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

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The \_\_\_\_\_ are available online at [http://www.usg.edu/academic\\_affairs\\_handbook/section2/C738/](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 \_\_\_\_\_ (numbered 1-5) are available in the VSU Undergraduate Catalog, and the \_\_\_\_\_ are available in the VSU Graduate Catalog and are numbered 1 through 4. Both

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(Additional notes for lab exercises)

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Tues. Jan. 15      General course information  
Microorganisms and microbiology

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Tues. Jan. 15L      BRIEF INTRODUCTION TO LAB SAFETY  
SUPPL. EX., HANDWASHING (see information in handout)

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Thurs. Jan. 17      Microorganisms and microbiology  
An overview of microbial life  
Cell structure/function

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Thurs. Jan. 17L      DISCUSSION ABOUT 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.

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Tues. Jan. 22      Cell structure/function

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Tues. Jan. 22L

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>LAB ORIENTATION & LABORATORY SAFETY

(Additional notes for lab exercises)

Tues. Jan. 22L

- Please note that, although you will need to cooperate with your lab group as you build the columns, the remainder of the Winogradsky column project will be done individually. 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.
- Please bring any required materials for your column to lab on Thursday, Jan. 31.
- Please note that you must record BOTH macroscopic and microscopic observations of your two columns during the project. For each column, detailed notes about and drawings of the columns and the observed microorganisms are required. 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. You may be asked to turn drawings for the day at the end of any lab period during which the columns are being observed. 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. Most (~90%) of the one-page summary should focus on your findings and their interpretation. 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.

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Thurs. Jan. 24 Cell structure/function

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Thurs. Jan. 24L LAB MANUAL EXERCISE 0 n3008dMC(s) n3008am20 . 2e t2 8 2hsusueasuesu t2 . 2hue i2 . 2n3008 hu3.458 0 Td( )Tj41.205e9 ( n(

(Additional notes for lab exercises)

Thurs. Jan. 31L

SUPL. EX., WINOGRADSKY COLUMN [WE WILL USE THE PROCEDURE IN THE SUPL. EX., BUT PLEASE ALSO READ LAB MANUAL EX. (green box p. 203) & ASSIGNED PAGES IN TEXT.]  
BE SURE TO RECORD YOUR INITIAL OBSERVATIONS OF YOUR COLUMN.

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Tues. Feb. 5

Eukaryotic microorganisms  
Nutrition, culture, & metabolism of microorganisms

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Tues. Feb. 5L

FINISH LAB MANUAL EX., UBIQUITY OF BACTERIA

(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.) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Additional notes for lab exercises)

Tues. Feb. 12L

IF TIME PERMITS, WORK ON THE FOLLOWING:

\_\_\_\_\_ Aseptically remove a sterile swab from wrapping paper & swab your gums and teeth. Gently rub swab onto a small area of a DRY slide. Allow smear to air dry; then heat fix it. Stain with \_\_\_\_\_, rinse, and blot dry. Examine with oil immersion objective. Draw epithelial cells and bacteria in your notebook. \_\_\_\_\_

>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, *Saccharomyces cerevisiae*. Draw a few representative cells of *Saccharomyces cerevisiae* as they appear in the negative stain. \_\_\_\_\_

Thurs. Feb. 14

Nutrition, culture, & metabolism of microorganisms

Thurs. Feb. 14L

(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 mi







(Additional notes for lab exercises)

SPRING BREAK

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Tues. Mar. 26 Viruses

Tues. Mar. 26L SUPPL. EX., ENUMERATION OF BACTERIA ASSOCIATED WITH

(Additional notes for lab exercises)

Thurs. Apr. 11L >FINISH SUPPL. EX., *S. aureus*  
>SUPPL. EX., STAPHAUREX\* RAPID AGGLUTINATION TEST FOR *S. aureus* IDENTIFICATION  
Record results.  
>FINISH LAB MANUAL EX., ENTEROTUBE (ENTEROPLURI) SYSTEM (Record results on board.)

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Tues. Apr. 16 (will include both class and lab material)

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Tues. Apr. 16L LAB MANUAL EX., KIRBY-BAUER METHOD (ANTIMICROBIAL AGENTS) (green box p. 139)

Practical applications of immunology  
WORK ELISA AND IMMUNOFLUORESCENCE PROBLEMS (SEE COURSE PACK)

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Thurs. Apr. 18 Adaptive immunity  
Practical applications of immunology  
Microbial identification & clinical microbiology

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Thurs. Apr. 18L >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)

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Tues. Apr. 23 Practical applications of immunology  
Microbial identification & clinical microbiology  
Human-microbe interactions; pathogenesis  
Epidemiology & public health

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Tues. Apr. 23L >LAB MANUAL EX., SPORE STAINING (green box p. 105) (Modified Schaeffer-Fulton Method) On one slide prepare a smear of the *Bacillus* species provided as well as a separate smear of your unknown. Allow 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 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 intermittently 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. Record results for unknown culture in lab notebook and on the descriptive chart.

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Thurs. Apr. 25 Human-microbe interactions; pathogenesis  
Epidemiology & public health  
Microbial diseases (selected topics)

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Thurs. Apr. 25L \_\_\_\_\_

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Tues. Apr. 30

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(EXAM 4) –

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\_\_\_\_\_ 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.

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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 \_\_\_\_\_ 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. \_\_\_\_\_

8. \_\_\_\_\_ During the laboratory portion of the course, each student will give a \_\_\_\_\_, \_\_\_\_\_ 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 \_\_\_\_\_ about the pathogen. \_\_\_\_\_

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](http://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. \_\_\_\_\_

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. \_\_\_\_\_

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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 \_\_\_\_\_ (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 \_\_\_\_\_ (oints/student pre Tc (ta)-2.8 (tu.7 (02c8 (e l)2.8 (ab)]TJ0.00-

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. \_\_\_\_\_ 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.

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EXAMS 1, 2, & 3 (Feb. 12, Mar. 12, & Apr. 16) (150 points each x 3=450)..... 450 POINTS