

**SYLLABUS and SCHEDULE**  
**MICROBIAL BIOLOGY AND DIVERSITY LABORATORY (BIOL 227)**  
**Thompson Complex, North Wing, Room 208**  
**FALL 2009**

**INSTRUCTOR:** Dr. R. King  
Office: 205E TCNW  
Office hours: By appointment  
Phones: 745-6910 [office]; 745-3696 [Biology Department office]

**COREQUISITES:** BIOL 226

**COURSE:** A laboratory course correlated with BIOL 226. This course will introduce students to fundamental principles for the safe manipulation of microbial cultures. Topics covered include: light microscopy, staining techniques, aseptic transfer, microbial media characteristics and preparation, microbial growth and enumeration and classical taxonomic methods.

**OBJECTIVES:**

1. To introduce and provide experience with fundamental laboratory techniques necessary for the safe study of microorganisms.
2. To identify and describe features of bacteria that are useful for classification purposes.
3. To master culturing techniques on various culturing media.
4. To apply learned skills to separate and identify unknown bacteria in mixed cultures.
5. To become familiar with numerous biochemical properties of bacteria and the importance of these properties for identification purposes.
6. To complement subjects reviewed in the lecture and to utilize online resources
7. To develop skills in the areas of cognitive processing, analytical thinking and communication
8. To understand how microorganisms can be controlled to reduce undesired effects through disinfection, sterilization and chemotherapeutic strategies.
9. To become proficient with bright-field microscopy.
10. To prepare slides properly for microscopic examination.
11. To develop appropriate aseptic techniques for sterilizing and maintaining sterility of transfer instruments and pure cultures.
12. To use serial dilution techniques to estimate the number of microorganisms in a sample.

**LAB MANUAL:** Background information on the microbiological techniques used in this laboratory will be accessed from online sources; <http://student.cbcmd.edu/courses/bio141/labmanua/toc.html>. Selected protocols will also be accessed from online resources. Additional protocols will be provided on the lab Blackboard site.

**REQUIRED SUPPLIES:** Goggles, lab coat and sharpie pen.

**ATTENDANCE:** Every laboratory period must be attended punctually and entirely and students must arrive prepared. Many of the labs will require students to return to the lab within 24-48 hours to collect data and record results. When you do return to the lab to check cultures and collect data, you must sign the sheet on the front desk.

**CELL PHONES AND PAGERS:** Please turn off your cell phone (and/or beeper) or set it to vibrate.

**EXAMS/ASSIGNMENTS/REPORTS/NOTEBOOKS:** A laboratory safety quiz will be given during the second lab period. Students must pass this quiz with a grade of 70% or better. Failure to do so will result in an "Incomplete" grade for the course. A midterm and a final practical exam will be given. The midterm will be given during the first hour of lab period 6 and will cover the material from weeks 1-5. The final exam is comprehensive and will be given during lab period 13. Two exercises (10 points each) on dilutions will be assigned. Students are required to maintain a lab notebook and complete 2 lab reports for the identification of bacterial unknowns. Record your observations in your notebook as you make them (See instructions for lab notebooks). Students can access their grades online at the "Ecourses" site (<http://ecourses.wku.edu>). Follow the directions to access your home page and change your password to maintain security.

**GRADING:** Course grades will be determined by the cumulative scores earned on a midterm exam (50 points), a final exam (100 points), dilution problem sets (10 points each), the identification of microorganisms (2 lab reports, 20 and 40 points respectively) and lab notebooks (100 points). Twenty points will be awarded for the successful isolation and correct gram staining of unknown #1. Forty points will be awarded for the correct identification of the unknown #2. For unknown #2, points will be deducted if a fresh unknown culture must be re-issued. There are 330 total points available. From the total points earned, a final letter grade will be awarded according to the following scale: 297 points, A; 264 points, B; 231 points, C; 198 points, D; 197 and below, F.

Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Office for Student Disability Services in DUC A-200 of the Student Success Center in Downing University Center. The telephone number is (270) 745-5004 V/TDD. Please DO NOT request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services.

**EMAIL:** The instructor may need to contact the student or the entire class outside the classroom time. The email address assigned by the university will be used for this purpose.

## **SCHEDULE OF LAB EXERCISES**

<b><u>PERIOD</u></b>	<b><u>MEETING DATE</u></b>	<b><u>EXERCISE</u></b>
1.	09-03-09	<ol style="list-style-type: none"><li>1. Brightfield Microscopy (Online manual, Lab 1)</li><li>2. Aseptic Technique (Online manual, Lab 2)</li><li>3. Ubiquity of Bacteria (protocol will be provided)</li><li>4. Motility Determination (Online manual, Lab 7)</li><li>5. Culture Characteristics (Online manual, Appendix A)</li></ol>
2.	09-10-09	<p style="text-align: center;"><b>LAB SAFETY QUIZ</b></p> <ol style="list-style-type: none"><li>1. Smear Preparation (Online manual, Lab 5)</li><li>2. Simple Staining (Online manual, Lab 5)</li><li>3. Gram Staining (Online manual, Lab 6)</li><li>4. Acid Fast (Online manual, Appendix C)</li><li>5. Pure Culture Technique (Online manual, Lab 3)</li></ol> <p><b>RECEIVE UNKNOWN #1.</b></p>
3.	09-17-09	<ol style="list-style-type: none"><li>1. Capsule Stain Demo (Online manual, Lab 6)</li><li>2. Staining (Online manual, Lab 7)</li><li>3. Cultivation of Anaerobes (Online manual, Lab 2 and 16)</li><li>4. Prep and Care of Stock Cultures (Online manual, Labs 2-3)</li></ol> <p><b>Continue analysis of UNKNOWN #1.</b></p>
4.	09-24-09	<p><b>Turn in report for bacterial UNKNOWN #1.</b></p> <ol style="list-style-type: none"><li>1. Temperature (Effects on Growth) (Online manual, Lab 2)</li><li>2. Temperature (Lethal Effects) (Online manual, Lab 2)</li></ol>
5.	10-01-09	<ol style="list-style-type: none"><li>1. Evaluation of Antiseptics (Online manual, Lab 20)</li><li>2. Kirby-Bauer Test (Online manual, Lab 21)</li></ol>

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| 6.  | 10-15-09 | <p><b>MIDTERM EXAM</b></p> <p>1. Physiological Characteristics (Ox/Ferm reactions)<br/>(Online manual, Lab 8)</p> <p><b>Receive Dilution Problem Set #1</b></p> <p><b>Receive and begin work on UNKNOWN #2</b></p> |
| 7.  | 10-22-09 | <p>1. Physiological Characteristics (hydrolytic reactions)<br/>(Online manual, Lab 8)</p> <p><b>Dilution Problem Set #1 Due</b></p>  |
| 8.  | 10-29-09 | <p>1. Enterobacteriaceae (Online manual, Labs 12-13)</p>   |
| 9.  | 11-05-09 | <p>1. Bacterial Population Counts; Viable Counts.<br/>(Online manual, Lab 4)</p>   |
| 10. | 11-12-09 | <p>1. Bacterial Counts on Food<br/>(Online manual, Lab 4, protocol will be provided)</p> <p><b>Dilution Problem Set #2 Due</b></p>   |
| 11. | 11-19-09 | <p>1. Bacteriological Examination of Water<br/>(Online manual, Lab 13)</p>   |
| 12. | 12-03-09 | <p>1. Microbial Population of Soil (protocol will be provided)<br/>2. Determining Phage Titers (Online manual, Lab 11)</p>   |
| 13. | 12-10-09 | <p><b>FINAL EXAM</b></p> <p><b>Last day to turn in report for UNKNOWN #2</b></p>   |

**Laboratory Notebooks:**

Notebooks must be bound and quad ruled.

The front cover of your notebook will be labeled with following information: Your name, course name, professor's name, semester

Reserve the first 3 pages of your notebook for a table of contents. You will update the table of contents each week.

Number all pages.

Neatness counts.

Completeness counts.

Entries in your lab notebook will have the following format.

Each exercise in any given lab period will have a Purpose, Materials and Methods, Results and Discussion.

1. Purpose: Describe the purpose of the exercise. Ask yourself “What is the goal of this exercise?” What is the learning objective?”
2. Materials and Methods - describe what was needed and the steps taken (including any modifications that were made). Be sure to use CORRECT SPELLING for all microorganism names (underline scientific names). Points will be deducted for incorrectly formatted scientific names. Copying from the lab manual is illegal.
3. Results (colored pencils/pens should be used to illustrate results; i.e. observations made with the microscope) - all figures/tables must have a title and legend (a description of what is being shown - label all relevant information)
4. Discussion - summarize your findings and discuss why something may not have worked, and what you would do differently next time to improve the outcome.

Notebooks may be inspected at any time. Points will be deducted for incomplete entries and sloppiness.