
Biology Department, College of Arts & Sciences, Valdosta State University
FALL 2019---COURSE SYLLABUS*

BIOL 3100, Sections A & B. Microbiology (CRN 81996 & 81997) - 4 credit hours

BIOL 5100, Sections A & B Microbiology (CRN 82019 & 83798) – 4 credit hours

Class:	TR		8:00-9:15 am, 2022 Bailey Science Center
Laboratory:	TR	3100/5100 <u>Section A</u>	10:00-11:25 am, 2068 Bailey Science Center
	TR	3100/5100 <u>Section B</u>	2:00-3:25 pm, 2068 Bailey Science Center

Instructor:	Dr. Jenifer Turco	Email:	jturco@valdosta.edu
Telephone:	229-249-4845	Office:	2091 Bailey Science Center
Office Hours:	Tues. & Thurs., 4:15-5:05 pm; or by appointment.		

Course Description: BIOL 3100 Microbiology 3-3-4 (4 credit hours) Prerequisites: BIOL 1107K, BIOL 1108K, BIOL 3200, CHEM 1211/CHEM 1211L, CHEM 1212/1212L. Recommended: CHEM 3402. **BIOL 5100 Microbiology 3-3-4 (4 credit hours)** Prerequisite: Admission into the graduate program or permission of the instructor. Survey of microbiology covering eubacteria, archaebacteria, protozoa, fungi, algae, and viruses. Includes fundamental techniques, microbial physiology and genetics, biotechnology, medical applications, and applied microbiology. Two 1.5-hour laboratory periods per week.

Required Textbook: **BROCK BIOLOGY OF MICROORGANISMS, Fifteenth Edition** by Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley, W. Matthew Sattley, and David A. Stahl Pearson Education, Inc. 2018.
Textbook options (select one): (1) traditional, hard-cover book (ISBN 9780134261928); (2) unbound loose-leaf book (ISBN: 9780134626109) ; (3) “Mastering Microbiology” with Etext for BrockBiology of Microorganisms (ISBN: 9781323751329). Please note that “Mastering Microbiology” is an online resource that is included with the eText. Access to “Mastering Microbiology” is NOT required for the course, although it is included with the eText, and students may use it if they wish. For additional information about the textbook options, please see the VSU Bookstore Web site.

Required Lab Manual: **LAB MANUAL FOR BIOL 3100 MICROBIOLOGY, Valdosta State University, Biology** McGraw-Hill, 2014. (ISBN 9781308191034)

Other Required Items: (i) A calculator; (ii) a permanent, fine-tip marking pen (“Sharpie”) for labeling cultures in lab; (iii) one or two thin, light-weight folder(s) for handing in assignments (Please do **not** use 3-ring binders for handing in assignments); (iv) paper clips or a stapler for organizing assignments; & (v) a notebook for organizing and recording lab results (this may be a thin loose-leaf folder).

Special Notes to Students:

1. In order to respect the privacy of each student, exam scores and grades will not be posted, given out by telephone, or sent to students by email.
 2. Students should consult the VSU Student Handbook, Catalog, Semester Calendar, Schedule of Classes, & Registration Guide (all available online) for information about VSU policies and procedures regarding registration, drop/add, and withdrawal. October 10 is the official midterm, and the withdrawal deadline is October 17. Students are not permitted to withdraw after this deadline except in cases of hardship.
 3. Students with disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The Access Office is located in Farbar Hall. The phone numbers are 229-245-2498 (V), 229-375-5871 (VP) and 229-219-1348 (TTY). For more information, please visit VSU’s Access Office or email:access@valdosta.edu.
 4. Valdosta State University (VSU) is committed to creating a diverse and inclusive work and learning environment free from discrimination and harassment. VSU is dedicated to creating an environment where all campus community members feel valued, respected, and included. Valdosta State University prohibits discrimination on the basis of race, color, ethnicity, national origin, sex (including pregnancy status, sexual harassment and sexual violence), sexual orientation, gender identity, religion, age, national origin, disability, genetic information, or veteran status, in the University's programs and activities as required by applicable laws and regulations such as Title IX. The individual designated with responsibility for coordination of compliance
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***This is a tentative syllabus. Changes to this syllabus will be announced during class or laboratory periods; alternatively, changes may be posted on BlazeView. Graduate students who are taking BIOL 5100 must meet with the instructor to discuss additional course requirements & grading.**

Special Notes to Students (continued from preceding page):

efforts and receipt of inquiries concerning nondiscrimination policies is the University's Title IX Coordinator: Maggie Viverette, Director of the Office of Social Equity, titleix@valdosta.edu, 1208 N. Patterson St., Valdosta State University, Valdosta, Georgia 31608, 229-333-5463.

5. Cell phones, music players, and other electronic devices may not be used at any time in class or lab. Students are cautioned to be certain that cell phones and specialty watches are silenced and put away during examinations. In addition, calculators may not be used during examinations. Should a cell phone, specialty watch, calculator, or other electronic device be seen or heard during an exam, the student's exam will be terminated and the student will receive a score of "0" on the exam. Students may use cameras during lab to photograph their lab results. Calculators may also be used during lab and lecture when exams are not in progress.
6. Please use the rest room before you come to class to take an exam. Should a student need to leave the classroom during an exam, the student's exam will be terminated. No hats may be worn during examinations.
7. Students are expected to read and adhere to the following: (i) the VSU Student Code of Conduct as described in the VSU Student Handbook and (ii) the Biology Department policy on plagiarism (available online through the departmental Web site). The instructor may use a variety of methods for detecting cheating and plagiarism. Cheating or plagiarism will result in a grade of "0" for the exam or assignment. In addition, the instructor may complete a Report of Academic Dishonesty and submit it to the VSU Student Conduct Office. A student who cheats or plagiarizes on more than one exam or assignment will receive a grade of "F" in the course.
8. Food is not permitted in the classroom. Students who wish to use laptop computers or tablets as part of the class must take extra care not to distract others. **Food and drink are not permitted in the lab.**
9. No disruptive behavior will be tolerated during class or lab. A student who engages in disruptive behavior will be asked to leave. If necessary, the campus police will be contacted.
10. At the end of the term, all students will be expected to complete an online Student Opinion of Instruction survey (SOI) that will be available through SmartEvals. Students will receive an email notification through their VSU email address when the SOI is available (generally at least one week before the end of the term). SOI responses are anonymous to instructors/administrators, and they will be able to access results only after they have submitted final grades. Before final grade submission, instructors will not be able to see any responses, but they can see the percentage of students who have or have not completed their SOIs. While instructors will not be able to see student names, an automated system will send a reminder email to those who have yet to complete their SOIs. Students who withdraw or drop a course will also be sent invitations to complete the Dropped Course Survey. Complete information about the SOIs, including how to access the survey, is available on the [SOI Procedures webpage](#).

Course Objectives:

(Pages 3-4 show how the objectives below are aligned with the University System of Georgia, VSU and Biology Department Educational Outcomes/Objectives.

After successful completion of this course, the student should be able to:

- A. List and describe the three domains of living organisms.
- B. List and describe the three types of noncellular infectious agents.
- C. List several activities of microorganisms that are beneficial to humans and the environment.
- D. List and briefly explain several current challenges in medical microbiology and infectious diseases.
- E. Compare and contrast the structure and function of the microorganisms in the domains *Bacteria*, *Archaea*, and *Eukarya*.
- F. List and describe the various strategies used by microorganisms to obtain carbon and energy.
- G1. Describe the growth of a pure culture of bacteria in a closed system, and perform mathematical calculations related to the exponential growth phase. Explain several ways in which bacterial growth can be measured.
- G2. Define and describe a biofilm. Discuss the importance and roles of biofilms.
- H. Compare and contrast the following processes as they occur in *Bacteria*, *Archaea*, and *Eukarya*: DNA replication, transcription, and translation.
- I. Describe several mechanisms through which gene expression is regulated in bacteria.
- J. Describe in detail how viruses replicate.
- K. Describe the causes and consequences of mutations.
- L. Describe the three mechanisms of horizontal gene transfer in bacteria, and explain their significance.
- M. Give examples of the use of microorganisms in genetic engineering and biotechnology.
- N. Briefly explain the role of microorganisms in the evolutionary history of life on earth.
- O. List and describe a variety of methods and approaches that are used to detect and identify various microorganisms and noncellular infectious agents.
- P. Explain how physical methods and chemical agents (antiseptics and disinfectants) are used for controlling microbes.
- Q. State the mechanisms of action of various antibacterial, antifungal, and antiviral medications.

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Course Objectives (continued from preceding page):

- R. Discuss the problem of antimicrobial drug resistance, and explain several ways in which the emergence of drug resistant bacteria can be minimized.
- S. Explain what is meant by the human microbiome. Discuss its importance and roles.
- T. Briefly describe the role of microorganisms in the cycling of nutrients, using examples from the carbon cycle, the nitrogen cycle, and the sulfur cycle.
- U. Describe in detail: (i) the innate defenses of humans and (ii) the adaptive immune response of a human to a foreign antigen.
- V. Explain how infectious diseases are transmitted, giving specific examples.
- W. List the major types of virulence factors observed in pathogenic bacteria, giving specific, detailed examples.
- X. List and describe several human diseases that are due to specific bacteria, viruses, protozoa, and fungi.
- Y.. Describe the general course of the disease caused by human immunodeficiency virus (HIV).
- Z. Properly handle microorganisms in a biosafety level 2 laboratory.
- ZA. Use a compound light microscope to examine various types of microorganisms.
- ZB. Keep accurate and complete records of microscopic observations, as well as other laboratory and field work.
- ZC. Use culture media to grow bacteria and fungi in the laboratory, and maintain stock cultures.
- ZD. Use staining techniques, physiological tests, and rRNA sequences as aids in bacterial identification.
- ZE. Use dilutions to solve problems such as determining the colony-forming units per milliliter in a bacterial suspension and the plaque-forming units per milliliter in a viral suspension.
- ZF. Work with others to: formulate an answerable question; develop a hypothesis; design and conduct an experiment; collect, organize and analyze data; and prepare a report with emphasis on the results and discussion.
- ZG. Use library and electronic resources to obtain formal scientific articles related to a particular topic in microbiology.
- ZH. Read a scientific article (a primary source) and give a brief oral presentation based on it.

Alignment of Assignments with Course Objectives:

The course objective(s) aligned with each assignment are given on the last page of this syllabus.

Alignment of Course Objectives with Learning Goals/Educational Outcomes:

The **Student Learning Goals for the Core Curriculum in the University System of Georgia (USG)** are available online at http://www.usg.edu/academic_affairs_handbook/section2/C738/. The application of these learning goals in VSU's Core Curriculum is explained at <http://www.valdosta.edu/academics/academic-affairs/vp-office/vsu-core-curriculum.php> . Each Core Area (A1, A2, B, C, D, and E) has one or more learning goals. In this syllabus they are referred to as VSUA1, VSUA2, VSUB, VSUC, VSUD, and VSUE.

The **Biology Undergraduate Educational Outcomes** (numbered 1-5) are available in the VSU Undergraduate Catalog, and the **Biology Graduate Educational Outcomes** are available in the VSU Graduate Catalog and are numbered 1 through 4. Both catalogs are available online at <http://catalog.valdosta.edu/> . In this syllabus the Biology Undergraduate and Graduate Educational Outcomes are designated as B1-B5 (<http://catalog.valdosta.edu/undergraduate/academic-programs/sciences-mathematics/biology/>) and GB1-GB4 (<http://catalog.valdosta.edu/graduate/graduate-degree-programs/arts-sciences/biology/ms-biology/>), respectively.

The course objectives that are aligned with the USG, VSU and Biology Department Learning Goals/Educational Outcomes are listed below.

<u>USG, VSU or Biology Objective</u>	<u>Course Objective(s)</u>
Core Area A1 Learning Goal	ZF, ZG, ZH
Core Area A2 Learning Goal	G, ZE, ZF
Core Area B Learning Goal	C, D, M, R, U, V, X, Y
Core Area D Learning Goal	all course objectives
VSUA1	ZF, ZG, ZH
VSUA2	G, ZE, ZF
VSUB	C, D, M, R, U, V, X, Y
VSUD	all course objectives
B1	Z, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH
B2	A, B, D, E, H, J, K, L, N, O, R, U, X, Y
B3	A, B, D, E, F, G, H, I, J, K, L, O, P, Q, U, W, X, Y
B4	B, D, H, I, J, K, L, M, O, R, X, Y
B5	C, D, F, R, S, T, V
GB1	all course objectives
GB2	G, ZB, ZE, ZF, ZG, ZH

BIOLOGY 3100/5100. Microbiology - Class and Lab Schedule

Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Tues. Aug. 20	General course information Microorganisms and microbiology	Chap. 1
Tues. Aug. 20L	BRIEF INTRODUCTION TO LAB SAFETY SUPPL. EX., HANDWASHING (see information in handout) <u>Always wash your hands before leaving lab!</u> <u>Be sure to read the lab exercises for each day before coming to lab.</u>	
Thurs. Aug. 22	Microorganisms and microbiology An overview of microbial life Cell structure/function <u>Review the following topics that you covered in introductory biology:</u> Basics of chemistry and biochemistry DNA structure & replication Transcription & translation	Chap. 1 Chap. 1 Chap. 2, 3 (p. 75-77), & 6 (p. 184-186)
Thurs. Aug. 22L	DISCUSSION/DEMONSTRATION ON CULTURE MEDIA PREPARATION--Please read over the following exercise: SUPPL. EX., PREPARATION OF CULTURE MEDIA Make your own diagram that explains, in a step-by-step fashion, how nutrient broth, nutrient agar slants, and nutrient agar plates are prepared (made) in our microbiology lab. At your convenience, read over the following exercise: LAB MANUAL EX., CULTURE MEDIA PREPARATION, green box p. 121. Complete questions, green box p. 129-130, except question 3 on p. 130.	
Tues. Aug. 27	Cell structure/function	Chap. 2, 3 (p. 75-77), & 6 (p. 184-186)
Tues. Aug. 27L	<u>Please note that missing this particular lab period will result in a deduction of 25 points, except in the event of a documented, serious emergency.</u> >LAB ORIENTATION & LABORATORY SAFETY RULES (Read course pack handout & lab manual, green box p. 1-4.) >LAB MANUAL EX., ASEPTIC TECHNIQUE, green box p. 61. <u>Wash your hands before leaving lab!</u> SUPPL. EX., WINOGRADSKY COLUMN (<u>Course pack/handout--We will use these procedures.</u>) LAB MANUAL EX., WINOGRADSKY COLUMN, green box p. 203 (Please read) PAGES 585-588 IN THE TEXTBOOK (Please read)	

- *Each student will build one Winogradsky Column and monitor it during the semester. In addition, each student will have an opportunity to monitor a developed column that was built by students in BIOL 3100 during earlier semesters. A limited number of developed columns are available; therefore, 2 students in each lab may be sharing one of these older columns.*
 - *In order to build a single column, you will need the following materials: approximately 4 cups of soil or sediment*
 - *(sediment usually works best and potting soil is NOT acceptable); approximately 3 cups of natural water from a pond, puddle, or stream (if you are unable to bring natural water, you can use some deionized water that is available in the lab); some very finely shredded newspaper (about one handful) or another complex source of organic carbon such as leaves; and one clear, clean, 1-liter plastic bottle (without ridges, if possible). Please use care when collecting your soil and water-- wear gloves and wash your hands!*
 - *It will be most convenient and efficient if you cooperate with your lab group (the 2 to 4 students on the long side of your lab bench) during construction of the columns. This is because some of the items you will use in building the columns (such as scissors and mixing utensils) will be available for each group rather than for each student. Therefore, kindly discuss the construction of the Winogradsky Columns with your lab group.*
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Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Thurs. Aug. 27L	(.....Continued from preceding page)	
	<ul style="list-style-type: none"> • <i>Please note that, although you will need to cooperate with your lab group as you build the columns, <u>the remainder of the Winogradsky column project will be done individually.</u> This includes your observations and records for: (i) your own new Winogradsky column and (ii) the established column from last semester that will be assigned to you.</i> • <i>Please bring any required materials for your column to lab on <u>Thursday, Sept. 5.</u></i> • <i>Please note that you must record BOTH macroscopic and microscopic observations of your two columns during the project. <u>For each column, detailed notes about and drawings of the columns and the observed microorganisms are required.</u> Drawings must be made from the actual columns or microorganisms being observed in the microscope; they should not be made from photographs. You may take photographs but these are optional. Nevertheless, photographs can be very useful in documenting changes in a column over time. <u>You may be asked to turn in your drawings for the day at the end of any lab period during which the columns are being observed.</u> In addition, at the end of the project, you must turn in an individual report consisting of the following: (i) a title page that includes your name, (ii) a table of contents with page numbers, (iii) a one-page, double-spaced, typed summary of what you did and your findings, and (iv) your well-organized, completely-labeled, original observations, notes, drawings, and optional photographs for each column. <u>Most (~90%) of the one-page summary should focus on your findings and their interpretation.</u> All pages of the report must be numbered. For the typed summary, the margins must be set at 1 inch on all sides, and a 12-point font must be used. Please check your word processing program to be certain that extra space is not inserted below each line in the typed summary. The summary must refer to the original notes, drawings, and optional photographs, and it must interpret the observations.</i> 	
Thurs. Aug. 29	Cell structure/function	Chap. 2, 3 (p. 75-77), & 6 (p. 184-186)
Thurs. Aug. 29L	<p>>LAB MANUAL EX., MICROSCOPY (green box p. 9); answer questions on green box p. 15-17. >MICROSCOPE CARE & USE ; MICROSCOPE CHECKLIST (course pack) EXAMINE PREPARED SLIDES OF <i>Plasmodium falciparum</i> in blood smear; <i>Trichomonas vaginalis</i>, <i>Trypanosoma cruzi</i> in blood smear, & <i>Entamoeba histolytica</i>. Make drawings in your lab notebook. Students should be able to describe these microorganisms and name the diseases they cause in humans.</p>	
Tues. Sept. 3	Cell structure/function Eukaryotic microorganisms	Chap. 2, 3 (p. 75-77), & 6 (p. 184-186) Chap. 13, 18, & Chap. 33
Tues. Sept. 3L	<p>>FINISH LAB MANUAL EX., ASEPTIC TECHNIQUE (Answer questions, green box p. 69-70.) <u>Please save your slants of <i>E. coli</i> for next week; place in rack on “to be incubated” cart.</u></p> <p>>CONTINUE MICROSCOPE WORK STARTED ON THURS., AUG. 29. >LAB MANUAL EX., MICROSCOPIC MEASUREMENTS – Use a stage micrometer to calibrate the ocular micrometer in your microscope, for the 10x, 40x, and 1000x objectives. Begin with step 2 of the procedure.</p> <p><u>Remember to bring the materials for your Winogradsky column on Thurs., Sept. 5.</u></p>	
Thurs. Sept. 5	Eukaryotic microorganisms	Chap. 18 & Chap. 33
Thurs. Sept. 5L	<p>>LAB MANUAL EX., UBIQUITY OF BACTERIA, green box p. 43. Each student will complete steps 1, 2, & 7. We will omit the remaining steps. Incubate tryptic soy agar plates until next week. >LAB MANUAL EX., THE FUNGI (green box p. 47). You will prepare the plates we will use for the “Mold Study” section next week. Work in groups of 3 or 4, and expose 4 plates of Sabouraud dextrose agar to air for 45 minutes. Expose 2 plates inside the building and the other 2 plates outdoors. Incubate the plates in a separate pan at room temperature until next week.</p>	

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Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Thurs. Sept. 5L	<p>(.....Continued from preceding page) >SUPPL. EX., WINOGRADSKY COLUMN [WE WILL USE THE PROCEDURE IN THE SUPPL. EX., BUT PLEASE ALSO READ LAB MANUAL EX. (green box p. 203) & ASSIGNED PAGES IN TEXT.] <u>BE SURE TO RECORD YOUR INITIAL OBSERVATIONS OF YOUR COLUMN.</u></p>	TEXT, P. 585-588
Tues. Sept. 10	<p>Eukaryotic microorganisms Nutrition, culture, & metabolism of microorganisms</p>	<p>Chap. 18 & Chap. 33 Chap. 3, 14, 15, 16 & 17 (selected topics)</p>
Tues. Sept. 10L	<p>>FINISH LAB MANUAL EX., UBIQUITY OF BACTERIA (Please do not open plates with mold (fungal) colonies in the lab. These plates should be opened only in the biological safety cabinet—please see the instructor for directions if you need to open one of these plates.) (For the table on green box p. 45, please enter your data on the Excel spreadsheet on the computer. Complete items 2, 3, & 4 at the top of green box p. 46. Answer short answer questions 1-4.) <u>Save any plates with fungal colonies for use on Thursday.</u> <u>>Please note that we will be working on the next 2 exercises during the next few labs. Please try to prepare your stained smears today, since stained microorganisms are the easiest to observe. These stained slides can be saved until the next lab, if necessary.</u> >LAB MANUAL EX., SMEAR PREPARATION (green box p. 85) & SIMPLE (POSITIVE) STAINING (green box p. 91). <u>Specific, modified directions:</u> On a single slide, prepare one smear of <i>Saccharomyces cerevisiae</i>, and a separate, second smear of <i>Escherichia coli</i>. Use the technique for preparing smears from solid media [see LAB MANUAL EX.], & stain with crystal violet for 30 seconds [See LAB MANUAL EX. for basic guidelines]. We will use paper towels instead of bibulous paper. <u>Use this slide in the next exercise.</u> >SUPPL. EX., EXAMINATION OF STAINED SLIDES AND WET MOUNTS OF THE YEAST <i>Saccharomyces cerevisiae</i> (A FUNGUS) AND THE BACTERIUM <i>Escherichia coli</i> <u>[Sometime during the next few labs, you must ask the instructor to look at: (1) a stained <i>E. coli</i> smear that you have prepared and brought into clear focus using the oil immersion objective of your assigned microscope, plus a drawing of it, & (2) a wet mount of a mixture of <i>S. cerevisiae</i> and <i>E. coli</i> that you have prepared and brought into clear focus using the oil immersion objective of your assigned microscope, plus a drawing of it. Use the ocular micrometer that you calibrated to determine the size of the yeast cells and the bacterial cells. Because <i>E. coli</i> cells are very small, the oil immersion objective should be used for these size determinations. These observations are required; upon their completion you will receive points.]</u></p>	
Thurs. Sept. 12	<p>Nutrition, culture, & metabolism of microorganisms</p>	<p>Chap. 3, 14, 15, 16 & 17 (selected topics)</p>
Thurs. Sept. 12L	<p>>FINISH LAB MANUAL EX., THE FUNGI (green box p. 47) (Mold Study – Do NOT open fungal cultures in the lab. Open them only in the biological safety cabinet. You will use clear cellophane tape to prepare slides of two or more different molds. The instructor will demonstrate this procedure, which is described in the lab manual. Examine the slides using the low power (10x) objective and the high dry (40x) objective. Draw the specimens in your lab manual or lab notebook. Include measurements of the fungal structures when possible. Also record a description of the appearance of the fungal colonies. Answer the questions in the lab manual (green box p. 56).</p>	
Tues. Sept. 17	<p>EXAM 1 (will include both class and lab material)</p>	
Tues. Sept. 17L	<p>>BEGIN SUPPL. EX. ISOLATION OF BACTERIAL UNKNOWN IIB >LAB MANUAL EX., PURE CULTURE TECHNIQUES (green box p. 71), STREAK-PLATE METHOD ONLY Continue lab work begun on Sept. 10 (YEAST <i>Saccharomyces cerevisiae</i> & BACTERIUM <i>Escherichia coli</i>) Please examine/draw your stained smears first and have instructor check your stained smear of <i>E. coli</i> Then prepare and examine your wet mount of the mixture and ask instructor to check it.</p>	

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Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Tues. Sept. 17L	<p>(.....Continued from preceding page) IF TIME PERMITS, WORK ON THE FOLLOWING: >Additional simple stain: Aseptically remove a sterile swab from wrapping paper & swab your gums and teeth. Gently rub swab onto a small area of a DRY slide. Immediately place the swab in the disinfectant bucket. Allow smear to air dry; then heat fix it. Stain with methylene blue, rinse, and blot dry. Examine with oil immersion objective. Draw epithelial cells and bacteria in your notebook. If you do not have time to do this today, it can be done on another day. >LAB MANUAL EX., NEGATIVE STAINING, green box p. 95. (We will use nigrosin & the method in Fig. 13.2. On green box page 96, follow steps 1, 3, 5, & 7. Instead of using bacteria for this stain, please use the yeast, <i>Saccharomyces cerevisiae</i>. Draw a few representative cells of <i>Saccharomyces cerevisiae</i> as they appear in the negative stain.</p>	
Thurs. Sept. 19	Nutrition, culture, & metabolism of microorganisms	Chap. 3, 14, 15, 16, & 17 (selected topics)
Thurs. Sept. 19L	<p>>SUPPL. EX., USING RIBOSOMAL RNA GENE SEQUENCES TO LEARN ABOUT A MICROORGANISM > CONTINUE SUPPL. EX. ISOLATION OF BACTERIAL UNKNOWN IIB (2) >CHECK WINOGRADSKY COLUMNS (Make macroscopic observations of columns, and draw/record this information. Observe biofilm slides. You may also prepare wet mounts, if desired. Make neat, detailed drawings of any microorganisms observed in your lab notebook. Use the information in LAB MANUAL EX., PROTOZOA, ALGAE, & CYANOBACTERIA (green box p. 29) to aid you in recognizing different groups of organisms. At some point during the semester, be sure you see and draw examples of various protozoa, algae, cyanobacteria, & other bacteria. Keep in mind that you may also see some microscopic invertebrate organisms in your samples. Give some thought to how you will organize your lab report on this work. >IF TIME PERMITS, CONTINUE WORK FROM SEPT. 10 & 17</p>	
Tues. Sept. 24	Metabolism of microorganisms Microbial systematics; Strategies for identification of microorganisms (with emphasis on prokaryotes) Microbial identification & clinical microbiology	Chap. 14, 15, 16, & 17 (selected topics) Chap. 13 Chap. 28 (Fig. 28.4)
Tues. Sept. 24L	<p>>FINISH WORK FROM SEPT. 10 (YEAST <i>Saccharomyces cerevisiae</i> & BACTERIUM <i>Escherichia coli</i>) & SEPT. 17 (OTHER STAINS) -- (LAST DAY) > CONTINUE SUPPL. EX. ISOLATION OF BACTERIAL UNKNOWN IIB (3)</p>	
Thurs. Sept. 26	Metabolism of microorganisms	Chap. 14, 15, 16, & 17 (selected topics)
Thurs. Sept. 26L	<p>>DISTRIBUTION OF UNKNOWN IA BACTERIAL CULTURES (UNKNOWN IA)----First, prepare subcultures (stock cultures) of the unknown IA. Please label your unknown IA stock cultures with the following: Unk IA, the date, your lab section (3100A or 3100B), and the seat numbers of your group members. >LAB MANUAL EX., GRAM STAINING (green box p. 99), (KNOWN & UNKNOWN IA CULTURES) Prepare smears from nutrient agar slant cultures as described in the lab manual Ex. on smear preparation (green box p. 85) In order to interpret the results of a Gram stain, you must use the oil immersion objective on the microscope. Complete drawings/questions in lab manual. For the unknown IA, record the dates, work done, drawings, etc., in your lab notebook. Also record your results for your unknown IA on the descriptive chart in the lab manual, green box p. 161. <u>Measure the cell size of your unknown IA.</u> Stained slides may be saved in a box for examination during the next lab, if desired. <u>Please note that information about the unknown IA lab report can be found under the section entitled "Laboratory", Item 6.</u></p>	

Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Tues. Oct. 1	Microbial growth	Chap. 5 & 7
Tues. Oct. 1L	<p>>CONTINUE SUPPL. EX. ISOLATION OF BACTERIAL UNKNOWN IIB (4)</p> <p>>SUPPL. EX., VARIOUS MEDIA [CULTURES FOR NUTRIENT AGAR, DESOXYCHOLATE AGAR (AND/OR MACCONKEY AGAR) AND PHENYL ETHYL ALCOHOL AGAR: <i>Escherichia coli</i>, <i>Staphylococcus aureus</i>, <i>Pseudomonas aeruginosa</i>, & unknown IA]</p> <p>(CULTURES FOR BLOOD AGAR: <i>E. coli</i>, <i>S. aureus</i>, <i>Bacillus cereus</i>, & unknown IA)</p> <p>>A THROAT CULTURE WILL ALSO BE DONE ON A SEPARATE BLOOD AGAR PLATE.</p> <p>>CONTINUE WORK ON GRAM STAINING KNOWN & UNKNOWN IA CULTURES.</p>	
Thurs. Oct. 3	Molecular microbiology	Chap. 4; Chap. 12 (p. 333-336)
Thurs. Oct. 3 L	<p>> CONTINUE SUPPL. EX. ISOLATION OF BACTERIAL UNKNOWN IIB (5)</p> <p>>Draw the name of a pathogen from the selections provided by the instructor. Record your selection in your lab notebook and on the instructor's record sheet.</p> <p>>FINISH SUPPL. EX., VARIOUS MEDIA -- Record results in the table provided with the exercise.</p> <p>ALSO, record results for your unknown IA in your notebook, and on the descriptive chart. Consider the following question: Is the pattern of growth of your unknown IA on the selective media consistent with the results you obtained in the Gram stain? If not, you may want to consider repeating the Gram stain during an upcoming lab.</p> <p>>EXAMINE ANY SAVED GRAM-STAINED SLIDES OF KNOWN & UNKNOWN IA CULTURES.</p> <p>>CHECK WINOGRADSKY COLUMNS (Make macroscopic observations of columns only. Draw/record this information.)</p>	
Tues. Oct. 8	Fall Break	
Thurs. Oct. 10	Molecular microbiology Regulation	Chap. 4; Chap. 12 (p. 333-336) Chap. 6
Thurs. Oct. 10L	<p>>HAND IN SUPPL. EX., RIBOSOMAL RNA SEQUENCES</p> <p>> FINISH SUPPL. EX. ISOLATION OF BACTERIAL UNKNOWN IIB (6)</p> <p>>CHECK WINOGRADSKY COLUMNS (Make both macroscopic and microscopic observations. Draw/record this information.)</p>	
Tues. Oct. 15	Regulation Viruses	Chap. 6 Chap. 8 & 10
Tues. Oct. 15L	<p>> Prepare new stock cultures of your unknown IA. Please label your unknown IA stock cultures with the following: Unk IA, the date, your lab section (3100A or 3100B), and the seat numbers of your group members.</p> <p>>LAB MANUAL EX., CULTURAL CHARACTERISTICS, green box p. 163. (You will inoculate your unknown IA in/on the following: nutrient agar slant [use a straight inoculation line], nutrient broth, motility medium [deep], nutrient gelatin deep, & fluid thioglycollate medium.) Fluid thioglycollate medium is being used to determine the oxygen requirements of the unknown IA culture. See the textbook for more information about oxygen requirements and this medium (text, p. 160-164).</p> <p>>LAB MANUAL EX., MOTILITY DETERMINATION (TUBE METHOD ONLY, green box p. 115)</p> <p>You will inoculate tubes of motility medium with <i>Staphylococcus aureus</i>, <i>Proteus vulgaris</i>, (& your unknown IA, as noted above).</p> <p>>LAB MANUAL EX., PURE CULTURE TECHNIQUES (green box p. 71), STREAK-PLATE METHOD ONLY</p> <p>Use a sterile nutrient agar plate and a VERY TINY sample of your unknown IA culture for doing a quadrant streak to obtain isolated colonies of the unknown IA (method B on green box p. 72). Each person will do his/her own streak plate.</p>	

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Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Tues. Oct. 15L	<p>(.....Continued from preceding page) >DISCUSSION ON THE USE OF BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY is on reserve in the library.</p>	
Thurs. Oct. 17	EXAM 2 (will include both class and lab material)	
Thurs. Oct. 17L	<p>>FINISH LAB MANUAL EX., CULTURAL CHARACTERISTICS. (Record results in notebook and on descriptive chart.) >FINISH LAB MANUAL EX., MOTILITY (TUBE METHOD & WET MOUNT) (Draw the motility tubes. In the lab manual, answer questions 3 & 5 in part B. If desired, you may prepare a wet mount of your unknown IA and assess motility using the microscope. You should be able to distinguish true motility from Brownian motion and movement due to fluid flow. Record the results of the motility tube test and wet mount for the unknown IA in your notebook and in the descriptive chart. >LAB MANUAL EX., PURE CULTURE TECHNIQUES (green box p. 71), STREAK-PLATE METHOD ONLY Check your nutrient agar plate from Tuesday to see if you obtained isolated colonies of the unknown IA. If you did, please measure the diameters of several well-isolated colonies and record a description of the colonies in your notebook and on the descriptive chart (lab manual, green box p. 161). Consult green box p. 166 in the lab manual for aids in describing colonies. If you did not obtain isolated colonies, determine how you will modify your technique next time. Consult the instructor if you have questions.</p> <p><u>YOU SHOULD NOW BE ABLE TO DETERMINE THE GROUP (4, 5, 17, OR 18) TO WHICH YOUR UNKNOWN IA BELONGS. WHICH SPECIFIC TESTS ALLOWED YOU TO DETERMINE THE GROUP?</u></p> <p>>LAB MANUAL EX., OXIDATION AND FERMENTATION TESTS (green box p. 167) – <u>Voges-Proskauer test only</u>. Inoculate one tube of MRVP broth with your unknown IA, and inoculate a separate tube of MRVP broth with <i>Enterobacter aerogenes</i>. Incubate one week. >MONITOR WINOGRADSKY COLUMNS</p>	
Tues. Oct. 22	Viruses	Chap. 8 & 10
Tues. Oct. 22L	<p>>Hand in lab report on Bacterial Unknown IIB. >LAB MANUAL EX., OXIDATION AND FERMENTATION TESTS (green box p. 167) >LAB MANUAL EX., MULTIPLE TEST MEDIA (green box p. 185) (We will do <u>ONLY</u> the test for hydrogen sulfide production using SIM medium.) >LAB MANUAL EX., HYDROLYTIC/DEGRADATIVE REACTIONS (green box p. 179) (Modification: we will use tributyrin agar rather than spirit blue agar for the lipid hydrolysis test. On tributyrin agar, a clear zone around the bacterial growth indicates a positive test for lipid hydrolysis.) >DISCUSSION ABOUT DETERMINING THE GENUS (OR GENUS AND SPECIES) OF YOUR UNKNOWN IA. SEE HANDOUT PROVIDED BY INSTRUCTOR. >MONITOR WINOGRADSKY COLUMNS</p>	
Thurs. Oct. 24	Viruses	Chap. 8 & 10
Thurs. Oct. 24L	<p>>Finish LAB MANUAL EX., OXIDATION/FERMENTATION TESTS >Finish LAB MANUAL EX., MULTIPLE TEST MEDIA (test for hydrogen sulfide production only) >Finish LAB MANUAL EX., HYDROLYTIC/DEGRADATIVE REACTIONS (Recall that on tributyrin agar, a clear zone around the bacterial growth indicates a positive test for lipid hydrolysis.) Record results in lab notebook, and on descriptive chart. <u>THIS IS THE LAST DAY FOR LAB WORK ON UNKNOWN IA.</u> Answer: questions 4-9 and 13 in part B on green box p. 189-191; matching sets 1-4 on green box p. 191-192. Work on lab report on unknown IA.</p>	

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Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Thurs. Oct. 24L	(.....Continued from preceding page) YOU SHOULD BE ABLE TO DETERMINE THE GENUS (OR GENUS AND SPECIES) OF YOUR UNKNOWN IA AFTER THIS LAB. SEE HANDOUT PROVIDED BY INSTRUCTOR.	
Tues. Oct. 29	Microbial genomics Genetics of <i>Bacteria & Archaea</i>	Chap. 9 & Chap. 18 (p. 600-603) Chap. 11
Tues. Oct. 29L	> SUPPL. EX., ENUMERATION OF BACTERIA ASSOCIATED WITH FRESH PRODUCE (SPREAD-PLATE TECHNIQUE) <u>WORK IN GROUPS OF 2 FOR THIS EXERCISE.</u> > <u>BEGIN TO WORK DILUTION PROBLEMS IN COURSE PACK</u> > MONITOR WINOGRADSKY COLUMNS >> <u>OPTIONAL: Hand in your stapled primary source concerning the pathogen you selected.</u> The instructor will provide feedback if you hand in the article today; however, points will not be awarded until you submit the article immediately after your brief report during lab.	
Thurs. Oct. 31	Genetics of <i>Bacteria & Archaea</i> Genetic engineering & biotechnology (selected topics)	Chap. 11 Chap. 12
Thurs. Oct. 31L	>COMPLETE SUPPL. EX., ENUMERATION OF BACTERIA ASSOCIATED WITH FRESH PRODUCE Record your results on board. > <u>WORK DILUTION PROBLEMS IN COURSE PACK</u> > HAND IN LAB REPORT ON BACTERIAL UNKNOWN IA. > MONITOR WINOGRADSKY COLUMNS	
Tues. Nov. 5	Microbial growth control (<u>Assigned reading will be given.</u>)	Chap. 5, 28, & 7
Tues. Nov. 5L	>BEGIN SUPPL. EX., <i>Staphylococcus aureus</i> (broth) >SUPPL. EX., PLAQUE ASSAY OF A PHAGE SUSPENSION – WORK IN GROUPS OF 2 > ASK QUESTIONS ON DILUTION PROBLEMS > MONITOR WINOGRADSKY COLUMNS (LAST WEEK)	
Thurs. Nov. 7	Biofilms (<u>Assigned reading will be given.</u>) Human Microbiome Innate immunity	Chap 5, 7 (7.9), & 20 (20.4, 20.5) Chap. 24 Chap. 26
Thurs. Nov. 7L	>CONTINUE SUPPL. EX., <i>Staphylococcus aureus</i> (mannitol salt agar) >FINISH SUPPL. EX., PLAQUE ASSAY OF A PHAGE SUSPENSION – Record results on board. <u>THERE WILL BE A WORK SESSION ON DILUTION PROBLEMS DURING LAB</u> > MONITOR WINOGRADSKY COLUMNS (LAST WEEK)	
Tues. Nov. 12	Innate immunity; adaptive immunity	Chap. 26-28
Tues. Nov. 12L	>CONTINUE SUPPL. EX., <i>Staphylococcus aureus</i> (TSA plates) >LAB MANUAL EX., ENTEROTUBE (ENTEROPLURI) SYSTEM, (green box p. 193) > WORK ON LAB REPORT ON WINOGRADSKY COLUMNS	
Thurs. Nov. 14	EXAM 3 (will include both class and lab material)	

Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Thurs. Nov. 14L	>FINISH SUPPL. EX., <i>S. aureus</i> >SUPPL. EX., STAPHAUREX* RAPID AGGLUTINATION TEST FOR <i>S. aureus</i> IDENTIFICATION Record results. >FINISH LAB MANUAL EX., ENTEROTUBE (ENTEROPLURI) SYSTEM (Record results on board.) > HAND IN LAB REPORT ON WINOGRADSKY COLUMNS	
Tues. Nov. 19	Adaptive immunity Practical applications of immunology Microbial identification & clinical microbiology	Chap. 26-28 Chap. 26-28 Chap. 28 (Fig. 28.4)
Tues. Nov. 19L	>LAB MANUAL EX., KIRBY-BAUER METHOD (ANTIMICROBIAL AGENTS) (green box p. 139) Practical applications of immunology > <u>WORK ELISA AND IMMUNOFLUORESCENCE PROBLEMS (SEE COURSE PACK)</u>	Chap. 26-28
Thurs. Nov. 21	Practical applications of immunology Microbial identification & clinical microbiology Human-microbe interactions; pathogenesis Epidemiology & public health	Chap. 26-28 Chap. 28 (Fig. 28.4) Chap. 24, 25 Chap. 29
Thurs. Nov. 21L	>FINISH LAB MANUAL EX., KIRBY-BAUER METHOD (ANTIMICROBIAL AGENTS) Record data & answer questions in lab manual. Practical applications of immunology > <u>WORK ELISA AND IMMUNOFLUORESCENCE PROBLEMS (SEE COURSE PACK)</u>	Chap. 26-28
Tues. Nov. 26	Human-microbe interactions; pathogenesis Epidemiology & public health Microbial diseases (selected topics)	Chap. 24, 25 Chap. 29 Chap. 30-33
Tues. Nov. 26L	>LAB MANUAL EX., SPORE STAINING (green box p. 105) (Modified Schaeffer-Fulton Method) On one slide prepare a smear of the <i>Bacillus</i> species provided. Allow smear to air dry, and then heat fix it. Put on gloves, and try to be neat. (You are responsible for cleaning up any spills of malachite green.) Cover the smears with a cut piece of paper towel that does not extend over the edges of the slide. Hold the slide with a clothespin or slide holder and soak the towel with malachite green. Heat the slide <u>intermittently</u> over the flame of the bunsen burner so that it “steams” for 5 minutes. Do NOT let the paper towel dry out—add more malachite green as needed. Allow the slide to cool and then remove the paper towel. Proceed with steps 2 through 5 as described in the lab manual version of this exercise (see the figure on green box p. 106). Complete drawings/ questions in lab manual. You may also try the <u>quick spore stain variation on the Schaeffer-Fulton method</u> which is in the lab manual on green box p. 106-107.	
Thurs. Nov. 28	<u>Thanksgiving break</u>	
Tues. Dec. 3	Microbial diseases (selected topics)	Chap. 30-33
Tues. Dec. 3L	<u>INDIVIDUAL REPORTS ON PATHOGENS</u>	
Thurs. Dec. 5	Microbial diseases (selected topics)	Chap. 30-33
Tues. Dec. 5L	<u>INDIVIDUAL REPORTS ON PATHOGENS</u>	

ADDITIONAL INFORMATION

Course Content: We will not be covering all of the material in the textbook and lab manual. Please read the pertinent sections of the textbook and lab manual, and make use of the tables and illustrations. Study questions and online resources for the textbook may also be useful. **Specific assigned readings on particular topics may be announced in class or lab, or they may be posted on BlazeView.**

Laboratory:

1. Laboratory exercises are an integral part of microbiology. Students are expected to attend ALL laboratory sessions, to be on time at the beginning of the period, and to complete all assigned laboratory exercises. There will be no makeups for the laboratory exercises.
2. Each student must **read the laboratory exercises for the day, any additional required readings (noted in the syllabus), and any notes pertaining to the lab exercises (in the syllabus) before coming to the laboratory.** This will allow the student to complete the exercises in an efficient and informed manner. Exercises indicated as “SUPPL. EX.” may be in the course pack. Alternatively, the instructor may provide a separate handout.
3. **Each student is required to wear proper attire in the lab (as noted in the lab safety guidelines), and to bring his/her course syllabus, lab manual, course pack and/or relevant handouts, and lab notebook to the lab. A student who comes to the lab without these essentials may not be permitted to complete the lab.**
4. Microscopes will be assigned and spot checks will be made to ensure that they are clean and properly stored. Misuse or mishandling of the microscopes will result in the loss of points (20 points per occurrence). After you have finished using your microscope, please consult the "microscope checklist" to be certain that you have followed the proper procedures.
5. Each student must record the results of the lab exercises and answer the related questions, as noted in the syllabus. In some cases, **lab reports** are due as indicated in the course schedule. If a student misses a portion of the lab work relating to a required lab report, the student’s report will be worth a maximum of 85% of the points allotted for the report. Each student must turn in his/her own **rRNA report**, as well as an **individual Winogradsky Column Project report**. For details about the Winogradsky report, please see pages 4 and 5. For the lab reports on bacterial unknowns IA and IIB, details are given in item #6.
6. **THE LAB REPORT FOR UNKNOWN IA MAY BE DONE INDIVIDUALLY OR WITH ONE OR MORE MEMBERS OF YOUR GROUP.** It must be organized in a thin folder that contains the following five, separate items. **Item [1] should be a title page with the unknown IA number and your name(s).** **Item [2] is worth 45% of the grade** and must be a neat and complete copy of the descriptive chart (green box p. 161 in lab manual) with the results of all of the tests performed. **Be sure to add the results of the O/F glucose test at the bottom of the chart.** Do not make your own table—use the one in the lab manual or a photocopy of it. **Item [3] is worth 15% of the grade** and must be a neat and complete copy of the table of results from the exercise entitled, SUPPL. EX., VARIOUS MEDIA. In this table, be sure to include the results for **both** desoxycholate agar and MacConkey agar if both media were used. **Item [4] is worth 40% of the grade** and must be the completed “identification form” provided by the instructor. This form provides space for you to indicate the unknown IA number, the GROUP to which your unknown IA belongs, and the GENUS (or GENUS & SPECIES) of your unknown IA.
THE BRIEF LAB REPORT FOR UNKNOWN IIB MUST BE DONE WITH YOUR GROUP MEMBER(S). It must consist of three parts: **[1]-(worth 65% of grade)**, a complete, organized, detailed, and dated record of each step involved in the isolation of unknown IIB, **[2]-(worth 15% of grade)**, drawings showing the appearance of the growth of the unknown IIB in the 2 fluid thioglycollate broth tubes, and **[3]-(worth 20% of grade)**, a conclusion about the oxygen requirements of unknown IIB.
7. A separate lab exam will not be given. However, **please note that the exams given during class periods (as well as the final exam) will include material covered during lab, including dilution problems.**
8. **Oral Presentations on Scientific Articles about Microbial Pathogens.** During the laboratory portion of the course, each student will give a **brief, 3- to 4-minute oral report** about a particular microbial pathogen selected (by lottery) from a list provided by the instructor. **Once a topic is chosen it may not be changed.** Students should use the textbook as a starting point to

obtain background information. Then they must locate **one formal, peer-reviewed, scientific article** about the pathogen. **This article must be a primary source (NOT a review article) that was published between 2011 and 2019; it must also list references at the end, and the listed references must be cited within the article. The primary source must be two or more pages long.** Perhaps students might consider trying to locate a suitable primary source in “Emerging Infectious Diseases” or possibly in “Morbidity and Mortality Weekly Reports” (MMWR), both of which are available free online at www.cdc.gov. Additional peer-reviewed, scientific and medical journals are available in the Odum library and/or online. The article may be obtained through interlibrary loan; however, this process is not recommended because it takes additional time. **Above all, please select a primary source that you will be able to read and understand. Approximately 2/3 of the presentation should focus on the primary source; the remaining 1/3 should consist of background information on the pathogen. Practice your talk and aim for 3 minutes; you will not be permitted to speak for more than 4 minutes.** Due to the short nature of these presentations, PowerPoint and other electronic illustrations may **NOT** be used. You may, however, write on the board, show a poster, or use a handout. Informal articles, Web sites, Internet articles or fact sheets, newspaper articles, magazine articles, book reviews, and letters to the editor are NOT acceptable sources. Students should make every effort to ensure the accuracy of the information in their reports. Should a report contain inaccurate information, the presenter should expect to be questioned about it as well as about the source of the information. **Immediately after giving the presentation, the student must turn in a complete, readable, paper copy of the primary source (including readable figures and tables).**

Please note that there will be no makeups for any of the oral presentations, except in the event of a documented, serious emergency.

Attendance, Participation, and Tardiness:

In accordance with VSU policy, attendance and participation will be checked both in class and in the laboratory. The VSU Undergraduate Catalog states, “A student who misses more than 20% of the scheduled classes of a course will be subject to receiving a failing grade in the course.” The remainder of this paragraph outlines the laboratory/student oral presentation period attendance policy, except that there is a special policy for the lab period on **Jan. 22** (see note in schedule). Attendance is required during ALL labs and student presentation periods. A student who has perfect lab attendance or who misses only one laboratory/student presentation period will receive 25 bonus points. A student who misses (or fails to complete) two to three laboratories/student presentation periods will receive 15 bonus points. Missing (or failing to complete) additional laboratories/student presentation periods will result in the **loss of points** as follows. Ten points will be deducted from the student’s total points for the fifth missed or incomplete period; 20 additional points will be deducted for the sixth missed or incomplete period; 40 additional points will be deducted for the seventh missed or incomplete period, and 40 additional points will be deducted for each subsequent missed or incomplete period. Students who are habitually late for lab or student oral presentation periods will be marked late. Coming late to lab or student presentation periods two times will be counted as one absence. **A student with more than 6 missed or incomplete laboratories/student presentation periods will not pass the course. There will be no makeups for the laboratory exercises.**

Examinations Given During Class Periods:

1. Examinations 1-4 will cover material presented during **both the class and laboratory portions of the course.** Examinations will begin promptly at the times and dates indicated on the class schedule. The final examination (Exam 4) will be **comprehensive** in that it will include material covered throughout the course. Exams 2 and 3 will be **comprehensive** in that up to 25% of the points on the exam may cover material presented before any earlier examination. Exams may include questions of the multiple-choice, matching, true-false, short-answer, and essay formats. A student who misses an examination should notify the instructor promptly. Arrangements for a make-up exam must be made within one week after the exam date; otherwise, a make-up exam will not be given. Make-up examinations may consist entirely of questions of the short answer and essay formats and will be worth fewer points than the regularly-scheduled exams.
 2. Students must bring **two #2 pencils and erasers** to all examinations. The instructor will not provide pencils. Also, please bring a pen that has dark ink (black or dark blue). The pen will be used for completing short-answer questions, diagrams, and essay questions. **Unless otherwise noted, students may NOT use calculators during examinations.**
 3. Please read items 5, 6, and 7 on page 2 of this syllabus for additional, important information about exams.
 4. Exams will not be returned to students. After grading has been completed, the instructor will bring the exams to one of the lab periods for students to view. If a student needs additional time to view an exam, or if a student is absent from lab on the day a particular exam is viewed, the student must make an appointment with the instructor within one week of the day the exam is viewed in lab.
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Late Assignments & Failure to Turn in Assignments:

Please make a calendar noting when assignments and lab reports are due. Turning in an assignment/report 1-3 days late will result in a deduction of 20% of the points for that assignment. Turning in an assignment 4-7 days late will result in a deduction of 50% of

the points for that assignment. **No points will be awarded for an assignment that is late by more than 7 days.** Students should note that completion of all assignments and reports is required in order to pass the course. Students will not be notified by the instructor for failing to turn in course assignments. Late assignments must be given directly to the instructor. They may NOT be placed in the instructor's mailbox. It is also not acceptable to slide late assignments under the instructor's office door.

Grading, points for each exam/assignment, and requirements to pass the course are outlined below.

Points for the course are allocated as follows:

EXAMS 1, 2, & 3 (Sept. 17, Oct. 17, & Nov. 14) (150 points each x 3=450).....	450	POINTS
EXAM 4 (FINAL EXAM –Dec. 10).....	185	POINTS
SLIDE/MICROSCOPE/DRAWING FOCUSING CHECKS (Course objective ZA) (Sept. 10, 17, & 24).....	25	POINTS
rRNA LAB REPORT (Course objective ZD) – (Oct. 10).....	20	POINTS
LAB REPORT ON UNKNOWN IIB (Course objectives ZB, ZC, ZD)--(Oct.. 22).....	40	POINTS
REPORT ON UNKNOWN IA (Course objectives ZB, ZC, ZD) – (Oct. 31).....	90	POINTS
INDIVIDUAL LAB REPORT ON WINOGRADSKY COLUMN PROJECT (Course objectives G2, T, ZB, ZF) - (Nov. 14).....	130	POINTS
INDIVIDUAL ORAL REPORT ON PATHOGEN (Course objective ZH) – (Dec. 3 & 5).....	45	POINTS
PRIMARY SOURCE FOR ORAL REPORT ON PATHOGEN (Course objective ZG) – (Dec. 3 & 5).....	15	POINTS
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TOTAL FOR COURSE	1000	POINTS

There are FOUR REQUIREMENTS TO PASS the course:

1. Do not miss (or fail to complete) any more than 6 laboratories or student presentation periods.
2. Complete and turn in all assignments and lab reports.
3. Obtain at least 40% of the points for **EACH** assignment and lab report.
4. Have a total of 600 or more points for the course.

Students should read the entire syllabus carefully so they understand the course policies & procedures.

The grade is "F" for a student who obtains less than 600 total points **or** fails to meet one of the other requirements for passing the course (see above list).

GRADING SCALE: 900-1000, A; 800-899, B; 700-799, C; 600-699, D; < 600, F
