BIO K235: Microbiology, Fall 2017

Three Rivers Community College, Norwich, CT
Instructor: Sarah B. Selke, Ph.D.
Office Hours (C214): Tuesdays 1:00 – 2:30pm, Wednesdays 10:30am - noon
Phone: 860-215-9470
Email: SSelke@trcc.commnet.edu

Required Textbook and Lab Manual:
Microbiology with Diseases by Taxonomy, 5th edition. 2017. Robert W. Bauman. Published by Pearson.
Access to MasteringMicrobiology, the textbook website, is also required.

Microbiology Experiments: A Health Science Perspective, 8th edition. 2016. John Kleyn and Anna Oller. Published by McGraw Hill.

This course is a web-enhanced course, which means that course materials are posted online. You will use Blackboard (BB) and MasteringMicrobiology, the textbook website.

- Lecture PowerPoints and other course materials will be posted on Blackboard (BB). BB can be accessed through **http://my.commnet.edu/.**
- You will submit assignments through MasteringMicrobiology (MM). Information on how to access the MM website and set up your account is attached to this syllabus.

Required Lab Materials:
disposable gloves (non-latex)
full length lab coat with long sleeves and cuffs (ex. Landau – style number 3178)
safety goggles
Please do not buy in advance as more information will be forthcoming in lab.

Course Prerequisites:
BIO 121 and CHE 111 or CHE 121, all courses passed with a "C" grade or better; or permission of the instructor. BIO 122 is recommended.

Course Description: This course is 4 credits and meets for 3 hours of lecture and 3 hours of lab per week. This course covers a comprehensive study of microorganisms. Topics covered will include the basic characteristics, morphology, physiology, growth, reproduction, and genetics of bacteria, as well as a brief taxonomical survey of the following microbial life forms Archaea, Eubacteria (including cyanobacteria, mycoplasms, rickettsia and chlamydia), Fungi, Protists and Viruses. Emphasis will be on species that affect humans.
Laboratory activities will include various techniques of staining, culturing, and isolating bacteria. The morphology and metabolic processes of select microbial groups will be studied. Students will learn to apply various modern biological techniques that are used for controlling the growth of microbes, and to identify unknowns.

General Course Objectives:
To aid the student in developing an understanding of life processes of microorganisms
To aid the student in developing an understanding of the effect, both positive and adverse, that microorganisms have on our daily lives
To provide a useful body of knowledge for students studying all areas of biology, environmental science, food science, nutrition, nursing, dental hygiene & medical technology

Grading Overview:
Your grade is based on the 1000-point scale. There will be a minimum of 1000 points assigned this semester.

3 Unit Tests = 300 points total
Final Exam = 200 points
2 Lab Practicals = 200 points total
Prelab Quizzes= 50 points
Assignments on MasteringMicrobiology = 250

No individual extra assignments will be given.

- **Unit Tests & Final Exam**
  There are three unit tests worth 100 points each. A #2 pencil is required for each exam. This item will not be supplied in class.
  The final exam is worth 200 points. **The final exam is cumulative and must be taken to pass this course.**

- **Lab Practical Exams**
  There are two lab practical exams worth 100 points each. Additional information about the lab practical exams will be given in lab.

- **Prelab Quizzes**
  At the beginning of each new lab exercise, you take a short quiz worth 5 points. The quiz will be closed-book, and based on information you will have read in preparation for the lab. There will be 12 quizzes, and your grade for two will be dropped. 10 assignments @ 5 points each = 50 points

- **MasteringMicrobiology**
  Twelve chapters will have several assignments to complete in MasteringMicrobiology worth a total of 25 points. Your grades for two chapters will be dropped. 10 chapters @ 25 points each = 250 points

Attendance Policy:
Attendance at all class sessions is required. If a class is missed due to circumstances beyond your control, please be sure to notify your instructor and make the necessary arrangements **with a classmate** for obtaining the notes. **You will be responsible** for the material**.**

Electronic devices (cell phones, pagers etc.) will be put in "Silent Mode" or turned off while class is in session.

Make-up exams:
Make-up exams may be granted on an individual basis following a conference with the instructor. It is up to the instructor's discretion to determine if a make-up exam will be granted. All make-up tests must be completed within one week of the original exam date. Please be aware that the format of any makeup exam is at the discretion of the instructor. The format could be the same, oral, essay or other, depending on the circumstances. It will not be the same exam taken by the rest of the students in the class.

Make-up labs:
There are no make-ups for lab activities that use live microorganisms.
There are no make-ups for the two Lab Practical exams.
There are no make-ups for Prelab Quizzes.

Final Grade:

93.5-100.0 = A	77.5-79.4 = C+
89.5-93.4 = A-	73.5-77.4 = C
87.5-89.4 = B+	69.5-73.4 = C-
83.5-87.4 = B	63.5-69.4 = D+
79.5-83.4 = B-	59.5-63.4 = D
	00.0-59.4 = F

College Withdrawal Policy:
The last day to withdraw is **December 11th, 2017**. Students who do not withdraw but stop attending class **will receive** a grade of "F" for the final grade. **Verbal withdrawals cannot be accepted**.

Accommodations for Disabilities: In order to receive accommodations (assistance or modification of class procedure owing to any type of disability), you must register with a counselor in the Student Services Development Center.

College Disabilities Service Provider	
Matt Liscum, Counselor (860) 215-9265 Room A113	• Learning Disabilities • ADD/ADHD • Autism Spectrum • Mental Health Disabilities
Elizabeth Willcox, Advisor (860) 215-9289 Room A113	• Medical Disabilities • Mobility Disabilities • Sensory Disability

Academic Misconduct:
Academic dishonesty and plagiarism will not be tolerated. Plagiarism, cheating, or any form of academic dishonesty is **prohibited**. Plagiarism includes any instance of copying words or ideas from another person (ie. another student, author of a book, internet resource etc.) without properly acknowledging the source. Students guilty of academic dishonesty directly or indirectly will receive a **zero** for an exercise or exam and may receive an **F** for the course in addition to other possible disciplinary sanctions that maybe imposed through the regular institutional procedures.

Blackboard Learn & your TRCC email address:
Your Blackboard Learn courses are automatically connected to your college-provided email account. For more information about this email account, visit the college home page and click the "New student email" button. This email account is the only official electronic means that the college will communicate course and non-emergency information to you. Make sure that you check it weekly at a minimum. Another option is to set up to forward your email from the college address to your preferred address. **Important class information is frequently communicated through the Blackboard Learn announcements or email function, both of which go to your TRCC email address.**

myCommNet Alert:
myCommNet Alert is a system that sends text messages and emails to anyone signed up in the event of a campus emergency. Additionally, TRCC sends messages when the college is delayed or closed due to weather. All students are encouraged to sign up for myCommNet Alert. A tutorial is available on the Educational Technology and Distance Learning Students page of the web site.
http://cdnapi.kaltura.com/index.php/extwidget/preview/partner_id/1053412/uiconf_id/11735071/entry_id/1_63tt1sjc/embed/dynamic

Digication:
As a student you will maintain an online learning portfolio using a college-designed template in Digication. Through this electronic tool you will have the opportunity to monitor your own growth in college-wide learning. It may even help you determine a major that is best suited to you. You will be able to keep and maintain your learning portfolio after graduation. A Three Rivers General Education Assessment Team will select and review random works to improve the college experience for all. If your work is selected and reviewed for assessment purposes, it will remain anonymous and private. Digication provides a "place" where you will connect your learning from the classroom, college, and life in general. Sometimes when you review all of the work you have done and think about it, you end up learning something different and perhaps unexpected. Please review your course outlines to determine what assignments to upload into the TRCC Digication template and please post your own choices, as well. Have fun in learning!

Board of Regents for Higher Education and Connecticut State Colleges and Universities Policy Regarding Sexual Misconduct Reporting, Support Services and Processes Policy:

Statement of Policy for Public Act No. 14-11: An Act Concerning Sexual Assault, Stalking and Intimate Partner Violence on Campus:
"The Board of Regents for Higher Education (BOR) in conjunction with the Connecticut State Colleges and Universities (CSCU) is committed to insuring that each member of every BOR governed college and university community has the opportunity to participate fully in the process of education free from acts of sexual misconduct, intimate partner violence and stalking. It is the intent of the BOR and each of its colleges or universities to provide safety, privacy and support to victims of sexual misconduct and intimate partner violence."

United States Department of Education and Office of Civil Rights Title IX Statement of Policy:
Title IX of the Education Amendments of 1972 (Title IX) prohibits discrimination based on sex in education programs and activities in federally funded schools at all levels. If any part of a school district or college receives any Federal funds for any purpose, all of the operations of the district or college are covered by Title IX.

Title IX protects students, employees, applicants for admission and employment, and other persons from all forms of sex discrimination, including discrimination based on gender identity or failure to conform to stereotypical notions of masculinity or femininity. All students (as well as other persons) at recipient institutions are protected by Title IX – regardless of their sex, sexual orientation, gender identity, part-or full-time status, disability, race, or national origin-in all aspects of a recipient's educational programs and activities.

If any student experiences sexual misconduct or harassment, and/or racial or ethnic discrimination on Three Rivers Community College Campus, or fears for their safety from a threat while on campus, please contact Edward A. Derr, the Diversity Officer and Title IX Coordinator:

Edward A. Derr
Title IX Coordinator and Diversity Officer
Admissions Welcome Center * Office A116
574 New London Turnpike, Norwich CT 06360
860.215.9255 * EDerr@trcc.commnet.edu

Policies described in this syllabus may change. Any policy change will be described in writing and distributed in class and electronically. Policy changes are not applied retroactively.

Specific Course Objectives:

After completion of this course, the student will be able to

1. develop critical thinking skills and learn to develop sound scientific conclusions by the analysis of scientific data.

2. demonstrate knowledge of the scientific method through examples.

3. understand the scope of microbiology as it relates to other fields of science.

4. list and explain the characteristics of life shared by all living organisms.

5. demonstrate an understanding of the general characteristics of various microbial life forms especially bacteria.

6. demonstrate knowledge of the characteristics used in the classification of microorganisms.

7. develop an understanding of microscopes, microscopy, and the microbial world.

8. explain in detail the differences between prokaryotic and eukaryotic cells.

9. identify the major morphological characteristic of bacteria cells.

10. name the various structures of a bacteria cell and describe their functions.

11. list and describe in detail the energy requirements, electron or hydrogen requirements, and carbon requirements for the growth and cultivation of bacteria.

12. describe in detail all of the nutrient requirements for the growth and cultivation of bacteria and discuss the different nutritional types of bacteria.

13. list and explain the physical conditions required for the growth and cultivation of bacteria.

14. understand and demonstrate the procedures for cultivating microorganisms and the problems associated with cultivation.

15. demonstrate knowledge of the various reproductive processes of bacterial cells, and explain in detail the phases of growth in bacterial cells.

16. list the different categories of culture media and describe the use of each type of media in the cultivation of bacteria.

17. describe and demonstrate several pure culture techniques.

18. demonstrate knowledge of the photosynthetic process including photophosphorylation, the Calvin-Benson cycle, and the chemiosmotic theory.

19. explain the differences in the photosynthetic process in algae, cyanobacteria, and bacteria.

20. demonstrate knowledge of chemical energy and the respiratory process in bacteria, including the Embden-Meyerhof, Pentose Phosphate, and the Entner-Doudoroff pathways of glucose catabolism, the Kreb's cycle and the electron transport system.

21. demonstrate knowledge of anaerobic metabolism in bacterial cells and describe various fermentation pathways used by different species of bacteria.

22. describe various forms of modification in the genetic make-up of bacterial cells.

23. demonstrate knowledge of the taxonomy of bacteria.

24. explain the characteristics and the taxonomy of fungi, algae, protozoans, and viruses.

25. define and/or explain in detail the terms of microbial control.

26. describe the processes involved in controlling the growth and activities of microorganisms by antimicrobial agents.

27. outline the action and limitations of chemical and physical agents used in the control of microbes.

28. list the major classes of chemical agents used to control microbes, give specific examples of the classes of chemicals, and describe the mode of action of specific chemical agents, as well the limitations of their use.

29. differentiate between synthetic drugs and antibiotics as chemotherapeutic agents used to treat infections. Name the biological source of specific antibiotics, the spectra of organisms that they affects, and the mode of action.

30. demonstrate knowledge of nosocomial infections and describe their sources.

31. list the most common nosocomial infections and the most frequently isolated organism(s) that cause(s) that infection

32. explain the types of patients that have the greatest risk for developing nosocomial infections and why they are at such high risk

33. describe infection control and prevention in the clinical environment.

34. demonstrate knowledge of the normal flora in various anatomical areas of the human body and describe host-microbe interactions.

35. discuss in detail Koch's postulates in relationship to diseases.

36. list the portals of entry of microbes into the human body and explain in detail how microbes breach the portals.

37. list and discuss the invasive methods of bacteria and other microbes.

38. explain how microbes produce diseases.

39. list and explain the stages of infection and illness.

40. demonstrate knowledge of diseases caused by microorganisms (bacteria, fungi, viruses, and protozoans) by portal of entry, and how these infectious agents damage the body.

41. discuss how infectious diseases of the human body are treated and/or prevented.

42. develop an understanding of the importance of soil, water, food, medical, and industrial microbiology.

Specific Laboratory Objectives:

After completion of this laboratory component of this course, the student will be able to

1. list and describe the proper use of all safety equipment and devices used in this microbiology lab, as well as follow all safety precautions while working in the microbiology laboratory.

2. list and describe the use of various types of microscopes as they relate to the study of microbiology.

3. name all of the parts of a bright field compound light microscope and describe the function of each part.

4. demonstrate proper technique for using the microscope in a microbiology laboratory.

5. demonstrate the ability to use the microscope as a vital instrument for gathering data by direct observation.

6. describe and identify various microbial life forms by studying the unique morphological differences via direct observation using a microscope.

7. demonstrate the ability to perform and correctly interpret the results of the following laboratory procedures: isolation techniques, transformation of *E. coli*, DNA restriction analysis, microbial metabolic tests, and microbial sensitivity tests.

8. name the major classes of staining procedures, give examples of specific stains within each class, and describe the purpose of each specific staining procedure.

9. demonstrate the ability to carry out various staining procedures and correctly interpret the results

10. demonstrate the ability to use learned laboratory skills and critical thinking skills to identify unknown bacterial samples.

BIO 235 Microbiology Lecture Schedule
Professor Sarah Selke, Fall 2017

Topic	Reading in *Microbiology* by Bauman
Introduction to Microbiology	Chapter 1 Chapter 4, outcomes 4.17 – 4.22
Microscopy and Cell Structure	Chapter 3, outcomes 3.1 – 3.12, 3.18 – 3.21, Chapter 11, 11.1 – 11.2
Microbial Metabolism	Chapter 5, outcomes 5.1 – 5.2, 5.8 – 5.12, 5.14 – 5.16
Microbial Nutrition and Growth	Chapter 6
Microbial Genetics	Chapter 7, outcomes 7.1 – 7.4, 7.6, 7.8, 7.9, 7.16 – 7.17, Ames Test page 221 7.29 , 7.32 (transformation, transduction, conjugation)
Microbial Control - environment	Chapter 9
Microbial Control – the body	Chapter 10, 10.1 – 10.11, Clinical Considerations in Prescribing Antimicrobial Drugs, 10.13 – 10.23
Characterizing and Classifying Microbes I	Chapter 4, 4.17 – 4.23 Chapter 11, 11.1 - 11.7
Characterizing and Classifying Microbes II	Chapter 11, Survey of Archaea 11.8 – 11.10 & Survey of Bacteria
Characterizing and Classifying Eukaryotes (Protists & Fungi)	Chapter 12, 12.5 - 12.26
Viruses, Viroids and Prions	Chapter 13
Infection, Infectious Diseases & Epidemiology	Chapter 14, 14.1 – 14.21, 14.26 – 14.28
Immunization and Immune Testing	Chapter 17, selected sections (if time allows)
Infectious Diseases of Humans (Bacteria & Viruses)	Chapters 19 – 21, 24 – 25 selected sections

Test Dates:

- Test 1 – Wednesday/Thursday, September 27 & 28
- Test 2 – Monday/Tuesday, October 23 & 24
- Test 3 - Wednesday/Thursday, November 15 & 16

Final Exam (cumulative):
Wednesday December 13th**,** Thursday December 14th**,** Monday December 18th
You may choose to attend whichever Final Exam best fits your schedule.

BIO 235 Microbiology
Professors Selke & Kardys
Fall 2017
List of Lab Exercises from Lab Manual

Lab Manual: *Microbiology Experiments: A Health Science Perspective*, 8th edition. 2016. John Kleyn and Anna Oller. Published by McGraw Hill.

Exercise 1
Exercise 2
Exercise 3
Exercise 5
Exercise 6
Exercise 7
Exercise 8 (pour plate)
Appendix 4 (spread plate)
Exercise 14
Exercise 15
Exercise 24 (modified)

Additional Lab activities that are not in Lab Manual (or are so heavily modified that students will need to follow supplemental instructions)

- Restriction Enzyme analysis (gel electrophoresis)
- Transformation
- Diversity of Microorganisms (cyanobacteria, fungi, protists)

Lab Practical Dates:

1. **Wednesday October 11th/Thursday October 12th**
2. **Wednesday December 6th/Thursday December 7th**

The following sections in your textbook are directly relevant to lab activities:
Units of Measurement, page 95
Microscopy, pages 96 – 104
Staining, pages 104 – 109
Obtaining Pure Cultures, pages 171 – 172
Culture Media, pages 172 - 176

Micro Lab Schedule
Fall 2017 Master

T 8/29 – Introduction to Microbiology Case Study

W/R 8/30 & 8/31
- Introduction to Microbiology lab – safety, lab coats
- Ex. 3 – Microscopes

T/W 9/5 & 9/6
- Ex. 3 con't
- Ex. 1 - Ubiquity of Microorganisms (inoculations)

R 9/7 TBA

M/T 9/11 & 9/12
- Ex. 1 con't
- Ex. 2 - Aseptic Technique (inoculations)

W/R 9/13 & 9/14
- Ex. 2 con't
- Ex. 5 - Simple stains

M/T 9/18 & 9/19
- Ex. 6 Differential & Specialty Stains (Gram stain only)

W/R 9/20 & 9/21
- Ex. 6 con't (Gram stain II, Endospore stain)

M/T 9/25 & 9/26
- Ex. 6 con't (Gram stain III, Acid-fast stain)

W/R 9/27 & 9/28
- Ex. 7 - Differential & Selective media (inoculations)
- Ex. 8 - Quantification of Microorganisms (introduction)

M/T 10/2 & 10/3
- Ex. 7 con't
- Ex. 8 con't (inoculations)

W/R 10/4 & 10/5
- Ex. 8 con't (results, problem-solving session/calculations)

M/T 10/9 & 10/10 – no lab, double lecture

W/R 10/11 & 10/12 at 1:30pm/9:30am
Lab Practical 1 – Exercises 1, 2, 3, 5, 6, 7, 8

M/T 10/16 & 10/17

- Transformation lab (handout, inoculations)

W/R 10/18 & 10/19

- Observe transformation plates
- Restriction enzyme lab (handout, introduction to lab only)

M/T 10/23 & 10/24

- Restriction enzyme lab (handout)
- Begins at 1:30pm/9:30am
- Lecture will occur while gels are running

W/R 10/25 & 10/26

- Restriction enzyme lab con't - observe gels
- Lecture for remainder of lab period

M/T 10/30 & 10/31 and W/R 11/1 & 11/2

- Lab TBA

M/T 11/6 & 11/7

- Ex. 14 – Antibiotics (inoculations)
- Ex. 15 – Antiseptics & Disinfectants (inoculations)

W/R 11/8 & 11/9

- Exercises 14 & 15 con't (results)

M/T 11/13 & 11/14

- Ex. 24 - Identification of Enteric Gram-negative rods (inoculations)
    - Note: this lab is modified, will only use BSL 1 organisms, see handout

W/R 11/15 & 11/16

- Ex. 24 con't (results)
- How to use a dichotomous key

M/T 11/20 & 11/21 – Microscopic observations of eukaryotes (FUNGI)

M/T 11/27 & 11/28 – Microscopic observations of eukaryotes (CYANOBACTERIA & ALGAE)

W/R 11/29 & 11/30 - Microscopic observations of eukaryotes (PROTOZOANS)

M/T 12/4 & 12/5 – Open Lab/Review for Lab Practical (attendance required)

W/R 12/6 & 12/7 at 1:30pm/9:30am
Lab Practical 2 – Exercises 14, 15 & 24, Restriction Enzyme lab, Transformation lab, microscopic observations of eukaryotes, lab week of 10/30 – 11/2

Getting Started with Pearson's MasteringMicrobiology

First, make sure you have these 3 things…

1. **Email:** You'll get some important emails from your instructor at this address.
2. **Course ID:** Ask your instructor for your Course ID!
3. **Access code or credit card:** An access code card may be packaged with your new book or may be sold by itself at your bookstore. Otherwise, you can buy instant access with a credit card or PayPal account during registration.

Next, get registered and join your course!

1. Go to **www.pearson.com/mastering/microbiology**.
2. Under Register Now, select **Student**.
3. Confirm you have the information needed, then select **OK! Register now.**
4. Enter your instructor's Course ID
    a. Monday/Wednesday section = **SELKEMICROFALL2017MONDAY** (reads as Selke Micro Fall 2017 Monday but in ALL CAPS with no spaces)
    b. Tuesday/Thursday section = **SELKEMICROFALL2017TUESDAY** (reads as Selke Micro Fall 2017 Tuesday but in ALL CAPS with no spaces)
    c. Then choose **Continue**.
5. Enter your existing Pearson account **username** and **password** and select **Sign in**.
   You have an account if you have ever used a Pearson MyLab & Mastering product, such as MyLab Math, MyLab IT, or Mastering Chemistry.
    - If you don't have an account, select **Create** and complete the required fields.
6. Select an access option.
    - Enter the access code that came with your textbook or was purchased separately from the bookstore.
    - Buy access using a credit card or PayPal account.
7. From the "You're Done!" page, select **Go to My Courses**.
8. Select **Yes** and enter your Course ID to join your course. Click **Continue**.
9. If asked, enter your Student ID according to the instructions provided and click **Continue**.
   That's it! You should see the Course Home page for the course.

To sign in later:

1. Go to **www.pearson.com/mastering/microbiology** and select **Sign In.**
2. Enter your Pearson account **username** and **password** from registration, and select **Sign In.**
    - If you forgot your username or password, select **Forgot your username or password?**

To join another course for the same textbook (no additional purchase needed):

1. **Sign in** with the **username** and **password** that you specified during registration.
2. Click **My Courses** in the upper left and then choose Join a Course.
3. Enter the Course ID from your instructor and click **Continue.**
4. If asked, enter your Student ID according to the instructions provided and click **Continue**.
5. To switch courses, select **My Courses** from the course menu (left side).
6. Select any active course link that appears below "Switch to another course".
7. The next time you sign in to Mastering, your course view will match the last course you chose.