

Course Syllabus: General Microbiology Laboratory

General Information:

Course Meetings:	M (2:00 – 4:00 pm OR 4:00 – 6:00 pm) Bolin Hall 223
Instructor:	James Masuoka, Ph.D.
Office:	Bolin Hall 324
Telephone:	397-4181
E-mail:	james.masuoka@msutexas.edu
Office Hours:	TR 9:00 am – 11:30 am (Other times by appointment)

Required Texts:

Prescott's Microbiology (Willey, Sandman & Wood), 11th Edition (2020).
McGraw Hill Education. ISBN 978-1-260-21188-7

Lab coat (gloves, safety glasses, and mask will be provided)

Course Description (Laboratory):

This laboratory section complements the lecture portion of the course as a study of prokaryotic structure and physiology. Students will learn and apply practical laboratory techniques to the identification and characterization of bacteria.

NOTE: Bacteriology relies on studying living organisms. As a result, time is required for organisms to grow after inoculation into growth medium. Thus, students will be required at times to come into the lab outside of the scheduled laboratory period to collect data and interpret results.

Course objectives (Laboratory):

- Practice general laboratory safety
- Practice safe handling of microorganisms, including aseptic technique
- Recognize various cellular and colony morphologies of prokaryotes
- Correctly use and maintain a compound microscope
- Use differential and selective growth media to obtain pure cultures
- Correctly perform and interpret Gram Stains and other staining techniques
- Interpret and analyze results from various assays used to identify bacteria and apply these methods to other situations
- Enrich, isolate and characterize prokaryotes based on the various metabolic strategies by which they adapt to their environment
- Communicate fundamental concepts of microbiology, both in written and in oral format

General Laboratory Policies:

- Laboratory safety rules **must** be followed at all times (see following section). Safety violations will result in deductions from the laboratory participation grade (see below).
- Cell phones and pagers are to be turned off before lab begins.
- Students are expected to read the introductory material prior to each lab session.
- Cheating will not be tolerated. Anyone suspected of cheating will be subject to the consequences outlined in the University's academic honesty policy.
- All lab sessions must be attended. We will not offer make-up labs.
- Punctuality is expected at all times. If you are more than 10 minutes late, you will miss the quiz for the day and be counted as absent.
- Attendance in lab is required. Attendance policy regarding excused absences is provided above.
- All quizzes, exams, or assignments missed due to unexcused absences will be recorded as zeros.
- If you have a documented disability that will impact your work in this class, please contact the TA or instructor to discuss your needs.
- Each group is responsible for proper clean up at the end of the laboratory period. This includes proper cleaning and storage of microscopes, proper disposal of contaminated materials, disinfection of benches and workspaces, etc. (see Waste Disposal Guidelines & Clean-up below)
- **Three unexcused lab absences will result in failure (receiving 0 points) of the laboratory portion of the course.**

Attendance Policy:

General and specific policies regarding attendance in BIOL 3044 Laboratory sections are provided in the sections above.

Grading:

Quizzes:	100 points (10 of 11 quizzes)
Assignments:	60 points (3 x 20 points)
Participation/safety:	90 points
Lab Final (practical/written):	100 points
Total:	350 points

Lab constitutes approximately 44% of the BIOL 3044 grade.

Quizzes will be given at the 5 minute mark of the laboratory period. Thus, it is imperative that you arrive to lab on time and are ready to go at the start (see General Course Policies). Quizzes will cover the exercises from the previous week and material from the upcoming exercises. Thus, it is important both to understand your previous results and to have read the exercises for the week so that you are prepared.

There will be **3 assignments** that will evaluate **key laboratory skills**. Each assignment will be worth 20 points. The first will focus on correct use and care of the compound microscope. One will focus on using correct aseptic technique – being able to transfer cultures without contaminating the culture or the environment. One will focus on the streak plate technique of isolating colonies.

The **laboratory participation/safety** grade is based on adherence to laboratory safety and attendance policies. Everyone starts the semester with 90 points. During the first two lab periods, students will be given gentle reminders regarding lab safety and attendance as needed. After that, points will be deducted for each violation. The severity of the deduction is at the discretion of the instructor. The exception to this regards appropriate dress. As stated above, students wearing open-toed shoes or short pants/skirts will not be permitted to enter the laboratory.

There will be one exam in the laboratory portion of the course during the final laboratory period. The exam format will include a laboratory practical section, with stations, and a written section.

Tentative Schedule of Laboratory Exercises

Week	Date	Exercise*	Quiz	Assignment
1	Jan. 11	No Lab Meeting (first day of the semester)		
2	Jan. 18	No Lab – MLK Jr. Day		
3	Jan. 25	Introduction, Check-In, Microscope		A1-A3
4	Feb. 1	Aseptic Technique, Smears, Simple Stain	1	
5	Feb. 8	Protozoa (Water Samples)	2	
6	Feb.15	Viruses: Plaque Assay	3	
7	Feb. 22	Viruses: Phage Enrichment, Spot Test	4	
8	Mar. 1	Endophyte Study – Design; (Phage DNA Extraction)	5	A1
9	Mar. 8	Endophyte: Plant tissue preparation, Plating	6	
10	Mar. 15	Endophyte: Bacteria, Fungi Subculture	7	
11	Mar. 22	Colony Morphology, Gram Stain, Tape Prep	8	A2
12	Mar. 29	Fungal Microscopy; Bacteria: Aerotolerance, Assays	9	
13	Apr. 5	BIOLOG Plate setup (Bacteria)	10	
14	Apr. 12	Bacteria & Fungi: DNA Prep, PCR	11	A3
15	Apr. 19	Laboratory Final Exam		

* Note on experimental cultures: Growth or other results should be read after 24 – 48 hours (although some slow growers may require 72 hours). So, ideally, you will arrange to come into lab outside of your scheduled time to observe your results. If this becomes problematic, after the required growth period the cultures can be transferred to the refrigerator (4°C) until the following Monday. Keep in mind, however, that even with the lower temperature, the organisms will continue to metabolize and your results may change.

Laboratory Safety:

Microbes are found everywhere within the environment – in the air, on surfaces, on your body. In the Bacteriology Laboratory, we deal with microbes at higher concentrations than found in the environment. We will also be dealing with organisms that are potentially pathogenic to humans – thus we treat EVERY organism as if it were pathogenic.

1. No food or drinks are to be taken into or consumed in the laboratory. Further, ANY activity that involves hand-to-face contact (applying cosmetics, handling contact lenses, etc.) should be avoided.
2. Disinfect the work area before starting lab, after completing lab, and after any spills that occur. Do not assume that the lab members before you cleaned up after themselves.
3. Wash your hands thoroughly with soap and water before leaving the laboratory – even if you need to leave only for a short time.
4. Open-toed shoes, sandals or similar footwear are not appropriate and should not be worn in the laboratory. Shorts and short skirts are also inappropriate in terms of laboratory safety. These regulations are for your personal safety. Students wearing inappropriate dress will not be permitted to enter the laboratory.
5. Long hair must be tied back as it is not only a potential source of contamination, but also a fire hazard.
6. Proper personal protective equipment (PPE) must be used in the lab whenever work is being done. For this laboratory, PPE includes a labcoat, safety glasses and laboratory gloves.
7. Be aware of the location of safety equipment such as fire extinguishers, eyewashes, showers, First Aid kits, etc.
8. Follow all waste disposal guidelines. (see below)
9. Refer to the Introduction section of your lab manual for additional discussion of laboratory safety issues.
10. When in doubt, ASK!

Waste Disposal and Cleanup:

Proper cleanup of the laboratory is essential to reduce contamination and to ensure that subsequent lab sections have a clean and organized work area. The following guidelines must be observed during each lab session. Each student must take an active role in proper cleanup and waste disposal. Do not leave it for someone else.

Lab benches: There are wash bottles of disinfectant (Cidecon) located on the lab benches. You must clean the lab bench before AND after each lab. If you should run out of disinfectant, refill the bottle from the large carboy next to the microscope cabinet. The best technique for disinfection is to stream disinfectant over the surface, then use a paper towel to even the fluid over the surface so that a light film remains. Do not wipe to dryness, but allow the disinfectant to air dry. The extended contact of the fluid to the surface increases effectiveness.

Paper towels and **soap** are located next to the sink.

Waste material: Bacterial cultures must be killed prior to disposal. Each group must dispose of their cultures once they have obtained and recorded their results. Dispose of each type of waste according to the following guidelines.

- **Liquid cultures:** add bleach to the tube. Squirrt bottles containing bleach (1:2 dilution of household bleach in water, 2.5% final) are kept next to the sink. Add 1/5 the culture volume (usually about 1 cm) and place the tube into the holding racks next to the sink. The tube cap should go into the appropriately marked basket. **NEVER** pour your cultures down the drain or into the trash.
- **Solid cultures (plates):** All cultures on plastic Petri plates are disposed of in the Contaminated Material Container (CMC, large box with the red plastic bag) next to the sink.
- **Solid cultures (slants):** For cultures on agar slants – remove the cap and place the cap in the appropriate basket. The tube is disposed of in the CMC. **DO NOT** bleach your slants.
- **Semi-solid cultures:** Some growth media are termed semi-solid because they do not contain enough agar to completely solidify. These media are treated like agar slants.
- **Additional note on CMCs:** Only materials that are visibly contaminated are to be put into CMCs. Paper towels used for washing hands go into the trash, as do transfer pipette wrappers, sterile swab wrappers and the like. If the organisms are dead/killed – as with paper towels used to wipe up Cidecon from the benches – the material still goes into the trash.

Acknowledgement of Laboratory Policies and Safety Practices Bacteriology – BIOL 3044

I _____ (name of student) have received a copy of the syllabus, laboratory schedule and policies of James Masuoka for Biology 3044.

_____ (Signature)

_____ (Date)

Student Safety Contract

To emphasize the importance of biological safety and security concerns, all students taking a course in the Microbiology Teaching Laboratory (Bolin 223 & 225) must sign this student safety contract. No student will be allowed to work in the laboratory without turning in a signed contract.

I _____ (name of student) understand that Bolin 223/225 is a laboratory room in which exercises are performed using viable microorganisms. As stated above, in the Bacteriology Laboratory, we deal with microbes at higher concentrations than are found in the environment. We will also be culturing organisms that are potentially pathogenic to humans, such as *Escherichia coli*, *Salmonella* sp., *Streptococcus* sp. and *Staphylococcus* sp. Although not every organism is a known pathogen, we treat EVERY organism as if it were pathogenic. I understand that I should not eat food, drink beverages, chew gum, or apply cosmetics (including contact lenses) while I am in the room.

I understand that this room contains hazardous chemicals and valuable equipment. I understand that I am not to use chemical reagents or equipment until I have received instruction in the proper utilization, safety precautions, etc. for each reagent or piece of equipment. I realize that following these safety rules insures my own safety and that of my fellow students and instructors. I cooperate with my instructors and fellow students to maintain a safe laboratory environment. I will closely follow my instructors' oral and written instruction.

_____ (Signature)

_____ (Date)

(Adapted from Bauman, R.; Amarillo College)