

BILD 4 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 important biological concepts and laboratory methods. Data collected in this course will contribute to an on-going research project on soil microbiomes at the Scripps Coastal Reserve on campus.

### Learning goals

- Collaborate with one another to learn important concepts and foundational skills
- Engage in research and learn to draw conclusions based on evidence and reasoning
- Connect with resources on campus, e.g. faculty research groups, library, writing center

### Major components

- Class: Learn biological concepts related to the laboratory research project
- Laboratory: Engage in a collaborative research project on soil microbiomes on campus
- Project: Develop and present research proposals on hypothetical projects

### Accessibility and inclusion | <http://disabilities.ucsd.edu> | [osd@ucsd.edu](mailto: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.

### Course contact

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Instructional assistants:	Marina Ahn   <a href="mailto:sja001@ucsd.edu">sja001@ucsd.edu</a>   Peter Kim   <a href="mailto:d1kim@ucsd.edu">d1kim@ucsd.edu</a> Richard Loi   <a href="mailto:rqlloi@ucsd.edu">rqlloi@ucsd.edu</a>
Class meetings:	Tuesday and Thursday 9:30-10:50 am   CSB 002
Laboratory sections:	Tuesday and Thursday 12:00-3:00 pm or 4:00-7:00 pm   York 4124
Office hours:	By appointment with instructor and/or instructional assistants
Course website:	<a href="https://ted.ucsd.edu">https://ted.ucsd.edu</a>

## Grading

Our course has four grading components: participation (20%), papers (20%), project (20%), and quizzes (20%). Because different people may excel in different aspects, the higher two components out of papers, project, or quizzes for each individual will be scaled to 30% instead of 20%, to a total of 100%.

The grading scheme is as follows but may be adjusted to improve everyone's grades if necessary: A+/A/A- at or 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%. Exact boundaries will be determined based on final grade distributions. Our 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.

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

Papers: Two papers will be written in teams in the format of papers from research journals. We will use the undergraduate research journal *Saltman Quarterly* as a guide. The first paper (5%) is one page, and the second paper (15%) is four pages.

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 concepts and methods learned in the course. The proposal will be presented in poster format, and the presentation will be graded as a team effort (20%).

Quizzes: Questions in quizzes will challenge us to apply our understanding in new contexts by solving problems. Therefore, quizzes are open resources (e.g. notes and books but not electronic equipment) and cumulative but will focus on the most recent material. There will be 2 short quizzes (25 minute) and 1 long quiz (75 minutes) that count as 3 short quizzes. Out of 5 quiz equivalents, the top 4 quiz grades (5% each) will be counted.

## Learning in this course

BILD 4 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 in

the laboratory is expected. To encourage collaboration, class activities, 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 as they apply to different examples. Therefore, quizzes will include questions that are based on solving problems in new contexts.

**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 students and faculty 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.

In our course, we need to establish a set of shared values. Following are values adopted from the International Center for Academic Integrity, which are open to discussion and possible alteration. Each team should adopt these values and must articulate the expectations for how they are made manifest within the team's work together.

**Honesty:** We will honestly demonstrate our knowledge and abilities according to standards and expectations. We will also communicate openly and without deception, including citing appropriate sources.

**Responsibility:** We will complete our work on time and participate fully (both mentally and physically) in class and in the laboratory. We will also contribute to work done in teams.

**Respect:** We will speak openly with one another while respecting diverse viewpoints and perspectives. We will also provide sufficient space for others to voice their ideas.

**Fairness:** We will contribute equally to laboratory work, papers, project, and team learning, so that we are not "freeloading" off of others on our teams. We will also not seek unfair advantages over others.

**Trustworthiness:** We will not engage in personal affairs while on class time, and we will be open and transparent about what we are doing in class. We will also not distribute course materials to others.

### 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, are required.

### Laboratory attendance

Attendance in laboratory is required. Missing two laboratory sessions, except in the case of a documented short-term illness or serious documented family emergency, will automatically result in an F grade. Please also be on time for laboratory sessions, as instructional assistants go over the experiments at the beginning of each session. Two late attendances will be counted as one absence.

### Assignments and quizzes

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. No late assignments will be accepted, except in the case of a documented short-term illness or serious documented family emergency.

### Course materials

Participation in lectures will be mainly through clicker questions, and quizzes will be given as multiple-choice questions on clickers to facilitate grading. To participate in lectures and take quizzes, you must have an i>clicker 2 (the newest version of i>clicker) and have it registered on TED.

### Podcast | <http://podcast.ucsd.edu/>

Classes will be recorded and available online as videos as a resource for review. However, attendance and participation are highly encouraged. Please see participation in the grading section for more details.

### Library guide | <http://ucsd.libguides.com/bild4>

A specific library guide has been designed for our course. This website serves as the starting point for navigating campus library resources that support our needs in completing major assignments.

### Calendar

A general outline is available below. More specific details for each week, including reading and assignments, will be provided on TED and in class. We may also adjust the schedule as necessary, while still focusing on the core concepts of the course.

Day	Lecture	Laboratory	Major assignments
1: T 8/4	<ul style="list-style-type: none"> <li>• BILD 4 introduction</li> <li>• Microbiomes</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory safety</li> <li>• Error analysis</li> </ul>	
2: Th 8/6	<ul style="list-style-type: none"> <li>• Forms of biodiversity</li> <li>• Ecoplate introduction</li> </ul>	<ul style="list-style-type: none"> <li>• Scripps Coastal Reserve</li> <li>• Soil and ecoplate</li> </ul>	
3: T 8/11	<ul style="list-style-type: none"> <li>• Measuring biodiversity</li> <li>• Ecoplate analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Ecoplate analysis</li> <li>• Data presentation</li> </ul>	
4: Th 8/13	<ul style="list-style-type: none"> <li>• Quiz 1</li> <li>• 16S rDNA sequences</li> </ul>	<ul style="list-style-type: none"> <li>• Genomic DNA prep</li> <li>• Asking questions</li> </ul>	
Sun 8/16	---	---	• Paper 1 (11:59 pm)
5: T 8/18	<ul style="list-style-type: none"> <li>• DNA replication</li> <li>• PCR</li> </ul>	<ul style="list-style-type: none"> <li>• PCR</li> <li>• Gel electrophoresis</li> </ul>	
6: Th 8/20	<ul style="list-style-type: none"> <li>• Recombinant DNA</li> <li>• Biotechnology</li> </ul>	<ul style="list-style-type: none"> <li>• Ligation</li> <li>• Transformation</li> </ul>	
7: T 8/25	<ul style="list-style-type: none"> <li>• Quiz 2</li> <li>• DNA sequencing</li> </ul>	<ul style="list-style-type: none"> <li>• Colony selection</li> </ul>	
8: Th 8/27	<ul style="list-style-type: none"> <li>• Research opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Designing posters</li> </ul>	
Sun 8/30	---	---	• Poster (11:59 pm)
9: T 9/1	<ul style="list-style-type: none"> <li>• Sequence alignment</li> <li>• Bioinformatics</li> </ul>	<ul style="list-style-type: none"> <li>• Sequence analysis</li> <li>• Data presentation</li> </ul>	
Wed 9/2	---	---	• Paper 2 (11:59 pm)
10: Th 9/3	<ul style="list-style-type: none"> <li>• Quiz 3-5</li> </ul>	<ul style="list-style-type: none"> <li>• Poster presentation</li> </ul>	
Exam	<ul style="list-style-type: none"> <li>• No final exam</li> </ul>		