UCSD BILD 1: The Cell

Professor: **Dr. Ivonne González-Gamboa**
Lecture Schedule **Spring Quarter 2024**: 4/1/24 - 6/7/24

Overview: Welcome to BILD 1! This course 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. **We are in this together!** If you have any concerns or issues, please don't hesitate to reach out to me for support. Together, we can create a supportive and inclusive learning environment where we can all thrive.

COURSE MEETING TIMES

This course will be fully in-person (see schedule below). Please look closely at the following course meeting times and the more detailed lecture schedule in this syllabus.

Lecture:

Section	Day	Time	Room
All	T/Th	3:30pm – 4:50pm	MOS 0114

Discussion Sections: check WebReg to see which section you are assigned to.

Section	Day	Time	Room	IA
D01	M	11am – 11:50am	DIB 122	Delisa and Morgan
D02	M	1pm – 1:50pm	DIB 121	Delisa and Yvonne
D03	W	11am – 11:50am	DIB 121	Delisa and Morgan
D04	W	1pm – 1:50pm	RWAC 0103	Delisa and Yvonne
D05	F	9am – 9:50am	RWAC 0103	Delisa and Lisa

REACHING THE INSTRUCTIONAL TEAM

Professor: **Dr. Ivonne González-Gamboa**
Professor contact: igonzalezgamboa@ucsd.edu
Student Hours: M, 5:00pm – 6:00pm, FAH 4009 and F, 10:30am – 11:30am, Zoom (Link on CANVAS)

IA Information:

IA Name	Email
Delisa Ramos (PhD)	d2ramos@ucsd.edu
Yvonne Song	z8song@ucsd.edu
Morgan Lucas	mjlucas@ucsd.edu
Lisa Chen	eyc003@ucsd.edu

Student hours: Student hours provide an opportunity for you to ask clarifying questions about the course material or any other topics! I encourage you to attend student hours rather than emailing the Instructor or the IAs for several reasons: 1) This is how we can cultivate a richer community and get to know each other better; 2) We can better explain the material using whiteboards and engaging in conversation. Additionally, other students may have similar questions, fostering a collaborative learning environment; 3) You will receive an immediate response during student hours, rather than having to wait for email replies.

You are encouraged to attend anyone's student hours. We offer student hours every day at various times! If these times are inconvenient for you, please feel free to reach out with your availability for an alternative time. Please refer to the Canvas site for information on IA student hours.

Piazza: The class piazza discussion board (on CANVAS) will be monitored daily for questions – please feel free to post (and answer) questions there. We are all a community learning and working together!

BILD 1 Supplemental Instruction and OASIS: Supplemental Instruction (SI) and the Office of Academic Support and Instructional Services (OASIS) provides an opportunity for students to actively and deeply learn course content by engaging in discussion with peers enrolled in BILD 1. These groups are not meant to be tutoring or review sessions. The leaders prepare session plans to encourage and guide students in teaching and learning with each other. The leaders, who have previously taken the course, will provide time and opportunity to work through more complicated concepts and problems that are associated with BILD 1. There are several study sessions (per week) outside the lecture. The sessions are designed to help with understanding content and to collaborate with peers who are also taking the course. Studies have shown that 95% of the students who attended four or more sessions earned a higher grade in their courses and overall GPA. SI and OASIS provide you with a session to explain, explore and elaborate what you know. Simultaneously, it allows you to clarify what you might struggle to understand. *While we encourage you to participate in SI or OASIS, participation in these sessions does not substitute for attending a regular discussion section (synchronously or asynchronously).*

LEARNING IN THIS COURSE

We will provide numerous opportunities for you to engage with biological concepts in low-stakes ways. These include: in-class questions (graded on participation rather than correctness); weekly study guide assignments; and weekly discussion section problem sets. Each assignment has been carefully selected with your learning in mind. Additionally, the teaching strategies employed in this course will involve the entire community of biologists in the classroom, fostering the development of leadership and communication skills while offering support in understanding biological concepts.

However, this focus on academic engagement will not come at the expense of your well-being. We have incorporated flexibility into the course structure to accommodate unforeseen circumstances that may arise during the quarter. Beyond physical health, we will consistently encourage you to prioritize personal time for recharging and relaxation through productive or healthy activities that bring you joy. Recognizing that studying is most effective when approached with a clear and positive mindset, our grading policies reflect the provision of allowances, such as dropping at least one of each assignment type, to ensure you have the necessary bandwidth on days when you may need it most.

As the quarter progresses, we will actively seek and utilize your feedback to make adjustments to the course. Any changes implemented will aim to enhance flexibility and will always be guided by your learning needs.

Recommended Textbook: "Campbell Biology", 12th Edition by Urry, Cain, Wasserman, Minorsky and Orr (Pearson 2021) ISBN 9780135188743. If you order directly from the publisher, the loose-leaf version of the book is $60: https://www.pearson.com/store/p/campbell-biology/P100002940947/9780135856215. You can also choose to purchase the ebook (allows you to highlight and make notes directly on the page, reads the book to you). See the "Recommended Textbook Reading Schedule" in CANVAS (Course Materials) to keep up with the course reading. This book is recommended, not required.

CANVAS: all course related information will be posted on our Canvas site. Please check the Canvas site and your UCSD e-mail regularly for any announcements as these will contain essential information.

LEARNING OUTCOMES

1) Explain the relationship between chemical structure and function of molecules such as DNA, RNA, proteins, amino acids, and lipids.
2) Compare and contrast how the structures and elements of prokaryotic cells, eukaryotic cells, and viruses' impact how they function.
3) Predict how and when molecules may enter or exit cells through various pathways in the cell membranes.
4) Analyze how energy is produced and used by cells, including processes such as cellular respiration and photosynthesis.
5) Explain how cells receive and act on external chemical signals, including the stages of cell signaling and how signals are amplified.
6) Explain mechanisms that lead to genetic diversity including mutation and meiotic recombination.
7) Analyze how environment interacts with genotypes to produce phenotypes.
8) Explain patterns and mechanisms of inheritance.
9) Apply the central dogma to explain how genes give rise to the traits we observe in organisms.
10) Explain how gene expression can be modulated.

GRADING CRITERIA AND SCALE

The following grading scheme will be used. The 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.

Assignment		Weight
Lecture participation	Piazza and google forms questions	10%
Study guide assignments	Weekly questions from lectures	15%
Discussion section	Attendance or completion of assignments	15%
Chemistry in Biology	Pre-Assessment quiz Post-Assessment quiz	1% 3%
Exams	Highest quiz (18%) Next highest quiz (12%) Lowest quiz (0%) Final exam (24%)	54%
Professionalism		2%
Total		**100%**
Extra credit		2%

Letter	Percent	GPA
A+	96-100	4.0
A	93-96	4.0
A-	90-93	3.7
B+	87-90	3.3
B	83-87	3.0
B-	80-83	2.7
C+	77-80	2.3
C	73-77	2.0
C-	70-73	1.7
D	60-70	1.0
F	<60	0

COURSE COMPONENTS

Lecture Participation: Lecture will be presented in person. The most important aspects of the material are presented in lecture. Concepts will be presented in a step-wise fashion designed to help you learn the material. Active participation in lecture is important for your learning! Participation includes attending class and participating in piazza and google forms questions. You may submit responses to questions through any electronic device with internet access. These will be graded only for participation (complete/incomplete). Questions must be completed during in-class synchronous participation. Lecture slides are available for download from CANVAS and lecture recordings will also be posted to CANVAS after lecture under the "Media Gallery". We will start counting participation points during week 2, so that there is time to settle. Additionally, we know that everyone has different circumstances and life events. Therefore, we will drop the lowest 4 lecture participation periods.

Study guide assignments: Creating study guides from the lecture slides is a great way to prepare for the exams. This allows you to study the study guide, rather than going through dozens of lecture slides before the exam. Each week, you will create at least 5 questions and answers per lecture that we covered that week. For example, if we covered two lectures that week, you'll want to write 10 questions and answers in your study guide assignment. The questions must be short answer format and must relate to the main points from the lecture. This way, before the exam, you will have a study guide to study for each lecture we went over. Note, that you are only required to write 5 questions and answers for each lecture, but I highly recommend writing more than that to make a more useful study guide. If students complete the study guide assignments with a strong attempt at correct answers and integrity, they will receive the full points.

Discussion Sections: Weekly discussion sections are designed to engage you in applying your knowledge and exercising your skills in collaborative problem solving and data analysis. Therefore, you will receive full credit for attendance with active participation in section in small groups working on problem sets. We will start discussion sections on the second week of classes.

We acknowledge that there might be extenuating circumstances preventing you from being able to attend section in a given week. Therefore, there will be two ways for you to earn the points, either synchronously (attending to discussion section) or asynchronously (submitting the problem set by the end of the week on CANVAS and it will be graded for correctness), and we will drop two discussion section assignments for each student. If you are unable to make it in a given week, please make sure to look at the problem sets (posted online), and attend student hours with any questions!

Chemistry in Biology Assignments: This year we have a special set of assignments associated with learning the chemistry behind life. Cells are made up of molecules like enzymes and DNA, and these molecules are chemicals that follow chemical principles. To understand life, it is crucial to not only understand, but master some basic concepts about how molecules interact with each other. This may seem daunting, but we will support you by giving you multiple opportunities for practice and demonstrating your proficiency. Although these assignments can be completed in any order, we expect that most students will do the following:

1. Take the Chemistry in Biology Pre-assessment Quiz, due at the end of the first full week of class. The purpose of this quiz is to give you a sense of which chemistry topics you already understand or do not understand. If you get a question wrong, it will state the topic and link to a supplemental AChiBE module on that topic. This Quiz is graded on completion.
2. Complete an optional AChiBE module on topics that are not yet mastered. For each topic, there is a module that contains pre-assessment questions, a video explainer designed by previous BILD 1 students that explains the chemistry topic in a real-world context, and post-assessment questions to help you understand whether you are solid in your learning. These are not graded, and you can answer the questions and watch the videos as many times as you'd like.
3. Come to student hours in week 2 to ask about any chemistry concepts that are still sticky after class
4. Take the Chemistry in Biology Proficiency Assessment, due at the end of the second week of class. This will have questions that are similar to the pre-assessment and module post-assessment questions to test whether you have mastered the chemistry material.

In order to get full credit on this assessment, you must score at least 90% on it (i.e. get at least 18 out of 20 questions correct). All students who score at least 18/20 will receive 30pts. Students who do not achieve at least 90% will receive 15pts for the assessment, regardless of their score. However, you may take the assessment up to 50 times (the questions change slightly each time), and if you score less than 18/20, you are encouraged to review the study materials and contact the teaching team to fully review the material. Scores will be adjusted according to these guidelines after the assignment is due. We believe that everyone can learn this material and that doing so will help you immensely in learning biology. We are here to support you in your journey!

Exams: 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, select all that apply, T/F, and short answer. Any material covered in or closely related to each lesson's learning objectives may be tested. For each exam, you will have the opportunity to earn up a percentage of your individual exam score back for filling out a post-exam reflection.

Quizzes

There will be 3 quizzes in this course. Your lowest quiz grade will be dropped. If you miss one of the quizzes, that will be the quiz dropped. We will also weight your quizzes differently based on your performance, with whichever quiz is your highest score being 18% of your final grade and your next highest quiz worth 12% of your grade.

Final exam

Everyone must take the final exam. If you need to miss the final exam due to a verifiable, unplanned emergency, you must notify us about the problem as soon as it is reasonable to do so. You must provide adequate documentation (doctor's note, copy of death certificate, etc.). We will discuss your best options given your circumstances.

Professionalism: This aspect of the course grade aims to incentivize students to reflect on how their actions affect their own learning and that of others in the course. Professional interactions carry significant benefits for both you, your peers, and/or the teaching team. Just as in the workplace, maintaining professionalism with colleagues or supervisors is advantageous for your own growth. By default, every student is presumed to demonstrate professional maturity, and this component is initially awarded to all students at the beginning of the quarter. However, throughout the quarter, based on observations by the teaching team, which may include but are not limited to one-on-one interactions and electronic communication, professionalism credit may be deducted as necessary.

Example 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
- Contributing to an inclusive learning environment
- Learning conceptually and meaningfully why full credit was not awarded for an assignment
- Clarifying course material that facilitates deeper learning
- Reporting errors or problems in class, on assignments, or for other course material
- Arriving on-time to discussion sessions and being prepared to work

Example interactions that challenge the classroom community:

- Contributing inequitably to team work
- Harassing and/or bullying the instructional team or other students, either in person or online
- Ignoring the directions or requests from the instructional team

Extra credit: You have multiple opportunities for extra credit. Following each quiz, a brief Canvas assignment will be provided, allowing you to reflect on the exam, identify and delve into any lingering points of confusion, and make up for missed exam points. Additionally, you can earn 2% of course extra credit by completing course evaluations and/or participating in related surveys designed to enhance the course and the educational experiences of future students, among other options to be communicated by the professor. There are no additional opportunities for extra credit beyond those assigned by the course instructor.

Late assignments: Assignments must be submitted on time to be eligible for full credit. Due to the structure of the course, late credit cannot be granted for lecture participation questions. Missing a session will count as one of your six dropped sessions. For discussion section assignments (asynchronous) and/or study guide assignments, partial credit will be automatically applied, with late submissions subject to a 20% deduction on the first day and half credit thereafter. However, if you anticipate missing a substantial number of assignments due to exceptional circumstances, please contact us as soon as possible to discuss possible accommodations.

DETAILED COURSE SCHEDULE

Below is the **tentative** lecture schedule; i.e. schedule may be a little ahead or behind track as the course progresses. The second table is the lecture topic and the corresponding recommended textbook reading for that topic.

Week	Day	Date	Topic
1	T	Apr. 2	Welcome to BILD 1! Topic 1: Intro to Cells
	Th	Apr. 4	Topic 2: Size and scale, introduction to matter Topic 3: Chemical bonds, water and life, carbon
2	T	Apr. 9	Topic 4: Macromolecules – DNA/RNA Topic 5: Macromolecules – Proteins
	Th	Apr. 11	Topic 6: Macromolecules – Carbohydrates/Lipids *(Quiz 1 up to this topic)*
3	T	Apr. 16	Topic 7: Cell structure – cell types and endomembrane systems and other cellular structures
	Th	Apr. 18	Topic 8: Membranes and transport – membrane structure, chemical movement and transport
4	T	Apr. 23	**Quiz 1 (covers material from topics 1-6)**
	Th	Apr. 25	Topic 9: Metabolism – energy and enzymes by Dr. Adam Caparco
5	T	Apr. 30	Topic 10: Cellular respiration and fermentation overview, redox. Aerobic respiration (Glycolysis, CAC, electron transport), anaerobic respiration, fermentation
	Th	May 2	Topic 11: Photosynthesis – background and light reactions. Calvin cycle and photorespiration (*Quiz 2 up to this topic*)
6	T	May 7	Topic 12: Cell signaling – reception, transduction, and response
	Th	May 9	**Quiz 2 (covers material from topics 7-11)**
7	T	May 14	Topic 13: Mitosis – cell cycle and division by Dr. Alex Neitz
	Th	May 16	Topic 14: Meiosis – general info and division by Dr. Alex Neitz *(Quiz 3 up to this topic)*
8	T	May 21	Topic 15: Genetics – Mendel's model and nonmendelian inheritance
	Th	May 23	**Quiz 3 (covers material from topics 12-14)**
9	T	May 28	Topic 16: Molecular basis of inheritance - chromosomes
	Th	May 30	Topic 17: Gene expression – transcription, codons, translation
10	T	June 4	Topic 18: Regulation of gene expression by Delisa Ramos

	Th	June 6	Topic 19: Mutations and cancer Topic 20: Genes and environment
Finals Week	M	June 10 3pm – 5pm	**Final exam - 80% topics 15-20 / 20% cumulative**

ACADEMIC INTEGRITY

Honesty is primarily the responsibility of each student. The College considers cheating to be a voluntary act for which there may be a reason, but for which there is no acceptable excuse. It is important to understand that collaborative learning is considered cheating unless specifically allowed for by the professor. The term cheating includes but is not limited to: plagiarism, receiving or knowingly supplying unauthorized information, using unauthorized material or sources, changing an answer after work has been graded and presenting it as improperly graded, illegally accessing confidential information through a computer, taking an examination for another student or having another student take an examination for you, and forging or altering grade documents. If any act of academic dishonesty is observed, **the professor is required to report it.** The student will **automatically receive a zero** on that test or assignment (the grade received as a result of an academic integrity violation stays calculated into the student's GPA even if the student retakes the class). There will also be an AI Administrative Fee of $50 (posted to the student account), mandatory AI Training, at least one Disciplinary Action, and possibly other actions per the professional judgement of the Appropriate Administrative Authority (AAA). Discipline may include probation, suspension (from a Quarter to Two Years), or dismissal. Please do not risk your GPA and/or future career by cheating.

SUBJECT TO CHANGE POLICY

The information contained in the course syllabus, other than the grade and absence policies, may be – under certain circumstances (e.g. to enhance student learning) – subject to change with reasonable advance notice, as deemed appropriate by the instructor.

TECHNICAL SUPPORT

For help with accounts, network, and technical issues: https://acms.ucsd.edu/contact/index.html
For help connecting to electronic library resources such as eReserves and e-journals: https://library.ucsd.edu/computing-and-technology/connect-from-off-campus/

Elements of this syllabus were adapted from a Fall2023 BILD 1 syllabus provided by Dr. Claire Meaders and Dr. Brooke Pickett and from the UCSD Teaching and Learning Commons.

AChiBE (Acting Chemistry Education in Biology Education)

We believe that one of the best ways to improve education is to conduct research studies. In this course, we are trying to understand the effect of the AChiBE (Acing Chemistry Education in Biology Education) activities. The researchers will analyze some of your survey results and exam scores, which will all be anonymized before being shared with them. Participation will only involve the completion of surveys and completing exams as normal. Participation in the study is completely voluntary and anonymous, and it does not affect your points or anything else in the course. I will not even know whether you are participating under after final grades have been posted. If you'd like to opt out of participating in the study, please go to https://forms.gle/2vVoPpWWVoY3fnLf6. The consent form, which also has more information about the study, is given below.

University of California, San Diego
Consent to Act as a Research Subject
Assessing the Impact of the Acing Chemistry in Biology Education (AChiBE) Program

Who is conducting the study, why you have been asked to participate, how you were selected, and what is the approximate number of participants in the study?
Melinda T. Owens and Claire Meaders and their research associates are conducting a research study to find out more about how the Acing Chemistry in Biology Education (AChiBE) program affects student learning and experience in the classroom. You have been asked to participate in this study because you are a student in a class that is being studied or used as a control. There will be approximately 900 participants in this study.

Why is this study being done?
The purpose of this study is to create knowledge that has the potential to improve the learning and educational experience of introductory biology students at UC San Diego and beyond.

What will happen to you in this study and which procedures are standard of care and which are experimental?
If you agree to be in this study, the following will happen:
- Your data from this class including grades, homework and exam submissions, and survey responses will be included in the analysis to determine the effectiveness of the AChiBE program used in this course compared to other similar courses.

How much time will each study procedure take, what is your total time commitment, and how long will the study last?
Your participation involves only agreeing to let us use your data in our analysis. It will require no time on your part above the time you put into this course without agreeing to the study.

What risks are associated with this study?
Participation in this study may involve some added risks or discomforts. These include the following:
A potential for the loss of confidentiality. Your instructor will render the data confidential by removing any personally identifying information before it is shared with the research team. Thus, data will only be kept in anonymized form for research purposes. No personally identifying data with people outside our research team. Your instructor will not know whether or not you are participating in this study until after the course is over and final grades are submitted. Research records will be kept confidential to the extent allowed by law. Research records may be reviewed by the UCSD Institutional Review Board. Since this is an investigational study, there may be some unknown risks that are currently unforeseeable. You will be informed of any significant new findings.

What are the alternatives to participating in this study?
The alternatives to participation in this study are not to participate. If you choose to opt-out of participating in this research study, we will exclude your data from analysis. Whether you participate will have no impact on your experience or grade in the associated class as your professor will not know who is or is not participating in the study until after the term is over.

What benefits can be reasonably expected?
There is no direct benefit to you for participating in the study. The investigator, however, may learn more about how to improve student learning, and society may benefit from this knowledge.

Can you choose to not participate or withdraw from the study without penalty or loss of benefits?
Participation in research is entirely voluntary. You may refuse to participate or withdraw or refuse to answer specific questions on a survey or questionnaire at any time without penalty or loss of benefits to which you are entitled, like grades. If you decide that you no longer wish to continue in this study at any time, simply respond to the online opt-out form here: https://forms.gle/2vVoPpWWVoY3fnLf6.
You will be told if any important new information is found during the course of this study that may affect your wanting to continue.

Can you be withdrawn from the study without your consent?
The PI may remove you from the study without your consent if the PI feels it is in the best interest of the study, for example, if there is incomplete data or plagiarized responses. You may also be withdrawn from the study if you do not follow the instructions given you by the study personnel.

Will you be compensated for participating in this study?
You will not be compensated for participating in this study.

Are there any costs associated with participating in this study?
There will be no cost to you for participating in this study.

Who can you call if you have questions?
Melinda Owens, Claire Meaders, or one of their associates has explained this study to you and answered your questions. If you have other questions or research-related problems, you may reach Melinda Owens at mtowens@ucsd.edu or (415) 290-8853.
You may call the Human Research Protections Program Office at 858-246-HRPP (858-246-4777) to inquire about your rights as a research subject or to report research-related problems.

Your Consent
If you consent to participate in this study, no action is needed. If you **do not** consent to participate in this study, or you choose to opt-out at any time during the quarter, please submit this form online at https://forms.gle/2vVoPpWWVoY3fnLf6. Your instructor will not have access to the list of students who opted out until after the term is over.