

Welcome to Introductory Biology Laboratory! BILD 4 aims to develop an understanding for research in the biology through laboratory experiments. We will work in teams to collect, analyze, and present original 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 construct scientific arguments: claims with evidence and reasoning

Components of the course

- **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

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 contribution in class and in the laboratory are essential because many ideas that will be developed in these activities cannot be easily captured otherwise. Being able to communicate understanding, articulate confusion, and defend scientific arguments based on evidence and reasoning is useful for learning¹ and critical to success. To encourage community building, many activities and assignments 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 laboratory skills as they apply to different examples and learn to draw conclusions based on evidence and reasoning. We will utilize class and laboratory time to construct and apply our knowledge, troubleshoot challenging topics, practice problem solving, and develop skills in critical thinking. Writing assignments and the research proposal will challenge us to think critically about data and experiments.

¹ Smith et al (2009) Science 323: 122–124. <http://science.sciencemag.org/content/323/5910/122.short>

Course logistics

The core learning components in this course are comprised of collaborative activities in class and laboratory, in addition to independent and team work on studying and completing assignments. Course materials, announcements, and other important details will be available on the TritonEd (<https://triton.ed.ucsd.edu>). Please check the course website and your @ucsd email regularly for updates.

Course materials: Assigned readings for this course will be from various sources including primary literature papers and will be posted on TritonEd. Each student will need to purchase a copy of the BILD 4 Laboratory Manual with carbonless sheets. For the laboratory, knee-length laboratory coat and UV-blocking safety glasses or goggles are required, and they are also available at the bookstore. iClicker2 is required for lectures and should be registered on TritonEd.

Podcast: Whenever possible, classes will be recorded and made available online as a resource for learning (<http://podcast.ucsd.edu/>). However, active contribution is highly encouraged, as classes will be interactive. Therefore, podcasts are provided as for the purpose of review and should not be used solely to substitute for active engagement in classes.

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 multi-tasking 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!² For this reason, we ask that you do not flip between relevant course materials and irrelevant activities on the internet.

² Sana et al (2013) Computers and Education 62: 24–31

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

Laboratory safety

Safety precautions are crucial in the laboratory setting. Biology lab safety training and assessment (<https://biolabclass-safetyquiz.ucsd.edu/introduction>) 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.

Appropriate laboratory attire and personal protective equipment (PPE) are required at all times. 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. PPE includes laboratory coats that cover to the knees and UV-blocking safety glasses or goggles, both of which are available at the bookstore.

Laboratory contribution

Attendance and active participation and contribution in laboratory are required. Please be on time for laboratory sessions as responsible conduct for being in a learning community with your peers. We understand that emergencies do happen. In case of emergencies, please contact the course instructor as soon as possible. Being late or missing laboratory sessions without a legitimate excuse is unprofessional and will result in deductions from the course grade.

Being more than 20 minutes late without a legitimate excuse

- First time: deduction of 2% of the course grade from the professionalism portion
- Second time: deduction of an additional 3% of the course grade from the professionalism portion
- Third time or subsequent times: deduction of an additional 5% of the course grade for each time

Missing whole or substantial portion of a laboratory session without a legitimate excuse

- Deduction of 5% of course grade for each laboratory session missed

Additional policies are available online: <https://biology.ucsd.edu/education/undergrad/course/ug-labs.html>

Grading

Our course has the following grading components: contribution (20%), writing assignments (25%), quizzes (25%), project (20%), and professionalism (5%). Because different people may excel in different aspects, the writing assignment or quiz component, whichever is higher for each individual, will be scaled to 30%, bringing the total to 100%. There are no opportunities for extra credit beyond what is assigned.

The general grading scheme is as follows, although it may be adjusted to improve everyone's grades if necessary. 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, 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.

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

Contribution: Active contribution both in class and in laboratory section are essential to learning in this course. Contribution is different from attendance or participation. Attendance means that we are merely physically present. Participation means that we have completed the required activities. Contribution involves attendance, participation, and active mental engagement that ultimately results in learning, e.g. thinking through the material, collaborating meaningfully with teammates, asking questions, etc.

There will be many contribution items, including pre-assignments, in-class discussions, laboratory activities, research notebooks, and data sharing. Contributions will be graded for thoughtful completion on a scale 0, 0.5, and 1. Because individuals may have different competing schedules, completing 85% or more of all contribution items will earn the full contribution grade. For example, if there are 40 contribution items, completing 34 items will result in 34/40.

The best way to learn how to solve problems and deepen our understanding is to work through the class and laboratory activities and discuss them with fellow classmates and the instructional team. To do so, we will discover and construct an understanding together instead of directly giving answers to the problems.

Writing assignments: These assignments will focus on generating figures from data collected by all groups in each laboratory section and drawing conclusions that are supported by evidence and reasoning in scientific arguments. Please see TritonEd throughout the quarter for more details.

Quizzes: Quizzes will be cumulative and will focus on the most recent material. There will be 2 short quizzes (35 minutes) and 1 long quiz (80 minutes) that count as 3 short quizzes. To facilitate reflection and learning from quizzes, each quiz will be in two phases: The first phase will be done individually, and the second phase will be the same quiz done again in teams. The individual portion will count for 80% of the quiz grade, and the team portion will count for 20%.

We are using this two-phase testing method for quizzes as people learn more from collaborative work compared to individual work.³ These collaborative testing opportunities allow us to deepen our understanding because we are receiving feedback on our thinking in a very timely fashion, which is critical for learning. It is also an opportunity to practice communicating effectively and collaborating to solve problems.

³ Gilley et al (2014) Journal of College Science Teaching 43: 83–91 <https://jstor.org/stable/43632038>

Project: Our final project will be a research proposal written and presented collaboratively in teams. Each team will identify a topic to study hypothetically and propose experiments to investigate that topic. Please see TritonEd throughout the quarter for more details.

Professionalism: This portion of the course grade is intended to engage everyone in considering the impact of their actions on their own learning and the learning of others in the course. Unprofessional interactions consume time yet have no meaningful benefits.

Professionalism can be demonstrated through individual (5% described in this section) and community efforts (extra credit described in the section below). The individual component is to account for demonstrating maturity and professionalism. By default, everyone is assumed to be professionally mature. Hence, this component is awarded at the beginning of the quarter. During the quarter, based on observations by the instructional team, which includes but is not limited to one-on-one interactions, electronic communication, and follow-up conversations on different correspondence, professionalism credit may be deducted.

Example interactions with meaningful benefits that:

- Developing deeper insight into course material, concepts, biology, and/or society in general
- Working collaboratively to improve in skill building and future opportunities
- Learning conceptually and meaningfully why full credit was not awarded for an assignment
- Clarifying course material that facilitates deeper learning

Example interactions that have no meaningful benefits and thus should be avoided:

- Contributing inequitably to team work in class, in discussion section, or on quizzes
- Harassing and/or bullying other students or the instructional team, either in person or online
- Ignoring the directions or requests from the instructional team, especially in relation to safety
- Being disruptive to fellow students in class, in discussion section, or on quizzes

Extra credit: The 0.5% extra credit is based on community professionalism, which can be earned by completing course evaluations and related surveys that are aimed to improve the course and the educational experiences of your future peers. If 90% or more of all students complete CAPEs, instructional assistant evaluations, and other course-based evaluation surveys in a mature and professional fashion (i.e. taking them seriously and providing timely and constructive feedback), 0.5% will be added to everyone in the course. Other than the community professionalism component, there are no other opportunities for extra credit beyond what is already assigned as part of the course by the instructor.

Late or missing assignments: In general, we are unable to accept late or missing assignments because of the large size of the course. This means that no late contribution items will be accepted; completing 85% of contribution items will earn the full contribution grade. However, we acknowledge that emergencies do occur. For missed quizzes, writing assignments, or poster presentation due to documented short-term illness or serious family emergency, please contact the course instructor as soon as possible or reasonable to do so. We are here to help you be successful in the course!

Regrades: If a grading error has been made, please submit a regrade request to the course instructor within one week of the assignments being returned. Attach a separate piece of paper to the assignment as a cover sheet, with a concise description or explanation for the regrade request. Regrades are submitted with the understanding that the instructional team may: (1) regrade the entire assignment, and (2) compare the submitted paper to a copy of the original assignment. As a result, the overall grade may go up or down or remain the same after the regrade.

Team work: A major goal of the course is to learn to collaborate with others. Unfortunately, despite best efforts and intentions, teams do not always function optimally. Dealing with these challenges is a natural part of the learning experience. Everyone is expected to contribute fully and equitably to team work as part of the university learning community.

If significant disputes occur over the relative contribution of individual members of the team, students can submit an appeal. In such cases, the team grade will be multiplied by the number of members in the team, and the points can be divided among individuals based on what each team member agrees that they deserve from their individual efforts. To submit an appeal, all members of the team need to get together and provide the following information in a document: clear and detailed descriptions of each member's contribution, calculations and explanations for how the points should be divided among the members, and signatures from each member with a statement attesting to the fact that everyone in the team has agreed to all information in the appeal document. Please submit the appeal to the course instructor within one week of the assignments being returned.

Academic integrity (<https://academicintegrity.ucsd.edu/>)

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. The instructional team will exercise care in planning and collaborating with students on academic work.

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 this course, we are using a statement of values⁴ to describe the behaviors for maintaining and protecting those values. These values are open to discussions and possible alterations based on mutual agreements among all students and the instructional team. In collaborative work, each team should discuss these values and agree on mutual expectations.

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.

⁴ This class statement of values is adapted from Tricia Bertram Gallant Ph.D.

	As students, we will ...	As the instructional team, we will ...
Honesty	<ul style="list-style-type: none"> Honestly demonstrate knowledge and abilities according to expectations Communicate without using deception, e.g. citing appropriate sources 	<ul style="list-style-type: none"> Give honest feedback Communicate honestly about expectations and standards through the syllabus and course materials
Responsibility	<ul style="list-style-type: none"> Complete assignments on time Be on time and fully contribute to team learning and activities 	<ul style="list-style-type: none"> Give timely feedback Be on time and mentally present Create relevant activities for learning
Respect	<ul style="list-style-type: none"> Speak openly with one another while respecting diverse perspectives Provide sufficient space for others 	<ul style="list-style-type: none"> Respect different perspectives Help facilitate respectful exchanges
Fairness	<ul style="list-style-type: none"> Contribute fully and equally to collaborative work Not seek unfair advantage 	<ul style="list-style-type: none"> Create fair assignments and exams and grade them in a fair and timely manner Treat all students teams equally
Trustworthiness	<ul style="list-style-type: none"> Focus on relevant work while in class Not distribute course materials to others in an unauthorized fashion 	<ul style="list-style-type: none"> Be available to all students when we say we will be Follow through on our promises
Courage	<ul style="list-style-type: none"> Say or do something when we see actions that undermine these values Accept a lower or failing grade or other consequences of upholding and protecting the above values 	<ul style="list-style-type: none"> Say or do something when we see actions that undermine these values Accept the consequences (e.g. lower teaching evaluations) of upholding and protecting the above values

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 academic success. 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, ophd@ucsd.edu, or <http://ophd.ucsd.edu>. Students may receive confidential assistance at CARE at the Sexual Assault Resource Center at 858-534-5793, sarc@ucsd.edu, or <http://care.ucsd.edu>, 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.

Meeting times

Please note that dates are listed in US format of month/day. For example, 1/2 means January 2nd.

Class	Day	Time	Location	Instructor	Email
A00	Monday	6:30p–7:50p	GH 242	Lo, Stanley	smlo@ucsd.edu

Section	Day	Time	Location	Instructional assistant	Email
A01	Tuesday	8:30a–11:20a	YORK 4124	Gaur, Kshitij	kgaur@ucsd.edu
				Kavi, Anuj	akavi@ucsd.edu
A02	Tuesday	9:00a–11:50a	YORK 1310	Jeziorski, Jacob	jjeziors@ucsd.edu
				Hales, Charis	chales@ucsd.edu
A03	Tuesday	12:00p–2:50p	YORK 4124	Tran, Melissa	mmt008@ucsd.edu
				Ngo, Katherine	kpngo@ucsd.edu
A04	Tuesday	12:30p–3:20p	YORK 1310	Gaur, Kshitij	kgaur@ucsd.edu
				Booreddy, Sathwik	sbooredd@ucsd.edu
A05	Tuesday	3:30p–6:20p	YORK 4124	Tran, Melissa	mmt008@ucsd.edu
				Jacob, Mark	majacob@ucsd.edu
A06	Tuesday	4:00p–6:50p	YORK 1310	Hanna, Jonathan	johanna@ucsd.edu
				Deng, Keying	k3deng@ucsd.edu
A07	Wednesday	8:30a–11:20a	YORK 4124	Hanna, Jonathan	johanna@ucsd.edu
				Yechuri, Deepti	dyechuri@ucsd.edu
A08	Wednesday	9:00a–11:50a	YORK 1310	Jeziorski, Jacob	jjeziors@ucsd.edu
				Myers, Katrina	k2myers@ucsd.edu
A09	Wednesday	12:00p–2:50p	YORK 4124	Rabalais, John	jrabalai@ucsd.edu
				Quach, Kaitlyn	k7quach@ucsd.edu
A10	Wednesday	12:30p–3:20p	YORK 1310	Cui, Laura	ljcui@ucsd.edu
				Kim, Eleanor	esk030@ucsd.edu
A11	Wednesday	3:30p–6:20p	YORK 4124	Rabalais, John	jrabalai@ucsd.edu
				Emanuel, Peter	pemanuel@ucsd.edu
A12	Wednesday	4:00p–6:50p	YORK 1310	Cui, Laura	ljcui@ucsd.edu
				Trinh, Kathleen	kptrinh@ucsd.edu

Exam	Day	Time	Location
12/13	Thursday	3:00p–5:59p	NSB Lobby

Office hours

Consider office hours to be more like study sessions or free-formed fireside chats, where we can talk about anything related to your academic and general experiences on campus. Dr. Lo's office hours are on a rotating schedule, so that more people can have an opportunity to come to office hours without scheduling conflicts. Please feel free to email and set up a separate appointment if the following times do not work for you.

The location for Dr. Lo's office hours is the Mandeville coffee cart (The Art of Espresso), and it is chosen to be a relatively central location for easy access from all over campus. Dr. Lo's office is in York 4070B (Revelle College) and may be far away for students coming from the other ends of campus.

Please note that dates are listed in US format of month/day. For example, 1/2 means January 2nd.

Week	Day	Date	Time	Location
0	---	---	---	---
1	---	---	---	---
2	Thursday	10/11	9:00a–9:50a	Mandeville coffee cart (Art of Espresso)
3	Thursday	10/18	12:00p–12:50p	Mandeville coffee cart (Art of Espresso)
4	Thursday	10/25	1:00p–1:50p	Mandeville coffee cart (Art of Espresso)
5	Thursday	11/1	2:00p–2:50p	Mandeville coffee cart (Art of Espresso)
6	Monday	11/5	9:00a–9:50a	Mandeville coffee cart (Art of Espresso)
7	---	---	---	---
8	Monday	11/19	12:00p–12:50p	Mandeville coffee cart (Art of Espresso)
9	Monday	11/26	1:00p–1:50p	Mandeville coffee cart (Art of Espresso)
10	Monday	12/3	2:00p–2:50p	Mandeville coffee cart (Art of Espresso)
Exam	Monday	12/10	3:00p–3:50p	Mandeville coffee cart (Art of Espresso)

Grab lunch or coffee with us!

We also encourage you to take advantage of the Dine-With-a-Prof or the Coffee-With-a-Prof program in the colleges (<https://students.ucsd.edu/academics/advising/academic-success/dine-with-a-prof.html>).

Undergraduate students may participate in the Dine-With-a-Prof program once per quarter during the academic year and the Coffee-With-a-Prof program twice per quarter during the academic year. These can be used with any professor or graduate instructional assistant on campus.



Calendar

A general outline for the course is provide below. More specific details for each week will be provided on TritonEd and in class. We may also adjust the schedule as necessary, while still focusing on learning the important concepts and laboratory skills intended for this course.

Please note that dates are listed in **US** format of month/day. For example, 1/2 means January 2nd.

Week	Meeting	Day	Date	Topic	Due dates and quizzes
1	Class	Mon	10/1	Introduction, microbiomes	
	Lab	Tues–Wed	10/2–10/3	Pipetting, statistics, graphs Manual: BB1, BB2	
2	Class	Mon	10/8	Soil properties, Ecoplate	
	Lab	Tues–Wed	10/9–10/10	Soil and Ecoplate setup Manual: SP1, SP2, FB1, GB1	Writing #1
3	Class	Mon	10/15	Carbon source utilization	
	Lab	Tues–Wed	10/16–10/17	Soil and Ecoplate analysis Manual: FW, SP3, FB2	
4	Class	Mon	10/22	DNA and 16S sequences	Quiz #1
	Lab	Tues–Wed	10/23–10/24	Metagenomic DNA extraction Manual: GB2, GB3	
5	Class	Mon	10/29	PCR, electrophoresis	
	Lab	Tues–Wed	10/30–10/31	16S amplification Manual: GB4, GB5	Writing #2 Poster part #1 (end of lab)
6	Class	Mon	11/5	Recombinant DNA technology	
	Lab	Tues–Wed	11/6–11/7	Ligation and transformation Manual: GB6, GB7	Poster part #2 (end of lab)
7	Class	Mon	11/12	No class: Veterans Day	
	Lab	Tues–Wed	11/13–11/14	Colonies counting Manual: GB8	Poster part #3 (end of lab)
8	Class	Mon	11/19	Getting into research	Quiz #2
	Lab	Tues–Wed	11/20–11/21	No lab: Thanksgiving Have a good break! (:	
9	Class	Mon	11/26	DNA sequencing	
	Lab	Tues–Wed	11/27–11/28	16S sequence analysis Manual: GB9	Poster part #4
10	Poster	Sun	12/2	---	Poster due at 11:59 pm
	Class	Mon	12/3	---	Quiz #3–5
	Lab	Tues–Wed	12/4–12/5	Work on writing assignment 3	Writing #3 (end of lab)
Exam	---	Thurs	12/13	---	Poster presentations

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. Please feel free to schedule a consultation with 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 in courses. Writing mentors can help at any stage of the writing process. The Writing and Critical Expression Hub offers: one-on-one writing tutoring; supportive and in-depth conversations about writing, the writing process, and writing skills; help with every stage in the writing process; and workshops on writing.

Teaching + Learning Commons (<https://commons.ucsd.edu/>)

Undergraduate student success at UC San Diego is defined as maintaining or exceeding good academic standing; making steady progress toward degree completion; actively engaging in research, co-curricular opportunities and the campus and local community; and utilizing resources to intentionally develop the competencies to lead in a global society. The Teaching + Learning Commons addresses the first two components of this definition through our student academic support services.

With the Teaching + Learning Commons, students can get support for challenging courses, subjects, and projects. Whether in a group setting or through one-on-one assistance, these support services and resources will help students develop effective learning and problem-solving strategies to be successful at UC San Diego and beyond.

Research Experience & Applied Learning Portal (<http://real.ucsd.edu/>)

The REAL Portal helps students discover internships and other hands-on experiential learning opportunities. UC San Diego is committed to educational experiences that develop students who are capable of solving problems, leading, and innovating in a diverse and interconnected world. Strengthening the connection between academic and high-impact, co-curricular experiences is one way to achieve this goal.

The REAL Portal is part of the suite of Engaged Learning Tools (ELTs), a suite of tools that helps students discover, capture, review and share your experiences. To learn more about the suite of tools, including the Enhanced Electronic Transcript and Co-Curricular Record, visit: <https://elt.ucsd.edu>