General Microbiology

BIMM 120

Summer Session II 2023

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Welcome to BIMM 120!

This class is designed to give you a foundational understanding of microbiology, and the role that microorganisms play in our daily lives. While this class is only open to biology majors, it is my desire that you will also see the connection between your own personal interests and microbiology.

Learning Objectives

Full disclosure: the material in this course is dense! That is only because cells are such intricate creations, and there are many fun things we can learn about them.

By the end of this course, there are eight main things you will be able to do masterfully:

- 1. **Appreciate the history of the field of microbiology**, and the role of scientists in the establishment of microbiology canon.
- 2. **Understand basic principles of general biology and immunology** that are needed to understand general microbiology.
- 3. Connect the complexity and diversity of microbial life to global roles of microorganisms.
- 4. Describe modern-day scientific methods used by microbiologists to advance science.
- 5. **Appreciate the importance of scientific research** in the establishment of microbiological principles.
- 6. Defend the impact of microbiology on everyday living.
- 7. Appreciate how cool and essential microbiology is!

Course Website

We will be using <u>Canvas</u> in this class. Here you can find all lecture slides, readings, assignments, quizzes, and exams.

If you are taking this course through UCSD Extension, it is imperative that you email the Extension Office to get access to Canvas ASAP!

COVID-19 Guidance

The syllabus is subject to change, due to campus efforts to contain COVID-19. These changes will be communicated at the earliest opportunity via Canvas Announcements. You may find it useful to ensure your Canvas settings are such that you receive Announcements via email as well.

General COVID-19 guidance from the UCSD campus can be found <u>here</u>. You can also find support for virtual learning <u>here</u>.

Podcast/Zoom Recordings

This class is not scheduled to be held in person. Lectures and Discussion Sections will be recorded on Zoom and shared on Canvas under Modules. In the event that the class is forced to be remote due to a change in the COVID-19 pandemic, the class will be held on Zoom and all recordings will be shared on Canvas under Modules.

Lectures

Lectures will be given during the normal class time on Mondays, Tuesdays, Wednesdays and Thursdays from 9 AM to 10:20 AM on Zoom. In cases of emergency, lectures may be pre-recorded and made available for viewing. All lecture recordings will be posted to Canvas to accommodate technical and scheduling issues. Students will be notified of the expected modality the week before but the instructor reserves the right to make last-minute changes as necessary.

Textbook

In this class, the primary text will be *Brock Biology of Microorganisms* (14th edition and up are acceptable) by Madigan et al.

You can best prepare for lectures by reading the indicated material from this text; however, you will only be assessed on what we discuss during class.

Films, Short Videos, and Podcasts

Throughout this class, you will be assigned some short videos to watch before lecture. These are required materials - they serve to review some of the material that is done in class so they are for your benefit.

Office Hours

We strongly encourage all students to attend my and your IA's office hours as often as possible! During office hours, we aim to connect with you, clarify topics in class, deeply engage topics you find interesting, and even learn more about career directions in Biology.

Please take advantage of this opportunity to get to know all of us!

Dr. Drakes' office hours: Mondays and Wednesdays, from 1 PM to 2 PM Theo's office hours: Mondays, from 12 PM to 12:50 PM Vincent's office hours: Fridays, from 11 AM to 11:50 PM

Discussion Sections

Weekly discussion sections are meant to reinforce in-class material and provide an opportunity to practice collaborative problem-solving. These will be held on Zoom as well.

Section #	IA	Days	Times	Location
A01	Vincent	Tuesday, Thursday	11:00 AM -11:50 AM	Zoom
A02	Theo	Monday, Wednesday	11:00 AM -11:50 AM	Zoom
A03	Theo	Monday, Wednesday	1:00 PM -1:50 PM	Zoom

We strongly encourage you to attend the discussion section that you are enrolled in, but if needed you can attend any of the other discussion sections.

Every week, we will have a problem set with questions that resemble the exam questions. Problem sets will be posted several days before the section. **Everyone should try to complete the problem set** <u>before section</u>, for your own learning.

Exams

There will be two exams given online through Canvas:

- Exam 1 will be a take-home exam, that will be available after class on Thursday August 17th, and will be due on Monday August 21 at 11:59 PM
- Exam 2 will be a take-home exam, that will be available after class on Thursday September 7th, and will be due on Friday September 8 at 11:59 PM

The final exam will be **cumulative** to assess long-term retention of knowledge. Don't worry! The structure of this class is designed to ensure that the material discussed in the lectures are retained throughout the course.

Missed Exams

We understand that emergencies can happen!

You are responsible for clearing absences from the exam with me before the exam date (unless it is an *extreme emergency that can be documented* in which case I must be notified within 24 hours following the incident).

Please check your schedule to ensure that you have no clashes.

Exam Regrade Policy

The regrading of examinations will be considered **unusual**, rather than a routine request. In order to submit a request for regrading, please submit a brief explanation of the regrading request.

Please submit your regrade request within **ONE WEEK** of the return of the graded examinations. It is understood that by submitting this regrade request, you agree to accept the

score of the entire regraded examination, not the original score. So if we identify additional errors to those highlighted in the first round of grading, points will be deducted therein.

Due to time constraints, we will not be able to regrade the final examination.

Exam Review Sessions

Exam Review Sessions will be held by your IA during the discussion section right before the exam.

Reading Quizzes (5 points each)

Learning experts uphold that reading material before class enhances the ability of a student to retain the information that is discussed during the lecture. To encourage you all to build this habit for future success, and also to assist you in better grasping lecture material, you are required to read excerpts from the text or other assigned pieces, or watch videos, before class and answer no more than 5 multiple choice questions.

Minute Papers (10 points each)

Minute papers are meant to help you recall **significant** and **challenging** material covered during the lecture.

For this assignment, you are expected to write for one minute about one thing that stood out to you. Leave a space, following this, and then write **one sentence** about an idea that was challenging to understand, if any. We will compile the challenging areas and address them during discussion sections and/or lectures. These will always be due at the end of the week but it is better for you if you complete them before the beginning of the following lecture.

Weekly Assignments (75 points each)

At the end of each week, you will be required to submit an assignment assessing the material discussed during lectures given that week. These assignments will be posted at the beginning of the course and will be due on Sundays. You will have **4 weekly assignments**.

Course Grade

Your grade in this course will be weighted.

Submission of exam practice questions (12.5 points each, 25 points total)	2.5%	
15 Reading Quizzes (5 points each, 75 points total)*		
15 Minute Papers (10 points each, 150 points total)**	15%	
Exam 1 (200 points)	20%	
Exam 2 (cumulative, 250 points)	25%	
4 Weekly Assignments (75 points each, 300 points total)	30%	
Total # of points = 1000 points		

*You will have a total of 17 possible attempts. The best 15 scores will be recorded. **You will have a total of 18 possible attempts. The best 15 scores will be recorded.

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

The Token Economy - Better than Extra Credit!

"You didn't fail, you just haven't passed yet!"

I am a proponent of inclusive learning strategies. Oftentimes course design in high school and undergrad did not easily facilitate my learning and I ended up teaching myself. I know from experience that some students are built to do well in some assignments, while others might struggle with them. I also know that life happens and sometimes you might miss an assignment! We are living in a real world where emergencies happen; life doesn't suddenly disappear because you are in college.

In this course, we will be implementing the **Token Economy**. This system allows us to *incentivize certain behaviours* that will <u>enable your success</u> in this class and beyond, while allowing for flexibility due to emergencies.

At the start of the course, everyone gets 1 token. Tokens allow you to:

- Redo **any assignment** (minute paper, weekly assignment or pre-class quiz). This will cost you <u>1 token</u>.
- Redo 20 points worth of questions on the midterm for <u>2 tokens</u> OR redo 35 points worth of questions on the midterm for <u>3 tokens</u>. These are not stackable (i.e. you cannot submit 6 tokens to redo 60 points worth of questions).

There is **no finite number of times that you can redo any assignment** - once you have enough tokens, you can redo whatever you want! If you want to redo the same assignment 5 times, you can.

For example, let's say you really want an A, but you have already missed 5 lectures/sections due to personal emergencies. Recall that you can miss 4 class gatherings without your attendance score being affected at all. You do not need to explain anything to myself or IAs to get an excused absence (we are all adults here and we understand that life happens!). Instead, you can email us to let us know that you missed 5 classes and would like to apply 1 token to get full credit for 1 attendance grade.

You may have noticed that in order to achieve all of the aforementioned benefits, you need 4 tokens, minimum, but you start off with 1 token. Fret not! You can **earn tokens** throughout the class through many different ways. You can do *any* or *all* of the following:

• By the end of Week 1, set two goals for yourself for BIMM 120 based on the learning objectives. Make a note of the grade that you hope to obtain. Additionally, briefly detail how you will make use of class resources, including but not limited to office hours, lecture slides, and discussion sections, to gain support during this class. Include any additional resources that we can provide that may be helpful. Use the Attainable Target document to list the things that you need to complete in order to achieve your grade (how many minute papers do you need to submit? What scores do you need for each assignment?)

At the end of Week 3, reassess your two goals. Have you achieved them already? Great! How did you reach them? Did you use the class resources listed in Part 1, or did you have to adjust and use other/additional resources?

If you've not yet reached your goal, that is okay! We still have one more week, and a lot can happen then! What grade do you currently have? Fill out the **Attainable Target** document again to reevaluate what is left for you to do to obtain your desired grade. If applicable, make a detailed plan to "catch up" if necessary. Be clear about how you plan to achieve your goals. Remember, you have not failed, you just haven't passed yet!

Complete both of these and submit them by the end of Week 3 to receive 1 token.

- Attend office hour sessions (either for the professor or any IA) to receive **1 token** (you can obtain up to **4 tokens** this way). You will only receive 1 token for office hours per week (but if you need to go more times in the week, please do so!)
- Attendance is not mandatory for this class. However, for every 6 classes that you attend, you will receive **1 token**. We have a total of 18 active classes with the final class being a review. By attending class alone, you can receive up to **3 tokens**.

Assignments and exam questions that you redo using tokens must be completed by the **last day of class (September 7)**.

Late Policy

Due to the size and relatively fast pace of this class, we are unable to award full points for assignments, quizzes, exams, or anything else submitted late **without early use of tokens**. Late submissions will be given half-credit for one day after the due date, and after that they will be given no credit (Remember that you can always use 1 token to redo!).

Exception: if you have a situation that would require you to miss substantial numbers of assignments, please reach out to us as soon as possible so we can discuss accommodations **How can I do well in this class?**

The best way to succeed in any class is to get the information from the professors and the IAs into your short term memory, and then into your long term memory. While we will not be primarily learning new terminology in this class, you will be required to remember important biological processes that make cells work. Below are some scientifically proven, and fairly straightforward approaches to improving recall of important concepts learned in class:

- Engage assigned readings/videos before coming to class. The textbook is not mandatory but it is very helpful. Engaging with class material before lecture has been scientifically proven to enhance information retention during lectures.
- Attend lectures (or listen to them) and take intentional notes. You are not required to know all the material that is found in the Brock textbook because this is just an introductory class. You will only be graded on what you are taught in class. Take notes of things that are said during the lectures, especially things that are not on the slides.
- **Reread your notes immediately after class.** This is not always possible (e.g. if you have a class immediately after our lecture). However, whenever you *can* attempt this, you will benefit greatly. Here, you are not reading to memorize but to, for imagery sake, grease the rails of the train that will take class material into your long term memory. This practice will make it easier to recall while you are studying so that you are not relearning material for the first time.
- Review (or rewrite) lecture notes within 24 hours. The final piece to this puzzle is to reread the notes within 24 hours. There is also extensive research showing the role of note review in the retention of lecture material in the long term.

In addition to ensuring that you remember concepts from our lecture, your study time should harness your skills in critical analysis and application. You can achieve this in the following ways:

- Formulate questions from the learning objectives and truthfully assess yourself. The learning objectives are what I use to devise the lecture material and the examinations. They are the things I want you all to know by the time the course is over! It will be in your best interest to devise questions for yourself to practice based on the learning objectives of the class, and of each lecture.
- Complete the practice questions before the discussion section. It's okay if you don't know the answer. During sections, you will spend the first 5 minutes revising your solutions with a classmate. You will both benefit more from this if you have completed the assignment.
- **Collaborate with your classmates, outside of class!** You're all in this together! Please know that you are not alone as you endure the challenges associated with taking a new class. You all can help each other. Moreover, there is scientific evidence that collaboration can lead to long-term retention of information ;)
- **Come to office hours.** I am here as your instructor to ensure that you can succeed in this class. Please communicate with me if there is a challenging topic, and we can go over it together during office hours. You are also encouraged to visit any of the IAs during office hours for support.

Finally, **give me feedback on the class!** This is not my class - it is ours. I want to ensure that you all have the best learning experience that you can have. I was once a student too, and I still am, so I understand what it is like to learn new material in a new context. As part of your minute paper, you have the option to write if something in the class is not working (e.g. Do you feel that the workload is overwhelming? Would you like to improve the inclusiveness of the class?). I will literally consider *any* and *all* types of feedback!

Academic Integrity

The University of California, San Diego has an established Academic Code of Conduct which outlines the high priority that the school places on **academic integrity**. BIMM 120 students are expected to adhere to the highest standards of academic integrity and honesty. In summary, all academic work assigned in this class will be completed by those to whom it is assigned, and only authorized aid is permitted for use. This means that the minute papers, midterm, and final exams are to be done individually. You are prohibited from cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures. However, you are allowed to collaborate for the podcast assignment, and for the weekly assignment (for the latter, collaboration is mandatory), and you are allowed to communicate personal and academic challenges that might affect your performance with me.

Academic dishonesty is any means employed to attain course credit in any unauthorized manner. BIMM 120 students are academically honest; they work hard for their grades, collaborate with their colleagues, and communicate any personal or academic challenges with the instructor. Academic dishonesty will not be tolerated in this or any class on campus. Any student who is caught participating in academic dishonesty may receive a failing grade or may be suspended. Your future is not worth risking trying to get a better grade by cheating.

Accessibility

The University of California, San Diego is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students in need of accommodations due to a disability should contact the <u>Office for Students with Disabilities</u> (<u>OSD</u>) for verification and determination of reasonable accommodations as soon as possible at the beginning of each quarter. After you do this, please notify me of the accommodations being made.

Discrimination and Harassment

The University of California, in accordance with applicable federal and state laws and university policies, **does not discriminate** on the basis of race, color, national origin, religion, sex, gender, gender identity, gender expression, pregnancy (including pregnancy, childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition, genetic information, ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services (including membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services). The university also prohibits harassment based on these protected categories, including sexual

harassment, as well as sexual assault, domestic violence, dating violence, and stalking. The nondiscrimination policy covers admission, access, and treatment in university programs and activities.

If students have questions about student-related nondiscrimination policies or concerns about possible discrimination or harassment, they should contact the <u>Office for the Prevention of</u> <u>Harassment & Discrimination (OPHD)</u> at (858) 534-8298. You may also <u>report bias</u> here.

Campus policies provide for a prompt and effective response to student complaints. This response may include alternative resolution procedures or formal investigation. Students will be informed about complaint resolution options. A student who chooses not to report may still contact <u>CARE at the Sexual Assault Resource Center</u> for more information, emotional support, individual and group counseling, and/or assistance with obtaining a medical exam. For off-campus support services, a student may contact the Center for Community Solutions. Other confidential resources on campus include <u>Counseling and Psychological Services</u>, <u>Office of the Ombuds</u>, and <u>Student Health Services</u>.

Inclusion

If you have any ideas on how we can make this class more inclusive, please email me at <u>t2spence@ucsd.edu</u>, or you can contact the Office of Diversity, Equity and Inclusion: Email: <u>diversity@ucsd.edu</u> Website: https://diversity.ucsd.edu/ https://students.ucsd.edu/student-life/diversity/index.html

Class Schedule

Date	Lecture #	Topics to be covered	Associated reading in <i>Brock Biology</i> and helpful videos	
8/7	1	History of Microbiology	What do top students do differently? How a few scientists transformed the way we think about disease Chapter 1: The Microbial World	
8/8	2	Microbial Cell Structure and Function	Chapter 2: Microbial Cell Structure and Function (Parts I and II)	
8/9	3	Microbial Cell Structure and Function	Chapter 2: Microbial Cell Structure and Function (Part III)	
8/10	4	Microbial Nutrition, Energetics and Metabolism	Chapter 3: Microbial Metabolism	
8/14	5	Microbial Nutrition, Energetics and Metabolism Flow of Molecular Information	Chapter 14: Metabolic Diversity of Microorganisms (Parts I to III) <u>DNA Replication</u> Chapter 6: Molecular Information Flow and Protein Processing (Parts I and II)	
8/15	6	Flow of Molecular Information	How are proteins made? Chapter 6: Molecular Information Flow and Protein Processing (Parts III to V)	
8/16	7	Metabolic Regulation	Chapter 7: Microbial Regulatory Systems	
8/17	8	Microbial Growth and Control	Chapter 4: Microbial Growth and Control <u>The Antibiotic Apocalypse Explained</u>	
	EXAM #1 due on August 21 by 11:59 PM			
8/22	9	Microbial Genomes, Genomics and Genetic Engineering	Chapter 10: Microbial Genomics and other Omics	
8/23	10	Biotechnology	Chapter 12: Biotechnology and Synthetic	

			Biology (Part III)
8/24	11	Microbial Diversity	Chapter 16: Phylogenetic Diversity of Bacteria
			Chapter 15: Ecological Diversity of Bacteria (supplementary reading)
8/28	12	Mechanisms of Microbial Evolution	Chapter 13: Microbial Evolution and Genome Dynamics
8/29	13	Viruses, Viral Genomes and Diversity	Chapter 5: Viruses and their Multiplication
8/30	14	Microbial Ecology and Environmental Microbiology	Life On Us: A Microscopic Safari Episode 1 and Chapter 19: Taking the Measure of Microbial Ecosystems
8/31	15	Microbial Ecology and Environmental Microbiology	How Bacteria Rule Over Your Body Chapter 20: Microbial Ecosystems Chapter 23: Microbial Symbioses with Microbes, Plants and Animals
9/4	16	Microbial Interactions with Humans: Pathogenesis and Vaccines	Chapter 25: Microbial Infection and Pathogenesis How The Immune System Actually Works You are Immune Against Every Disease
9/5	17	Microbiology and Social Justice: Plagues of the Past and Present	Chapter 31: Person-to-Person Bacterial and Viral Diseases (only required to read section: 31.8) Chapter 32: Vectorborne and Soilborne Bacterial and Viral Diseases (only required to read sections: 32.5, 32.7) <u>What Typhoid Mary teaches us about</u> <u>coronavirus</u> We will cover Typhoid, Yellow Fever, Influenza and the Bubonic Plague
9/6	18	Microbiology and Social	We will cover Smallpox, Cholera and Polio

			The Story of Cholera Polio Explained - Vaccination, Symptoms and
			<u>Transmission</u>
9/7	19	FINAL EXAM REVIEW	
EXAM #2 due on September 8 by 11:59 PM			