Welcome to Introductory Biology Laboratory! BILD 4 aims to develop an understanding for research in the biological sciences through discovery-based laboratory experiments. We will work in teams 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

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 participation and contribution in classes and in the laboratory are essential because many ideas and laboratory methods 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 both useful for learning[1] and critical to success in any discipline. To encourage collaboration and community building, many class and laboratory 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. Data analysis 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

Diversity, Equity, and Inclusion

I believe very strongly that the classroom is a place to expand our knowledge and experiences safely, while being respected and valued. I support the values of UC San Diego to *"create a diverse, equitable, and inclusive campus in which students, faculty, and staff can thrive".* I strive to uphold the values articulated by the Office of the Vice Chancellor for Diversity, Equity, and Inclusion:

"We believe that true excellence is achieved through productive relationships among people of diverse perspectives. When the collective talents of our students, faculty, and staff at UC San Diego are united in an environment that is open and inclusive, creativity and innovation prospers."

I hope you will join me in creating a class that upholds these values to further enhance our learning as a community.

For more information, please visit: http://diversity.ucsd.edu/

Course logistics

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

Class	Time	Location	Instructor
A00	Thursdays 8 – 9:20 AM	York 2622	Lisa McDonnell

Laboratory	Time	Location	Instructional assistants
A01	Thurs 9:30 am to 12:20 pm	York 1310	Nick Liang, Natalie Toothacre
A02	Thurs 1:00 pm to 3:50 pm	York 1310	Nick Liang, Yunpeng Fu
A03	Thurs 4:30 pm to 7:20 pm	York 1310	Jerry Liu, Jonathan Pham
A04	Friday 8:00 am to 10:50 am	York 1310	Jerry Liu, Carleen Villarreal
A05	Friday 11:30 am to 2:20 pm	York 1310	Garrett Wong, Nguyen Tran
A06	Friday 3:00 pm to 5:50 pm	York 1310	Garrett Wong, Eric Johnson

Instructor	Email	Office	Phone	Office hours
Lisa McDonnell	lmcdonnell@ucsd.edu	York 3080D	858-246-0890	Wed. 10:30 AM– 11:30 AM York 2300

Course materials: Laboratory activities are detailed in the BILD 4 Laboratory Manual, available at the bookstore. 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. iClicker is required for lectures and should be registered on TritonEd.

Participation and contribution in class meetings will be mainly through clicker questions and short writing activities. To participate in clicker-based discussions, please have an iClicker registered on TritonEd. Short in-class writing activities will be done in the carbonless personal lab manuals, so please be sure to bring the Laboratory Manual to class meetings and laboratory sections.

Podcast: Whenever possible, class meetings will be recorded and made available online as a resource for learning (http://podcast.ucsd.edu/). However, participation and contribution are highly encouraged, as substantial portions of class meetings will be interactive. Many important concepts and ideas that are the result of collaborative learning cannot be easily captured on video. Therefore, podcasts are provided for the purpose of review and should not be used solely to substitute for active engagement in class meetings.

Technology: Students are welcome to bring laptop computers, tablets, or similar technology to class meetings 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. The use of cell phones, personal computers, or other personal devices is not permitted in the laboratory for safety reasons.

[2] Sana et al (2013) Computers and Education 62: 24-31
http://www.sciencedirect.com/science/article/pii/S0360131512002254

Grading

BILD 4 has five grading components:

Contribution 25%
Writing assignments 25%
Quizzes 10%
Combined poster presentation and writing assignment 35%
Professionalism (5%).

These five grading components add up to 100%, and final grades will be determined based on percentages out of 100%. There are no opportunities for extra credit beyond what is assigned as part of the course.

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

Contribution: Active participation both in classes and laboratory sections is essential to learning in this course. There will be many contribution items, including pre-class and pre-laboratory assignments, in-class and in-laboratory discussions and activities, laboratory notebooks and data collection. Contributions will be graded for thoughtful completion. Because individual students may have different competing schedules and life events, completing 90% of the contribution items will earn the full contribution grade.
Contributing to the class community is greatly valued in this course. A bonus of 2 contribution points will be awarded 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.

Because you only need 90% of contribution items, please do not contact your instructor if you miss clicker questions (unless it is because of a documented family or medical emergency).

Writing assignments: There will be three writing assignments: the first will be written individually (5%), and second two assignments will be written in teams (10% each). The 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 on these assignments.

Quizzes: There will be 5 short quizzes given during lecture in weeks 2, 4, 6, 8, and 10. Quizzes will be open resources (e.g. notes and calculators but not electronic equipment that can be used to communicate with others). Quizzes are cumulative but will focus on material covered during the previous 2 weeks in class. The lowest quiz score will be dropped and the remaining 4 quizzes will be worth a total of 10% of the course grade. To facilitate reflection and learning from quizzes, each quiz will be in two phases: The first phase will be done individually (12 minutes) and the second phase will be the same quiz done again in groups (12 minutes). The individual portion will count for 80% of the quiz grade, and the group portion will count for 20%.

Poster project and final writing assignment: The final course project will be an analysis related to the soil microbiome research project that forms the foundation of this class. It has two parts: a group poster presentation (15% of course grade) and an individual final writing assignment (15% of course grade). Each group will analyze some aspect of existing data collected by BILD 4 students in past years using foundational concepts and laboratory skills learned in the course. The group poster presentations will be held during exam week, and will be judged by faculty, researchers, and staff from across campus. The individual final writing assignment will be on the same topic as the group poster with a similar structure to the other writing assignments and will additionally include a summary and critical assessment of other posters at the poster session. Please see TritonEd throughout the quarter for more details on these assignments.

Together the poster project and final writing assignment are worth 35% of the course grade. Because different people may excel in different ways, the group poster presentation or writing assignment, whichever is higher for each individual, will be scaled to 20% instead of 15%. Together they will total 35%.

Professionalism: This portion of the course grade (5%) is intended to engage students 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 to you, your fellow students, and/or the instructional team. Analogously in the workplace, being unprofessional to your colleagues or supervisors will only discount you. When you are discounted, you may not be invited for new opportunities that you may or may not be aware of.

Professionalism can be demonstrated through individual and community efforts. The individual component is to account for demonstrating maturity and professionalism. By default, every student is assumed to be professionally mature. Hence, this component is awarded to every student at the beginning of the quarter. During the quarter, based on observations by the teaching team, which includes but is not limited to one-on-one interactions, electronic communications, promptness and active participation in lab, your professionalism credit may be deducted in steps of 0.5 or 1%.

Example interactions with meaningful benefits that result in the following are desired:

- Deeper insight into course material, course concepts, biology, and/or society in general
- Improvement in skill building and future opportunities
- Learning conceptually and meaningfully why full credit was not awarded for an assignment
- Reporting errors or problems in class or laboratory, assignments, or other course material

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

- Asking questions when the information is already available or will eventually be known
- Ignoring the directions or requests from the instructional team
- Harassing and/or bullying the instructional team or other students, either in person or online
- Being late to lab, or missing class without an acceptable excuse
- Contributing inequitably to group work in lab

Late or missing assignments: No late contribution items will be accepted, as completing 90% of all the contribution items will earn the full contribution grade. No late assignments will be accepted for the writing assignments or the poster project, except in the case of a documented short-term illness or serious family emergency. In this case, please contact Dr. McDonnell as soon as possible or as soon as it is reasonable to do so.

Regrades: If a grading error has been made, please submit a re-grade request to Dr. McDonnell at the end of the class meeting within one week of the assignment being returned. Attach a separate piece of paper to your assignment as a cover sheet. If you think your work deserves more points, i.e. it is not an arithmetic error, please write on the cover sheet a concise description of how your answer compares to the rubric and why you think it should have earned more points.

Students who submit for regrades understand that we 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.

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

If significant disputes occur over the relative contribution of individual members of the group, students can submit an appeal. In such cases, the group grade will be multiplied by the number of people in the group, and the points can be divided among individuals based on what each group member thinks they deserve based on their effort. To submit an appeal, all members of the group need to get together and provide the following information in a document: clear and detailed descriptions of each member's contribution, calculations 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 group has agreed to all information in the appeal document. Please submit the appeal to Dr. McDonnell at the end of a class meeting within one week of the assignment being returned.

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 laboratory meeting. Students will not be allowed to participate in any laboratory section without completing this online training and assessment.

From the beginning of the first lab, appropriate laboratory attire is always required. 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. Starting at the beginning of the second lab, personal protective equipment (PPE) is required. 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 attendance

Attendance in laboratory is required. Missing two laboratory session, except in the case of a documented family or medical emergency, will automatically result in being dropped from the class. 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 (http://biology.ucsd.edu/education/undergrad/course/ug-labs.html).

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, such as the research proposal. Please feel free to schedule a consultation with Bethany Harris (bethany@ucsd.edu), 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 on course papers, i.e. data analysis & writing assignments and the research proposal, as well as other independent writing projects. Writing mentors can help at any stage of the writing process, from brainstorming to final polishing. The Writing and Critical Expression Hub offers: one-on-one writing tutoring by appointment; supportive and in-depth conversations about writing, the writing process, and writing skills; help with every stage in the writing process, walk-in tutoring; and workshops on writing.

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!

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.

Academic integrity
https://students.ucsd.edu/academics/academic-integrity/index.html
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. Instructors, for their part, will exercise care in planning and collaborating with students on academic work, so that academic integrity is upheld.

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 organizations, these are commonly called codes of conduct or ethics. In this course, we are using a statement of values[4] in support of codes of ethics, like the Policy on Integrity of Scholarship, to state explicitly our values and describe the behaviors for maintaining and protecting those values.

The following values are fundamental to academic integrity and are adapted from the International Center for Academic Integrity. In collaborative work, each group should discuss these values and must articulate the expectations for how they are made manifest within the group's work together.

	As students, we will …	As the instructional team, we will …
Honesty	• Honestly demonstrate your knowledge and abilities according to expectations listed in the syllabus or in relation to specific assignments and exams • Communicate openly without using deception, including citing appropriate sources	• Give you honest feedback on your demonstration of knowledge and abilities on assignments and exams • Communicate openly and honestly about the expectations and standards of the course through the syllabus and in relation to assignments and exams
Responsibility	• Complete assignments on time and in full preparation for class • Show up to class on time and be mentally physically present • Participate fully and contribute to team learning and activities	• Give you timely feedback on your assignments and exams • Show up to class on time and be mentally and physically present • Create relevant assessments and class activities
Respect	• Speak openly with one another while respecting diverse viewpoints and perspectives • Provide sufficient space for others to voice their ideas	• Respect your perspectives even while we challenge you to think more deeply and critically • Help facilitate respectful exchange of ideas
Fairness	• Contribute fully and equally to collaborative work, so that we are not freeloading off of others on our teams • Not seek unfair advantage over fellow students in the course	• Create fair assignments and exams and grade them in a fair and timely manner • Treat all students and collaborative teams equally
Trustworthiness	• Not engage in personal affairs while on class time • Be open and transparent about what we are doing in class	• Be available to all students when we say we will be • Follow through on our promises • Not modify the expectations or

	• Not distribute course materials to others in an unauthorized fashion	standards without communicating with everyone in the course
Courage	• Say or do something when we see actions that undermine any of the above values • Accept a lower or failing grade or other consequences of upholding and protecting the above values	• Say or do something when we see actions that undermine any of the above values • Accept the consequences (e.g. lower teaching evaluations) of upholding and protecting the above values

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. A breach of academic integrity may result in a zero the assignment/test/participation item in question and/or a failed grade in the course. The impact of the breach on a grade will be determined by the instructor in consultation with the Academic Integrity Office.

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

Class & Lab Schedule

Please check TritonEd often for relevant information and any updates to the schedule.

Week	Dates	Class	Laboratory	Lab manual	*Deadlines*
1	1/9 – 1/13	• Introduction to BILD 4 • Microbiomes • Statistics	• Introduction to laboratory • Pipetting and statistics • Error analysis	• BB1 • BB2	
2	1/16 – 1/20	• Quiz 1 • Forms of biodiversity • Introduction to Ecoplate	• Soil properties • Ecoplate setup	• SP1, SP2 • FB1 • GB1	*Practice writing assignment due at start of lab*
3	1/23 – 1/27	• Carbon source utilization • Ecoplate analysis	• Scripps Coastal Reserve • Moisture Analysis • Ecoplate analysis	• FW • SP3 • FB2	*Writing I due at start of lab (Soil properties)*
4	1/30 – 2/3	• Quiz 2 • DNA purification • 16S rDNA sequences	• Genomic DNA prep • Polymerase chain reaction	• GB2, GB3	
5	2/6 – 2/10	• Polymerase chain reaction • Gel electrophoresis	• Gel electrophoresis • PCR Purification	• GB4 • GB5	*Writing II due at start of lab (Ecoplate)*
6	2/13 – 2/17	• Quiz 3 • Recombinant DNA • Biotechnology	• Ligation • Transformation	• GB6, GB7	
7	2/20 – 2/24	• DNA sequencing	• Transformation data • Illumina and previous class data analysis	• GB8	
8	2/27 – 3/3	• Quiz 4 • Biodiversity calculations	• DNA sequence analysis • Biodiversity calculations • Start work on posters	• FB3 • GB9, GB10	*Writing III due by Sunday 3/5 at 11:59 PM*
9	3/6 – 3/10	IAs talk in lecture	• Continue work on posters		*Posters due Sunday 3/12 at 11:59 PM*
10	3/13 – 3/17	• Quiz 5 • Guest Lecture microbiome	• Work on last writing assignment	---	*Writing IV due by Sunday 3/19 at 11:59 PM*
"Exam"*	Thurs 3/23 at 11:30 AM	• Poster presentations	---	---	

*Please note there is no written final exam. The exam time is used for your final poster presentations.

