

## **BILD 4: Introductory Biology Lab | Fall 2014 | UC San Diego**

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This course aims to develop an understanding for research in biology through inquiry-based laboratory experiments. We will work in teams to collect, analyze, and present original research data while learning laboratory methods common to a variety of biological disciplines. Data collected in this course will contribute to an on-going research project on microbial communities at the Scripps Coastal Reserve.

Class: Tuesday, 12:30-1:50 pm in York 4124A

Laboratory: Tuesday, 2:00-5:00 pm in York 4124A

Office Hours: Wednesday 2:00-3:00 pm, Friday 10:00-11:00 am, or by appointment in York 4124A

### **Grading**

There are four components of grading in this course: contribution (20%), laboratory reports (30%), project (20%), and quizzes (20%). Because different people may excel in different aspects, the laboratory report, project, or quiz component, whichever is highest for each individual, will be scaled to 40%, 30%, or 30% respectively.

In general, the grading scheme is as follows but may be adjusted to improve everyone's grades if necessary: A+/A/A- at above 90%, B+/B/B- at 80-90%, C+/C/C- at 70-80%, D+/D/D- at 60-70%, and F at under 60%. This course is not graded on a curve (i.e. 20% of students getting A, B, C, and such), and thus, the ability to do well in the course is not dependent on others doing poorly.

Contribution: Active participation both in class and in the laboratory is essential to learning in this course. There will be many participation items, including pre-class and pre-lab assignments, in-class discussions, in-lab activities, and lab notebooks. Participation will be graded for thoughtful completion, and 80% participation items (rounded up to whole items) will be counted (total 20%).

Laboratory reports: Two laboratory reports (5% and 20% respectively) will be written in teams. A peer review process will be in place to provide feedback on drafts of the laboratory reports, and the quality of peer reviews will be graded individually (5%).

Project: The project will be a research proposal written collaboratively in teams. Each team will identify a topic to study hypothetically and propose experiments to investigate that topic using the methods learned in the course. To facilitate the project, there will be 5 checkpoints (1% each) throughout the quarter. The poster presentation will be graded as a team (15%).

Quizzes: Quizzes will be done individually. They are open resources (e.g. notes and books but not electronic equipment) and cumulative but will focus on the most recent material. Quiz questions will challenge you to apply your understanding in new contexts by solving problems. There will be 3 short quizzes (25 minute) and 1 long quiz (50 minutes) that count as 2 short quizzes. Out of 5 quiz equivalents, the top 4 quiz grades (5% each) will be counted.

### **Syllabus**

A general outline for the course is available on the last page. Learning objectives for each day and more specific emphases for each reading assignment will be provided on TED and in class. We may also adjust the schedule as necessary, while still focusing on the core concepts and ideas of the course.

**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. Therefore, active participation both in class and in the laboratory is expected. To encourage collaboration, many activities, including laboratory work and the project, will be done in teams, and grades will not be assigned on a curve.

Instead of memorization, we will focus on developing an understanding of fundamental concepts and ideas as they apply to different examples. Therefore, quizzes will include questions that are based on solving problems in new contexts and will be open resources, e.g. notes and books but not electronic equipment. However, quizzes are individual work, and you are not allowed to communicate with other people on quizzes.

**Academic integrity**

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.

**Laboratory safety**

Safety precautions are crucial in the laboratory setting. As such, appropriate personal protective equipment (PPE), including laboratory coats that cover to the knees, UV-blocking safety glasses or goggles, long pants or equivalent, and closed-toe and closed-heel shoes, is required.

**Inclusion and accessibility**

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, <http://disabilities.ucsd.edu>), which is located in University Center 202 behind Center Hall. 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. For further information, contact the OSD at 858-534-4382 or [osd@ucsd.edu](mailto:osd@ucsd.edu).

Lab	Date	Pre-class assignments	Class	Pre-lab assignments	Laboratory
1	10/7	<ul style="list-style-type: none"> <li>• Pre-surveys</li> </ul>	<ul style="list-style-type: none"> <li>• Introduction to BILD 4</li> <li>• Scientific methods</li> <li>• Prokaryotes vs. eukaryotes</li> </ul>	<ul style="list-style-type: none"> <li>• Draw a scientist</li> </ul>	<ul style="list-style-type: none"> <li>• Asking our own questions</li> <li>• Laboratory safety</li> <li>• Error analysis</li> </ul>
2	10/14	<ul style="list-style-type: none"> <li>• Reading response</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Quiz 1</a></li> <li>• Microbial communities</li> <li>• Functional diversity</li> </ul>	<ul style="list-style-type: none"> <li>• Diagram and explain protocols</li> </ul>	<ul style="list-style-type: none"> <li>• Natural Reserve site visit</li> <li>• Ecoplate, moisture, pH</li> <li>• Biodiversity</li> </ul>
3	10/21	<ul style="list-style-type: none"> <li>• Reading response</li> </ul>	<ul style="list-style-type: none"> <li>• Biodiversity</li> <li>• Ecoplate analysis</li> <li>• Metabolite analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Analyze methods sections</li> </ul>	<ul style="list-style-type: none"> <li>• Ecoplate analysis</li> <li>• Data presentation</li> <li>• Writing lab reports</li> </ul>
4	10/28	<ul style="list-style-type: none"> <li>• Reading response</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Quiz 2</a></li> <li>• Genomes and 16S</li> <li>• Gel electrophoresis</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Lab report 1 due</a></li> <li>• Diagram and explain protocols</li> </ul>	<ul style="list-style-type: none"> <li>• Genomic DNA prep</li> <li>• Gel electrophoresis</li> <li>• Writing introduction</li> </ul>
5	11/4	<ul style="list-style-type: none"> <li>• Reading response</li> </ul>	<ul style="list-style-type: none"> <li>• DNA replication and PCR</li> <li>• Applications of PCR</li> <li>• DNA barcoding</li> </ul>	<ul style="list-style-type: none"> <li>• Diagram and explain protocols</li> <li>• Identify news articles</li> </ul>	<ul style="list-style-type: none"> <li>• Polymerase chain reaction</li> <li>• Gel electrophoresis</li> <li>• Formulate project question</li> </ul>
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6	11/18	<ul style="list-style-type: none"> <li>• Reading response</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Quiz 3</a></li> <li>• Recombinant DNA</li> <li>• Biotechnology</li> </ul>	<ul style="list-style-type: none"> <li>• Diagram and explain protocols</li> </ul>	<ul style="list-style-type: none"> <li>• PCR clean up and ligation</li> <li>• Gel electrophoresis</li> <li>• Writing discussion</li> </ul>
7	11/25	<ul style="list-style-type: none"> <li>• Reading response</li> </ul>	<ul style="list-style-type: none"> <li>• DNA sequencing</li> <li>• Biotechnology</li> </ul>	<ul style="list-style-type: none"> <li>• Draft of lab report 2 due for peer review</li> </ul>	<ul style="list-style-type: none"> <li>• Transformation</li> <li>• Writing abstract and results</li> </ul>
8	12/2	<ul style="list-style-type: none"> <li>• Reading response</li> </ul>	<ul style="list-style-type: none"> <li>• Sequence alignment</li> <li>• Evolutionary trees</li> <li>• Bioinformatics</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Peer review for lab report 2 due</a></li> </ul>	<ul style="list-style-type: none"> <li>• Sequence analysis</li> <li>• Writing discussion</li> </ul>
9	12/9	<ul style="list-style-type: none"> <li>• Post-surveys</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Quiz 4 and 5</a></li> <li>• Research in microbial ecology</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Lab report 2 due</a></li> </ul>	<ul style="list-style-type: none"> <li>• Designing a poster</li> </ul>
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