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

TR 3100/5100 Section B 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 1107, K-----Textbook Required BROCK BL

by Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley, W. Matthew Sattley, David A. Stahl
Pearson Education, Inc. 2018.

Textbook options (select one) (1) traditional, hardcover book (ISBN 9780134261928) (2) unbound
looseleaf book (ISBN: 9780134626109) (3) "Mastering Microbiology with Etext for Brock Biology
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 Text, 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 stapler for organizing assignments (v) a notebook for organizing and recording lab results (this may be a thin
looseleaf 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.

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, tleix@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 exams. In addition, calculators may not be used during examinations. Should a cell, 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.

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 cultures.
- ZD.

 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. 7577), & 6 (p. 184186)
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 except question 3 on p. 130.	
Tues. Aug. 27	Cell structure/function	Chap. 2, 3 (p. 7577), & 6 (p. 184186)
Tues. Aug. 27L	<p><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></p> <p>>LAB ORIENTATION & LABORATORY SAFETY RULES (Read course pack handout & lab manual, green box p. 14.)</p> <p>>LAB MANUAL EX., ASEPTIC TECHNIQUE green box p. 61. <u>Wash your hands before leaving lab!</u></p> <p>SUPPL EX., WINOGRADSKY COLUMN (<u>Course pack handout--We will use these procedures.</u>)</p> <p>LAB MANUAL EX., WINOGRADSKY COLUMN, green box p. 208 (Please read)</p> <p>PAGES 585-588 IN THE TEXTBOOK (Please read)</p>	

Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
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Thurs. Aug. 27L (.....Continued from preceding page)

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- _____
- _____

Date

Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Tues. Sept. 17L	(.....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. Stain with methylene blue, rinse, and blot dry. Examine with oil immersion objective. Draw epithelial cells and bacteria in your notebook. <u>If you do not have time to do this today, it can be done on another day.</u> >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.	
Thurs. Sept. 19	Nutrition, culture, & metabolism of microorganisms	Chap. 3, 14, 15, 16, & 17 (selected topics)
Thurs. Sept. 19L	>SUPPL EX., USING RIBOSOMAL RNA GENE SEQUENCES TO LEARN ABOUT A MICROORGANISM > CONTINUE SUPPL EX. ISOLATION OF BACTERIAL UNKNOWN IIB (2) >CHECK WINOGRADSKY CO LUMNS (Make macroscopic observations of columns, and describe 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 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. <u>Give thought to how you will organize your lab report on this work.</u> >IF TIME PERMITS CONTINUE WORK FROM SEPT. 10 & 17	
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	>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)	
Thurs. Sept. 26	Metabolism of microorganisms	Chap. 14, 15, 16, & 17 (selected topics)
Thurs. Sept. 26L	>DISTRIBUTION OF UNKNOWN IA BACTERIAL CULTURES (UNKNOWN IA) ---- <u>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.</u> >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). <u>In order to interpret the results of a Gram stain, you must use the oil immersion objective on the microscope.</u> Complete drawings/questions in lab manual. For the unknown IA, record the dates, work done, drawings, etc., in your lab book. 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>	

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</p>	

Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Tues. Oct. 15	(.....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	
Thurs. Oct. 17	EXAM 2 (will include both class and lab material)	
Thurs. Oct. 17L	>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 and assess motility using the microscope. You should be able to	

Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
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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 L...	END (1) 207 (1) 580 MC (e) 255 (5) 6) TT-1-18 B-2.1 (...)-0 Td (O- 0 0 9.96 -68 Tm [(OR) 10.72 (a280.021-Tw)
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Date	Topics/Lab Exercises (Additional notes for lab exercises)	Related material in text
Thurs. Nov. 14L	>FINISH SUPPLE EX., <i>S. aureus</i> >SUPPL EX., STAPHAUREX* RAPID AGGLUTINATION TEST FOR <i>S. aureus</i> IDENTIFICATION Record results. >FINISH LAB MANUAL EX., ENTEROTUBE(ENTEROPLUR) 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 >WORK ELISA AND IMMUNOFLUORESCENCE PROBLEMS (SEE COURSE PACK)	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 >WORK ELISA AND IMMUNOFLUORESCENCE PROBLEMS (SEE COURSE PACK)	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. 107.	
Thurs. Nov. 28	<u>Thanksgiving break</u>	
Tues. Dec. 3	Microbial diseases (selected topics)	Chap. 30-33
Tues. Dec. 3	<u>INDIVIDUAL REPORTS ON PATHOGENS</u>	
Thurs. Dec. 5	Microbial diseases (selected topics)	Chap. 30-33
Tues. Dec. 5	<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 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 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 for the report. Each student must turn in his/her own RNA report, as well as an individual Winogradsky Column Project report. For details about the Winogradsky report, please see pages 4 and 5 of the lab report 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, 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 table () test table 6.9 (e) 2.8 (s) 2.53 (e (t) te)-1 Tw 9.98

obtain background information. Then they must locate one

