

Bisc 210: Principles of Microbiology
University of Mississippi
Spring 2014

Instructor: Dr. Jason Hoeksema (phone: 915-1275, e-mail: hoeksema@olemiss.edu)

Office hours: T and F 11-12 and by appointment (Shoemaker Hall Rm. 318)

Lecture: T & Th 4:00-5:15 p.m. (Bishop Hall Rm. 209)

Labs: W & Th at various times (Shoemaker Hall Rm. 527)

Course Description:

Bisc 210 is an introductory (non-Biology major) course in microbiology emphasizing human interactions with microbes, including disease, food, sanitation, and biotechnology. The course is designed for students in health-related studies such as nursing & nutrition. It applies to the laboratory science requirement of the core curriculum, and may not be counted toward a major or minor credit in the Department of Biology. Students will earn 3 credits for the lecture portion of the course, and 1 credit for the lab portion, although only one aggregate grade is assigned.

Importance of Course:

Microorganisms, which include bacteria, viruses, fungi, and other microscopic organisms, are everywhere. They can have strong beneficial or detrimental effects on humans and on our environment. This course will not only give students a foundation in the previous scientific discoveries about microbes, but also will prepare you to interpret the new scientific discoveries of the future. Science is a dynamic process, and an understanding of how science works is fundamental to understanding microbiology or any other branch of biology.

Course Learning Outcomes:

By the end of the semester, students should be able to:

- Compare and contrast the structure and function of the major taxonomic groups of microbes, including both eukaryotes and prokaryotes
- Use and understand key techniques for studying, culturing, and controlling the growth of microbes
- Understand microbial genetics and the use of microbes in biotechnology
- Understand principles of disease and epidemiology, and the mechanisms through which microbes are involved in diseases
- Describe key roles that microbes play in our environment and in food production

Required Materials:

Text: Microbiology: An Introduction (11th Edition) by G. Tortora, B. Funke, and C. Case. Benjamin Cummings.

Laboratory Manual: Laboratory Manual for Microbiology (2nd Edition), by J. Hoeksema. Kendall Hunt Publishing Company, 2012. (ISBN 978-1-4652-1321-1)

Clicker: ResponseCard NXT from Turning Technologies (note: you can NOT use the iPhone app, as it does not work for all purposes)

A strategy for success in BISC 210:

1. Take advantage of lecture and lab time. This is a time when you have great access to instructors, class materials, and your fellow students. Don't waste it. If you really engage and concentrate during this time, it will pay off by the end of the semester, saving you a great deal of time studying. Take thorough notes during lecture and lab. **Do not miss ANY lectures or labs. Do not ever arrive late or leave early.**
2. Assigned reading. Read the assigned textbook chapters immediately after the corresponding lecture, focusing only on the pages corresponding to material covered on lecture. ****Also, don't just read straight through the pages. Instead, read each chapter multiple times in different ways: The first time you read the material, just read the section headings and the first sentence of each paragraph. Then go through the whole chapter again, studying the boldface and other important vocabulary that you don't recognize, making flashcards for each word. Then read the chapter a third time, studying only the captions of the figures used in lecture. Then, read the section a 4th time, reading all of the text. Finally, try to answer the study questions at the end of the chapter, and go back to study sections that you still don't understand.**
3. Utilize the website www.masteringmicrobiology.com, which is described in the first pages of your textbook. The website contains a number of very helpful resources for studying the material in this course. If you bought a new textbook, there should be a code in your textbook that you can use to log into the website. If you bought a used textbook, then you can go to the website and purchase access separately.
4. Review, re-write and/or re-organize your lecture notes as soon as possible after lecture.
5. Ask or write down questions that arise during lecture and while reading and studying. Make sure you talk to an instructor about your questions, either during class, after class, during office hours, during an appointment, or with a study group.
6. Study more often, for shorter periods of time, rather than waiting until right before an exam. Take frequent breaks while studying, breaking for at least 5-10 minutes every hour. ****When studying, quiz yourself with multiple choice questions similar to those used in lecture.** Make them up, use those from the end of each chapter, and from online resources. For each bit of material, think about what kind of question I might ask, and test yourself. This will prepare you for using your knowledge on the exam.
8. Accommodations for disabilities. I encourage students with disabilities, including invisible disabilities such as chronic illnesses and learning disabilities, to talk to me during my office hours as soon as possible (please don't wait until just before an exam). In order to make appropriate accommodations, I will need official authorization from someone at the University Counseling Center. If you know or suspect you may have a disability, or just want to talk with someone about a problem you are having, you should make an appointment as soon as possible to meet with a counselor there by phone or e-mail (662-915-3784, counslg@olemiss.edu), or by stopping by the center. The University Counseling Center is located on the corner of Poole and All American Drive, next door to the SAE house. Office hours are 8:00 a.m. to 5:00 p.m., Monday through Friday. Crisis intervention services are available on a 24-hour basis without appointment. The center also offers a variety of useful services for the university community, including substance abuse services, relaxation and mindfulness exercises and courses, and an eating disorder support group. Please see their website (http://www.olemiss.edu/depts/stu_counseling/) or drop by for more information.

Lecture Schedule

Note: “TFC” = Your textbook, *Microbiology* by Tortora, Funke, & Case

| Date | Lecture topic (and reading assignment) |
|-------------------------------|--|
| Thur. Jan 23 | Introduction & The Microbial World and You (TFC Ch 1) |
| Tue. Jan. 28 Thur. Jan. 30 | Prokaryotic & Eukaryotic Cells (TFC Ch 4) & Key Chemical Principles (TFC Ch 2) (previous topic continued) |
| Tue. Feb. 4 Thur. Feb. 6 | Microbial Metabolism (TFC Ch 5) & Microbial Growth (TFC Ch 6) Control of Microbial Growth (TFC Ch 7) |
| Tue. Feb. 11 Thur. Feb. 13 | Microbial Genetics (TFC Ch 8) Biotech & Recombinant DNA (TFC Ch 9) |
| Tue. Feb. 18 Thur. Feb. 20 | (previous topic continued) To be announced |
| Tue. Feb. 25 Thur. Feb. 27 | 1st Midterm Exam Classification of Microbes (TFC Ch 10) & Diversity in Domains Bacteria & Archaea (TFC Ch 11) |
| Tue. Mar. 4 Thur. Mar. 6 | (previous topic continued) Eukaryotes: Fungi, Algae, & others (TFC Ch 12) |
| Tue. Mar. 11 Thur. Mar. 13 | No Class: SPRING BREAK |
| Tue. Mar. 18 Thur. Mar. 20 | (previous topic continued) To be announced |
| Tue. Mar. 25 Thur. Mar. 27 | Viruses, Viroids, & Prions (TFC Ch 13) Disease & Epidemiology (TFC Ch 14) |
| Tue. Apr. 1 Thur. Apr. 3 | Pathogenicity (TFC Ch 15) & Antimicrobial Drugs (TFC Ch 20) 2nd Midterm Exam |
| Tue. Apr. 8 Thur. Apr. 10 | Diseases of the Skin & Eyes (TFC Ch 21) Diseases of the Nervous System (TFC Ch 22) |
| Tue. Apr. 15 Thur. Apr. 17 | Diseases of the Cardiovascular & Lymphatic Systems (TFC Ch 23) (previous topic continued) |
| Tue. Apr. 22 Thur. Apr. 24 | Diseases of the Respiratory System (TFC Ch 24) Diseases of the Digestive System (TFC Ch 25) |
| Tue. Apr. 29 Thur. May 1 | Diseases of the Urinary & Reproductive Systems (TFC Ch 26) to be announced |
| Wed. May 7 | FINAL EXAM: 4 p.m. |

Exams: The two midterm lecture exams and the final lecture exam will be administered using clickers. The final exam is cumulative (~1/2 new material, 1/2 material from the 1st two units).

Lecture quizzes: Lecture quizzes (worth 5 points each) will be given during each lecture, using clickers, with questions distributed throughout each lecture. To receive full credit for each quiz, students must submit answers to every quiz question. **Missed lecture quizzes cannot be made up** due to unexcused absence, excused absence, or due to a malfunctioning or forgotten clicker. However, you get a few free misses because the maximum total score for lecture quizzes is 90 points, i.e. 5 x 18, and there are more than 18 lectures (you cannot get extra points by participating in more than 18 lecture quizzes). *****It is your responsibility to come to class on time with the same (functioning) clicker every day, and to make sure that it contains your own student ID number. Do not switch clickers during the semester without my permission, or you will not receive lecture quiz credit.** No lecture quiz credit will be given for malfunctioning

clickers, forgotten clickers, clickers with dead batteries, or clickers accidentally containing the wrong student ID number, so please do not ask.

Lab Schedule

| Date | Lab Exercises (in Hoeksema lab manual) |
|-------------|--|
| Jan. 22-23 | No labs this week |
| Feb. 29-30 | Lab #1: Lab Safety, Use and Care of the Microscope |
| Feb. 5-6 | Start Lab #2: Culturing Microorganisms from the Environment, and Media Preparation Start Lab #3: Hand-washing, Disinfection, and Hand-scrubbing |
| Feb. 12-13 | Finish Lab #s 2 and 3 Start Lab #4: Isolation of Bacterial Colonies, and Aseptic Technique |
| Feb. 19-20 | Lab #4 continued (part 2) Lab #5: Smears, Simple Stains, and Bacterial Morphology |
| Feb. 26-27 | Lab #6: Gram Stain finish Lab #4 Lab Test #1 |
| Mar. 5-6 | start Lab #7: Disk-Diffusion Test of Antimicrobial Agents Lab #8: Bacterial Diversity |
| Mar. 12-13 | No Class: SPRING BREAK |
| Mar. 19-20 | finish Lab #7 Intro to Lab #9: Synthesis of Data on Cultured Microbes Lab Test #2 |
| Mar. 26-27 | Start Lab #10: Bacterial Roles in Fermentation of Foods Check in with TA about progress on Lab #9 |
| Apr. 2-3 | Finish Lab # 10 Presentations and discussion from Lab #9 |
| Apr. 9-10 | Lab #11: Fungi |
| Apr. 16-17 | Lab #12: Protozoans and Algae |
| Apr. 23-24 | Final Lab Test |
| Apr 30-May1 | No Labs |

Lab grade (200 points total): Each of the 11 **regular lab sessions** is worth 12 points (11 x 12 = 132 points), with credit being awarded based on active participation, accurate completion of assigned lab exercises, and scores on quizzes. The first two **Lab Tests** are worth 16 points each, and the **Final Lab Test** is worth 36 points. The Final Lab Test is cumulative, and may require written answers to questions, recognition of specimens and knowledge of their characteristics, and understanding of laboratory techniques.

Grading scale (plus/minus system):

90%+ = A or A-

80-89% = B-, B, or B+

70-79% = C-, C, or C+

60-69% = D

<60% = F

Grading/Points Breakdown:

| Lecture | |
|-----------------|-----------------------------------|
| Source | Points |
| Midterm Exam 1 | 150 |
| Midterm Exam 2 | 150 |
| Final Exam | 210 |
| Lecture Quizzes | 90 (<u>maximum</u> : 15 x 6 pts) |
| Lab | 200 |
| Total | 800 |

Academic misconduct: Students are responsible for abiding by the university's policies on Academic Conduct and Discipline, which are available on the university website. Academic misconduct will not be tolerated in this course, and possible sanctions for academic misconduct include: failure of the course, disciplinary probation, or suspension or expulsion from the University. The following misuses of clickers will be treated as serious instances of academic misconduct (i.e. cheating):

- Using a clicker that contains another student's ID number on a lecture quiz or exam
- Allowing another student to use a clicker containing your student ID number during a quiz or exam
- Using more than one clicker during a lecture quiz or exam, or
- Attempting to enter clicker answers from outside the lecture room.

***You are required to bring a photo ID with you to class each day (including exam days), to facilitate enforcement of ethical use of clickers by occasional random manual attendance checks.

*****If you cheat with your clicker in any of the ways listed above, you will automatically FAIL the course, and an academic misconduct report will be added to your university file.**

Blackboard, and lecture files: Partial lecture notes, in the form of PDF handouts and Powerpoint files, will be available for download from Blackboard before each lecture. Note: The files available for download are in broad outline form only, and do not contain all material that will be tested on exams. Thorough note-taking in class will be required to fill in the blanks and additional information, in order to obtain all required material. The downloadable files are intended to somewhat reduce the amount of writing and sketching that students have to do during class, not to replace note-taking.

Absences from exams and laboratories:

If you have an emergency or official University activity that causes you to miss a lab, midterm exam, or the final exam, it is essential that you contact me prior to the absence if possible, either by e-mail or phone (see above for contact info) to arrange an alternative option. Midterm and final exams, and laboratory exercises, can only be made up under special circumstances when they have been missed due to a medical or family emergency or official University activity

(documentation required). A note from the doctor must state that you were unable to attend class—it is not sufficient to provide a note stating that you visited the doctor. Under such circumstances, the best way to make up a laboratory exercise is to attend a different laboratory section during the same week, so contacting me ahead of time is essential.

Expectations, Attendance, Participation, and Preparation:

A laboratory course in biology requires a substantial time commitment, both in and out of the classroom. For each hour of class (lecture and lab), you should plan to study for at least two hours outside of class in preparation. Please consider this commitment carefully. Only you can earn an education--it cannot be given to you. So, please take an active role, and take responsibility for your learning. If you do not study regularly outside of class, and prepare for lecture and lab by reading and studying assigned materials (see below for study suggestions), lectures will likely be difficult to follow, and exams will also be very difficult. You are expected to attend and be *on time* for all lectures and labs. If you are not, your learning is likely to suffer substantially.

E-mail communication and professionalism:

You are responsible for managing your olemiss.edu e-mail account for functionality, i.e. not allowing it to become full and non-functional, and checking it every day, so that you can receive course announcements from instructors in a timely fashion. When communicating with your instructors (and other colleagues in professional settings) by e-mail, professionalism is essential. Towards that end, your e-mails should always contain:

1. A greeting of some kind, such as “Dr. Hoeksema,” or “Dear Ms. Smith,” (not simply “Hey”)
2. Content that is clear (e.g., what course you are writing about), concise, and polite
3. A signature identifying yourself, such as “Sincerely, Jason Hoeksema” or “best wishes, Sally Smith” or even simply “John Doe”

If you can't take the time to type a professional, courteous e-mail with your phone or blackberry or other PDA, then please find yourself a computer with a full keyboard before e-mailing me or any other professional colleague.

Cell phones, texting, e-mail, web-browsing, and music in class and meetings:

Turn off your phones, mp3 players, and PDAs before entering lecture, lab, or a meeting with an instructor. Laptop computers and other note-taking devices are allowed in lecture, but **only for taking notes**. Texting, e-mailing, internet browsing, listening to music, and making phone calls are all **strictly prohibited** during lecture, lab, and meetings with instructors. Students engaging in these activities will be asked to leave class and will not receive credit for that day's quizzes or lab.