

**Biology 333: General Microbiology Sections 3 and 4**  
**Fall 2016**  
**Class Syllabus**

**Course and Instructor Information**

Lecture: T R 1:00 – 1:50, TNR 464

Lab: Section 3 M W 10:00 – 11:50, TNR 451

Section 4 M W 1:00 – 2:50, TNR 451

Final Exam: Wednesday, December 21, 12:30 – 2:30

Instructor: Dr. Matt Rogge

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Office hours: M, W 3:00 – 3:50

Other times by appointment

**Course Description**

The purpose of this course is to introduce the student to the study of microorganisms in various fields. The course will focus on bacteriology, but topics including viruses, fungi, and the vertebrate immune system will also be introduced. Lecture material 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 in diverse habitats, and how the metabolic activities contribute to a functional ecosystem
- Recognize how microbial genetics affect 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:	Willer, et al. 2011. Prescott's Microbiology, 10 <sup>th</sup> Edition. McGraw-Hill, New York, New York. Available from text rental.
Lab manual:	Microbiology in the Laboratory, A manual for Biology 333/533, available in the bookstore
Other materials:	A black permanent marker <u>is required</u> 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 for the class.

### Attendance

Students are expected to attend all lecture and lab sessions. It will be difficult to make up missed labs or lab assignments due to the availability of cultures, media, and reagents that may not be available after the regularly scheduled labs. **Assume that if you miss a lab, you will not have the opportunity to make up the exercise, even if the absence is health-related.** If you miss a lab, however, do ask if it is possible to make up the lab. Attendance at exams is **REQUIRED**. Make-up exams will only be administered in the event of illness or emergency, which will also 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 the exam period, a meeting with the instructor is required at least a week in advance of the exam to discuss the situation, and rescheduling may occur at the **PROFESSOR'S** discretion.

### Open labs

The lab is usually open when there are not any scheduled labs during normal business hours. For safety reasons, students will not be allowed to use the lab without an instructor or another student present in the area. 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. Those classes have priority over open lab time.

### Microbiological safety

We will be working with live organisms 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 eight lab quizzes worth a total of 120 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. There will be no makeup points for missing a quiz.

**Total value: 120 points (30%)**

### 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. 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%)**

### 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 in order 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.

Pre-exam (10 pts) – Due by the end of the 2<sup>nd</sup> week of class

Scientific journal article summary (15 pts) – Due by Dec 1 (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-		

**ROUNDING:** Percentages with a decimal value of .50 or higher will be rounded **up** to the next whole percentage (e.g., 89.500% → 90%). Percentages with a decimal value of 0.49 or less will be rounded **down** to the next whole percentage (e.g., 89.499% → 89%). **NO EXCEPTIONS.**

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. If you get a C, it’s because you earned it. If you get an A, it’s because you earned it. If you need a certain grade, start from day one at doing what you need to do to earn that grade. If you find yourself falling short, seek further assistance (ask questions, come to office hours, attend tutoring sessions, etc). **Your grade is completely in your hands.**

### 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

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 behind enough 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

- Show up for all scheduled lectures and labs
- Look at the material you anticipate will be covered in class *before* you arrive to class
- 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.
- 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. While you will need to know what words mean to understand and answer questions, I will never ask you to define a word.
- Study frequently. Repetition is the key to learning *any* topic. Studying for 40 hours over the span of four 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.
- Study 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.
- 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 is 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 will risk falling behind.
- 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=IIU-zDU6aQQ>
  - <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. I do not allow the use of electronics to record my lectures (visual or audio) without prior approval. If I find that lectures or labs are being inappropriately recorded, your final grade will be dropped one full letter.

## TENTATIVE LECTURE SCHEDULE

(Subject to change)

Week	Date	Topic	Chapter(s)
1	Sept 6	Syllabus / Introduction to microbiology	1, 19
	Sept 8	Introduction to microbiology and taxonomy	1, 19
2	Sept 13	Introduction to microbiology and taxonomy	1, 19
	Sept 15	Cellular structure of bacteria	3
3	Sept 20	Cellular structure of bacteria	3
	Sept 22	Viruses and prions	6
4	Sept 27	Viruses and prions	6
	Sept 29	Bacterial nutrition and growth	7
5	Oct 4	Bacterial metabolism	10, 11, 12
	Oct 6	Bacterial metabolism	10, 11, 12
6	Oct 11	<b>EXAM 1</b>	
	Oct 13	Bacterial metabolism	10, 11, 12
7	Oct 18	Bacterial metabolism	10, 11, 12
	Oct 20	Bacterial genetics	13
8	Oct 25	Bacterial genetics	13
	Oct 27	Bacterial genetics: regulation of expression	14
9	Nov 1	Bacterial genetics: regulation of expression	14
	Nov 3	Bacterial genetics: regulation of expression	14
10	Nov 8	Bacterial genetics: mechanisms of genetic variation	16
	Nov 10	Bacterial genetics: mechanisms of genetic variation	16
11	Nov 15	Microbial interactions	32
	Nov 17	<b>EXAM 2</b>	
12	Nov 22	Microbial interactions	32
	Nov 24	<b>No Class – Thanksgiving Break</b>	
13	Nov 29	Vertebrate immune system	33, 34
	Dec 1	Vertebrate immune system	33, 34
14	Dec 6	Vertebrate immune system	33, 34
	Dec 8	Infection and pathogenicity	9
15	Dec 13	Infection and pathogenicity	31
	Dec 15	Antibiotic Resistance	34
16	<b>FINAL EXAM, Wednesday December 21, 12:30 – 2:30</b>		

### TENTATIVE LAB SCHEDULE

Week	Date	Topic	Pages
1	Sept 5	<b>Labor Day – NO LAB</b>	
	Sept 7	Lab Introduction	3-6
		Fomites	8-14
		Handwashing	15-19
2	Sept 12	Aseptic Technique	26-36
	Sept 14	<b>Quiz 1</b>	
		Selective and Differential Media	37-40
3	Sept 19	Microscopes and Measurement	41-52
	Sept 21	Basic Staining Techniques	53-57
4	Sept 26	<b>Quiz 2</b>	
		Bacterial Morphology	58-62
	Sept 28	Capsule, Endospore, Acid-Fast Stains	63-68
5	Oct 3	<b>PLE #1</b> (Morphological Unknown)	69-71
		Motility	72-75
	Oct 5	<b>Quiz 3</b>	
		Relationship of Oxygen to Growth	76-79
6	Oct 10	Environmental Parameters of Growth	80-84
	Oct 12	Quantitating Microbial Populations	99-106
7	Oct 17	<b>Quiz 4</b>	
		Bacterial Growth Curve	107-112
	Oct 19	Effects of Heat and UV on Bacterial Growth	85-91
		<i>PLE #1 Due</i>	
8	Oct 24	Chemical Control of Microbial Growth	92-98
	Oct 26	<b>Quiz 5</b>	
		Fungi	131-137
9	Oct 31	Biochemical Characterization	113-124
	Nov 2	Read Biochemical Results	
10	Nov 7	<b>PLE #2</b> (Morphological, Cultural, and Biochemical Unknowns)	125-126
	Nov 9	Read PLE #2 cultures	
11	Nov 14	<b>Quiz 6</b>	
		Bacteriophage	127-130
	Nov 16	Transformation	167-176
12	Nov 21	Soil Microbiology	138-141
		<i>PLE #2 due</i>	
	Nov 23	<b>NO LAB – THANKSGIVING BREAK</b>	
13	Nov 28	Microbiology of Water	142-148
		<b>PLE – Streak for Isolation</b>	
	Nov 30	<b>Quiz 7</b>	
		Microbiology of Food	149-152
		<i>PLE #4 due</i>	
14	Dec 5	Normal Flora: Cocci	153-158
		Dental Microbiology	159-160
	Dec 7	Antibiotics	161-163
15	Dec 12	<b>PLE – Serial Dilution Plating</b>	
		Tracking Disease Outbreaks with ELISA	178-185
	Dec 14	<b>Quiz 8</b>	
		<i>PLE #3 Due</i>	
		<b>PLE – Micropipetting</b>	
		Lab Clean Up, check out	
16	Dec 19/21	<b>Finals Week – NO LAB</b>	