
Biology Department, College of Arts & Sciences, Valdosta State University

SPRING 2009----COURSE SYLLABUS*

BIOL 3100, Sections A & B. Microbiology (CRN 20585 & 20586) - 4 credit hours

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

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Course Description:

BIOL 3100 Microbiology 3-3-4 (4 credit hours)

Prerequisites: BIOL 2010, BIOL 2230, BIOL 2270, CHEM 1212/1212L. **Recommended:** CHEM 3402.

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 Materials:

Textbook: **BROCK BIOLOGY OF MICROORGANISMS, Twelfth Edition**
by Michael T. Madigan, John M. Martinko, Paul V. Dunlap, and David P. Clark
Prentice Hall 2009

Laboratory Manual: **BENSON'S MICROBIOLOGICAL APPLICATIONS, LABORATORY MANUAL
IN GENERAL MICROBIOLOGY (Complete Version), Eleventh Edition**
by Alfred E. Brown
McGraw-Hill, Inc. 2009

Other Materials: Calculator that is not integrated with a cell phone
Permanent, fine-tip marking pen ("Sharpie") for labeling cultures in lab
One CD (or jump drive) for oral presentation
One thin, light-weight folder for handing in references & other assignments (Please do not
use a 3-ring binder to hand in assignments.)
Paper clips or stapler/staples for organizing references & assignments

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, Fall Semester Calendar, Schedule of Classes, & Registration Guide for information about VSU policies and procedures regarding registration, drop/add, and withdrawal. March 5 is midterm. Students may not withdraw after midterm except in cases of hardship.
 3. Students requesting classroom accommodations or modifications because of a documented disability should discuss this need with the instructor at the beginning of the semester. These students must contact the Access Office for Students with Disabilities located in Farber Hall. The phone numbers are 245-2498 (V/VP) and 219-1348 (TTY).
 4. Cell phones may not be used during examinations or at any time in class or lab.
 5. Students must read and follow the Student Code of Conduct as outlined in the VSU Student Handbook. VSU policies regarding academic dishonesty are explained in Appendix A, Section 1.
 6. Students must read and follow the Biology Department policy on plagiarism (available online through the departmental web site). The instructor may use a variety of methods for detecting plagiarism.
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***This is a tentative syllabus. Changes to this syllabus will be announced during class or laboratory periods; alternatively, changes will be posted on WebCT.**

Course Objectives:

(Page 3 shows how the objectives below are aligned with the VSU General Education Outcomes and the Biology Department Education Outcomes.)

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, energy, and electrons.
- G. 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.
- 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. Describe specific 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.
- R. Discuss the problem of antimicrobial drug resistance, and explain several ways in which the emergence of drug resistant bacteria can be minimized.
- S. Give examples of beneficial interactions between: (i) microorganisms and plants, (ii) microorganisms and animals, and (iii) different types of microorganisms.
- T. 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, 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 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 determine 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 and organize data, and write a formal report in the format used in a scientific journal.
- ZG. Use library and electronic resources to obtain formal scientific articles related to a particular topic in microbiology.
- ZH. Read the articles mentioned in objective ZG and give an oral presentation based on them.

Alignment of Assignments with Course Objectives:

The course objective(s) aligned with each assignment are given on page 11.

Alignment of Course Objectives with VSU General Education Outcomes & Biology Department Educational Outcomes:

The VSU General Education Outcomes (1-8) are available online at

<http://www.valdosta.edu/academic/VSUGeneralEducationOutcomes.shtml>.

In this syllabus, the VSU General Educational Outcomes are designated as: VSU1-VSU8

The Biology Department Educational Outcomes (1-5) are in the Undergraduate Catalog on page 108. The catalog is available online through <http://www.valdosta.edu>. In this syllabus the Biology Department Educational Outcomes are designated as: B1-B5.

The course objectives that are aligned with the VSU General Education Outcomes and Biology Department Educational Outcomes are given below:

<u>VSU or Biology Objective</u>	<u>Course Objective(s)</u>
VSU1	D, R, V, X, Y
VSU2	D, R, V, X, Y
VSU3	ZF, ZG, ZH
VSU4	ZB, ZF, ZH
VSU5	all course objectives
VSU6	-----
VSU7	G, ZA, ZE, ZF, ZH
VSU8	-----
B1	Z, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH
B2	A, B, D, H, J, K, L, N, O, R, X, Y
B3	A, D, E, F, G, H, I, O, P, Q, U, W, X, Y
B4	D, H, I, J, K, L, M, O, X, Y
B5	C, D, S, T, V

BIOLOGY 3100. Microbiology - Class and Lab Schedule

Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Tues. Jan. 13	General course information Microorganisms and microbiology	Chap. 1
Tues. Jan. 13L	> <i>Program #1, The Microbial Universe</i> >LABORATORY SAFETY (Read sheet in course pack & p. ix-xv in lab manual before Jan. 15.) SUPPL. EX., HANDWASHING <u>Wash your hands before leaving lab!</u> >PLEASE READ THE FOLLOWING BEFORE JANUARY 20: SUPPL. EX., WINOGRADSKY COLUMN; EX. 54 WINOGRADSKY COLUMN (IN LAB MANUAL), AND PAGES 654-657 IN THE TEXTBOOK. YOUR GROUP'S LAB REPORT ON THE WINOGRADSKY COLUMN PROJECT (DUE APRIL 16) must be written in the style of a scientific paper and must contain the following sections: <u>Title, Authors, Abstract, Introduction, Materials and Methods, Results, Discussion, Literature Cited, and an Appendix</u> . The Results section must include your group's organized observations on the Winogradsky columns, selected drawings, and a written description of the results. The Appendix must contain each lab group member's original written notes and drawings for the project, and each person's notes and drawings must be labeled with his/her name. The overall format for the report must follow the "Instructions for Authors" for the Journal of Bacteriology (available online at http://jb.asm.org/misc/ifora.shtml)	
Thurs. Jan. 15	Microorganisms and microbiology An overview of microbial life Cell structure/function <u>INDEPENDENT STUDY/REVIEW:</u> Review of chemistry and biochemistry; DNA structure & replication; transcription; translation	Chap. 1 Chap. 2 Chap. 4 Review Chap. 3 Review Chap. 7
Thurs. Jan. 15L	>LABORATORY SAFETY/LAB ORIENTATION (Read safety sheet in course pack & p. ix-xv in lab manual before today's lab.) >EX. 19, CULTURE MEDIA PREPARATION (Also read SUPPL. EX., Preparation of nutrient broth and nutrient agar) Students should be able to explain how nutrient broth, nutrient agar plates, and nutrient agar slants are prepared. Complete questions, p. 139-140 (lab manual). >PLEASE READ THE FOLLOWING BEFORE JANUARY 22: EX. 1, MICROSCOPY, "MICROSCOPE CARE & USE" (in the course packet), and "MICROSCOPE CHECKLIST" (in the course packet)	

Date	Topics/Lab Exercises	Related material in text
Tues. Jan. 20	Cell structure/function	Chap. 4
Tues. Jan. 20L	<p>>EX. 7, UBIQUITY OF BACTERIA, Complete steps 1-7, but omit step 6.</p> <p>>EX. 9, ASEPTIC TECHNIQUE <u>Wash your hands before leaving lab!</u></p> <p>>PLEASE READ THE FOLLOWING BEFORE TODAY'S LAB: SUPPL. EX., WINOGRADSKY COLUMN; EX. 54 WINOGRADSKY COLUMN (IN LAB MANUAL), AND PAGES 654-657 IN THE TEXTBOOK.</p> <ul style="list-style-type: none"> • <i>Discuss the Winogradsky Column Project with your lab group. Decide on a question, formulate a hypothesis, and decide how you will conduct the experiment. Decide on your assignments for the Winogradsky Column Project, and bring any required materials to lab on Tuesday, Jan. 27. Each group of 4 students will build at least two columns.</i> 	
Thurs. Jan. 22	Cell structure/function	Chap. 4
Thurs. Jan. 22L	<p>>EX. 1, MICROSCOPY (read before lab)</p> <p>>MICROSCOPE CARE & USE ; MICROSCOPE CHECKLIST (read before lab)</p> <p>>EX. 11, SMEAR PREPARATION & EX. 12 , SIMPLE STAINING (On a single slide, prepare a smear of <i>Saccharomyces cerevisiae</i>, and a separate smear of <i>Escherichia coli</i>. Use the technique for preparing smears from a slant culture [see Ex. 11], & stain with crystal violet [see Ex. 12].) We will use paper towels instead of bibulous paper. Use this slide in the exercise below (Suppl. Ex., Examination).</p> <p>>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> (Hand in your drawings to the instructor at the end of lab.)</p> <p>>FINISH EX. 9, ASEPTIC TECHNIQUE (Answer questions, p. 79-80.)</p>	
Tues. Jan. 27	Cell structure/function Eukaryotic microorganisms	Chap. 4 & 9 (pages 235-236) Chap. 18
Tues. Jan. 27L	<p>>EX. 8, THE FUNGI (Page 64, Fungi Study. You will prepare the plates we will use next week. Work in groups of 4 and expose 2 plates of Sabouraud dextrose agar to air for 45 minutes. Expose one plate inside the building and the other plate outside. Incubate the plates at room temperature until next week.)</p> <p>>FINISH EX. 7, UBIQUITY OF BACTERIA (Complete table, p. 57. Answer short answer questions 1 & 2 on page 58.) <u>Ask instructor to save any plates you want to use for fungal slides next week.</u></p> <p>>SUPPL. EX., WINOGRADSKY COLUMN (WE WILL USE TEXT, P. 654-657 THE PROCEDURE IN THE SUPPL. EX., BUT PLEASE READ EX. 54 IN THE LAB MANUAL AS WELL.) <u>Discuss plans for the lab report with your group.</u></p>	
Thurs. Jan. 29	Eukaryotic microorganisms	Chap. 18
Thurs. Jan. 29L	<p>> SUPPL. EX., ENUMERATION OF BACTERIA ASSOCIATED WITH FRESH PRODUCE <u>Work dilution problems in course pack.</u></p> <p>>ADDITIONAL SIMPLE STAIN: Aseptically remove a sterile swab from wrapping paper & swab your gums and teeth. Gently rub swab onto a DRY slide. Allow smear to air dry; then heat fix. Stain with <u>methylene blue</u>, rinse, and blot dry. Examine with oil immersion objective. Draw epithelial cells and bacteria on page 104 or 105.</p> <p>>MONITOR <u>WINOGRADSKY COLUMNS</u> (Record information about the columns and make neat, detailed drawings of any microorganisms observed. Use the information in EX. 6 , PROTOZOA, ALGAE, & CYANOBACTERIA to aid you in recognizing different groups of organisms. At some point during the semester, be sure you see and draw examples of protozoa, algae, & cyanobacteria. Since it has only been 2 days since the columns were set up, it is probably too soon to remove any of the biofilm slides.) <u>Discuss plans for the Winogradsky lab report with your group.</u></p>	
Tues. Feb. 3	Eukaryotic microorganisms Nutrition, culture, & metabolism of microorganisms	Chap. 18 Chap. 5 & 21

Date	Topics/Lab Exercises	Related material in text
Tues. Feb. 3L	<p>> COMPLETE SUPPL. EX., ENUMERATION OF BACTERIA ASSOCIATED WITH FRESH PRODUCE <u>Work dilution problems in course pack.</u> >FINISH EX. 8, THE FUNGI (Fungi Study – Do NOT open fungal cultures in the lab. Open them only in the biological safety cabinet. You will use transparent tape to prepare slides of two or more different molds. The instructor will describe this procedure. Examine the slides using the low power (10x) objective and the high dry (40x) objective. Draw the specimens on p.67, part A2. Also record a description of the appearance of the fungal colonies. Answer the questions on p. 68.) >EX. 13, NEGATIVE STAINING (We will use the method in Fig. 13.1); On page 102, follow steps 1-7, but omit step #4. Draw a few representative <i>Staphylococcus aureus</i> cells and <i>Bacillus subtilis</i> cells on page 104 or 105. Answer questions 1-5, page 106; and answer questions on page 107. (You may need to consult Ex. 14 to answer the questions about the capsule stain.) >MONITOR WINOGRADSKY COLUMNS</p>	
Thurs. Feb. 5	Nutrition, culture, & metabolism of microorganisms	Chap. 5, 21, & 20
Thurs. Feb. 5L	<p>>DISTRIBUTION OF GENERAL UNKNOWN CULTURES (RECORD THE GENERAL UNKNOWN #) READ ABOUT STOCK CULTURES IN EX. 20. (Prepare subcultures of unknown on nutrient agar slants. For your unknown, record dates, work done, drawings, results, etc. on your own unknown record sheet (in your lab notes/notebook). Also record the results on the descriptive chart on page 263. There are a few tests that are not listed in the chart on p. 263. <u>Please add the results of these tests at the bottom of page.</u> >EX. 10, PURE CULTURE TECHNIQUES, STREAK-PLATE METHOD ONLY Remove a very minute amount of your unknown culture and use it, along with a prepared nutrient agar plate, for doing the quadrant streak (method B on page 85), in order to grow isolated colonies. >EX. 15, GRAM STAINING, Prepare smears from nutrient agar slant cultures (<u>including your unknown</u>) as described on p.96 of lab manual. Complete drawings/questions, p. 119-122; omit questions 1 & 2 on p. 122.) Make a drawing of your unknown, and record the results of the gram stain on your unknown record sheet, as well as on the descriptive chart on page 263. >YOUR LAB REPORT ON THE GENERAL UNKNOWN (which is due on April 2) should be organized in a thin folder that contains the following: (i) a well-organized and complete copy of your unknown record sheets, including your drawings, (ii) a <u>neat and complete</u> copy of the descriptive sheet (p. 263 in lab manual) with the results of all of the tests performed (do not make your own table—use the one in the lab manual or a photocopy of it), (iii) a statement of your conclusion about the identity of the unknown bacterium (based on EX. 44 and <i>Bergey's Manual of Determinative Bacteriology</i>, and (iv) a paragraph explaining & discussing the following: how you arrived at your conclusion, any test results that are inconsistent with your conclusion, & any additional tests that would allow you to more specifically identify your unknown. <u>Do NOT describe the methods used for performing the various tests in your report.</u> You may prepare this report individually or with your lab partner. >HAND IN REFERENCES FOR ORAL PRESENTATION</p>	
Tues. Feb. 10	EXAM 1 (Material covered through Feb. 5)	
Tues. Feb. 10L	<i>Program #3, Metabolism</i>	Chap. 24 (p. 717-720); Chap. 25 (p. 749-755), & Chap. 36 (p. 1026-1032)
	<p>Go over EX. 22 (POUR PLATE TECHNIQUE) in lab book as another example of the use of dilutions. Ask questions about dilution problems. >CONTINUE EX. 10, EVALUATE STREAK-PLATE; IF ISOLATED COLONIES WERE OBTAINED, MEASURE THEIR DIAMETER (Be certain to record the time of incubation along with the diameter.) PREPARE ANOTHER STREAK PLATE OF YOUR UNKNOWN CULTURE, REFINING YOUR TECHNIQUE IF NECESSARY. Save the first streak plate in the pan provided; you will use it for performing the endospore stain in a later lab. >MONITOR WINOGRADSKY COLUMNS – <u>Discuss plans for lab report with your group.</u></p>	
Thurs. Feb. 12	Metabolic diversity of microorganisms	Chap.15, 16, & 17

Date	Topics/Lab Exercises	Related material in text
Thurs. Feb. 12L	<i>Program #3, Metabolism</i>	Chap. 24 (p. 717-720); chap. 25 (p. 749-755), & Chap. 36 (p. 1026-1032)
	<p>>FINISH EX. 10, EXAMINE STREAK PLATE OF UNKNOWN. Measure diameter of isolated colonies and record a description of colonies on your unknown record sheet and on the descriptive chart on p. 263. Be sure to record the incubation time along with the colony diameter and description. Consult p. 268 (Ex. 40) for information about describing colonies.</p> <p>>EX. 17, ACID-FAST STAINING (Ziehl-Neelsen Method: see below) Use 0.1% albumin solution instead of water for preparing the smears. On one slide prepare a smear of a mixture of <i>Mycobacterium smegmatis</i> & <i>Staphylococcus aureus</i>, as well as a separate smear of your unknown. Allow the smears to air dry, and then heat fix them. Put on gloves, and try to be neat. (You are responsible for cleaning up any spills of carbol fuchsin.) Cover the smears with a cut piece of paper towel. Hold the slide with a clothespin or slide holder and soak the towel with carbol fuchsin. 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 carbol fuchsin 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 in Figure 17.1 on page 118.</p> <p><u>Complete drawings/questions, p. 119-122; omit questions 1 & 2 on p. 122. Record results for unknown culture on unknown record sheet, and on the descriptive chart on p. 263.</u></p> <p>>ASK QUESTIONS ABOUT DILUTION PROBLEMS</p>	
Tues. Feb. 17	Metabolic diversity of microorganisms	Chap.15, 16, & 17
Tues. Feb. 17L	<p>>SUPPL. EX., VARIOUS MEDIA (CULTURES FOR DESOXYCHOLATE AGAR AND PHENYL ETHYL ALCOHOL AGAR: <i>Escherichia coli</i>, <i>Staphylococcus aureus</i>, <i>Pseudomonas aeruginosa</i>, & unknown) (CULTURES FOR BLOOD AGAR: <i>E. coli</i>, <i>S. aureus</i>, <i>Bacillus cereus</i>, & unknown)</p> <p>>A THROAT CULTURE WILL ALSO BE PERFORMED ON A BLOOD AGAR PLATE.</p> <p>>EX. 16, SPORE STAINING [Modified Schaeffer-Fulton Method: On one slide prepare a smear of the <i>Bacillus</i> species provided as well as a separate smear of your unknown, as described in the lab manual. Allow the smears to air dry, and then heat fix them. 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. 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. Proceed with steps 2 through 5 as described in the lab manual in Figure 16.1 on p. 114.</p> <p><u>Complete drawings/questions, p. 119-122; omit questions 1 & 2 on p. 122. Record results for unknown culture on unknown record sheet, and on the descriptive chart on p. 263.</u></p> <p>>MONITOR WINOGRADSKY COLUMNS- Work on lab report with your group.</p> <p>>WORK DILUTION PROBLEMS; ASK QUESTIONS ABOUT PROBLEMS</p>	
Thurs. Feb. 19	Microbial growth	Chap. 6
Thurs. Feb. 19L	<p>>EX. 33, ULTRAVIOLET LIGHT: LETHAL EFFECTS</p> <p>>FINISH SUPPL. EX., VARIOUS MEDIA -- Record results in the table provided with the exercise.</p> <p><u>ALSO, record results for your unknown on your unknown record sheet, and on the descriptive chart on p. 263.</u></p> <p><u>Consider the following question: Is the pattern of growth of your unknown on the selective media consistent with the results you obtained in the Gram stain?</u></p> <p>>WORK DILUTION PROBLEMS; ASK QUESTIONS ABOUT PROBLEMS</p> <p><u>>PICK UP 2 STERILE, 50 ML TUBES TO ASEPTICALLY COLLECT FRESH WATER SAMPLE</u></p>	
Tues. Feb. 24	Microbial molecular biology DNA structure & replication; transcription, translation	Chap. 3, 7, & 8

Date	Topics/Lab Exercises	Related material in text
Tues. Feb. 24L	<p><u>REMEMBER TO BRING 2 TUBES WITH FRESH WATER SAMPLE FOR TODAY'S LAB.</u> >EX. 61, BACTERIOLOGICAL EXAMINATION OF WATER (You will use the water collected in 2 sterile, 50 ml tubes for this exercise.) >PREPARE NEW STOCKS OF UNKNOWNNS >EX. 18, MOTILITY DETERMINATION (TUBE METHOD ONLY) (You will inoculate tubes of motility medium with <i>Staphylococcus aureus</i>, <i>Proteus vulgaris</i>, & your unknown . >EX. 40, CULTURAL CHARACTERISTICS (You will inoculate your unknown in/on the following: nutrient agar slant [use a straight inoculation line], 2 tubes nutrient broth [one to be incubated at room temperature, and the other at 37° C], motility medium [done in Ex. 18 above], nutrient gelatin deep, and fluid thioglycollate medium.) >EX. 21, CULTIVATION OF ANAEROBES – We will not do this exercise, but you should read it with particular attention to the information about fluid thioglycollate medium. FINISH EX. 33, ULTRAVIOLET LIGHT: LETHAL EFFECTS (Observe demonstration; record results & answer questions on p. 223-224.) >MONITOR WINOGRADSKY COLUMNS</p>	
Thurs. Feb. 26	<p>Microbial molecular biology DNA structure & replication; transcription, translation Regulation of gene expresiion</p>	<p>Chap. 7 & 8 Chap. 9</p>
Thurs. Feb. 26L	<p>>CONTINUE EX. 61, BACTERIOLOGICAL EXAMINATION OF WATER (MPN+EMB/MAC) We will use MacConkey agar instead of Endo agar. <u>Be sure to streak the plates to obtain isolated colonies.</u> >FINISH EX. 40. (Record results on unknown record sheet and on descriptive chart on p. 263. Please note that the nutrient gelatin tubes must be refrigerated briefly before the results can be read. Consult Ex. 21 for information about fluid thioglycollate medium.) .>FINISH EX. 18, MOTILITY (TUBE METHOD & WET MOUNT) (On pages 127-128, draw the motility tubes and answer questions 3 & 5 in part B. Prepare a wet mount of the nutrient broth culture of your unknown and examine for motility using the microscope. Record the results of the motility tube test and wet mount for the unknown on the record sheet and in the descriptive chart on p. 263.) FINISH EX. 33, ULTRAVIOLET LIGHT: LETHAL EFFECTS (Observe demonstration; record results & answer questions on p. 223-224.) (IF NOT DONE ON TUES.) >MONITOR WINOGRADSKY COLUMNS (IF NOT DONE ON TUES.)</p>	
Tues. Mar. 3	<p>Regulation of gene expression</p>	<p>Chap. 9</p>
Tues. Mar. 3L	<p>>COMPLETE EX. 61, BACTERIOLOGICAL EXAMINATION OF WATER (If you have an EMB plate that shows colonies with a green metallic sheen, or if you have a MacConkey plate that shows pink colonies, please give the plate to the instructor. We will omit the “completed test procedure” and the IMViC tests.) Answer questions 4-9 on p. 398-399. >PREPARE NEW STOCKS OF UNKNOWNNS >EX. 41, OXIDATION AND FERMENTATION TESTS >EX 43, LITMUS MILK TEST & TEST FOR HYDROGEN SULFIDE PRODUCTION (SIM MEDIUM) ONLY >EX. 32, WATER ACTIVITY AND OSMOTIC PRESSURE >MONITOR WINOGRADSKY COLUMNS</p>	
Thurs. Mar. 5	<p>Viruses</p>	<p>Chap. 10 & 19</p>
Thurs. Mar. 5L	<p>>FINISH EX. 41(EXCEPT VP TEST – continue incubating) >EX. 43 (FINISH TEST FOR HYDROGEN SULFIDE PRODUCTION; <u>LITMUS MILK – Observe results & continue incubating tubes</u>) Record information on unknown record sheet, and on descriptive chart on p. 263. >CONTINUE EX. 32, WATER ACTIVITY AND OSMOTIC PRESSURE ASK QUESTIONS ABOUT DILUTION PROBLEMS</p>	
Tues. Mar 10	<p>EXAM 2 (material covered through Mar. 5)</p>	

Date	Topics/Lab Exercises	Related material in text
Tues. Mar. 10L	>FINISH VP TEST (EX. 41) >EX. 43, FINISH LITMUS MILK (Record results on unknown record sheet & descriptive chart on p. 263) >EX. 42, HYDROLYTIC/DEGRADATIVE REACTIONS (Modification: we will use tributyrin agar rather than spirit blue agar for the lipid hydrolysis test.) > <u>Do the following online exercise on your own:</u> >SUPPL. EX., USING RIBOSOMAL RNA GENE SEQUENCES TO LEARN ABOUT A MICROORGANISM >CONTINUE EX. 32, WATER ACTIVITY AND OSMOTIC PRESSURE >MONITOR WINOGRADSKY COLUMNS – <u>Work on lab report with your group.</u>	
Thurs. Mar. 12	Viruses Microbial genetics	Chap. 10 & 19 Chap. 11
Thurs. Mar. 12L	>FINISH EX. 32, WATER ACTIVITY AND OSMOTIC PRESSURE Record results and answer questions on p. 219. >FINISH EX. 42, HYDROLYTIC/DEGRADATIVE REACTIONS Answer questions 4-9 in part B, p. 291-292. In addition, answer questions in part C, p. 293-294. Record results on unknown on record sheet, and in descriptive chart on p. 263. >READ EX. 44, USE OF BERGEY'S MANUAL, & EXAMINE APPENDIX 2 (TEXT) >BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY is on reserve in the library. Consult it to find out which additional tests would allow you to more specifically identify your unknown. You will need this information for your lab report.	
SPRING BREAK		
Tues. Mar. 24	Microbial genetics	Chap. 11
Tues. Mar. 24L	>SUPPL. EX., PLAQUE ASSAY OF A PHAGE SUSPENSION READ pages 173-175 in the lab manual. <u>Ask questions on dilution problems.</u> >EX. 35, EFFECTIVENESS OF ALCOHOL >MONITOR WINOGRADSKY COLUMNS <u>>WORK ON YOUR WINOGRADSKY COLUMN PROJECT WRITTEN REPORT.</u>	
Thurs. Mar. 26	Genetic engineering & Biotechnology Microbial genomics Microbial evolution & systematics	Chap. 12 & 26 Chap. 13 Chap. 14
Thurs. Mar. 26L	>COMPLETE SUPPL. EX., PLAQUE ASSAY. <u>Ask questions on dilution problems.</u> >FINISH EX. 35, EFFECTIVENESS OF ALCOHOL >SUPPL. EX., BACTERIOLOGICAL ANALYSIS OF URINE (RECORD UNKNOWN #) > HAND IN SUPPL. EX., RIBOSOMAL RNA SEQUENCES	
Tues. Mar. 31	Microbial identification & clinical microbiology Microbial growth control	Chap. 32 Chap. 27
Tues. Mar. 31L	> SUPPL. EX., BACTERIAL CONJUGATION (Not in course pack—instructor will give handout.) >EX. 36, KIRBY-BAUER METHOD >EX. 37, EVALUATION OF ANTISEPTICS & DISINFECTANTS (Paper disk method; this exercise will be slightly modified.) >CONTINUE SUPPL. EX., URINE (Inoculate Enterotube II;)--See EX. 46, ENTEROTUBE II (We will omit the Kirby-Bauer antibiotic sensitivity tests described in the urine exercise.) >MONITOR WINOGRADSKY COLUMNS (LAST WEEK FOR COLUMN OBSERVATIONS)	
Thurs. Apr. 2	Microbial growth control Microbial ecology >SUPPL. EX., <i>Staphylococcus aureus</i> EXPERIMENT	Chap. 27 Chap. 23, 24, & 26

Date	Topics/Lab Exercises	Related material in text
Thurs. Apr. 2L	> SUPPL. EX., <i>Staphylococcus aureus</i> EXPERIMENT > COMPLETE SUPPL. EX., BACTERIAL CONJUGATION (Record results & answer questions.) > FINISH EX. 36 & 37; RECORD DATA & ANSWER QUESTIONS IN LAB MANUAL > FINISH SUPPL. EX., URINE & EX. 46 ENTEROTUBE II--- <u>HAND IN THIS LAB REPORT</u> > MONITOR WINOGRADSKY COLUMNS (IF NOT DONE ON TUES.; LAST WEEK FOR COLUMN OBSERVATIONS) > HAND IN LAB REPORT ON GENERAL (FIRST) UNKNOWN	
Tues. Apr. 7	Innate immunity; adaptive immunity	Chap. 29, 30, & 31
Tues. Apr. 7L	> VIDEO SEGMENTS > <i>Program #9, Microbial Control</i> > CONTINUE SUPPL. EX., <i>Staphylococcus aureus</i> (Record results on board. Streak for isolation on a plate of tryptic soy agar using presumptive <i>S. aureus</i> isolate—plate will be used on Thurs. for EX. 73. We will omit the Kirby-Bauer antibiotic sensitivity tests.) <u>Work on Winogradsky column lab report with your group.</u>	
Thurs. Apr. 9	Adaptive immunity	Chap. 29, 30, & 31
Thurs. Apr. 9L	> FINISH SUPPL. EX., <i>Staphylococcus aureus</i> > EX. 73, LATEX AGGLUTINATION TEST FOR <i>S. aureus</i> identification. (We will use a slightly different test from another manufacturer. The instructor will explain the principle of this test.) <u>Work on Winogradsky column lab report with your group.</u>	
Tues. Apr. 14	Adaptive immunity	Chap. 29, 30, & 31
Tues. Apr. 14L	LAB EXAM	
Thurs. Apr. 16	Practical applications of immunology > <u>WORK ELISA AND IMMUNOFLUORESCENCE PROBLEMS (SEE COURSE PACKET)</u> Human-microbe interactions Epidemiology & public health	Chap. 29-32 Chap. 28 Chap. 33
Thurs. Apr. 16L	<u>Hand in Winogradsky column lab report for your group.</u> <u>Complete percent effort forms for your Winogradsky group (required).</u> STUDENT ORAL PRESENTATIONS	
Tues. Apr. 21	EXAM 3 (Material covered through April 16)	
Tues. Apr. 21L	STUDENT ORAL PRESENTATIONS	
Thurs. Apr. 23	Human-microbe interactions Epidemiology & public health	Chap. 28 Chap. 33
Thurs. Apr. 23L	STUDENT ORAL PRESENTATIONS	
Tues. Apr. 28	Person-to-person microbial diseases	Chap. 34
Tues. Apr. 28L	STUDENT ORAL PRESENTATIONS	
Thurs. Apr. 30	Person-to-person microbial diseases Other microbial diseases	Chap. 34 Chap. 35, 36, & 37
Thurs. Apr. 30L	STUDENT ORAL PRESENTATIONS	

Date	Topics/Lab Exercises	Related material in text
Tues. May 5	COMPREHENSIVE FINAL EXAM (EXAM 4) – 10:15 am – 12:15 pm	

ADDITIONAL INFORMATION

Course content: We will not be covering all of the material in the textbook and lab manual. Please read the sections of the textbook and lab manual that pertain to the topics covered, and make use of the tables and illustrations. Study questions and online resources for the textbook may also be useful. **Specific assigned readings may be announced in class or lab.**

Laboratory:

- 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.
- 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.
- Each student must **read the laboratory exercises for the day, any additional required readings from the lab manual (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.
- Each student must record the results of the lab exercises and answer the related questions, as noted in the syllabus. Preferably, lab records should be kept in a loose-leaf notebook. 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 drawings (Jan. 22). However, the Winogradsky Column Project report must be prepared with your lab group (due April 16). For the remaining reports [general unknown and urine unknown (both due April 2)], students may prepare their lab reports individually, or they may work with their lab partners and turn in joint reports.
- One **lab exam** will be given. It will include dilution problems as well as other material covered during the lab. If a student misses the lab exam, the instructor should be notified promptly. Arrangements for a make-up exam must be made within one week after a student misses the lab exam; otherwise, a make-up will not be given. The make-up exam will be worth 85% of the points allotted for the regularly-scheduled exam.
- Oral Presentations.** During the laboratory portion of the course, each student will give an 8- to 10-minute **oral report** on a peer-reviewed, primary scientific article or case study selected from a list provided by the instructor. Students will draw numbers to indicate the order in which they will select articles and give their presentations. Once a topic is chosen it may not be changed. Students should search databases in GALILEO to find related, formal scientific articles. Some peer-reviewed, scientific journals are available in the Odum library and/or online. At least three formal articles (including the original article chosen) from PEER-REVIEWED, PROFESSIONAL JOURNALS must be used to prepare the presentation. Only one of these articles may be a review article; the others must be primary sources. Complete, stapled (or paper-clipped) copies of these articles must be placed in a thin folder & handed in on Feb. 5. The folder with the articles must again be provided to the instructor on the day of the presentation. Articles must list references at the end. Informal articles, Web sites, Internet articles or fact sheets, newspaper articles, magazine articles, book reviews, and letters to the editor are NOT acceptable. 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.

For their presentations, students are encouraged to use Powerpoint software. Students using Powerpoint must use a version that is compatible with the version available in the microbiology lab. If you are in doubt, please bring your Powerpoint presentation to the lab at least one week before the day of your presentation to verify that it will run. If you do not check your presentation ahead of time, you are responsible for having a backup method for showing your illustrations. Full-size print-outs of your Powerpoint slides are useful as backups, since they may be shown using the ELMO projector. Students electing not to use Powerpoint should use other illustrations. Illustrations may be placed on a large poster or they may be shown on the ELMO projector. Transparencies may also be used. There will be no makeups for the oral presentations. **On the day of the presentation, the student must turn in a copy of any illustrations (including text) used during the presentation, as well as copies of the three references used. In addition, the student must hand in any note cards or papers used during the presentation immediately afterward.**

ADDITIONAL EMPHASIS: IF YOU WANT A GOOD SCORE ON YOUR PRESENTATION, YOU MUST FOLLOW THE GUIDELINES ON THE PROVIDED EVALUATION FORM. A STUDENT WHOSE REPORT DOES NOT FOCUS ON THE PRIMARY SCIENTIFIC ARTICLE OR CASE STUDY WILL RECEIVE A SCORE OF ZERO.

Attendance, participation, and tardiness: In accordance with VSU policy, attendance and participation will be checked in the laboratory and in class. The remainder of this paragraph outlines the lab/oral report attendance policy. Attendance is required

during ALL labs and oral report periods. A student who has perfect attendance during laboratory/oral report periods will receive 20 bonus points. A student who misses (or fails to complete) only one laboratory/oral report period will receive 10 bonus points. Missing (or failing to complete) additional laboratory/oral report periods will result in the **loss of points** as follows. Ten points will be deducted for the fourth missed (or incomplete) laboratory/oral report period; 20 additional points will be deducted for the fifth missed (or incomplete) laboratory/oral report period; 40 additional points will be deducted for the sixth missed/incomplete laboratory/oral presentation period, and 50 additional points will be deducted for each subsequent missed/incomplete period. Students who are habitually late for lab or oral report periods will be marked late. Coming late to lab or oral report periods three times will be counted as one absence. A student with more than 6 absences (or a student who fails to complete more than 6 laboratory or oral report periods) will not pass the course. **There will be no makeups for the laboratory exercises or student presentations.**

Examinations given during class periods:

- Examinations 1-4 will cover material presented during both the class and laboratory portions of the course. The first three exams will be worth 170 points each. The final exam will be worth 190 points. Examinations will begin promptly at the times and dates indicated on the class schedule. The final examination 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. Make-up examinations for exams 1, 2, and 3 will be worth 145 points rather than 170 points each.
- STUDENTS ARE REQUIRED TO BRING TWO #2 PENCILS AND ERASERS TO ALL EXAMINATIONS. THE INSTRUCTOR WILL NOT PROVIDE PENCILS.

Late Assignments & Failure to Turn in Assignments:

Please make a calendar noting when assignments and lab reports are due. Turning in an assignment/report 1-4 days late will result in a deduction of 20% of the points for that assignment. Turning in an assignment 5-9 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 9 days.** 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 the course are allocated as follows:

<u>EXAM 1</u> (Feb. 10)	170	POINTS
<u>EXAM 2</u> (Mar. 10)	170	POINTS
<u>EXAM 3</u> (April 21)	170	POINTS
<u>EXAM 4</u> (FINAL EXAM – May 5)	190	POINTS
LAB REPORT (Drawings) (Course objective ZA) – (Jan. 22)	10	POINTS
REFERENCES FOR ORAL PRESENTATION (Course objective ZG) – (Feb. 5)	12	POINTS
rRNA LAB REPORT (Course objective ZD) – (Mar. 26)	13	POINTS
LAB REPORT ON GENERAL UNKNOWN (Course objectives ZC, ZD) – (April 2)	30	POINTS
LAB REPORT ON URINE UNKNOWN (Course objective ZD) – (April 2)	15	POINTS
LAB EXAM – (April 14)	80	POINTS
LAB REPORT ON WINOGRADSKY COLUMN (Course objective ZF) - (April 16)	70	POINTS
ORAL PRESENTATION (Course objective ZH) - (April 16-April 30)	70	POINTS

TOTAL FOR COURSE	1000	POINTS

Students should carefully read the “Attendance, Participation, and Tardiness” and the “Late Assignments and Failure To Turn in Assignments” sections of the syllabus.

There are FOUR REQUIREMENTS TO PASS the course:

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

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**