DNA fragment containing the RFP sequence C. Ligating plasmids with promoter sequences and RFP sequence	Experiment 4F Experiment 4G Experiment 4H
	23-Feb	**Lab 14** A. Transformation of competent cells with RFP ligation products Start RNAi	Experiment 4I Experiment 6A
8	**28-Feb**	**Lab 15** Pick RFP colonies to measure RFP Coose RFP colony to grow up and send for sequencing Observe worms and extract RNA (IAs can set up RT-qPCR today or next lab)	Experiment 4J Experiment 4K Experiment 6B, & 6C
	2-Mar	**Lab 16 *Computer labs available*** Purify plasmid, run gel to check concentration and send for sequencing Analyze RFP Data	Experiment 4L, 4M Instructions provided separately
9	**7-Mar**	**Lab 17 *Computer labs available*** A. Computer Lab: Analyze results of RT-qPCR measurement of *unc*-22 mRNA PTC extraction & PCR Check plasmid sequences	Experiment 6E Experiment 5A Instructions provided separately
	9-Mar	Check PTC PCRs using gel electrophoresis	Exp 5A gel
10	**14-Mar**	Lab clean-up & Review	
	16-Mar	**Final Quiz during lab time *Computers**	