

Micr-22: Microbiology

Course Syllabus (details may change); Mt. San Antonio College, Fall 2019

Welcome to Microbiology! Please feel free to ask questions. I would like everyone to be successful microbiologists this term. We will cover a wealth of material, and time is scarce. Your active participation in learning both in and out of class is essential!

Instructor Information: Chris Briggs *Office:* Bldg. 60, Room 2104, or I will be nearby.
Email: cbriggs5@mtsac.edu *Phone:* 909-274-5808
 If I am contacted after Thursday afternoon, I may not reply until Monday morning.

Website: Canvas page, and <http://faculty.mtsac.edu/cbriggs>

Student Hours: Tu: 9:30 – 11am, W: 10 – 11am, Th: 9:30 – 11am. I reserve these times just for you, so please feel free to stop by my desk. Other times are also available by appointment.

Class Meetings: **Lecture:** Tu & Th, Room 11-2312 **Lab:** Tu & Th, Room 60-2506
 11:30am – 12:55pm 1:15 - 2:40 (course #21544) or 3:00 - 4:25 (#21545)

Week	Date	Lecture Topics	Assessments / Due Dates
1	Aug 27	The Microbial World and You (Chapter 1)	
	Aug 29	Principles of Disease and Epidemiology (Ch 14)	Syllabus assignment due
2	Sep 03	Observing Microorganisms (Ch 3)	Microscopes worksheet due
	Sep 05	Cell Structure and Function (Ch 4)	Cell worksheet due (in lecture); Lab materials due (in lab)
3	Sep 10	Classification of Microorganisms (Ch 10)	Lab exercise 1 due (in lecture)
	Sep 12	Prokaryotes: Bacteria and Archaea (Ch 11)	Epidemiology worksheet due (in lecture)
4	Sep 17	Eukaryotes: Fungi, etc. (Ch 12)	
	Sep 19	Viruses, Viroids, and Prions (Ch 13)	Case studies assignment due
5	Sep 24	Microbial Metabolism (Ch 5)	
	Sep 26	Microbial Growth (Ch 6)	Article report 1 due
6	Oct 01	Catch up & Review	
	Oct 03	Exam 1	Lecture Exam 1 (Ch. 1, 3-5, 10-14)
7	Oct 08	Control of Microbial Growth (Ch 7)	
	Oct 10	Antimicrobial Drugs (Ch 20)	
8	Oct 15	Microbial Genetics (Ch 8)	
	Oct 17	Biotechnology and DNA Technology (Ch 9)	Lab midterm (in lecture); Labs 2-7 due (in lecture)
9	Oct 22	Microbial Mechanisms of Pathogenicity (Ch 15)	
	Oct 24	Innate Immunity: Nonspecific Defenses (Ch 16)	Art. rep. 1 resub. due (optional); Lab report due (on Lab 4)
10	Oct 29	Adaptive Immunity: Specific Defenses (Ch 17)	
	Oct 31	Catch up & Review	
11	Nov 05	Exam 2 (cumulative)	Lecture Exam 2 (Exam 1, plus Ch. 6-9, 15, 16, 20)
	Nov 07	Practical Applications of Immunology (Ch 18)	
12	Nov 12	Disorders Assoc. w/ the Imm. Syst. (Ch 19)	Article report 2 due
	Nov 14	Bioterrorism	
13	Nov 19	Diseases of Skin, Eyes, Nervous Syst. (Ch 21, 22)	
	Nov 21	Dis. of Cardio., Lymph., Resp. Syst. (Ch 23, 24)	Extra-credit due (optional), Lab report resub. due (optional)
14	Nov 26	Dis. of Dig., Urinary, Reprod. Syst. (Ch 25, 26)	Article report 2 resubmission due (optional)
	Nov 28	Holiday -- No classes	
15	Dec 03	Environmental & Applied Microbio. (Ch 27, 28)	Labs 8-17 due (in lecture, to be returned next lab mtng.)
	Dec 05	Catch up & Review	
16	Dec 10	10:30 – 1pm: Lecture Final Exam	Lecture final exam (comprehensive)
	Dec 10	1:30 – 4pm: Lab Final Exam (for 1:15 lab)	Lab final exam (in lab, comprehensive), Pathogen test
	Dec 12	1:30 – 4pm: Lab Final Exam (for 3:00 lab)	Lab final exam (in lab, comprehensive), Pathogen test
Later	Continue applying these ideas. Come back, visit, share your successes!		

Schedule and readings are subject to change. Please prepare for our meetings by reading the introductory material for each day before you come to class.

Materials

Required:

- 1" or larger three-ring binder for lab manual.
- Lab manual: Briggs. Microbiology Lab Manual: Discovering Your Tiny Neighbors. Revised May 2019. Bring this to every lab session. It will be distributed to you for free in lab.
- Other required lab materials are described in our lab orientation document.

Strongly recommended:

- Textbook: Tortora, Funke, and Case. Microbiology: An Introduction. 10th, 11th, 12th, or 13th edition. Benjamin Cummings / Pearson. The older editions can be purchased online for \$10 or less, and will help you prepare. Some students also find it useful to bring their textbook to class, since many figures we use are from the text. Free texts for many subjects are also available online at openstax.org.

Optional: Heymann. Control of Communicable Diseases Manual. Am. Pub. Health Assoc.

Leboffe and Pierce. A photographic atlas for the microbiology laboratory. 3rd edition or newer. (This contains color images and explanations of most things we encounter in lab. Also check out www.microbelibrary.org and www.microbeworld.org for more images.)

Some Important Dates and Holidays

Sep 6 – Last day to add a class; last day to drop with a refund. Nov 1 – Last day to drop with a "W."

Sep 8 – Last day to drop without a "W."

Nov 11 – Veteran's Day Holiday.

Sep 2 – Labor Day Holiday.

Nov 28-29 – Thanksgiving Holiday.

Objectives: Upon completion of this course, my goal is for all students to be able to:

1. explain the basic features of every major group of microorganisms.
2. describe the physiology and genetic processes of microorganisms.
3. apply physical and chemical methods of controlling microorganisms.
4. explain the dynamics of host-parasite interaction.
5. diagnose specific diseases on the basis of symptoms and laboratory test results.
6. perform basic microbiology lab procedures.
7. demonstrate safe handling procedures for microorganisms.

Catalog Description: Fundamental concepts of microbiology including viruses, bacteria, fungi, protozoa and parasitic worms. 4 units. Degree applicable, CSU, UC. Prerequisites: CHEM 10 or CHEM 40.

Student Learning Outcomes:

- Aseptic technique. Students are able to demonstrate aseptic techniques that are appropriate for the allied health fields.
- Aseptic Transfer. Perform aseptic transfer techniques and interpretations of laboratory results.
- Basic Features. Explain the basic features of every group of microorganisms.
- Control Methods. Apply physical and chemical methods of controlling microorganisms.
- Diseases. Diagnose specific diseases on the basis of symptoms and laboratory test results.
- Hand Washing. Analyze, using student's own experimental design, effective hand washing.
- Host-Parasite Interaction. Explain the dynamics of host-parasite interaction.
- Lab Procedures. Perform basic microbiology lab procedures using appropriate PPE required for this laboratory course.
- Microscope. Demonstrate how to properly use the compound light microscope, as well as know its parts, their functions, how to safely transport and clean it.
- Physiology. Describe the physiology and genetic processes of microorganisms.
- Safe Handling Procedures. Demonstrate safe handling and proper hazardous waste disposal procedures for microorganisms and chemicals used.

Course Measurable Outcomes:

1. Explain the basic features of every group of microorganisms.
2. Describe the physiology and genetic processes of microorganisms.
3. Apply physical and chemical methods of controlling microorganisms.
4. Explain the dynamics of host-parasite interaction.
5. Diagnose specific diseases on the basis of symptoms and laboratory test results.
6. Perform basic microbiology lab procedures using appropriate PPE required for this laboratory course.
7. Demonstrate safe handling and proper hazardous waste disposal procedures for microorganisms and chemicals used.
8. Analyze, using student's own experimental design, effective hand washing.
9. Demonstrate how to properly use the compound light microscope, as well as know its parts, their functions, and how to safely transport and clean it.
10. Perform aseptic transfer techniques and interpretations of laboratory results.
11. Demonstrate proper and complete labeling of bacterial cultures and accurate recording of observations in the lab manual.

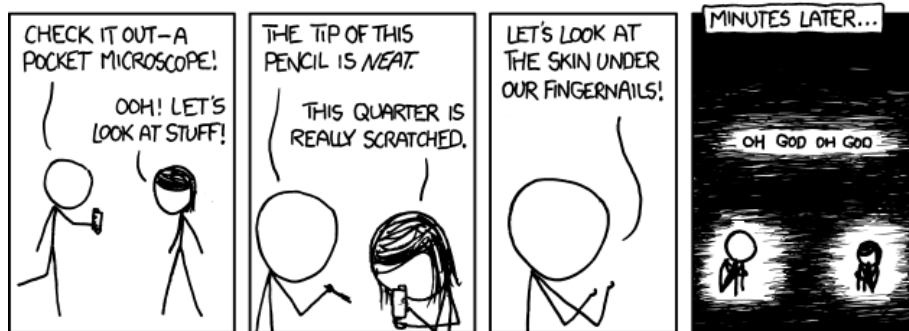
Grading

Please make all score verification requests either by email or at my office desk. You will receive one overall grade for lecture and lab combined. Your lab score will make up approximately one-third of your final grade.

Syllabus assignment		= 10 pts
Case studies assignment		= 10
Reports on journal articles	2 x 25 pts	= 50
Pathogen project (total)		= 80
Lecture exams 1 and 2	2 x 50 pts	= 100
<u>Lecture final exam</u>		<u>= 100</u>
Lecture total		= 350
Formal lab report		= 30 pts
Staining challenge (lab activity)		= 10
Pure culture challenge (lab activity)		= 10
Lab exercise 1		= 5
Lab exercises 2-7, submitted before midterm		= 20
Lab midterm		= 30
Lab exercises 8-17, submitted before final		= 40
<u>Lab final exam</u>		<u>= 30</u>
Lab total		= 175
Course total		= 525
Extra credit (maximum possible)		= 20 pts

Grading Scale:

A ≥ 90%
B ≥ 80 %
C ≥ 70 %
D ≥ 60 %
F < 60 %



<http://xkcd.com/860>. Accessed 22 July 2013.

Lecture

We will use lecture time to introduce ideas and to discuss challenging topics. One benefit of being gathered together is the opportunity to learn from each other. We will be open to new ideas, and our discussion may drift into very interesting territory. Some students get frustrated by what seem like “off-topic” digressions, but I encourage you to keep an open mind, since the scope of our class can reasonably encompass a broad swath of inquiry, from economics to art to sociology. I will do my best to guide our discussions in useful directions while responding to your valuable input. I hope that you will recognize the benefits of these explorations, since they help connect microbiology to many other parts of the human experience.

Lab: The laboratory portion of this class is outlined in a separate section.

Assignments

Lecture Assignments: These are meant to prepare you for our discussions that day. They include take-home quizzes, worksheets, written work, and other class preparation. Links to all remaining assignments are on our Canvas page.

Lecture Exams

These assess your grasp of large sets of material. Review early and often. Exams are a combination of objective questions (matching, multiple-choice), short-answer questions, and diagrams to complete. Prepare to explain what you know, not just repeat it. Part of the training in this course is the ability to work under pressure (such as those in the medical professions do all the time)! As part of your studying, practice writing out answers to questions while a timer is running, to simulate test-taking conditions. Review for our final exam in lecture by getting comfortable with everything on our earlier exams and the study guide for the recent material.

My Expectations

Attendance: The most successful students come to class. Please save yourself from distraction and keep everyone safe by leaving children elsewhere.

Enrollment Policy: Be sure to attend consistently in the first two weeks. If you miss a class in the first two weeks, please tell me if you intend to stay in the class, since I will drop absent students to make room for those on the waitlist. Otherwise, if you intend to drop the course, please do it officially.

Considerate Behavior: Please help maintain our positive learning environment by arriving on time, limiting unrelated conversations, and minimizing your use of cell phones. Cell phones may not be used during exams or other forms of assessment. If you touch your cell phone during any in-class assessment, I must assume that you are cheating, take the exam from you, and give you a grade of zero.

Accommodations: If you have a disability that may prevent you from succeeding in this class, please contact the ACCESS

Center. The Center is located in the Student Services Building (9B). 909-274-4290. <http://www.mtsac.edu/access/> Also, please tell me if there is anything I can do to better accommodate you.

Late Assignments: All assignments are due by the beginning of lecture on the due date. I try to strictly enforce this to encourage timely arrivals and because we often use your completed assignment in class. Work on your assignment early enough so that if problems arise, you have time to deal with them. See below for my policy on late assignments.

On time: Turned in by the beginning of class:
100% maximum possible, such as +10/10.
Turned in within 48 hours of when due:
90% maximum possible, such as +9/10.
Turned in after 48 hours have passed:
50% maximum possible, such as +5/10.
Turned in after graded assignments are returned:
No score, but I can still give you feedback.

Make-up exams: I do not give make-up exams. If you are ill, or have some kind of emergency, and will miss an exam as a result, call me as soon as you are able and leave a message (before class meets, if possible). I am at 909-274-5808. I will then use your final exam score to replace the missed exam score. You will be able to make up one exam in this manner, but not the final.

Please note: Many students find the final exam especially challenging because of the amount of material it covers. I would like to see you do well in this class, so I recommend taking exams as they occur, getting your feedback, and improving as you go.

Cheating, Plagiarism, and Academic Integrity: Cheating and plagiarizing are dishonest, unfair, and devalue your degree. As a result, the college and the department have regulations that carry serious penalties, including failing this course. These regulations are detailed in the College Catalog, and part of my job is to enforce them.

Some Advice for Success: Microbiology can be a difficult subject, requiring lots of time outside of class. My advice is that you seek help before you think you need it!

1. Introduce yourself to your classmates. Working with a group of inquisitive friends is a great way to identify material that you do not understand.
2. Study your notes the same day or the following day. We remember a very small percentage of what we hear, but if we review what we have heard, early and often, then we are more likely to remember it.
3. Ask Questions: If you do not understand the material, please ask, or write your question down and ask later. Ask your friend in class, or ask me anytime. Since I love teaching, I am happy to help you understand the material. Asking questions is one of the most powerful things you can do to learn.

Mt. San Antonio College
Biological Sciences Department Policy on Student Cheating

POLICY:

1. No dictionaries, reference materials, notes, or programmable calculators may be used during any exam or quiz unless authorized by the professor.
2. No electronic devices, of any type, may be used during any exam or quiz unless authorized by the professor. Electronic devices include, but are not limited to: cell phones, PDAs (personal digital assistants), earphones, cameras, MP3 players, translation devices, and electronic dictionaries.
3. No talking, signaling, sharing of note cards, calculators or other materials is allowed during any exam or quiz, unless authorized by the professor.
4. Only the materials required or authorized for an exam or quiz should be taken out of your notebook, backpack, pocket, or purse. All other materials should be put away as instructed, including electronic devices.
5. Students may not leave the classroom during an exam or quiz unless authorized by the professor. If a student leaves the room without permission, the test or quiz will be forfeited at that time.
6. This policy will be strictly enforced by all professors in all classes taught in the Department.

CONSEQUENCES:

7. A single act of cheating or academic dishonesty in any form may result in receiving a 0 on that test, quiz or assignment.
8. Action taken by the professor will be consistent with the college policy on cheating and academic dishonesty. In addition, a report regarding the violation will be submitted to the Director of Student Life for further action, which may also result in further disciplinary action, including, but not limited to suspension or expulsion from the college.

WHAT IS CHEATING?

Some examples of cheating include, but are not limited to:

- a. Plagiarism, which is the use of materials authored by another person or obtained from a commercial source or the use of passages without proper acknowledgment.
- b. Having or using unauthorized materials during any exam or quiz
- c. Notes concealed in or written on clothing, hats, or skin (as examples).
- d. Looking at another student's work during any exam or quiz.
- e. Changing answers on a returned exam in order to claim there had been a grading error.
- f. Sharing any content of exams or quizzes with individuals who have not yet taken it.
- g. Removing an exam or quiz from the classroom without the professor's approval.
- h. Taking photos of exams, quizzes, completed ScanTrons®, or exam keys.
- i. Turning in work that was generated by other individuals

or by the same individual but in a prior semester, including but not limited to: lab report data, lab report or homework questions, homework assignments, and extra credit assignments.

- j. Working together on a lab experiment when told to work individually.
- k. Falsifying lab data.
- l. Allowing another student to look at your exam or quiz, or allowing another student to copy your homework, lab reports, or other assignments. (If that work is duplicated you may also receive the same penalties listed above for violation of the Biology Department Policy on Cheating, and the college policy on cheating and academic dishonesty.)
- m. Falsifying documents, including signatures.

If you are unclear about what constitutes cheating in your class or for a particular assignment, please contact your instructor for clarification before the assignment is due.

Keep this policy for your records. Last updated February 22, 2013.

Mt. San Antonio College: Micr-22 Lab Orientation

Welcome to the Microbiology 22 Laboratory!

Laboratory Objectives:

To teach concepts of microbiological techniques using critically selected and tested experiments. Students will be taught through lectures (during this laboratory portion of the course) & demonstrations on such topics as effective hand washing, aseptic techniques, cultivation & cultural characteristics of bacteria, critical thinking of laboratory results/interpretations, proper & complete labeling, and essential recording of their observations. Students will be taught how to use a compound microscope including use of oil-immersion lens, how to conduct gram, acid-fast and spore staining (through instructor demonstrations & continual, active assistance with your professor during the lab period), as well as how to identify unknown species based on morphology, staining and biochemical results. Students will be taught how to test & analyze antimicrobial products and be instructed (through demonstrations & ongoing assisting of students) how to perform other means of controlling microbial growth. Your instructor is expected to be actively involved during your entire laboratory session to teach proper techniques and be involved in assisting in lab safety.

Student Preparation:

The optimum performance of lab experiments requires regular attendance. The maximum allowable lab absences may not exceed 2 week's worth of labs in the regular semester. Be fully prepared to do the required procedures and you are expected to **be present for the full lab period**, taking a break when convenient. **Read the assigned exercises BEFORE coming to lab so that you allow the maximum use of lab time and the best microbiology lab experiences! The labs are hands-on, rewarding and fun!** Interact with each other, develop friendships, and always reach out to help those in need while in lecture and lab!

Supplies:

To drop off by the third lab meeting:

_____ One booklet of 4x6 inch lens paper (instructor will keep for you to use) available at Mt. SAC bookstore.

_____ One package of 20 petri dishes (each 100mm diameter, 15mm tall), available at Mt. SAC bookstore.

To bring to every lab meeting:

_____ A lab coat, long pants, and closed-toe shoes are required to attend our lab. The lab coat needs to go to your knees and close in the front. It will protect your clothing from spilled cultures and stains. Your closed-toe shoes need to cover the top of your foot. These protective measures are required on and after _____ (date).

_____ Eye protection (goggles with a seal even if you wear glasses!) will be required when chemicals or living cultures are handled, which means you should bring them to every lab meeting. They will be required on and after _____ (date).

Tip: To avoid fogging inside your goggles, try rubbing any of the following materials on the inside surface, and then letting it dry: mild dish soap, baby shampoo, non-abrasive toothpaste, or shaving cream.

_____ Gloves are required for everyone when chemicals or living cultures are handled.

_____ Pencil and eraser.

_____ Fine tip permanent marker for labeling cultures.

Testing and Grading System:

Your lab grade for Microbiology 22 will comprise approximately 1/3 of your total course grade.

For lab exercises, you must have been present *and* have performed the "hands on" experiment to receive the full points.

There is no make-up of lab work except at another regular lab session that same week pending instructor approval and seat availability (lab schedules for M/W and T/Th split labs may differ depending on holidays so always check with your instructor first). **Maximum of 2 labs may be made up during the course.** Quizzes are different in other sections, so they cannot be made up.

Remember....you are expected to attend each lab session fully prepared for that day's activities having carefully read the lab exercise beforehand.

Rules and Regulations:

Our microbiology laboratory can be an interesting and exciting experience, but there are also potential hazards of which you should be aware. Improper handling of chemicals, equipment and/or microbial cultures is a dangerous practice and can result in injury or infection.

Because living microorganisms are an integral part of our lab sessions, we use aseptic techniques to keep materials free of contaminating organisms. Although the virulence (the degree of disease-causing ability) of microbes used in this academic lab environment has been greatly diminished because of their long-term maintenance on artificial media, the basic steps below must be followed at all times!

1. **Food and drinks are NOT ALLOWED in any microbiology labs.**

2. **Wash your hands thoroughly**, upon entering and prior to leaving the laboratory!
3. To remain in the lab, you must be wearing a lab coat that goes to your knees (long sleeved and buttoned/closed in front), closed-toe shoes that cover the top of your foot, and clothing that covers your legs (no shorts or short dresses). Open wounds should be covered and protected before entering the lab.
4. Wear gloves and eye protection whenever hazardous chemicals or living cultures are handled.
5. Never apply cosmetics or insert contact lenses in the laboratory. Do not put anything (e.g. pencils) in your mouth while in lab!
6. At the beginning **and** end of each lab session, spray the top of your table with germicidal solution, using paper towels to spread the disinfectant and letting it air dry.
7. Keep your desk and floor free of non-essential materials at all times (including your cell phones!).
8. Know where the fire extinguisher, emergency eye/face wash and shower are located in our laboratory. Make sure chairs are not blocking the room's exits.
9. Keep cultures in a test tube rack to prevent accidental spillage. Always handle cultures with care.
10. Hot test tubes should be handled with test tube holders.
11. Never remove media, equipment, or bacterial cultures from the lab. Doing so is absolutely prohibited.
12. No visitors are allowed in the laboratory for liability and safety reasons.
13. Immediately cover spilled cultures or broken culture tubes with paper towels and then saturate them with germicide. After 15 minutes of reaction time, remove the towels and dispose of them in a manner indicated by your instructor. Broken glass is swept up with brush and dustpan, and discarded into a dedicated broken glass container.
14. All glass coverslips and broken-non repairable slides must be disposed of in the broken glass container.
15. Immediately report to the instructor any incidents such as cuts or burns.
16. When handling contaminated materials:
 - a. Do not put contaminated instruments, such as inoculating loops, needles, pipettes, on bench tops. Loops and needles must be sterilized by incineration. Contaminated pipettes and cotton swabs must be disposed of in the autoclave container ("burn box") in the back of the lab room.
 - b. Never pipette by mouth. Doing so is strictly prohibited. Pipetting is carried out with the aid of a mechanical pipetting device only, and the cotton plug in the top of the disposable pipettes is to be left alone.
 - c. Contaminated plates, swabs, and disposable pipettes must be disposed of in the biohazard container provided.
 - d. Contaminated test tubes must be placed in wire baskets provided in the autoclave bin in the back of the lab room with the rubber bands removed, and different types separated into different baskets.
 - e. Live mounts of hazardous organisms must be soaked in germicide for 15 minutes, before washing with soap and water. Organisms on stained slides are killed by the staining process, so these slides can be washed with soap after observation without soaking in germicide first. All slides must be cleaned, dried and returned to their proper boxes.
17. When using Bacti-cinerators:
 - a. They will reach optimum sterilizing temperature (1500°F/815°C) after 10 minutes. **Please turn off the Bacti-cinerator at the end of lab, but leave them plugged in.**
 - b. **Do not let your inoculating loops or needles stay inside the Bacti-cinerator unattended!** They can fall out, and will weaken rapidly if heated too long.
18. Labeling:
 - a. Wax pencils and permanent markers are useful for writing on glassware and microscope slides.
 - b. Do not use tape because it is too difficult to remove.
 - c. Remove rubber bands before discarding test tubes or plates.

Sign the following and return to your instructor by the beginning of the second lab period, after you carefully read and understand all the information in this handout.

I have carefully read the regulations and safety rules of our microbiology course, and agree to abide by them.

Print your name: _____

Signature: _____ **Date:** _____