Biology 333: General Microbiology Sections 1, 2, and 3
Fall 2017
Class Syllabus

Course and Instructor Information

Lecture: M W 11:00 – 11:50, TNR 120
Lab: Section 1 T R 10:00 – 11:50, TNR 451
Section 2 T R 1:00 – 2:50, TNR 451
Section 3 T R 3:00 – 4:50, TNR 451
Final Exam: Thursday, December 21, 2:45pm – 4:45pm

Instructor: Dr. Matt Rogge
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Office hours: M, W 10:00 – 10:50
Other times by appointment

Course Description

The purpose of this course is to introduce the student to the study of microorganisms. The course will focus on bacteriology, but additional topics include viruses, prions, fungi, and the vertebrate immune system. Lecture will focus on prokaryotic cell structure and function, microbial metabolism, microbial interactions, and disease. Laboratory exercises will focus on handling and culturing microbes, using cultural and cellular traits to identify bacteria, and applied microbiology.

What you should acquire from this class

Students will understand that…

- The microbial world includes organisms from many taxonomic groups
- Microbial organisms are involved in complex environmental interactions that can be both beneficial and detrimental
- The study of microbes requires careful observation and precise techniques
- The study of microscopic organisms involves the analysis of physiological, morphological, and genetic traits

Learning outcomes

Knowledge:

Students will…

- Be able to distinguish prokaryotic from eukaryotic cells
- Describe the metabolic processes used by microbes that allow them to live an diverse habitats, and how the metabolic activities contribute to a functional ecosystem
- Recognize how microbial genetics affects observable traits in microbes and are used to identify microbes
- Recognize beneficial and detrimental interactions that microbes have with humans and other organisms in an environment

Skills:

Students will…

- Demonstrate the ability to use aseptic technique in the handling and culture of microbes
- Complete commonly used laboratory practices for the culture and identification of microbes
- Perform standard practices to analyze the growth of microbes and treatments, both physical and chemical, that inhibit microbe growth

Dispositions:

Students will…

- Identify the advantages and disadvantages of microbes to health and well-being of humans and other organisms
- Recognize the ubiquitous occurrence of microbes in the environment and the necessary functions they perform in an ecosystem
- Realize the effects of overuse antimicrobial agents and the potential negative impacts

Required materials

Textbook:	Willey, et al. 2017. Prescott's Microbiology, 10th Edition. McGraw-Hill, New York, New York. Available from text rental.
Lab manual:	Microbiology in the Laboratory, A manual for Biology 333/533, Fall 2017 Edition, available in the bookstore
Other materials:	A black permanent marker is required for lab

Optional materials

An optional lab manual by Leboffe and Pierce, *A Photographic Atlas for the Microbiology Lab*, is available for purchase in the DUC bookstore. This book is not required for the class, but you may find it beneficial.

Attendance

Students are expected to attend all lecture and lab sessions. It will be difficult to makeup missed labs or lab assignments due to the availability of cultures, media, and reagents after the regularly scheduled labs. *Assume that if you miss a lab, you will not be able to make it up, even if the absence is health-related.* **ATTENDANCE AT ALL EXAMS IS REQUIRED**. Make-up exams will only be administered in the event of illness or emergency, which ***will require documentation***. The professor reserves the right to change the format of any makeup exams. If you are aware ahead of time of a conflict with a scheduled exam, a meeting with the instructor is required ***at least a week in advance*** of the exam to discuss the situation. **A makeup date is not guaranteed.**

Open labs

The lab is usually open when there are not any scheduled labs during normal business hours (9am – 5pm). For safety reasons, students will not be allowed to use the lab without an instructor or another student present in the area. ***If you use Bunsen burners during open lab, be sure they are TURNED OFF before you leave.*** Before attempting to conduct lab work outside of the regularly scheduled time period, check the lab schedule posted near the lab entrance to be sure a class is not scheduled at the same time. Classes have priority over open lab time.

Microbiological safety

We will be working with live microorganisms that have the potential to be infectious to humans. Careless or sloppy work endangers other students and is unacceptable in a microbiology lab. Part of this class is learning about and using proper microbiological lab techniques as described by the Centers for Disease Control, and students will be graded on their ability to perform these techniques. *Students that consistently use improper technique will receive point deductions*.

Grading

Lab quizzes

There will be six lab quizzes worth a total of 90 points. Each quiz is worth 15 points. The quizzes will cover information and techniques covered during lab sessions, as well as real-world application of the methods used in the exercises. The format of the quizzes will be any combination of multiple choice, short answer, matching, diagrams, and fill in the blank. Lab quizzes will *occasionally* cover specific results from previous labs, but most

question/problems will be related to the ***application*** of the techniques covered, e.g., how cultures are interpreted, why media or culture conditions support or inhibit the growth. In other words, focus on **why** the tests are done, **how** they work, and **what** they show. There will be no makeup points for missing a quiz.
Total value: 90 points (22.5%)

Lab exercises
There will be five graded lab exercises (practical lab exercises – PLEs) each worth 10 or 15 points. More information regarding these exercises can be found in the lab manual and will be discussed in class. PLEs are ***individual*** exercises, not group exercises. You are expected to perform them on your own without help from others. There will be no makeup points for missing a PLE.
Total value: 60 points (15%)

Pop lab quizzes
You should come to lab prepared to do the work scheduled for the day. For randomly chosen lab sessions, there will be short pop quizzes given that cover the introductory information provided in the lab manual for that day's scheduled lab exercise. The quizzes will be unannounced, and their point value will vary, but will not exceed 6 points per quiz. The format of the quizzes will be any combination of multiple choice, short answer, matching, diagrams and fill in the blank. There will be no makeup points for missing a quiz.
Total value: 20 points (5%)

Lab participation
Many lab activities are performed in groups. To ensure you are being a team-player and involved in the preparation and analysis of experiments, you will be assigned points for your participation. There are about 30 labs this semester, and participation in each lab is worth 1 point. If you are active within your group, you get the point. If you are not actively participating in group work, you will receive 0 points for that day. Missing a lab will result in receiving 0 points that day.
Total value: 30 points (7.5%)

Exams
There will be three exams. The first two exams are 50 points each and cover only the material in that unit. The final is worth 100 points, with 50 points covering the third unit of material and 50 points covering cumulative material from the semester. The lecture exams cover material that was discussed in class. Material discussed *only* in lab will not be on the exam, but realize that some material covered in lecture can overlap with lab information. The format of the exams will be any combination of multiple choice, short answer, matching, diagrams and fill in the blank. The only excuses for missing an exam will be a death in the family, violent illness, or accident, and written evidence of some kind ***will be required*** to make up a missed exam. NO EXCEPTIONS**.**
Total value: 200 points (50%)

Enrichment points
Throughout the semester, you have the opportunity to perform extra assignments. These assignments are not required; you choose to do or not do them. These exercises are not graded, but are checked for completeness. By putting forth the effort to do the assignment and following any provided guidelines, you will receive the full point value. Further information regarding these assignments will be disseminated as due dates approach.

Pre-exam (10 pts) – Due by the end of the 2nd week of class
Scientific journal article summary (15 pts) – Due by November 30 (D2L dropbox)
Class review (10 pts) – Due by the last lecture period (D2L dropbox)
Pre-exam review (10 pts) – Due by the last lecture period (D2L dropbox)
Lab check-out (5 pts) – Last day of lab
Total value: up to 50 points

TOTAL CLASS POINTS: 400 to 450 pts (depending on the number of enrichment assignments you complete)

Grades will be calculated by dividing the total points received by the total points possible and multiplied by 100. The following scale will be used to assign a final grade. Grades will not be curved.

93 to 100%	A	80 to 82%	B-	67 to 69%	D+
90 to 92%	A-	77 to 79%	C+	60 to 66%	D
87 to 89%	B+	73 to 76%	C	<60%	F
83 to 86%	B	70 to 72%	C-		

Grades are assigned based on how well you perform on the described exercises. I do not "give" grades because you need it to get into med school, grad school, or stay in your current program of study. **Note that some programs will not accept a C- as a passing grade.** If you want an A in the course, you will need to exhibit excellence in every aspect of the course. Average performance will result in an average grade (usually B- or C+). Achieving only the *minimum* expectations is ***not*** exhibiting excellence; it is being average and will result in an average grade.

ROUNDING: Percentages with a decimal value of xx.50 or higher will be rounded **up** to the next whole percentage (e.g., 89.500% → 90%). Percentages with a decimal value less than xx.50 will be rounded **down** to the next whole percentage (e.g., 89.49999999% → 89%). NO EXCEPTIONS.

Future Letters of Recommendation and References
In the future, you may need a former professor to write a letter of recommendation or be a reference for your employment application, application for graduate school, awards and scholarships, or other future endeavors. If you decide that you want to ask me to be a reference for you, you need to consider what you have provided for me to write or talk about. Were you an average, above-average, or excellent student? Were you engaged in class and excited about the material? Am I familiar with you outside of class and your goals for your life and career? Have you separated yourself from other students I have had in terms of interest, motivation, or academic success? What am I going to be able to say about you to convince someone else that you are better than other applicants? Furthermore, have you exhibited any negative characteristics that I might mention in my letter? The information I give reflects my honesty, and I will not give false or misleading information, because that may affect my ability to vouch for future students. Serving as a reference in no way guarantees that the reference will be a *positive* one. You need to consider these things for *any* person you hope to be a reference, not just me.

If you do ask me to be a reference or write a letter, I require the request to be in writing and an in-person meeting scheduled to discuss the position(s) for which you are applying. Before I give a recommendation, I require a current CV and/or transcript, copies of or links to forms I need to fill out, and all necessary contact information (names, addresses, phone numbers) required for me to submit the recommendation. Finally, I require these materials be delivered a minimum of **two weeks** before a recommendation is due. If any of these criteria are not met, I will not have time, nor will I be well enough informed to write a letter.

Graduate credit
Students taking the course for graduate credit will be assigned additional work and should discuss this work with the instructor as soon as possible.

Expectations
In lab and lecture, I expect you to be respectful of the other students around you. This means that when I am lecturing, you be quiet and allow the other students to hear what they want or need to hear. Continual failure to be respectful of the other students will lead to point deductions.

You are responsible for attending lecture in order to ensure exposure to all the material covered. You are responsible for asking questions regarding topics you do not fully understand. I am more than willing and happy to meet with you outside of class to further explain any topics. You can stop by during office hours or call/email/see me after class to set up an appointment outside of office hours. If there is any way I can assist you in this class, do not hesitate to ask, and I will do my best to help. Do not risk falling so far behind that catching up is impossible.

UWSP values a safe, honest, respectful, and inviting learning environment. In order to ensure that each student has the opportunity to succeed, we have developed a set of expectations for all students and instructors. This set of expectations is known as the *Rights and Responsibilities* document, and it is intended to help establish a positive living and learning environment at UWSP. Visit here for more information:
http://www.uwsp.edu/stuaffairs/Pages/rightsandresponsibilities.aspx

Academic integrity is central to the mission of higher education in general and UWSP in particular. Academic dishonesty (cheating, plagiarism, etc.) is taken very seriously. **Don't do it!** The minimum penalty for a violation of academic integrity is a failure (zero) for the assignment. For more information, see the UWSP "Student Academic Standards and Disciplinary Procedures" section of the *Rights and Responsibilities* document, Chapter 14, which can be accessed here:
http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/SRR-2010/rightsChap14.pdf

How to be successful in this class

- Attend all scheduled lectures and labs, pay attention, and be an active learner.
- Look at the material you anticipate will be covered in class *before* you arrive to class. We cover a lot of material during the semester.
- Develop good note-taking skills. **Do not try to write down *everything* that is said or on the Powerpoint slides.** Sort through the information and make note of the important ideas and concepts being discussed. Reading and processing the information is the first step in learning the information. Print out the skeletonized PowerPoint presentations and bring them to class to supplement your notes.
- Learn to take notes with abbreviations so that you can spend enough time listening in addition to writing. Leave space in your notes so that you can go back and fill in more details later on.
- Be engaged in the classroom. Write information in *your own words*, and answer questions asked by the instructor, even if it is quietly to yourself.
- Do not study *for exams*. Studying that way promotes memorization, not understanding. Instead, study for learning and understanding, and do it often. You need to develop critical thinking skills to succeed in a science-based course and career. No boss is going to walk into your workspace and ask you to define a list of terms. They will expect you to understand and apply the information, not define it.
- Do not try to memorize definitions. You will need to know what words mean to understand and answer questions, but I will never ask you to define a word.
- Begin studying for exams ***at least two weeks*** before the exam.
- Study frequently. Repetition is the key to learning *any* topic. Studying for 40 hours over the span of two weeks will be much more beneficial than studying for 40 hours the weekend before the exam.
- After you have studied and know some or most of the material, meet with other students in the class and actively *discuss* the information. Explain mechanisms, theories, concepts, etc to other students. The other students can help you fill in areas where you are deficient. You will find that explaining these things to someone else is one of the best ways to ensure you know and understand the information. Then have another student explain a different idea or concept, and help them identify areas in which they are deficient.
- Begin studying your notes beginning with "big picture" ideas. Find the bigger concepts and make sure you have a basic understanding of those ideas. Once those bigger concepts are understood, add additional details relating to those ideas. By doing this, you construct "compartments" in your mind to store the details rather than simply trying to absorb all the details and hoping that they arrange

themselves into a coherent idea. Ultimately, the difference between an A, a B, and a C is the level of detail that you know, but you should ***begin*** by focusing on the bigger picture.

- The level of detail that you will be required to know is the level of detail that I cover in lectures. The book has much more detailed information, which may help you better understand the material I cover, but I will not ask about the details I do not cover.
- When you do not understand something, LOOK IN THE TEXTBOOK! The book can give more detailed explanations and images that may help you better understand the material. Alternatively, **use the internet**. You have a wealth of information at your fingertips, use it!
- When your notes do not make sense and the book does not help, schedule an appointment with me. I am here to help you learn. I do not expect you to be a microbiologist *before* taking the class. I understand that much of this material may be new to you, and one or two lectures may not be enough for you to fully grasp the concepts. Do not be too stubborn to ask for help or you risk falling behind.
- When answering questions, be sure you answer it ***clearly***. You should not expect me to interpret vague answers in your favor. Your ability to explain something clearly is related to your knowledge of the subject. If answers are not clear or direct, my interpretation is that you do not understand that topic very well.
- When I ask you to ***explain*** something, the answer should not be a one or two-word answer. A good explanation will incorporate answers to the following questions:
  - "**What** is happening?"
  - "**Why** is it happening?"
  - "**How** it is happening?"
  - Remember ***WHAT, WHY, and HOW***.
- Watch the following YouTube videos. The first is an hour-long lecture from psychology professor discussing how to study. The second is a 6 minute summary of the longer video.
  - https://www.youtube.com/watch?v=IlU-zDU6aQ0
  - https://www.youtube.com/watch?v=23Xqu0jXlfs

Access for all Students

The Americans with Disabilities Act (ADA) is a federal law requiring educational institutions to provide reasonable accommodations for students with disabilities. For more information about UWSP's policies, visit: http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/ADA/rightsADAPolicyInfo.pdf

If you have a disability and require classroom and/or exam accommodations, please register with the Disability and Assistive Technology Center and then contact me **AT THE BEGINNING OF THE COURSE**. I am happy to help in any way that I can, but you need to be registered. For more information, please visit the Disability and Assistive Technology Center, located on the 6th floor of the Learning Resource Center (the Library). You can also find more information here: http://www4.uwsp.edu/special/disability/

Use of electronics during class

Please turn off/mute/set to vibrate any electronic devices that could interrupt class (lab or lecture) before class begins. If it is a personal emergency, feel free to excuse yourself from the class and communicate outside of the classroom.

TENTATIVE LECTURE SCHEDULE

(Subject to change)

Week	Date	Topic	Chapter(s)
1	Sept 4	LABOR DAY – NO CLASS	
	Sept 6	Syllabus / Introduction to microbiology	1, 19
2	Sept 11	Introduction to microbiology and taxonomy	1, 19
	Sept 13	Introduction to microbiology and taxonomy	1, 19
3	Sept 18	Cellular structure of bacteria	3
	Sept 20	Cellular structure of bacteria	3
4	Sept 25	Viruses and prions	6
	Sept 27	Viruses and prions	6
5	Oct 2	Bacterial nutrition and growth	7
	Oct 4	Bacterial metabolism	10, 11, 12
6	Oct 9	**EXAM 1 (through Ch. 7)**	
	Oct 11	Bacterial metabolism	10, 11, 12
7	Oct 16	Bacterial metabolism	10, 11, 12
	Oct 18	Bacterial metabolism	10, 11, 12
8	Oct 23	Bacterial genetics	13
	Oct 25	Bacterial genetics	13
9	Oct 30	Bacterial genetics: regulation of expression	14
	Nov 1	Bacterial genetics: regulation of expression	14
10	Nov 6	Bacterial genetics: regulation of expression	14
	Nov 8	Bacterial genetics: mechanisms of genetic variation	16
11	Nov 13	Bacterial genetics: mechanisms of genetic variation	16
	Nov 15	**EXAM 2 (through Ch. 14)**	
12	Nov 20	Microbial interactions	32
	Nov 22	Microbial interactions	32
13	Nov 27	Vertebrate immune system	33, 34
	Nov 29	Vertebrate immune system	33, 34
14	Dec 4	Vertebrate immune system	33, 34
	Dec 6	Infection and pathogenicity	35
15	Dec 11	Infection and pathogenicity	35
	Dec 13	Antibiotic Resistance	9
16	Dec 18 – 20	**FINAL EXAM, THURSDAY, DEC. 21, 2:45PM – 4:45 PM**	

TENTATIVE LAB SCHEDULE

Week	Date	Topic	Pages
1	Sept 5	Lab Introduction	3-6
		Fomites	8-12
	Sept 7	Handwashing Experiment	13-17
2	Sept 12	Culture Media	18-24
	Sept 14	Aseptic Technique	25-33
3	Sept 19	Microscopes and Measurement	38-48
	Sept 21	**LAB QUIZ 1 (Introduction through Microscopes)**	
		Basic Staining Techniques	49-53
4	Sept 26	Bacterial Morphology	54-58
	Sept 28	Capsule, Endospore, Acid-Fast Stains	59-64
5	Oct 3	**PLE #1** (Morphological Unknown)	65-67
		Motility	68-71
	Oct 5	Relationship of Oxygen to Growth	72-75
6	Oct 10	**LAB QUIZ 2 (Basic Staining through Relationship of O_2 and Growth intro)**	
		Environmental Parameters of Growth	76-80
	Oct 12	Quantitating Microbial Populations	94-101
7	Oct 17	Effects of Heat and UV on Bacterial Growth	81-86
	Oct 19	Chemical Control of Microbial Growth	87-93
		PLE #1 Due	
8	Oct 24	Selective and Differential Media	34-37
	Oct 26	**LAB QUIZ 3 (O_2 results through Selective and Differential intro)**	
		Fungi	126-132
9	Oct 31	Biochemical Characterization	108-119
	Oct 2	Read Biochemical Results	
10	Nov 7	**PLE #2** (Morphological, Cultural, and Biochemical Unknowns)	120-121
	Nov 9	**LAB QUIZ 4 (Selective and Differential Results through Biochems)**	
		Read PLE #2 cultures	
11	Nov 14	Bacterial Transformation	159-164
	Nov 16	Bacteriophage	122-125
12	Nov 21	Soil Microbiology	133-136
		PLE #2 due	
	Nov 23	**THANKSGIVING BREAK – NO LAB**	
13	Nov 28	Microbiology of Water	137-143
	Nov 30	Microbiology of Food	144-147
14	Dec 5	**LAB QUIZ 5 (Transformation through Food Micro intro)**	154-155
		Dental Microbiology	
		PLE 4 – Serial Dilution Plating	
	Dec 7	Normal Flora: Cocci	148-153
		Serial Dilution PLE Due	
15	Dec 12	Antibiotics	156-158
		PLE 3 – Streak for Isolation	
	Dec 14	**LAB QUIZ 6 (Food Micro results through Antibiotics interpretation)**	
		Isolation Streak PLE Due	
		PLE 5 – Micropipetting	
		Lab Clean Up, check out	
16	Dec 19/21	**Finals Week – NO LAB**	