**Microbiology 4000: Basic and Practical Microbiology**
**Autumn 2016**
**The Ohio State University**

Lecture meets for 3 classroom hours per week, on Monday, Wednesday, and Friday. Attendance in lecture is strongly recommended. Attendance in lab is required for successful completion of the course. We currently use Canvas as a supplement to both the lecture and lab portions of the class. On Canvas you will find the comprehensive syllabus, lecture and lab handouts, animations, videos, and photos of lab results. You will also use Canvas to complete worksheets prior to each lab period and lab quizzes.

## Materials needed for course

**Lecture Text:** "Microbiology: A Human Perspective", 8th ed. by Nester et al.,
McGraw Hill Publishing Co. ISBN 9781259874994 (**e-Textbook plus Connect Access Code**).
Available at the OSU bookstores or can be purchased by using the link:
http://connect.mheducation.com/class/d-bullwinkle--pradhanmwf

**Laboratory Manual:** The printed and/or digital version of the lab manual "Basic and Practical Microbiology" as well as the Active Learning component are available for purchase at the University Readers Student Store https://students.universityreaders.com/store/ or at Barnes and Noble on High Street, in the bookstore of the Central Classroom Building.

## Instructor Information

**Course instructors:** Dr. Tammy Bullwinkle
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Phone: 292-5867
Office: 384B Biological Sciences Building, 484 W 12th Ave
Office Hours: Wed 1:30-3:30 pm (or by appointment)

Dr. Madhura Pradhan
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Office: 372 Biological Sciences Building, 484 W 12th Ave
Office Hours: WF 2:00pm-3:00pm and TR 11:00am-12:00N. I may also be available before/after the lecture and by appointment to answer your questions.

**Lab Coordinator:** Dr. Mette Ibba
Email: ibba.2@osu.edu
Phone: 292-0509
Office: 374 Biological Sciences Building, 484 W 12th Ave
Office Hours: Email or call for appointment or just drop by.

## MICROBIOLOGY 4000: Lecture Schedule, Autumn 2016

**NOTE: THE FOLLOWING SCHEDULE IS SUBJECT TO CHANGE.**

| Date | Topic | Chapter(s) / | Instructor |
|---|---|---|---|
| Aug. 24 | Introduction/ Humans and the Microbial World | 1 | TB |
| Aug. 26 | Humans and the Microbial world/ Microscopy | 1,3 | TB |
| Aug. 29 | Microscopy and Cell Structure | 3 | TB |
| Aug. 31 | Dynamics of Prokaryotic Growth | 4 | TB |
| Sept. 2 | Dynamics of Prokaryotic Growth | 4 | TB |
| **Sept. 5** | **Labor Day: No Classes** | | |
| Sept. 7 | Metabolism: Energetics and Enzymes Review, Central Catabolism | 6 | TB |
| Sept. 9 | Metabolism: Central Catabolism | 6 | TB |
| Sept. 12 | Metabolism: Respiration and Fermentation | 6 | TB |
| Sept. 14 | Metabolism: The Diversity of Prokaryotic Organisms | 6 | TB |
| Sept. 16 | Bacterial Genetics: DNA to Protein Review | 7 | TB |
| **Sept. 19** | **EXAM 1** | **(chapter 1, 3, 4, and 6)** | |
| Sept. 21 | Bacterial Genetics: Regulation and signals | 7 | TB |
| Sept. 23 | Bacterial Genetics: Mutations | 8 | TB |
| Sept. 26 | Bacterial Genetics: Mutations/HGT | 8 | TB |
| Sept. 28 | Bacterial Genetics: Horizontal Gene Transfer | 8 | TB |
| Sept. 30 | Viruses, viroids and prions | 13 | TB |
| Oct. 3 | Viruses, viroids and prions | 13 | TB |
| Oct. 5 | Viruses, viroids and prions | 13 | TB |
| Oct. 7 | The Control of Microbial Growth | 5 | TB |
| Oct. 10 | The Control of Microbial Growth | 5 | TB |
| **Oct. 12** | **EXAM 2** | **(chapters 7, 8, 13, and 5)** | |
| **Oct. 14** | **Autumn Break: No Class** | | |
| Oct. 17 | Antimicrobial Medications | 20 | MP |
| Oct. 19 | Antimicrobial Medications | 20 | MP |
| Oct. 21 | The Innate Immune Response | 14 | MP |
| Oct. 24 | The Innate Immune Response | 14 | MP |
| Oct. 26 | The Innate Immune Response | 14 | MP |
| Oct. 28 | The Adaptive Immune Response | 15 | MP |
| Oct. 31 | The Adaptive Immune Response: Humoral | 15 | MP |
| Nov. 2 | Practical applications of Immunology | 15 | MP |
| Nov. 4 | The Adaptive Immune Response: Cell-mediated | 15 | MP |
| Nov. 7 | Host-Microbe Interactions | 16 | MP |
| **Nov. 9** | **Exam 3** | **(chapters 14, 15, 20)** | |
| **Nov. 11** | **Veteran's Day: No class** | | |
| Nov. 14 | Host-Microbe Interactions | 16 | MP |
| Nov. 16 | Host-Microbe Interactions/Epidemiology | 16,19 | MP |
| Nov. 18 | Epidemiology | 19 | MP |
| Nov. 21 | Epidemiology | 19 | MP |
| **Nov. 23** | **Thanksgiving: No Class** | | |
| **Nov. 25** | **Columbus Day observed: No class** | | |
| Nov. 28 | Respiratory System Infections: Upper respiratory tract | 21 | MP |
| Nov. 30 | Respiratory System Infections: Lower respiratory tract | 21 | MP |
| Dec. 2 | Respiratory/Digestive System Infections | 21, 24 | MP |
| Dec. 5 | Digestive System Infections | 24 | MP |
| Dec. 7 | Digestive System Infections | 24 | MP |

**Dec. 15 FINAL EXAM** (**Thursday**, **10:00-11:00 am)** for class meeting MWF at 11:30am
**Dec. 15 FINAL EXAM** (**Thursday**, **4:00-5:00 pm)** for class meeting MWF at 4:10pm

# Microbiology 4000 Lab Schedule – Autumn 2016

| Lab | Date | Laboratory Schedule |
|---|---|---|
| 1 | T - Aug 23<br>W - Aug 24<br>R - Aug 25 | **Online Pre-Lab Quiz 1 (DUE IMMEDIATELY)**<br><br>Exercise 1-1: Lab safety rules and regulations – M1 (Module 1)<br>Exercise 1-2: Where do the parts belong on the microscope – M1<br>Exercise 1-3: Using the microscope – M1<br>Exercise 1-4: Getting familiar with microbes and their sizes – M1<br>Exercise 1-5: Motility and pond water microbes – M1<br>Exercise 1-6: Fungi and molds – M1<br>**Online Quiz 1 (Module 1) Aug 23 at 1am – Aug 30 before 11:59 pm** |
| 2 | T - Aug 30<br>W - Aug 31<br>R - Sept 1 | **Online Pre-Lab Quiz 2 (Due Monday, Aug 29 before 11:59 pm)**<br><br>Exercise 2-1: Streaking bacteria organisms to obtain single isolated colonies – Day1/M2<br>Exercise 2-2: Streaking bacterial organisms to examine nutritional needs – Day1/M2<br>Exercise 2-3: Streaking microorganisms to examine temperature requirements – Day1/M2<br>Exercise 2-4: Isolating and characterizing of bacterial species from a mixed culture– Day1/M2<br>Exercise 2-5: Dilution and enumeration using spread plate technique- Day1/M2<br>Exercise 2-6: Simple stain – crystal violet - M2<br>Exercise 2-7: Differential stain – Gram stain - M2<br><br>Practice use of Micropipettors and serological pipettes Appendix – Handout |
| 3 | T - Sept 6<br>W - Sept 7<br>R - Sept 8 | **Online Pre-Lab Quiz 3 (Due Monday, Sept 5 before 11:59 pm)**<br><br>Exercise 2-1: Streaking microorganisms to obtain single isolated colonies - Day2/M2<br>Exercise 2-2: Streaking bacterial organisms to examine nutritional need – Day2/M2<br>Exercise 2-3: Streaking microorganisms to examine temperature requirements – Day2/M2<br>Exercise 2-4: Isolating and characterizing of bacterial species from a mixed culture– Day2/M2<br>Exercise 2-5: Dilution and enumeration using spread plate technique- Day2/M2<br>Exercise 2-8: Acid-fast stain - M2 DEMO<br>Exercise 2-9: Capsule stain - M2<br>Exercise 2-10: Observation of endospores - M2<br>Exercise 2-11: The endospore stain - M2<br>Exercise 2-12:The Flagella stain - M2 DEMO<br>**Competency Test 1: Microscope** |
| 4 | T - Sept 13<br>W - Sept 14<br>R - Sept 15 | **Online Pre-Lab Quiz 4 (Due Monday, Sept 12 before 11:59 pm)**<br>Exercise 2-4: Isolating and characterizing of bacterial species from a mixed culture – Day3/M2<br>Exercise 2-5: Dilution and enumeration using spread plate technique - Day3/M2<br><br>Exercise 3-1: Sampling the environment - Day1/M3<br>Exercise 3-2: Biofilm formation using pond water sample - Day1/M3<br>Exercise 3-3: Isolation of a biofilm-forming bacterium from soil - Day1/M3<br><br>Exercise 4-1: Carbohydrate utilization in bacteria – Day1/M4<br><br>**Online Quiz 2 (Module 2) Sept 13 at 1am - Sept 20 before 11:59 pm**<br>---<br>**Competency Test 1: Microscope (continued)**<br>**Competency Test 2: Inoculation** |
| 5 | | **Online Pre-Lab Quiz 5 (Due Monday, Sept 19 before 11:59 pm)** |

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|---|---|---|
| | T - Sept 20<br>W - Sept 21<br>R - Sept 22 | Exercise 3-1: Sampling the environment - Day 2/M3<br>Exercise 3-2: Biofilm formation using pond water sample – Day2/M3<br>Exercise 3-3: Isolation of a biofilm-forming bacterium from soil – Day2/M3<br><br>Exercise 4-1: Carbohydrate utilization in bacteria - Day2/M4<br>Exercise 4-2: Protein utilization in bacteria – Day1/M4<br>Exercise 4-3: Catalase and oxidase activities – Day1/M4<br>Exercise 4-4: Aerobic and anaerobic growth – Day1/M4<br><br>**Competency Test 3: 3-phase streak plate** |
| 6 | T - Sept 27<br>W - Sept 28<br>R - Sept 29 | **Online Pre-Lab Quiz 6 (Due Monday, Sept 26 before 11:59 pm)**<br><br>Exercise 3-3: Isolation of a biofilm-forming bacterium from soil – Day3/M3<br><br>Exercise 4-2: Protein Utilization in Bacteria – Day2/M4<br>Exercise 4-3: Catalase and oxidase activities – Day2/M4<br>Exercise 4-4: Aerobic and anaerobic growth – Day2/M4<br>Exercise 4-5: Anaerobic respiration and Nitrogen reduction – Day1/M4<br><br>Exercise 5-1: Identification of unknown bacteria in the clinic - Day1/M5<br>Exercise 5-2: Identification of unknown bacteria in the laboratory - Day1/M5 |
| 7 | T - Oct 4<br>W - Oct 5<br>R - Oct 6 | **Online Pre-Lab Quiz 7 (Due Monday, Oct 3 before 11:59 pm)**<br><br>Exercise 3-3: Isolation of a biofilm-forming bacterium from soil – Day4/M3<br><br>Exercise 4-5: Anaerobic respiration and Nitrogen reduction – Day2/M4<br>Exercise 4-6: Selective, differential and selective-differential media - Day1/M4<br><br>Exercise 5–2: Identification of unknown bacteria in the laboratory - Day2/M5<br><br>Exercise 6-1: Growth Curve – M6<br>Exercise 6-2: Effect of pH on bacterial growth - Day1/M6<br>Exercise 6-3: Effects of osmosis pressure on bacterial growth - Day1/M6<br>Potato slices Demo - M6<br><br>**Online Quiz 3-1 (Module 3 Exercises 3.1 – 3.3) Oct 4 at 1am – Oct 11 before 11:59 pm** |
| | T - Oct 11<br>W - Oct 12<br>R - Oct 13 | **Autumn break** |
| 8 | T - Oct 18<br>W - Oct 19<br>R - Oct 20 | **Online Pre-Lab Quiz 8 (Due Monday, Oct 17 before 11:59 pm)**<br><br>Exercise 3-3: Isolation of a biofilm-forming bacterium from soil – Day5/M3<br><br>Exercise 4-6: Selective, differential and selective-differential media - Day2/M4<br><br>Exercise 5–2: Identification of unknown bacteria in the laboratory - Day3/M5<br><br>Exercise 6-2: Effect of pH on bacterial growth - Day2/M6<br>Exercise 6-3: Effects of osmosis pressure on bacterial growth - Day2/M6<br>Exercise 6-4: Effect of high temperature on viability of bacteria – Day1/M6<br>Exercise 6-5: Effect of UV radiation on bacterial viability – Day1/M6<br><br>**Online Quiz 4 (Module 4) Oct 18 at 1am - Oct 25 before 11:59 pm** |

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|---|---|---|
| 9 | T - Oct 25<br>W - Oct 26<br>R - Oct 27 | **Online Pre-Lab Quiz 9 (Due Monday, Oct 24 before 11:59 pm)**<br><br>Exercise 3-4: Examination of microbes in milk and juice- Day1/M3<br>Exercise 3-5: Examination of microbes in meat and cheese- Day1/M3<br>Exercise 3.6: The symbiotic relationship of bacteria in yogurt production – Day1/M3<br><br>Exercise 5–2: Identification of unknown bacteria in the laboratory - Day4/M5<br><br>Exercise 6-4: Effect of high temperature on viability of bacteria – Day2/M6<br>Exercise 6-5: Effect of UV radiation on bacterial viability Day2/M6<br>Case study I - Handout<br>Exercise 6-6: The effectiveness of hand washing – Day1/M6<br><br>**Online Quiz 5 (Module 5) Oct 25 at 1am – Nov 1 before 11:59 pm** |
| 10 | T - Nov 1<br>W - Nov 2<br>R - Nov 3 | **Online Pre-Lab Quiz 10 (Due Monday, Oct 31 before 11:59 pm)**<br><br>Exercise 3-4: Examination of microbes in milk and juice - Day2/M3<br>Exercise 3-5: Examination of microbes in meat and cheese - Day2/M3<br>Exercise 3-6: The symbiotic relationship of bacteria in yogurt production – Day2/M3<br><br>Exercise 5–2: Identification of unknown bacteria in the laboratory - Day5/M5<br><br>Exercise 6-6: The effectiveness of hand washing – Day2/M6<br>Exercise 6-7: Effects of mouthwashes and rinses on bacterial growth – Day1/M6<br>Exercise 6-8: Effects of antiseptics and disinfectants on bacterial growth – Day1/M6<br>Exercise 6-9: The effect of antibiotics on bacteria – Day1/M6<br>Exercise 6-10: The action of natural antibiotics – Day1/M6<br><br>Case Study I – Handout<br><br>**Online Quiz 3-2 (Module 3 Exercises 3.4 – 3.6) Nov 1 at 1am – Nov 8 before 11:59 pm** |
| 11 | T - Nov 8<br>W - Nov 9<br>R - Nov 10 | **Online Pre-Lab Quiz 11 (Due Monday, Nov 7 before 11:59 pm)**<br><br>Exercise 5–2: Identification of unknown bacteria in the laboratory - Day6/M5<br>Exercise 6-7: Effects of mouth washes and rinses on bacterial growth – Day2/M6<br>Exercise 6-8: Effects of antiseptics and disinfectants on bacterial growth – Day2/M6<br>Exercise 6-9: The effect of antibiotics on bacteria – Day2/M6<br>Exercise 6-10: The action of natural antibiotics – Day2/M6<br><br>Exercise 7-1: Mutualism – M7<br>Exercise 7-2: Parasitism – Day1/M7<br>Exercise 7-3: Phagocytosis and virulence factors – M7<br>Exercise 7-4: Antigen-antibody interactions – M7<br><br>Normal Microbiota of the Nose and Mouth - Handout<br>Case Study I - Handout<br>**Online Quiz 6 (Module 6) Nov 8 1am - Nov 15 before 11:59 pm** |

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|---|---|---|
| 12 | T - Nov 15<br>W - Nov 16<br>R - Nov 17 | **Online Pre-Lab Quiz 12 (Due Monday, Nov 14 before 11:59 pm)**<br><br>Exercise 5–2: Identification of unknown bacteria in the laboratory - Assignment due<br><br>Exercise 6-9: The effect of antibiotics on bacteria – Day3/M6<br><br>Exercise 7-2: Parasitism – Day2/M7<br>Exercise 7-5: Epidemiology and Elisa – M7<br><br>Case study II - Handout<br>**Online Quiz 7 (module7) Nov 15 at 1am - Nov 22 before 11:59 pm** |
| | T - Nov 22<br>W - Nov 23<br>R - Nov 24 | **Thanksgiving** |
| | T - Nov 29<br>W - Nov 30<br>R - Dec 1 | **Lab Exam** |

| GRADES | QTY | Individual Point Value | Total Points |
|---|---|---|---|
| Pre-Lab Quiz 1 | 1 | 1 | 1 |
| Pre-Lab Quizzes | 11 | 4 | 44 |
| Module Quizzes | 7 | 6 | 42 |
| Lab Exam | 1 | 50 | 50 |
| Hands on Assignments | 3 | 3 | 9 |
| Assignments 1and 2 | 2 | 2 | 4 |
| Assignment 3 | 1 | 10 | 10 |
| TOTAL POINTS | | | 160 |

## Microbiology 4000 Learning Outcomes

*Successful students will be able to…*

1. Describe the basic morphology of bacteria, their growth requirements, and how they adapt and reproduce. [1,2]
2. Explain how environmental factors affect the culturing of microbes in a laboratory setting.[1,2]
3. Understand the diversity of metabolism that exists in bacteria and describe the unique metabolic ways used only in the prokaryotic world.[1]
4. Describe bacterial genetics with the emphasis on two main processes responsible for the diversity in the bacterial world: mutations and bacterial gene transfer.[1]
5. Describe the basic morphology of viruses, how they reproduce and cause diseases.[1]
6. Apply appropriate aseptic techniques when completing any exercise in lab.[2]
7. Correctly carry out basic microbiology laboratory techniques including: Gram staining, production of pure cultures, production of dilution series and enumeration of microbes, inoculation of various culture media, the filter disk method of testing bacterial susceptibility to various agents, and use of the ELISA test.[2]

8. Correctly and safely use any equipment needed to carry out exercises in lab.[2]
9. Demonstrate how to identify unknown bacteria using tests, media, and techniques introduced in lab.[2]
10. Explain how unknown bacteria are identified through submission of a lab report that includes a flow chart and interpretation of results.[2]
11. Describe Biofilm, and explain how it is formed.
12. Explain how microbes are involved both constructively and destructively in foods.[1.2]
13. Explain microbial symbiosis based on observations made in lab.[2]
14. Describe some of the normal microbiota of the nose, mouth, and skin.[1]
15. Understand infection and disease control. Understand the preventative techniques necessary to limit the spread of bacteria and viruses.[1]
16. Describe and explain various ways to control the growth of microbes.[1.2]
17. Describe how to track the spread of a simulated disease, and how to determine the index case.[1,2]
18. Describe the system of Natural or non-specific immunity.[1]
19. Describe Adaptive immunity; understand how it is acquired and how it protects us.[1]
20. Describe how microbes overcome the host body's immune mechanisms and how they are transmitted.[1]
21. Explain several aspects of immunity based on observations made in lab. Including: phagocytosis, precipitin, agglutination, and complement fixation.[1,2]
22. Describe the etiological agent, pathogenesis, symptoms and treatment of microbial diseases of the Respiratory system and the Digestive system. [1]

[1]Lecture goal

[2]Lab goal

## Guidelines for Final Grade

**Points Available**: The entire course is based on a 400 point system. 240 of the points are from lecture and 160 points are from lab assessments.

| | |
|---|---|
| Lecture Exam I | 55 points |
| Lecture Exam II | 55 points |
| Lecture Exam III | 55 points |
| Final lecture Exam (non-comprehensive) | 55 points |
| Lecture Homework Assignments (Connect/Learnsmart) | 20 points |
| PreLab Quizzes | 45 points (1 and 4 points per quiz) |
| 7 Lab Module Quizzes | 42 points (6 points per quiz) |
| Unknown Summary (ID of unknown bacteria) | 10 points |
| Assignments | 4 points (2 point each assignment) |
| 3 Lab Competency Tests | 9 points (3 points per competency test) |
| Final Lab Exam | 50 points |
| **TOTAL POINTS** | **400 points** |

*Please see Attendance Policy on p. 9 of this syllabus

**Grading Scale** (*Note: This is a guideline and may be subject to change*)

| Final total points | Grade | Final total points | Grade |
|---|---|---|---|
| 372-400 | A | 308-319 | C+ |
| 360-371 | A- | 292-307 | C |
| 348-359 | B+ | 280-291 | C- |
| 332-347 | B | 268-279 | D+ |
| 320-331 | B- | 240-267 | D |

*The table below gives additional information concerning the point categories above. Please read the information carefully and ask if you have questions.*

**Table Concerning Point Categories** (Continued on next page)

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| **Lecture Exam Policy:** All exams are as scheduled. Students with excusable conflicts need to contact either Dr. Bullwinkle or Dr. Pradhan at least one week ahead of the regularly scheduled exams. Should you miss an exam and have a valid excuse, you must contact the Instructor and provide a written documentation for your absence in order to be eligible to take a make-up exam. Also note that the format of the make-up exam may be different (short answer) than the regular exams. ***All make up exams must be completed within one week of the regularly scheduled exams.***<br>All make up exams will be administered by the Testing center. Students are responsible for arranging an appointment with the testing center **which needs to be approved by the Instructor**. It is a student's responsibility to notify the Instructor in a timely fashion so that the appointment is approved in time.<br>Visit http://registrar.osu.edu/testing/index.asp for more information. |
| **Lecture Homework Assignments:** We will use Adaptive Learning Resource called LearnSmart or Connect (from McGraw Hill) in this course for the assessment purposes and to encourage student preparedness. This smart technology uses continuously adapting learning path individualized for each student.<br>You will be assigned Learnsmart test questions based on 9 chapters throughout the semester, out of which you need to complete the homework assignments for only 8 chapters in order to get the full credit of 20 points. The extent of questions asked for each chapter is not fixed since it will vary depending on the depth and complexity of the topics being covered. For each chapter, you need to complete 100% of the total questions in order to receive the full credit.<br>Each assignment will remain open over a period of approximately 7-14 days and must be completed before the deadline. It can be accessed multiple times during the open period. The assignment can also be accessed after the completion/submission/after due date, if you'd like to review the questions just before the exam. However, you will not get credit for the completion of assignment after the due date.<br>You will need an access code (that comes with the customized book package) in order to gain access to Learnsmart technology. |
| |
| **PreLab Quizzes and Module Quizzes**: PreLab quizzes has to be completed in order to prepare yourself for lab each week. Each quiz contains 8-12 questions, You will be able to take the PreLab quizzes twice before the due date and the Module quizzes only once. There will be giving no make-up quizzes and only under certain condition, and with proper documentation, will a make-up PreLab or Module quizzes be given. |

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| **Lab Competency Tests:** Learning basic microbiology laboratory techniques is an important part of your lab experience. During the semester you will be tested on three of these techniques: use of the compound light microscope, aseptic technique, and three-phase streak plate. You will have plenty of opportunities to practice these techniques during lab. Please be sure to ask your lab TA to observe you as you practice and to critique your technique. |
| |
| **Assignment 1 and 2:** These assignments concerns the post-exercise questions found in your lab manual. Twice during the semester your answers will be randomly collected from 2 – 4 exercises by your TAs and graded.<br><br>**Assignment 3 - Identification of Unknown Bacteria:** This assignment concerns the identification of two unknown bacterial species. The lab manual contains detailed information about the format to be use for this assignment. |
| **Final Lab Exam:** The examination will include questions about the techniques and touch on several different exercises from throughout the semester. More information concerning specific topics covered in the exam will be given in the lab period prior to the final lab exam and guidelines will be posted a few weeks prior to the exam. The exam consists of 50 multiple choice questions about lab exercise techniques and results. |
| |

## ATTENDANCE POLICY

### Lecture attendance

Attendance in lecture is highly recommended. You are responsible for *all the material covered in lecture*, including all handouts, additional assignments, and announced schedule changes.

**Attendance in the laboratory is mandatory.** It is necessary for course completion to attend the labs. Due to the nature of this course, there will not be any make-up labs. Missing one or more labs without a valid written excuse (e.g. doctor's note), will result in losing course points, which will influence your overall grade. For an excused absence from lab, please bring a valid written excuse within one week of the missed lab. You also lose points for being over 10 minutes late to lab. If you are over 40 minutes late to lab, it will count as a missed lab. If you have more than 4 unexcused or excused absences you may not be allowed to complete the lab course. Please, contact the lab coordinator and lecture instructor to see if you will be allowed to complete the course. Please, note that if your absences are due to a documented illness or other valid excused reasons, you may be eligible for an incomplete grade. (NOTE: Written records of your reason must be submitted.)

## QUESTIONS CONCERNING GRADING OF COURSE MATERIALS

If you have any questions or concerns regarding grading of any of the lecture exams offered in this course, you must submit them in writing to the lecture instructor within one week from the date the grade for the exam is posted on Carmen. You must address all the concerns regarding the final exam before the final grade is posted on Carmen. Once the final grade is posted, no questions from the final will be addressed.

Any questions that you have regarding grading of lab materials must be submitted in writing to your lab TA or the lab coordinator within a week of the date the graded material (quiz, etc.) was returned to you.

### Disability Statement

Any student who feels s/he may need an accommodation based on the impact of a disability should contact Dr. Pradhan/Bullwinkle (for lecture accommodations) or Dr. Mette Ibba (for lab accommodations) privately to discuss your specific needs. Please contact the Office for Disability Services at 614-292-3307 in room 098 Baker Hall to coordinate reasonable accommodations for students with documented disabilities.

**Academic Misconduct Statement**

- Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute "Academic Misconduct."
- The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct, so we recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.
- If we suspect that a student has committed academic misconduct in this course, we are obligated by University Rules to report our suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact Dr. Pradhan.

**General Education Course Information**

Microbiology 4000 is a General Education Course (GE) in Natural Science and as such, is part of the Colleges of Arts and Sciences (ASC) General Education Program.

**Goals of ASC Natural Sciences Courses:**

Natural science coursework fosters students' understanding of the principles, theories and methods of modern science, the relationship between science and technology, and the effects of science and technology on the environment.

**Learning Objectives of ASC Natural Sciences Courses:**

1. Students understand the basic facts, principles, theories, and methods of modern science.
2. Students learn key events in the history of science.
3. Students provide examples of the inter-dependence of scientific and technological developments.
4. Students discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

Microbiology 4000 meets the GE Natural Science Learning Objectives in multiple ways. The course includes an overview of the basic biology, structure, and function of microorganisms with a concentration on bacteria and viruses. Principles and theories related to microbial growth, metabolism, genetics, and the human immune system are included. Students study modern scientific methods of culturing and identifying microbes in the laboratory part of the course. The lecture part of the course also explains how scientific methods are used in the field of microbiology and how these methods have been used historically in key discoveries such as pasteurization, vaccination and antibiotic therapy. Both lecture and lab provide opportunities for students to learn and experience how technological advances in microscopy, genetic engineering, and biochemical techniques have contributed to understandings of scientific principles of microbiology and vice versa. In lecture, current events from news media and recent scientific publications are used to help students appreciate the positive and negative roles of microorganisms in fields such as health and disease, the environment, industry, and food sciences. By the end of the course, students will have developed an understanding of how microorganisms are involved in nearly every aspect of their everyday life.