

Welcome to **Introductory Biology Laboratory!** BILD 4 aims to develop an understanding for research in the biological sciences through inquiry-based laboratory experiments. We will work in groups to collect, analyze, and present original research data while learning foundational biological concepts and laboratory skills. 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 foundation biological concepts and laboratory skills
- Engage in research and learn to draw conclusions based on evidence and reasoning
- Connect with resources on campus, such as faculty research groups, library, and 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 | 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 get in touch!

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 this course, we need to establish a set of shared values. Following are values adopted from the International Center for Academic Integrity (<http://www.academicintegrity.org/icai/home.php>), which serve as the foundation for academic integrity. These values include:

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. 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 outside of the class.

All course materials are the property of the instructor, the course, and UCSD, and may not be posted or distributed to anyone outside of the course.

Any suspected instances of a breach of academic integrity will be reported to the Academic Integrity Office for review.

COURSE LOGISTICS AND CONTACT INFO

Required materials: The BILD 4 Laboratory Manual, knee-length laboratory coat, and UV-blocking safety glasses or goggles are required for the laboratory and are available at the bookstore. iClicker is required for lectures and should be registered on TritonEd.

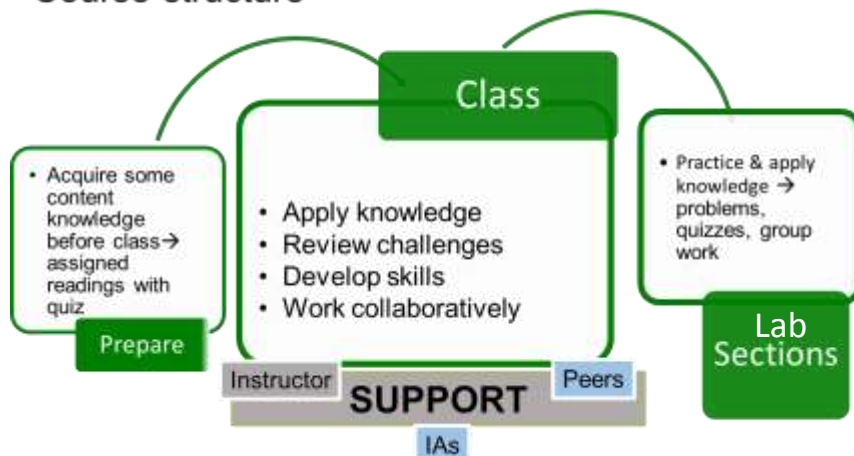
Class	Time	Location	Instructor
A00	Tuesday Thursday 9:30-10:50am	CENTR 113	Lisa McDonnell lmcdonnell@ucsd.edu Office: 3080D York Hall Office hours: TBD

Laboratory	Time	Location	Instructional assistants
A01	Tuesday and Thursday 11:00am to 2:00pm	York 4124	Kendall Higgins kthiggin@ucsd.edu Liza Brusman lbrusman@ucsd.edu
A02	Tuesday and Thursday 12:00 pm to 3:00 pm	York 1310	Garrett Wong grwong@ucsd.edu Daryn Longman dlongman@ucsd.edu

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 in lab is expected. Being able to **communicate** understanding, and confusion, is critical to success in any discipline, and is very useful for learning¹. To encourage collaboration, class activities and **discussions** will be done in groups, and grades will not be assigned on a curve. I use class time to work on applying our knowledge, troubleshooting difficult topics, and practice solving problems. There are often pre-class assignments to prepare for the material to come in class.

Course structure



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.

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

GRADING

BILD 4 has four grading components: participation (20%), quizzes (30%), laboratory reports (20%), and research proposal (20%). Because different people may excel in different aspects, the laboratory reports or research proposal component, whichever is higher for each individual, will be scaled to 30% instead of 20%, bringing the total to 100%.

The general grading scheme is as follows. Exact boundaries will be determined based on final grade distributions: Because course assessments are not perfectly precise, grade cutoffs will be identified by large gaps in between individual scores. However, BILD 4 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.

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%		

Participation: Active participation both in lectures and in the laboratory is essential to learning. There will be many participation items, including pre-lecture and pre-laboratory assignments, in-lecture 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.

Quizzes: Quizzes will be open resources (e.g. notes and calculators but not electronic equipment that can be used to communicate with others). Quizzes will be cumulative but will focus on the most recent material. There will be 2 short quizzes (30 minutes) and 1 long quiz (90 minutes) that count as 3 short quizzes. Out of 5 quiz equivalents, the top 4 quiz grades will be counted.

To facilitate reflection and learning from quizzes, each quiz (small or large) will be in two phases: The first phase will be done individually, and the second phase will be the same quiz done again in groups. The individual portion will count for 80% of the quiz grade, and the group portion will count for 20%.

Why use this collaborative testing method? People learn more from collaborative work compared to doing work alone^{2, 3}. These collaborative testing opportunities allow us to deepen our understanding because we are receiving feedback on our thinking in a very timely fashion (and feedback is critical for learning). Also, it is an opportunity to practice communicating effectively and collaborating to solve problems.

2 Heller et al., 1992. http://www.physics.emory.edu/faculty/weeks//journal/Heller_AJP_91a.pdf

3 Gilley and Clarkston, 2014. http://www.cwsei.ubc.ca/SEI_research/files/Gilley-Clarkston_2-Stage_Exam_Learning_JCST2014.pdf

Papers (a.k.a. laboratory reports): Two papers will be written in in the format of research papers from peer-reviewed journals. We will use the Division of Biological Sciences undergraduate research journal Saltman Quarterly (<http://sq.ucsd.edu/>) as a guide. The first paper (5%) is one page, and the second paper (15%) is four pages.

Poster project: The project will be a research proposal written and presented in poster format collaboratively in groups (15%). Each group will identify a topic to study hypothetically and propose experiments to investigate that topic using foundational concepts and laboratory skills learned in the course. An individual component (5%) will involve critiques and summaries of other posters.

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 lab** in week 1.

From the beginning of the first lab, appropriate laboratory attire and personal protective equipment (PPE) are required, including laboratory coats that cover to the knees, UV-blocking safety glasses or goggles, 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.

LABORATORY ATTENDANCE

Attendance in laboratory is required. Missing one laboratory session, except in the case of a documented short-term illness or serious family emergency, will automatically result in an **F grade**. Please **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. Additional policies are available online (<https://biology.ucsd.edu/education/undergrad/course/waitlist.html>).

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 (i.e. papers and poster projects) will be accepted, except in the case of a documented short-term illness or serious family emergency. Please coordinate within groups to ensure that group assignments are completed.

LECTURE PODCAST

<http://podcast.ucsd.edu/>

Whenever possible, lectures will be recorded and available online as videos as a resource for review. However, attendance and participation are highly encouraged, as **substantial portions of lectures will be interactive**. 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 BILD 4. This website serves as the starting point for navigating campus library resources that support our needs in completing major assignments, including the papers and research proposal. Please feel free to schedule a consultation with Bethany Harris (bethany@ucsd.edu), our biomedical librarian, for further assistance.

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.

REGRADES

If a grading error has been made, you should submit a re-grade request to Dr. McDonnell at the end of a lecture within two days 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. If you think your answer deserves more points (e.g it is not an arithmetic error), please write a concise description of how your answer compares to the key, and why you think it should have received more points, on a separate but attached piece of paper. No re-grades are possible for exams written in pencil or non-permanent 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. There are no opportunities for extra credit beyond what is assigned as part of the course by the instructor.

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 screen⁴! 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.

4 Sana et al. 2013. <http://www.sciencedirect.com/science/article/pii/S0360131512002254>

CALENDAR

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

Week	Day/Lab	Dates	Lecture	Laboratory	Deadlines
1	1	June 28	<ul style="list-style-type: none"> BILD 4 introduction Microbiomes 	<ul style="list-style-type: none"> Asking questions Error analysis 	Syllabus quiz due before class starts
	2	June 30	<ul style="list-style-type: none"> Forms of biodiversity Ecoplate introduction 	<ul style="list-style-type: none"> Scripps Coastal Reserve Soil properties, Ecoplate 	
2	3	July 5	<ul style="list-style-type: none"> Measuring biodiversity Ecoplate analysis 	<ul style="list-style-type: none"> Ecoplate analysis Data presentation 	Writing in your own voice assignment due at the start of class
	4	July 7	<ul style="list-style-type: none"> Quiz 1 16S rDNA sequences 	<ul style="list-style-type: none"> Genomic DNA prep Paper 1 peer review 	Draft of paper 1 due in lab
		Sunday July 10 at 11:59pm	---	---	---
3	5	July 12	<ul style="list-style-type: none"> DNA replication Polymerase chain reaction 	<ul style="list-style-type: none"> Polymerase chain reaction Gel electrophoresis 	---
	6	July 14	<ul style="list-style-type: none"> Recombinant DNA Biotechnology 	<ul style="list-style-type: none"> Ligation and transformation Asking questions 	---
4	7	July 19	<ul style="list-style-type: none"> Quiz 2 DNA sequencing 	<ul style="list-style-type: none"> Colony selection Designing posters 	---
	8	July 21	<ul style="list-style-type: none"> Research opportunities for undergraduates Review 	<ul style="list-style-type: none"> Designing posters 	---
5	9	July 26	<ul style="list-style-type: none"> Sequence alignment Bioinformatics 	<ul style="list-style-type: none"> Sequence analysis Data presentation 	---
		Wed July 27 at 11:59pm	---	---	Poster due
	10	July 28	<ul style="list-style-type: none"> Quiz 3 	<ul style="list-style-type: none"> Paper 2 peer review 	Draft of paper 2 due in lab
		Fri July 29 at 12:59 pm	---	---	---
Exam		Saturday July 30, 9-11am	<ul style="list-style-type: none"> Poster presentations 	---	---