General Microbiology (BISC 333)

Spring Semester 2019

10:00 am – 10:50 am M-W-F Shoemaker 303

Instructor: Wayne L. Gray, PhD. wlgray@olemiss.edu
Office- Shoemaker Hall Room 303

Course Description: General Microbiology (BISC 333) introduces students to the basic physiology and diversity of microorganisms. The class will focus on key cellular aspects that differentiate microorganisms from other larger forms of life, and inform students on several organisms from throughout the microbial phylogenetic spectrum.

Course Objective: Upon completion of the course students are expected to know and understand the following aspects of microbiology:

- microbial structure and morphology
- microbial growth and physiology
- microbial gene expression and regulation
- microbial genetics
- microbial pathogenesis and host defense
- antimicrobial agents and vaccines
- lab diagnosis of microbial infections
- epidemiology

This objective will be achieved through attending and actively participating in class lectures and laboratories, reading course materials, and performing successfully on quizzes and exams.

A goal of the course is to enhance student learning through oral and written communication, reasoning and critical thinking through data analysis, and ethical reasoning.

Prerequisites- Grade of a C or better in BISC 160, BISC 161, BISC 162 and BISC 163.

Recommended Textbook: Brock Biology of Microorganisms, 14th Edition (recommended)

Dr. Gray’s office hours: Tuesday 9:00 – 10:00 am and Thursday 4:00- 5:00 pm (no appointment necessary). If you cannot meet during scheduled office hours, you can make an appointment by email.

In-Class Policies: Regular class attendance is expected. Cell phone use and texting is not permitted, and cell phones must be turned off during class. Use of laptop computers for note-taking is fine, but it is not appropriate to be facebooking, twitting, or sending emails, etc.

Turning Technologies Response Cards (Clickers)- Clickers or I-phone will be used as an optional extra-credit class participation grade. Most classes will include 3-4 clicker questions. Your final class participation grade will depend on the number of correct answers during the semester and will count much as 20% of your final grade. You must register your Response Card on Blackboard. It is the student’s responsibility to correctly register and maintain the clicker (I-phone). Bring your fully
charged card to every class. Using another person’s card is serious academic misconduct and will be reported to the University Academic Discipline Committee. Violation will also result in loss of participation points and possible expulsion from the course.

**Blackboard:** You are assigned a Web ID and Password for access to online resources including Blackboard, the UM course management system ([https://blackboard.olemiss.edu](https://blackboard.olemiss.edu)). Course announcements, Power Point slides, study materials, grades, and other course information will be posted on a regular basis. You should consult Blackboard daily for important class messages.

**Exams and Grading:** There will be three exams including the final exam and will cover lecture material. Each of the 3 exams will consist of 40 multiple choice questions.

The laboratory component of the course will include weekly quizzes and an unknown. The final lab grade will count equal to one lecture exam.

The optional class participation grade will count as an additional exam and would be worth 20% of the final grade. Your final course grade will be determined based on the higher final grade calculated with or without the class participation grade.

Bring your **student ID, #2 pencil, and a Scantron form # F-289** to every exam. The Scantron form # F-289 (red print) can be purchased at the Bookstore in the Student Union. **No electronic devices are allowed to be turned on during exams.** If you suspect that a question was graded improperly, you have one week from the date of test return to contact me.

**Final Grading Scale**

<table>
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<tr>
<th>Grade Range</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>92.5 and over</td>
<td>A</td>
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<tr>
<td>89.5 to 92.49</td>
<td>A-</td>
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<tr>
<td>87.5 to 89.49</td>
<td>B+</td>
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<tr>
<td>79.5 to 87.49</td>
<td>B</td>
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<tr>
<td>77.5 to 79.49</td>
<td>C+</td>
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<tr>
<td>69.5 to 77.49</td>
<td>C</td>
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<td>59.5 to 69.49</td>
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<tr>
<td>0 – 59.49</td>
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Final grade thresholds may be adjusted downward (i.e., only in your favor), depending on overall class performance. However, I generally stick with this grade scale since there is a generous extra-credit policy.

**Make-up exams-** Valid reasons for missing an exam are very limited and include medical or family emergency or University-sanctioned events. Depending on the circumstances, a student may or may not be allowed to make-up an exam. To be eligible to make up an exam:

1) You must notify Dr. Gray by email or in person immediately, preferably prior to the exam, but at most, 24 hours after the exam.
2) Documentation for an excused absence may be required.
3) Upon receiving an excused absence, a make-up exam will be scheduled, within 1-2 days.
4) The format of the make-up exam will be multiple choice, short answer, oral, and/or discussion.
5) Unexcused absence for a missed exam results in a grade of zero.

**Microbiology in the News:** On a regular basis, brief overviews of current topics in the news concerning virology, microbiology, or biology will be discussed in class or will be posted on Dr. Gray’s
Dr. Gray will inform you whether this material will be covered on exams.

**Special Needs:** Reasonable accommodations will be made for students with disabilities that may affect their ability to participate in the course or meet course requirements. The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation, or to accurate assessment of your achievement, please contact Dr. Gray as soon as possible. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content, and the use of non-captioned or non-transcribed video and audio files. If you are approved through SDS, you must log in to your Rebel Access portal at [https://sds.olemiss.edu](https://sds.olemiss.edu) to request approved accommodations. If you are NOT approved through SDS, you must contact Student Disability Services at 662-915-7128 so the office can: 1. determine your eligibility for accommodations, 2. disseminate to your instructors a Faculty Notification Letter, 3. facilitate the removal of barriers, and 4. ensure you have equal access to the same opportunities for success that are available to all students.

**Academic Misconduct:** Academic dishonesty and cheating of any kind is not tolerated. Procedures for handling academic misconduct are described in the UM Policy Code ACA.AR.600.001. Penalties include, but are not limited to, taking a 0 on an exam and/or expulsion from the course.

**Keys to Success in this Course:**

- read the PowerPoint slides and textbook, preferably before coming to class
- attend class- listen, take notes, ask questions
- keep up with the material- don’t put off studying until the night before the exam
- contact Dr. Gray if you need additional help
Wednesday, Jan. 23 – Course Introduction
Friday, Jan. 25 - “Seven Wonders of the Microbe World” documentary (26 min) History of Microbiology
Monday, Jan. 28 – Introduction to Microorganisms
Wednesday, Jan. 30 - Bacterial Structure and Function
Friday, Feb. 1 – Bacterial Structure and Function
Monday, Feb. 4 - Bacterial Metabolism
Wednesday, Feb. 6 – Bacterial Metabolism
Friday, Feb. 8 - Bacterial DNA and Replication
Monday, Feb. 11 - Bacterial Gene Expression
Wednesday, Feb. 13 – Bacterial Gene Expression
Friday, Feb. 15 - Bacterial Growth
Monday, Feb. 18 - Bacterial Growth
Wednesday, Feb. 20 - Bacterial Regulatory Systems
Friday, Feb. 22 - Review
Monday, Feb. 25 - Exam #1 Bring Scantron form F-289
Wednesday, Feb. 27 – Bacterial Genetics
Friday, March 1 - Bacterial Genetics
Monday, March 4 – Biotechnology
Wednesday, March 6 Biotechnology
Friday, March 8- “Understanding Bacteria” documentary (50 min)

MWF, March 9 – 17 Spring Break
Monday, March 18 - Bacterial Diversity
Wednesday, March 20 – Bacterial Diversity
Friday, March 22- Introduction to Archaea
Monday, March 25- Introduction to Fungi
Wednesday, March 27- Introduction to Viruses
Friday, March 29 - Introduction to Protozoa
Monday, April 1 – Introduction to Metazoa - Parasites
Wednesday, April 3 – Review
Friday, April 5 - Exam # 2 Bring Scantron form F-289
Monday, April 8- The Human Microbiome
Wednesday, April 10 – The Human Microbiome
Friday, April 12 - Microbial Pathogenesis
Monday, April 15- Innate and Adaptive Host Immunity Against Microbes
Wednesday, April 17- Vaccines
Friday, April 19 - Good Friday- No class
Monday, April 22 - Antimicrobial Agents
Wednesday, April 24 - “The Trouble with Antibiotics” PBS documentary
Friday, April 26 – Clinical Microbiology Laboratory & Diagnosis
Monday, April 29 - Epidemiology
Wednesday, May 1- Epidemiology
Friday, May 3- Review

Final Exam on Friday, May 10, at 8:00 am, Bring Scantron form F-289.
General Microbiology (BISC 333)
Laboratory Syllabus – Spring 2019

Laboratory Coordinator- Dr. Linda Mota

Course Instructor: Dr. Wayne Gray

Graduate Student Teaching Assistants: Anurag Rijal, Sarah Russell, Xia Li.

Lab location: Shoemaker 523

Lab materials: Course exercises are posted on Blackboard. Laboratory procedures are not provided in any other format. The related exercise for each lab period must be printed out prior to entering lab. If you do not have the lab printed out, you will not be allowed to do lab activities. We provide all other items that are essential for lab activities.

Lab grades: The lab counts the same amount towards your final course grade as one of the BISC 333 lecture exams (100 points). 50 of these points will be available as lab quizzes that are taken during each lab; 50 will be available as a lab report based on a number of lab exercises that you will perform over the course of the semester.

Lab quizzes: Each lab, there will be a 5-pt lab quiz (11 quizzes total). Your lowest lab quiz grade is dropped and the highest ten quizzes count towards your final grade. Quizzes can cover material from the previous week’s lab or that week’s lab, but all quiz questions will be taken from the review questions after the exercises in the lab manual. Lab quizzes count for 50 points towards your Bisc 333 grade.

Lab report: You will be assigned an unknown bacterium to work with during the semester. As you perform lab exercises you will determine some of this organism’s morphological, biochemical, and metabolic characteristics. Based on your results, you will attempt to identify your unknown bacterium from a list of possible bacteria provided to you. You are required to turn in a report on this bacterium, including the results of all of the tests performed, what they mean, and the identity of your bacterium. The report is worth 50 points of your final lab grade.

Lab attendance: There are no make-up lab periods - if you miss a lab, you miss the opportunity to learn that material, and the ability to conduct any tests on your unknown bacterium that were scheduled for that lab period. Because of class seating limitations you may only attend the lab section that you are enrolled for unless the course instructor has authorized it ahead of time.

Lab behavior and safety: A microbiology lab is a fairly dangerous place to be. As well as the usual danger from chemicals and glassware, you will also be working with live microorganisms. Many of the unknown bacteria that you will be working with are capable of making you or others sick. These can include Staphylococcus aureus (“staph”), Escherichia coli (“E. coli”), and Pseudomonas aeruginosa, all of which are regarded as opportunistic pathogens. You will be trained in the correct methods to work with these bacteria, and will be informed of lab safety rules and policies. If your instructor believes that you are violating these policies you will be penalized in terms of loss of lab points. Continued violation of safety rules will result in you being removed from the lab portion of Bisc 333 and you will be assigned a score of 0 for the lab portion of Bisc 333.
Safety should always be your main priority when working in the microbiology lab. This policy is in place to protect you and others from microbiological hazards.

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<tr>
<th>Week</th>
<th>Quiz</th>
<th>Date</th>
<th>Exercise (lab manual pages)</th>
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<tr>
<td>1</td>
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<td>Jan 21</td>
<td>No class</td>
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<td>2</td>
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<td>Jan 28</td>
<td>Introduction and lab safety</td>
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<td>Ex 1: Microorganisms in the environment</td>
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<td>Ex 2: Use of the microscope</td>
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<td>Ex 3: Wet mount for live microorganisms</td>
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<td>Feb 4</td>
<td>Ex 1: Microorganisms in the environment (complete)</td>
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<td>Ex 4: Aseptic technique and working with bacterial cultures</td>
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<td>Ex 5: Making and heat-fixing a bacterial smear</td>
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<td>Ex 6: Simple staining a bacterial smear</td>
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<td>Ex 8: The Gram stain</td>
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<td>Ex 9: The Schaeffer-Fulton spore stain</td>
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<td>Feb 11</td>
<td>Ex 7: Transferring bacterial cultures and making a streak plate</td>
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<td>Ex 11: General, selective, and differential growth media</td>
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<td>Ex 12: The microbial degradation of polymers</td>
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<td>Feb 18</td>
<td>Ex 7: Transferring bacterial cultures and making a streak plate (complete)</td>
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<td>Ex 11: General, selective, and differential growth media (complete)</td>
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<td>Ex 12: The microbial degradation of polymers (complete)</td>
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<td>Ex 10: Assessing bacterial motility using motility agar deeps</td>
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<td>Ex 13: Testing bacteria for catalase and oxidase activity</td>
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<td>Ex 14: Testing bacteria for their ability to ferment carbohydrates</td>
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<td>Ex 15: Testing bacteria for antibiotic sensitivity</td>
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<td>Ex 10: Assessing bacterial motility using motility agar deeps (complete)</td>
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<td>Ex 14: Testing bacteria for their ability to ferment carbohydrates (complete)</td>
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<td>Ex 15: Testing bacteria for antibiotic sensitivity (complete)</td>
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<td>Ex 16: Enumerating the number of bacteria</td>
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<td>Ex. 17: Using turbidity to examine a bacterial growth curve</td>
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<td>Mar 4</td>
<td>Ex 16: Enumerating the number of bacteria (complete)</td>
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<td>Ex 18: Routine microbiological testing of water quality</td>
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<td>8</td>
<td>6</td>
<td>Mar 11</td>
<td>No class – SPRING BREAK</td>
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<td>9</td>
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<td>Mar 18</td>
<td>Ex 18: Routine microbiological testing of water quality (complete)</td>
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<td>Unknown organism lab 1</td>
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<td>10</td>
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<td>Mar 25</td>
<td>Unknown organism lab 2</td>
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<td>April 1</td>
<td>Unknown organism lab 3</td>
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<td>April 8</td>
<td>Unknown organism lab 4</td>
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<td>April 15</td>
<td>Unknown lab reports due, unknown lab presentation</td>
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<td>14</td>
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<td>April 22</td>
<td>No class</td>
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<td>15</td>
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<td>April 29</td>
<td>No class</td>
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ATTIRE AND PROTECTION
Open-toed shoes (sandals), shorts, and/or loose-flowing clothing are allowed but not recommended. For a few weeks of the class we will be working with chemicals that can permanently stain clothing - so I'd recommend wearing older clothes if possible. You are welcome to wear a lab coat or scrubs if you would like (but do not wear scrubs that you also wear in another setting - we will be working with potential pathogens). While you will be trained in the correct way to handle stains, chemicals, and microorganisms, if you are concerned about skin contact you are welcome to bring latex gloves to class (use “powder free” gloves if possible).

FOOD AND DRINK
Food and drink are never allowed in the laboratory. Any food items or trash must be disposed of in hallway trash cans (not those in the lab) before entering the laboratory. This includes bottled water.

WORK AREAS AND LABORATORY BENCHES
All work areas and benches must be kept clean and free of all unnecessary items at all times. Personal items should be kept in areas safe from contamination (e.g. tucked under the benches). At the start of every lab period you should wipe down your lab bench with disinfectant (located on each bench, paper towels are near the sink), and you should repeat this procedure following any lab spills. If any lab spill occurs notify your instructor. At the end of each lab period you must thoroughly disinfect your lab bench.

WASTE DISPOSAL
There are various types of waste disposal containers in the laboratory. Regular trash cans are for paper towels, loose paper and other regular trash. Glassware (slides, culture tubes etc.) that has not been used when working with live microorganisms is disposed of in the broken glass trash container. Any items that have been potentially contaminated by microorganisms (e.g. used agar plates, cultures, swabs) must be disposed of in the red biohazard container (non-glass items such as plates, swabs etc.) or in a biohazard glass waste box designated by your instructor (culture tubes etc.).

HAND WASHING
You are required to wash your hands before leaving the laboratory, and may also wish to do so at other times if you believe that you have contaminated them. It is also recommended that you wash your hands just before coming to class (use the sinks in the restrooms).

FIRE AND OTHER HAZARDS
Many of our lab activities will involve the use of Bunsen burners to sterilize lab materials. When burners are not in use, turn off the gas supply. If you’re having trouble getting the burner to light, turn off the gas and ask the instructor for help. If you smell gas, check to see if burners nearby have been left on. Be aware that people around you may be using open flames, and take appropriate precautions. You may wish to tie back long hair, and avoid wearing loose, flowing clothing to minimize the chance of fire.

In the event of a fire in the laboratory, a fire extinguisher is located on the wall near the microscopes (small fires may be extinguished without the extinguisher). In the event of a fire on a person, follow the “drop and roll” rule (drop the person to the ground, and roll them to snuff out the
flames). In the event of fire in the building (fire alarm) evacuate the laboratory and use stairs to exit the building.

**SPILLS**
Notify the instructor of any spills or broken glass. Bacterial spills should be covered with a paper towel and disinfectant for 5 minutes before clean up. Broken glass must carefully be placed in the broken glass waste container.

**LABORATORY ACCESS**
You are only allowed in the laboratory during class time or if you are accompanied by the course instructor.

**GENERAL LAB BEHAVIOR AND CONDUCT**
Use common sense when working in the laboratory. Many of the safety procedures that we follow are there to protect you. Think about what you are doing and everything will go fine.

Work with your lab partner or group. Some exercises are designed for pairs; others may be for larger groups. This is to make the work manageable within the scheduled lab time. If you're having problems with a lab partner or group, talk to your instructor about it.

Only students registered for BISC 333 are allowed in the laboratory. If you are not registered you may not attend the lab. Do not bring friends, family, children, or other individuals to the laboratory.

Practical jokes, rowdy behavior, or any other “goofing off” is not allowed in the laboratory, and potentially endangers other students or lab personnel. Show respect and consideration for other students.

No cell phones or other distracting electronic devices are allowed in the laboratory (turn them off and keep them in your pack). There is a clock on the wall for any experiments that need to be timed – don’t use the clock on your cell phone. You will be penalized severely if your phone is seen or heard in the laboratory.