BILD 1: The Cell

UC San Diego – Winter 2024

<u>Section information:</u> See below for section information, including IA names and emails.
<u>Lecture schedule</u>: see the last page

Basic Contact Information for BILD 1 Professor

Lecture time: MWF 12pm-12:50pm
Lecture location: York 2722
Website: UCSD **Canvas** site for BILD 1, Winter 2024 (go to https://coursefinder.ucsd.edu/)
Dr. Cressida Madigan, Ph.D.
Assistant Professor, Molecular Biology
Email: cmadigan@ucsd.edu
Office: Tata Hall 4102
Office Hours: Wednesdays 3-4pm and Fridays 2-3pm
If you want to meet and these times don't work for you, please send us an email to schedule another time.

Required and Optional Materials

Required materials: a device that can access the internet, like a cell phone or computer
Recommended: *Campbell Biology* (8th, 9th, 10th, or 11th editions)
Lecture slides and all required course readings will be posted on the class website.

Welcome to BILD 1: The Cell!

BILD 1 is an introduction to the structure and function of cells, both in organisms like bacteria and in organisms like us. We will study the biological molecules present in cells, how cells obtain energy, and how these organisms pass information on to the next generation. In other words, we will deepen our understanding of the essential functions of living things by exploring the physical structures and biological principles that underlie the fundamental unit of all living organisms, the cell.

This course also aspires to support you in developing basic content knowledge and skills necessary to evaluate new discoveries in the life sciences and to continue to expand your knowledge of biology throughout your life. That requires going beyond memorization of facts to acquire an understanding of how and why organisms function as they do, and what happens when the components of organisms do not function properly.

In addition, the teaching strategies in this course will engage all of you as a community of biologists in the classroom to develop leadership and communication skills as well as support each other in understanding biological concepts. You will also have the opportunity to practice scientific writing skills through numerous writing assignments and in-class activities.

Prerequisite: NONE, although knowledge of high-school chemistry is helpful.

What We Will Learn in BILD 1

We anticipate that you will learn many different things in BILD 1! We anticipate that what you will be able to do by the end of the quarter includes, but is not limited to, the following:

- **Demonstrate an understanding of the structure and function of cells** and how **information is transmitted from generation to generation**.
- **Predict how a perturbation** of a molecule, structure, or cell (like through a disease or experimental manipulation) **will affect its function** and the function of the cell as a whole.
- **Demonstrate a mechanistic (how) and teleologic (why) understanding** of the physiological processes underlying cells.
- **Develop critical thinking skills** to be able to think like a biologist and **solve biologically-relevant problems**.
- **Increase your understanding of your own learning (metacognition)**, including recognizing what topics are easy or difficult for you to learn, learning what study strategies work best for you, and seeking help from instructors and colleagues at appropriate times.

All questions on exams, as well as nearly all questions on homework and in-class and in-section activities, will be tied to at least one of these overall learning outcomes.
At the beginning of each unit, we will also provide you with specific biology-related learning outcomes to guide your learning of that material. The problems on the exams will be tied to those specific learning outcomes.

How We Teach in BILD 1 and Why

We have chosen the teaching strategies in this course to **promote everyone's learning.** Extensive educational research has shown that people learn best when they are **actively engaging with the material through thinking, writing, and discussing**.[1] To encourage that engagement, we will use class time to work on applying our knowledge, troubleshooting difficult topics, and practice solving problems. There will be pre-class assignments to prepare you for the material you will engage with in class.
We also want you to be able to **apply what you learn about biology in whatever context you find yourself in your future**, including in your career and your personal life. Therefore, instead of memorization, we will focus on developing an understanding of fundamental concepts as they apply to different examples. Exams will include questions that are based on solving problems in new contexts.
Research has also shown that people generally learn best in **collaborative environments,** where they learn together and construct a shared understanding of the material.[2] While talking and working with your colleagues, you may identify gaps in your own knowledge, exercise the communication skills that are crucial in any career, and gain skills in working with colleagues as they learn to identify their confusions, ask questions, and think critically and skeptically about biology. Therefore, **active participation** both in class and discussion section is crucial. To encourage collaboration, class and section activities will be done in groups, and grades will never be assigned on a curve.

[1] Freeman *et al.* 2014. Active learning increases student performance in science, engineering, and mathematics. http://www.pnas.org/content/111/23/8410

[2] Smith *et al.* 2009. Why Peer Discussion Improves Student Performance on In-Class Concept Questions. http://science.sciencemag.org/content/323/5910/122

BILD 1 Class Culture

BILD 1 is a **community of scientists** trying to increase their understanding of the biological world. The classroom culture is designed to engage you in collaborating and thinking like a scientist.

When people collaborate to work towards a common goal, in this case building our learning, we must **establish shared values** so that everyone understands acceptable ways of working together. In organizations, these are commonly called codes of conduct or ethics. In this course, we use the following statement, adapted from the International Center for Academic Integrity and Dr. Tricia Bertram Gallant, to explicitly state our values and describe the behaviors that maintain and protect these values.

	As students we will…	As the teaching 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 and physically present • Participate fully and contribute to team learning and activities • Take ownership of your own learning by using course and outside resources, including the BILD2 team, to clarify confusions and extend your knowledge	• 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 • Providing selected resources and a helpful environment to help you address your confusions and extend your knowledge
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 equitably
Trustworthiness	• Not engage in personal affairs while on class time	• Be available to all students when we say we will be

	• Be open and transparent about what we are doing in class • Not distribute course materials to others in an unauthorized fashion	• Follow through on our promises • Not modify the expectations or 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 the 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 of upholding and protecting the above values

Note on electronic devices

You are welcome to bring laptops or other devices to lecture to take notes. However, research shows that **"multi-tasking" on computers is likely to decrease not only your grade but also the grades of people around you who can see your screen!**[3] For this reason, we ask that you do not flip between lecture notes and the internet unless as part of an in-class activity. The use of cell phones, computers, or any other electronic devices is not permitted during exams; using such a device during an exam is grounds for receiving a failing grade.

[3] Sana *et al*. 2013. Laptop multitasking hinders classroom learning for both users and nearby peers. https://www.sciencedirect.com/science/article/pii/S0360131512002254

How Your Letter Grade will be Assigned

Grade assignments will be based on the percentage of total points earned. We do not decide your grade, but rather you as a student do the work to earn your grade.

%	Grade	%	Grade	%	Grade	%	Grade
98+	A+	87-89	B+	77-79	C+	60-69	D
93-97	A	83-86	B	73-76	C	0-59	F
90-92	A-	80-82	B-	70-72	C-		

How Your Grade will be Calculated

Grading

The activities, requirements, and assignments that comprise this course are designed to promote your learning and facilitate your understanding of biology from different viewpoint and using many different teaching methods. In addition, these assignments (particularly in-class lecture activities and Biologist Journal assignments) give me highly valuable information that allows me to adjust the course to meet your educational needs.

Accommodations and extensions

If you receive accommodations, I am happy to provide them. However please contact OSD immediately, and they will contact me. I cannot provide accommodations without direction and paperwork from OSD.

A note on re-grading

We are always happy to meet with you **to discuss your learning.** If you believe that a grading error has been made, please follow these steps: email your IA and submit a document that re-states the question, with a concise paragraph explaining what your choice was and why this answer is more correct than the answer on the rubric. The IA will discuss with you, but if further explanation is necessary, contact me within one week of the assignment or exam to discuss.

Explanation of Course Components

Lecture Participation

As stated above, **active participation in lecture is important for your learning.** Participation includes attending class and participating in in-class activities, including using Mentimeter to respond during in-class quizzes. To respond, you need a device with internet access (like your phone).

How we measure lecture participation: Every class, we get a report of how many students responded to questions. We use that to determine the % of students who attended lecture. If more than 85% of students respond to the quiz questions, then all students get participation points for that lecture. If less than 85% of students respond, no one receives participation points for that lecture. Whether the quiz answers are correct does not matter.

If you believe that you might have a situation or condition that will cause you to miss 2 weeks (4 days) or more of lectures, please contact us right away, *so we can strategize about accommodations****. This includes mental and physical health conditions.***

Course Component	Total Points	~% of Grade

Lecture Participation and Homework	**518**	**30%**
Lecture Participation (18 @ 11 points each)	**198**	
Biologist Journals (16 @ 20 points each)	**320**	
Exams	**942**	**54%**
Highest scoring midterm	**250**	
Next highest scoring midterm	**250**	
Next highest scoring midterm	**250**	
Final Exam	**442**	
Professionalism	**40**	**2%**
TOTAL	1750	100%

Homework and Pre-class Biologist Journals

To give you further practice, allow you to reflect on your learning, and prepare you for class, before most classes, there will be an assigned activity called a Biologist Journal, posted on Canvas. This activity may include a reading from online sources or primary literature, but it will always involve writing to a specific prompt. These Journals are not meant to be formal essays or finely polished documents for public view. Instead, they should reflect your own ideas and thought processes and should be as much for your own benefit as ours. Grades will be awarded for turning in these Journals on time, meeting the word count, and writing thoughtfully on topic. Biologist Journal prompts will be posted on Canvas several days before they are due. **They will be due NO LATER THAN 11:59pm the night before class.**
Because of the size of this class and to prepare you for hard deadlines later in your career, **we cannot award points for assignments submitted late.** Even if you miss the deadline for an assignment, we still highly recommend doing the work to prepare for class and exams. As with lecture attendance, you can submit 85% of Biologist Journals and other homework and still receive full credit.

Section Participation

Discussion sections will be on zoom and led by the section IA. The primary goal of discussion section is to **engage you in applying your knowledge and exercising your skills** in collaborative problem solving and data analysis. Your IA can answer questions about homework or lecture. You should already be enrolled in a section, and **you must attend the section which you are enrolled** to receive credit. We are not able to change the number of students in a section, so if a section is full you must choose another one.

Midterms

To facilitate developing useful knowledge and skills for the long term, tests in this course will focus on **applying knowledge to assess and solve novel problems.** Questions will be multiple choice and short answer. Any material covered in or closely related to each lesson's learning objectives may be tested.
There will be 4 midterms in this course. Your lowest midterm grade will be dropped. If you miss one of the midterms, that will be the midterm dropped.

Final Exam

Everyone must take the final exam. It is only completed individually. **If you need to miss the final exam due to a verifiable, unplanned emergency, you must notify us (by phone or e-mail) of the problem as soon as it is reasonable to do so. You must also provide adequate documentation (doctor's note, copy of death certificate, etc.).** We will discuss your best options given your circumstances.

Course Policies

Professionalism
Extra Credit Opportunities

You have several opportunities for extra credit. Extra credit questions will be offered on each exam to make up for exam points missed. In addition, there are three other opportunities for extra credit:

- 10 points for **meeting with an IA or Prof. Madigan** during office hours or another scheduled meeting, including coffee or dining with a prof.
- 10 points for **community professionalism**.
- Points can be earned by completing course evaluations and related surveys. If 90% or more of all students complete all CAPEs and other course evaluation surveys in a mature and professional fashion (taking them seriously and providing timely and constructive feedback), 10 points will be awarded to everyone in the course.

This portion of the course grade is intended to motivate you to consider the impact of your actions on your 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 teaching team. Analogously in the workplace, being unprofessional to your colleagues or supervisors will only discount you. When you are discounted, you will not be invited for new opportunities that you may or may not be aware of.

Professionalism can be demonstrated through individual (described here) and community efforts (described below). The individual component is to account for you personally demonstrating maturity and professionalism.

By default, everyone is assumed to be professionally mature, so this component is automatically awarded to you at the beginning of the quarter. During the quarter, based on observations by the teaching team, including but not limited to one-on-one interactions, electronic communication, and follow-up conversations on grades, your professionalism credit may be deducted in steps of 5pts.

Examples of interactions with meaningful benefits:

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

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

- **Contributing inequitably to team work in class, in discussion section, or on exams**
- **Harassing and/or bullying the instructional team or other students, either in person or online**
- **Ignoring the directions or requests from the instructional team**
- **Asking for course credit when such credit would conflict with stated course policies (such as the policy on late assignments) or when it would be applied inequitably (such as just for you)**
- **Being disruptive to fellow students in class, in discussion section, or on exams**

Students with Disabilities or other Special Circumstances

UC San Diego (as an institution) and we (as human beings and instructors of this course) are committed to full inclusion in education for all persons. If you have a disability, including mental health issues, or other special circumstance that might affect your attendance or performance in this course, please contact us early in the quarter to work out reasonable accommodations to support your success. To ensure fairness and proper support, anyone who requests accommodations because of a disability must get a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD). To contact OSD, use the student portal: https://academicaffairs.ucsd.edu/sso/osdsp/home, email the Biology OSD liaison at bioosd@ucsd.edu, or call 858-534-4382.

Whenever possible, we strive to use universal designs that are inclusive. If you have feedback on how to make the class more accessible and inclusive, please get in touch!

Podcasts and Lecture Recording

Whenever possible, **classes will be recorded and made available online** as a resource for learning (http://podcast.ucsd.edu). However, remember that active participation and contribution are highly encouraged, and many important concepts and ideas will be developed collaboratively by doing in-class activities that cannot be replicated by watching a video. Also, I may record class to study my own effectiveness as an instructor.

Academic Integrity and Originality

Integrity of scholarship and learning is fundamental to creating our classroom community and the academic community at large. The University expects that both students and faculty will honor this principle and in so doing protect the validity of University intellectual work.

For you, this means that all academic work you submit for this course should be **your own new original work.** We emphasize this for several reasons. First, **using your own thoughts and putting things in your own words helps you learn.** There is no better way to discover quickly what you understand and what you don't than to explain a concept to someone else. Second, in professional settings, trying to hide dishonest behavior or pass someone else's words off as your own can lead to trouble.

To encourage original thought and writing in this class, we take precautions. For example, exams are scanned before being graded. **Our goal is not to *catch* anyone** (although we can't give credit for dishonest work or plagiarized material), **but to help everyone make a habit of using their own thoughts and voice.**

In addition, part of being a good member of a community **is not facilitating dishonest behavior by others**. No course materials, particularly homework and exams, may be posted online, submitted to private or public repositories, or distributed to unauthorized people outside of the course.

To hold everyone accountable for their actions, any serious suspected instances of a breach of academic integrity will be reported to the Academic Integrity Office for review. For more information on academic integrity, please visit https://students.ucsd.edu/academics/academic-integrity/index.html.

Supplemental Instruction and Tutoring for BILD 1

Helpful Resources

The Teaching + Learning Commons is now offering supplemental instruction (SI) and tutoring for BILD 1. The Commons has data that indicates that students who take regularly advantage of these opportunities earn better grades.

Supplemental Instruction is offered three times a week. With a peer leader who attends our section, you will collaborate with your peers to explain, explore, and elaborate what you know. Simultaneously, you will clarify what you might struggle to understand and develop skills and strategies to be highly successful with the content. SI is open to everyone in the course on a drop-in basis (meaning you do not need to reserve a slot ahead of time). More details, like the schedule, are available on Canvas.

General Resources at UCSD

If you are experiencing anxiety, depression, or worse, you are not alone. On top of facing the normal stresses of college, many college students are in their late teens or early twenties, which is when many mental illnesses emerge for the first time because of brain maturation. In addition, you may be experiencing the effects of trauma or violence. Or, you might be one of the 19% of UC students who report not being able to access adequate food[4] or who do not have a safe, stable place to live.

Whatever your situation, whether your problems feel big or small, we encourage you to seek help and support, either from us or from professional resources on campus. Some are listed below. It is also important to find a community of like-minded people around you. Some of the resources here at UCSD include: the Black Resource Center (brc.ucsd.edu), the Cross-Cultural Center (ccc.ucsd.edu), the LGBT Resource Center (lgbt.ucsd.edu), the Raza Resource Centro (raza.ucsd.edu), the Student-Parents Resource page (students.ucsd.edu/well-being/wellness-resources/student-parents), the Student Veterans Resource Center (students.ucsd.edu/sponsor/veterans), the Undocumented Student Services Center (uss.ucsd.edu), the Women's Center (women.ucsd.edu).

[4] Martinez et al. 2016. University of California Global Food Initiative: Student Food Access and Security Study. https://www.ucop.edu/global-food-initiative/best-practices/food-access-security/student-food-access-and-security-study.pdf

***Please note that while we on the instructional team are here to support you, instructors are obligated by law to notify UCSD's Title IX coordinator if a student (or any person at UCSD) discloses to us a personal experience of sexual harassment, sex or gender discrimination, domestic violence, or stalking. This is so that the University can properly address the issue. If you do not want your experiences to be reported, please contact CAPS or CARE, which can talk to you confidentially.**

General Help and Resources		
Academic Support	**Psychology & Physical Safety***	**Basic Needs**
OASIS (http://oasis.ucsd.edu) The Office of Academic Support & Instructional Services (OASIS) offers math and science tutorial Programs for everyone. They also have services and scholarships for those of you who have	**CAPS (http://caps.ucsd.edu)** CAPS offers free, confidential counseling. They can help with urgent crises, such as an assault or thoughts of self-harm. They can also talk if you are worried about a friend or classmate.	**Triton Food Pantry (http://basicneeds.ucsd.edu/triton-food-pantry/)** The Triton Food Pantry discreetly offers food for current UCSD students to ensure each of you has enough nutrition to get through the day.

overcome significant obstacles to become successful (like being first in your families to go to college). **Teaching + Learning Commons (http://commons.ucsd.edu)** The Teaching + Learning Commons offers tutoring, consultations, and workshops on learning strategies as well as assistance with writing in the Writing + Critical Expression Hub.	**CARE at SARC** **http://care.ucsd.edu** Campus Advocacy, Resources, and Education at the Sexual Assault Resource Center (CARE at SARC) offers support for those of you who have experienced sexual violence or violence from a partner. They have free confidential counseling, including on nights and weekends.	**The Hub** **(https://basicneeds.ucsd.edu)** The Hub serves those of you who have trouble accessing basic needs, including food or stable housing, or who have financial emergencies. They can help you connect with a variety of on- and off-campus programs, including the Food Pantry, CalFresh, emergency loans, emergency housing, or changes to your financial aid.

IA Office Hours

IA	Day	Time	Location	Email
Alison Balitaan	**T, Th**	**11-1pm**	**Roger's Market (Revelle)**	**abalitaan@ucsd.edu**
Malika Nindra	**T**	**6-8pm**	**Biomedical Library Rm 105**	**mnindra@ucsd.edu**
Dora Deng	**Th**	**9-11am**	**Galbraith Hall Active Study Room**	**m1deng@ucsd.edu**
Jackie Zhao	**?**	**?**	**?**	**jiz065@ucsd.edu**
Maurya Gutta	**?**	**?**	**?**	mgutta@ucsd.edu
Anusha Chatterjee	**?**	**?**	**?**	**achatter@ucsd.edu**

You are encouraged to attend any IA's office hours.

COURSE schedule

Every attempt to made to stick to the schedule below, but we may need to make changes to lectures, assignments, or exams. Regardless, we will adhere to the foundational concepts below:

Date	Guiding Questions	Assignments Due 11:59pm Night Before Class
Class #1 M Jan. 8	**Welcome! Who are we? How do we think like biologists?**	**Reading: Syllabus**
Class #2 W Jan. 10	**What is life? How do we define life using structure and function?**	**Biologist Journal #1 Due!**
Class #3 F Jan. 12	**How do we think across size and scale? What makes up the structure of living things?**	**Biologist Journal #2 Due! BioSci Pre Survey Due!**
M Jan. 15	**Happy MLK Jr. Day! No lecture**	
W Jan. 17	**No lecture**	
Class #4 F Jan. 19	**What molecules make up the structure of living things? How do their structures serve their functions?**	**Biologist Journal #3 Due!**
Class #5 M Jan. 22	**What molecules make up cell membranes? How do their structures serve their functions?**	
W Jan. 24	**Midterm 1 (online, open note)**	
Class #6 F Jan. 26	**How do substances enter or leave through lipid membranes?**	**Biologist Journal #4 Due!**
Class #7 M Jan. 29	**How do we know what reactions will happen inside a cell? What are enzymes?**	**Biologist Journal #5 Due!**
Class #8 W Jan. 31	**How will the structure of an enzyme affect its function?**	**Biologist Journal #6 Due!**
Class #9 F Feb. 2	**Where does all the matter and energy for living things come from? (Photosynthesis I)**	**Biologist Journal #7 Due!**
Class #10 M Feb. 5	**Where does all the matter and energy for living things come from? (Photosynthesis II)**	
W Feb. 7	**Midterm 2 (online, open note)**	
Class #11 F Feb. 9	**How do living things get matter and energy from food? (Cellular respiration I)**	**Biologist Journal #8 Due!**
Class #12 M Feb. 12	**How do living things get matter and energy from food? (Cellular respiration II)**	**Biologist Journal #9 Due!**
Class #13 W Feb. 14	**How do cells receive and act on outside signals?**	**Biologist Journal #10 Due!**
Class #14 F Feb. 16	**What is the relationship between DNA, protein, and traits?**	**Biologist Journal #11 Due!**

M Feb. 19	**Happy President's Day! No lecture**	
Class #15 W Feb. 21	**How are genes expressed?**	**Biologist Journal #12 Due!**
F Feb. 23	**Midterm 3 (online, open note)**	
Class #16 M Feb. 26	**Where do mutations come from? How do mutations cause cancer?**	**Biologist Journal #13 Due!**
Class #17 W Feb. 28	**How is DNA copied? How do cells inherit mutations?**	**Biologist Journal #14 Due!**
Class #18 F Mar. 1	**What cells in the adult body are actively dividing? How is mitosis like a copy machine?**	
Class #19 M Mar. 4	**How are mutations passed between generations? (meiosis I)**	**Biologist Journal #15 Due!**
Class #20 W Mar. 6	**How are mutations passed between generations? (meiosis II)**	**Biologist Journal #16 Due!**
F Mar. 8	**Midterm 4 (online, open note)**	
Class #21 M Mar. 11	**What is the relationship between genotype and phenotype?**	
Class #22 W Mar. 13	**How do dominant and recessive alleles contribute to traits?**	
Class #23 F Mar. 15	**How do genes interact with each other and with the environment? Building on BILD1**	**Complete CAPEs!**
Class #24 M Mar. 18	**IA-lead Review session for Final based on student feedback**	**Reading: Final Exam study guide**
W Mar. 20	**No lecture**	
F Mar. 22	**Final Exam, 12pm-2:00pm (online, open note)**	**Final reflection due!**