BIMM 120 | Microbiology | Spring 2019

Professor Eric Allen

Tue/Thu 12:30 – 1:50 pm, Peterson Hall 108

	DATE	LECTURE TOPIC	Assignments & Readings
FUNDAMENTALS OF MICROBIOLOGY	Tu Apr 02	1) Course Overview & Introduction to the Microbial World	See textbook reading lists on attached pages below
	Th Apr 04	2) Cell Structure & Function Part I: Cell Walls & Membranes	
	Tu Apr 09	 Cell Structure & Function Part II: Other Structures & Inclusions; Biofilms 	
	Th Apr 11	4) Molecular Biology of Bacteria & Archaea	
	Tu Apr 16	5) Microbial Differentiation, Regulation, & Sensing	
	Th Apr 18	6) Genomics of Microorganisms	Paper #1
	Tu Apr 23	7) Mobile Genetic Elements & Horizontal Gene Transfer	Homework 1 assigned
	Th Apr 25	8) Microbial Growth & Cell Cycle	
	Tu Apr 30	9) Wrap up & REVIEW lectures 1-8	Homework 1 due
	Th May 02	*** MIDTERM EXAM ***	
ſENT	Tu May 07	10) Microbial Trophic Dynamics: Carbon & Energy	
	Th May 09	11) Metabolic Diversity I: Respiration & Fermentation	
	Tu May 14	12) Metabolic Diversity II: Photosynthesis	
IRON	Th May 16	13) Metabolic Diversity III: Unique Microbial Metabolisms	
MICROBES IN THE ENV	Tu May 21	14) Microbial Ecology I: Microbial Species & Evolution	Paper #2
	Th May 23	15) Microbial Ecology II: Biogeochemistry, Elemental Cycles	
	Tu May 28	16) Microbial Bioremediation	Paper #3 Homework 2 assigned
	Th May 30	17) Metagenomics: Sampling the Unknown	
	Tu Jun 04	18) Symbiosis: Plant- & Animal-Microbe Interactions	Homework 2 due
	Th Jun 06	19) Catch up day & Final Exam review	
	Mo Jun 10	*** FINAL EXAM 11:30 AM – 2:30 PM ***	

Class web site: <u>http://tritoned.ucsd.edu/</u> (syllabus, lectures, assigned papers, homeworks, IA docs, etc.)

Textbook: "Brock Biology of Microorganisms" by Madigan *et al.* Any recent edition is acceptable: 12th ed. (2008), 13th ed. (2010), 14th ed. (2014), or 15th ed. (2017).

CONTACT INFORMATION

Professor Eric Allen

Email: <u>eallen@ucsd.edu</u> Office Hours: *by appointment* Office: 4170 Hubbs Hall (Scripps Institution of Oceanography campus) Phone: (858) 534-2570

SIO Shuttle: Pick up outside Mandeville – get off at SIO shuttle stop on La Jolla Shores Dr. (every 15 min) Shuttle information: <u>https://transportation.ucsd.edu/shuttles/sio.html</u>

Instructional Assistants	email	Office Hours
Roland Liu	<u>rbl005@ucsd.edu</u>	TBD
Christopher Ivanoff	<u>civanoff@ucsd.edu</u>	TBD
Jennifer Ren	jjren@ucsd.edu	TBD
Frank Lee	fjl005@ucsd.edu	N/A
Jasper Lee	jbl003@ucsd.edu	N/A

Discussion section times and locations:

Section	Time	Location	IA
A01	Fri 11:00 -11:50 am	CSB 002	Roland
A02	Fri 12:00 – 12:50 pm	CSB 001	Roland
A03 Thu 5:00 – 5:50 pm		CSB 001	Jennifer
A04	Wed 9:00 – 9:50 am	WLH 2205	Chris

<u>You are not required to attend discussion sections</u> but you will find regular attendance to be highly beneficial as the IA's will review class material and answer questions about the lectures, papers, and recommended readings.

Sections will start the week of Monday Apr 8th (week 2)

Grading:

There will be one midterm (200 points), one final exam (200 points), and two written homework assignments (50 points each) with a total of 500 points up for grabs in this class. Final grades will be based on the midterm score, the final and the homework assignments. Each exam will consist of True/False and Multiple-Choice questions, with questions taken directly from the lectures and assigned papers. Readings from the text book are highly recommended but are not required. Topics covered in the textbook readings, but not covered in class, will NOT be on the exams....whew!

Homework written assignments (50 points each):

For the homework assignments, you will be given one or two questions and asked to write a short essay. Your answer(s) to each question should occupy <u>approximately 1 page</u> (it is okay if more than one page but please be concise). The questions will be posted on TritonEd along with the due date (one week following the date assigned). A printed copy of your homework should be <u>submitted in class by the due date AND uploaded to TritonEd</u>. Be sure to provide references to the source material (primary literature) used to obtain your answers!

Course Website

The course TritonEd site contains required readings (i.e. primary research articles) in addition to all lecture notes in .pdf format. Why more reading? Well, microbiology is a highly dynamic science. Many exciting and important finding have yet to find their way into the textbooks which is why we turn to the primary research literature. Not only is reading papers fun but the correct approach to scientific literature can be a very rewarding experience. The materials/methods sections will provide you a 'train of thought' as to how the experiments were conducted/conceived ("how did they do that?") and critical reading of the paper will allow you to evaluate whether or not the results justify the conclusions ("why did they

do that?"). These papers will provide a more thorough picture of modern microbiology. The papers will be introduced in class on the lecture date they are assigned and discussed further in your next section meeting. <u>Questions from the</u> <u>assigned papers will appear on the Midterm and Final exams!</u>

Useful websites:

<u>PubMed</u>: <u>https://www.ncbi.nlm.nih.gov/pubmed/</u> (journal literature portal) <u>Google Scholar</u>: <u>https://scholar.google.com/</u> (journal literature portal) <u>Small Things Considered</u>: <u>http://schaechter.asmblog.org/schaechter/</u> (odds and ends from the microbial world) <u>Microbe wiki</u>: <u>http://microbewiki.kenyon.edu</u> (great resource for exploring a rich variety of microorganisms)

Assignment schedule at a glance...

Week	Week Starting	Assignment
1	Mon Apr 01	No paper or homework the first week!
2	Mon Apr 08	No paper or homework the second week!
3	Mon Apr15	Required Reading Paper 1: "TBD"
4	Mon Apr 22	Homework 1 assigned
5	Mon Apr 29	Homework 1 DUE & MIDTERM EXAM on Thursday May 2 nd
6	Mon May 06	No paper or homework this week!
7	Mon May 13	No paper or homework this week!
8	Mon May 20	Paper 2: "TBD"
9	Mon May 27	Paper 3: "TBD" plus Homework 2 assigned
10	Mon Jun 03	Homework 2 DUE

General guidelines for reading the research papers:

<u>Familiarize yourself with related topics</u>: Read the related material in the textbook to familiarize yourself with the subject matter. Research papers are written for people who already know something about the subject matter.

Try to answer the following questions as you read the required papers:

1. What questions were addressed in this paper?

Frequently the introduction (or the first few paragraphs of Science and Nature articles) will present background information and raise the questions that will be addressed in the paper.

2. What were the main conclusions from the paper?

The main conclusions will be summarized in the abstract and further discussed in the discussion section. Why were these conclusions important?

3. What experiments were performed to answer these questions?

These will be briefly summarized in the abstract, sometimes also in the discussion (or the last few paragraphs of science or nature papers), and will be discussed at length in the results section of the paper.

4. For each experiment:

What conclusion did the experiment allow? What were the caveats of each experiment? (i.e. were there alternative explanations?) What experiments ruled out these alternatives?

Read the assigned papers <u>before</u> attending section and ask your IA any questions you may have. If questions remain, attend either your IA's or Dr. Allen's office hours.

To prepare for the exams:

- 1. Attend the lectures! ALL questions will come directly from the lectures and assigned papers.
- 2. Read the related material in the text (note: the reading assignments will always follow from section-to-section within a chapter; if you have any questions ask your IA). *These readings will reinforce the lectures and provide additional information that you will find useful.* Also don't be afraid to do extra reading to understand the material. Ultimately, if you understand the concepts you are in a much better position to answer the questions!
- 3. Read the papers! Both the midterm and final exam will have questions about the papers; these questions will require that you understand the experiments and what conclusions they reveal.
- 4. Attend section regularly, as you will be able to ask questions about the lectures and papers.
- 5. Bring a #2 pencil to exams! We will use scantrons for our exams unless otherwise noted, the scantrons will be provided for you at the exams.
- 6. Do not cheat! Disciplinary steps will be taken when cheating is discovered. These steps may include failing the exam and being reported to the appropriate authorities.

Based on prior experience, the students who do best in this class attend the lectures and sections, read the textbook for background content, and read the papers before attending section. Make this be YOU!

Exam Inquiries:

<u>During the exam</u>: If you think that a question is written ambiguously or feel that more than one answer is correct, raise your hand and ask me or an assistant for clarification.

<u>After the exam</u>: Prepare a <u>written</u> explanation, with documentation if possible (i.e. references to text), and deliver the query to your IA via email. Just one written inquiry, and no verbal inquiries, will be considered for each exam, from each student. If we find that a question has more than one answer or should be discarded after the exams have been graded, all of the exams will be re-graded using the new answer key.

***A MESSAGE FROM OUR FRIENDS AT THE UCSD ACADEMIC INTEGRITY OFFICE:

Statement of Academic Integrity:

Students are expected to do their own work, as outlined in the UCSD Policy on Integrity of Scholarship http://www.senate.ucsd.edu/manual/appendices/app2.htm. Academic misconduct will not be tolerated. Any student who engages in suspicious conduct will be confronted and subjected to the disciplinary process. Cheaters will receive a failing grade on the exam, and/or in the course. They may also be suspended from UCSD pursuant to University guidelines. (Translation: just don't do it!)

Academic misconduct includes but is not limited to:

- 1. <u>Cheating</u>, such as using "crib notes" or copying answers from another student during the exam.
- 2. <u>Plagiarism</u>, such as using the writings or ideas of another person, either in whole or in part, without proper attribution to the author of the source. 3. <u>Collusion</u>, such as engaging in unauthorized collaboration on exams, completing for another student any part or the whole of an exam, or
- procuring, providing or accepting materials that contain questions or answers to an exam or assignment to be given at a subsequent time.

SUGGESTED READINGS FROM "BROCK BIOLOGY OF MICROORGANISMS" TEXTBOOK

Brock Biology of Microorganisms 12th Edition

- Lecture 1 Introduction: 1-10, 377-390 Lecture 2 - Cell Walls & Membranes: 66-86 Lecture 3 – Cell Structures & Inclusions: 86-106, 158, 677-680 Lecture 4 – Molecular Biology: 175-182, 189-194, 2017-213 Lecture 5 – Differentiation & Sensing: 224-237, 242-246 Lecture 6 – Microbial Genomics: 343-353, 355-360 Lecture 7 - Mobile Elements & HGT: 282-285, 294-303, 309-312, 360-364 Lecture 8 – Growth & Cell Cycle: 141-157 Lecture 9: catch-up & review session Lecture 10 – Trophic Dynamics: 107-113, 114-122 Lecture 11 - Respiration & Fermentation: 122-125, 613-618, 622-629, 631-635, 636-639 Lecture 12 – Phototrophy & Other Autotrophies: 578-595, 596-602, 605-608 Lecture 13 – Microbial Species & Evolution: 367-374, 390-393 Lecture 14 – Microbial Biogeochemistry: 673-677, 694-705 Lecture 15 – Microbial Bioremediation: 705-713 Lecture 16 - Metagenomics: 658-662, 665-666 Lecture 17 – Plant and Animal Symbioses: 714-721, 725-730, 817-819
- Lecture 18 Microbiomes: 812-822
- Lecture 19: catch-up & review session



Brock Biology of Microorganisms 13th Edition

- Lecture 1 Introduction: 1-10, 34-36, 454-467
- Lecture 2 Cell Walls & Membranes: 48-64
- Lecture 3 Cell Structures & Inclusions: 64-81, 133, 674-676
- Lecture 4 Molecular Biology: 151-157, 170-174, 192-197
- Lecture 5 Differentiation & Sensing: 210-223, 226-231
- Lecture 6 Microbial Genomics: 314-323, 327-333
- Lecture 7 Mobile Elements & HGT: 159-162, 273-281, 286-288, 333-336
- Lecture 8 Growth & Cell Cycle: 118-132
- Lecture 9: catch-up & review session
- Lecture 10 Trophic Dynamics: 86-90, 92-98, 106-108
- Lecture 11 Respiration & Fermentation: 98-101, 373-377, 381-388, 390-394, 395-397
- Lecture 12 Phototrophy & Other Autotrophies: 341-354, 354-358, 361-367
- Lecture 13 Microbial Species & Evolution: 447-452, 467-470
- Lecture 14 Microbial Biogeochemistry: 670-673, 699-709
- Lecture 15 Microbial Bioremediation: 713-717
- Lecture 16 Metagenomics: 649-658
- Lecture 17 Plant and Animal Symbioses: 723-730, 732-741, 745-749
- Lecture 18 Microbiomes: 793-796
- Lecture 19: catch-up & review session



Brock Biology of Microorganisms 14th Edition

- Lecture 1 Introduction: 1-12, 355-363, 369-376 Lecture 2 – Cell Walls & Membranes: 32-47 Lecture 3 – Cell Structures & Inclusions: 48-63, 159, 602-605 Lecture 4 – Molecular Biology: 108-115, 120-127 Lecture 5 – Differentiation & Sensing: 216-230 Lecture 6 – Microbial Genomics: 183-193, 198-205 Lecture 7 – Mobile Elements & HGT: 208-211, 299-307, 310-311 Lecture 8 – Growth & Cell Cycle: 144-158 Lecture 9: *catch-up & review session* Lecture 10 – Trophic Dynamics: 74-85, 95-96 Lecture 11 – Respiration & Fermentation: 86-89, 401-424 Lecture 12 – Phototrophy & Other Autotrophies: 380-400 Lecture 13 – Microbial Species & Evolution: 348-352 Lecture 14 – Microbial Biogeochemistry: 598-602, 632-642 Lecture 15 – Microbial Bioremediation: 645-647, 650-657
- Lecture 16 Metagenomics: 204-206, 579-587
- Lecture 17 Plant and Animal Symbioses: 672-679, 682-691, 696-699
- Lecture 18 Microbiomes: 706-712
- Lecture 19: catch-up & review session



Brock Biology of Microorganisms 15th Edition

- Lecture 1 Introduction: 1-11, 26-29, 364-376
- Lecture 2 Cell Walls & Membranes: 35-47
- Lecture 3 Cell Structures & Inclusions: 48-64, 620-624, 152
- Lecture 4 Molecular Biology: 103-108, 115-119
- Lecture 5 Differentiation & Sensing: 174-188, 192-196
- Lecture 6 Microbial Genomics: 242-251, 257-265
- Lecture 7 Mobile Elements & HGT: 108-109, 313-323, 325-328, 254-256
- Lecture 8 Growth & Cell Cycle: 138-151
- Lecture 9: catch-up & review session
- Lecture 10 Trophic Dynamics: 74-84, 94-96
- Lecture 11 Respiration & Fermentation: 85-91, 419-425, 427-431, 434-438, 441-443
- Lecture 12 Phototrophy & Other Autotrophies: 393-410, 413-416
- Lecture 13 Microbial Species & Evolution: 364-370, 382-384
- Lecture 14 Microbial Biogeochemistry: 615-620, 652-662
- Lecture 15 Microbial Bioremediation: 666-670, 673-680
- Lecture 16 Metagenomics: 257-259, 595-604
- Lecture 17 Plant and Animal Symbioses: 700-709, 714-718, 721-726
- Lecture 18 Microbiomes: 730-740
- Lecture 19: catch-up & review session

