

Biology 206: Microbiology for the Health Sciences
Spring 2014

Instructor: Dr. Heather B. Felise

Classrooms: Lecture – Collier Hall of Science Room 202
Lab – Collier Hall of Science Room 300

Time: Lecture - MWF 8:55 – 9:45am
Lab – WF 1:15-2:45pm (section LA) **OR** WF 2:45 – 4:15pm (section LB)

Office: Collier Hall of Science Room 323

Office Hours: Tuesday 10-11:30am; Thursday 1-3pm or *by appointment*

Phone: 610-861-1428

Email: feliseh@moravian.edu

Required Textbook: *Microbiology: A Human Perspective 7th Edition*, by Eugene W. Nester, Denise G. Anderson and C. Evans Roberts, Jr. and Martha T. Nester, McGraw-Hill Higher Education, 2012.

Required Book: *Revenge of the Microbes*, by Dixie D. Whitt and Abigail A. Slayers, ASM Press 2005

Required Lab Manual: *Microbiology Experiments: A Health Science Perspective 7th Edition*, by John Kleyn, Mary Bicknell and Anna Oller, McGraw-Hill Higher Education, 2012.

COURSE DESCRIPTION: This course serves as an introduction to microbiology (the study of organisms too small to be seen with the naked eye), with a focus on microbes in the field of biology, such as their unique metabolic and organismal diversity, and their role in human health. We will investigate the mechanisms used by humans, to ward off infectious diseases and the pathogenesis, immune invasion, and mechanisms of toxin action of microbial pathogens, particularly of bacteria and viruses. Although microbiology is a rapidly expanding field, too broad to be completely covered in a single semester course, I hope that you will leave with an appreciation and enthusiasm for the breadth of microorganisms that exist and the critical role they play in our health.

COURSE OBJECTIVES:

By the end of this course students should have mastered content in the following areas:

- Function of prokaryotic cell structures in comparison to those found in eukaryotes
- Mechanisms involved in energy flow and transformation
- Fundamental principles of prokaryotic genetics
- Range of biological diversity in the microbial world
- Methods of microbial control
- Role of microbes in food production
- Immunology
- Microbial diseases

By the end of this course students will have had the opportunity to:

- Use qualitative and quantitative microbial techniques
- Objectively analyze and interpret data
- Apply means by which scientists ask and answer questions
- Practice scientific writing and oral communication
- Work together on collaborative projects

LECTURE:

Lecture Exams: There will be five exams, each worth 75 points, given during semester at the designated lecture session (Please see the attached course schedule). Both lecture material and reading assignments are fair game for lecture exams. Lecture exams will be a combination of multiple-choice (approximately 45 points of the total 75 points) and short-answer essay questions (approximately 30 points of the total 75 points).

In the event of special needs (such as medical excuse or family emergency) make-up exams will be given, but arrangements must be made **in advance** and **documentation for the absence, e.g. a doctor's note, is required**. If there is an emergency please contact me ASAP. **Make-up exams may be oral and will be given at a time I deem appropriate.**

Attendance and participation: It is my experience that those students who do not show up for class, do not perform well in class. Therefore to further encourage you to attend class you will receive **50 points for attending lecture and actively participating in class**. Students are allowed a maximum of five absences during the semester, including those due to illness, school activities, and family emergencies. If you miss class more than the allowed number of absences, 25 points will be deducted from your lecture attendance grade and 5 points will be deducted for each additional absence. **Please note that absences are not divided into excused and unexcused.** Therefore it is not necessary to notify the instructor of an absence, unless it is a scheduled exam (see above). With that said it is the student's responsibility to identify and obtain missed work, assignments, lecture slides and notes. **If you arrive late to class after attendance has been taken, you will be marked absent for the class.**

Active Learning Exercises: In this class I will be using a variety of teaching strategies, including both traditional lecture and active learning pedagogies. Therefore some of these activities will require active involvement on your part. It is my hope that you find these approaches interesting and engaging and that they enable you to be more successful in this course. Active learning techniques that will be used in this course include the following:

Clicker Questions – Multiple-choice questions will be embedded within lectures to provide an opportunity for students to test their newly acquired knowledge as well as allowing me to gauge student comprehension and to adjust the remainder of the lecture accordingly.

Think, Pair, Share – In this approach students think about a question, and then share it with one or two other students. Often this will be followed by a class debrief of responses.

Brainstorming – Class discussion to generate ideas about a topic. Responses will be recorded on the blackboard.

Small Group Problem Based Activities – Students will work together in a small group setting to investigate a scenario or solve a problem provided by the instructor.

Online Study Activities – Independent computer exercises designed to facilitate student comprehension of course material.

Reading Reflections – Written summaries of a scientific news stories and/or reading assignments. These will also include student's personal opinions or reflections of the article.

Level of student engagement and participation in these activities will be considered when assessing the student's participation grade for the course.

LABORATORY:

Attendance: Attendance in the laboratory is mandatory and you should assume each lab will take the entire class period. In the case of an absence, five points will be deducted from your lab report. Due to the nature of the experiments, **there will be no make-up labs**. You are expected to read the assigned lab exercises **prior** to coming to lab. This includes assigned sections of the lab manual. **It is my experience that students who do not attend and actively participate in laboratory exercises, do not do well in this course.**

Safety: Close-toed shoes are required - that means no flip-flops or sandals! If you wear inappropriate footwear, you **will not be allowed to stay in lab**. Protective lab coats will be provided and **their use is mandatory**. Be sure to wash your hands and clean your bench prior to leaving the lab! Additional safety information will be provided in the laboratory.

Lab reports: The lab reports will consist of the exercises found in the laboratory manual and will include all data, as well as answering questions at the end of the exercise. They are due at the **beginning of the lab period following completion of the experiment** (Please see attached laboratory schedule). Due to copyright laws, only exercise sheets from the lab notebook will be accepted. **Lab reports will be worth 15 points each, unless otherwise noted by the instructor.**

Quizzes: In order to encourage attendance and preparedness for lab, **3 quizzes, each worth 20 points**, will be given during the designated laboratory sessions (Please see attached course schedule). These quizzes will be given at the beginning of the lab period and will assess basic information about lab exercises recently completed and to be performed the day of the quiz. You will have the first 15 minutes of the laboratory period to take the quiz; if you are late to class your quiz will be due when the rest of the class finishes with their quiz.

Practicum: The laboratory practical exam will be based on experiments done during the semester and will include specimen slides under the microscope, cultures on specific growth media and identification of biochemical reactions. **In other words, anything done in the lab may show up on this exam!** You may not use your notes or lab manual for the exam. Due to the nature of the experiments performed in this class, **there will be no open labs for review.**

GRADING: The final grade in the course will be based upon the following items:

Lecture: (approximately 60% of Final Grade)

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|---|----------|
| ➤ Lecture Exams 1-5 (5 x 75 points each) | 375 pts. |
| ➤ Classroom Attendance | 50 pts. |
| ➤ Case Study Report and Presentation | 75 pts. |
| ➤ Revenge of the Microbes Reading Reflections | 60 pts. |
| ➤ Participation in active learning exercises | 60 pts. |

Laboratory: (approximately 40% of Final Grade)

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|--------------------------------|----------|
| ➤ Laboratory Reports/Exercises | 240 pts. |
| ➤ Laboratory Practicum | 75 pts. |
| ➤ Laboratory Quizzes | 60 pts. |
| ➤ Laboratory Unknown | 50 pts. |

Grading Scale

| % | GRADE |
|-------------|-------|
| 93-100 | A |
| 90-92 | A- |
| 87-89 | B+ |
| 83-86 | B |
| 80-82 | B- |
| 77-79 | C+ |
| 73-76 | C |
| 70-72 | C- |
| 67-69 | D+ |
| 63-66 | D |
| 60-62 | D- |
| 59% & below | F |

BLACKBOARD: All information, including announcements, lecture slides and study guides, associated with this course will be posted on Blackboard. You must register for this course on Blackboard the first week of class. Your opportunity to register will **expire** on Wednesday, January 22nd. For instructions visit the following website: <http://home.moravian.edu/public/cit/help/blackboard/bbstudent.asp>. The course ID is BIO206.SP14 and the enrollment code is “microbes rock”. When registering, **please use the email account where you would like to receive course notifications**.

CLASS POLICIES:

Cell phones: *As a courtesy to the professor, turn all cell phones OFF before class! No calls or texting during class.* If you are observed texting during class you will be asked to leave the classroom. If this occurs, you will not receive credit for attendance.

Academic Integrity: I expect all class members to adhere to the Moravian College policy on academic honesty (please see *Student Handbook*). If dishonesty is observed on a student’s exam, a course grade of an F will be assigned for the class and the individual will not be allowed to withdrawal from the course. If dishonesty is observed on an assignment, the student will receive a zero for that assignment.

Disability Support: Students who wish to request accommodations in this class for a disability should contact #####, Assistant Director of Learning Services for Disability Support, 1307 Main Street (extension 1510). Accommodations cannot be provided until authorization is received from the office of Learning Services.

***** Any portion of this syllabus is subject to change during the course of the semester at the discretion of the instructor.**

BIO206 TENTATIVE LECTURE SCHEDULE

| DATE | DAY | LECTURE TOPIC | BACKGROUND READING |
|----------------|----------------|---|--|
| 1/13 | M | Introduction/Humans and the Microbial World | Syllabus/Chapter 1 |
| 1/15 | W | Microscopy and Prokaryotic Cell Structure | Chapter 3 |
| 1/17 | F | Prokaryotic Cell Structure | Chapter 3 |
| 1/20 | M | NO LECTURE (Martin Luther King Day) | |
| 1/22 | W | Prokaryotic Cell Structure/Dynamics of Prokaryotic Growth | Chapter 4 |
| 1/24 | F | Dynamics of Prokaryotic Growth | Chapter 4 |
| 1/27 | M | NO LECTURE | Revenge of the Microbes Chapters 1-4 |
| 1/29 | W | NO LECTURE | |
| 1/31 | F | EXAM I | Chapters 1, 3 & 4; RM 1-4 |
| 2/4 | M | Microbial Metabolism | Chapter 6 |
| 2/6 | W | Microbial Metabolism | Chapter 6 |
| 2/8 | F | Microbial Metabolism | Chapter 6 |
| 2/10 | M | The Blueprint of Life: From DNA to Protein | Chapter 7.1-7.3 |
| 2/12 | W | NO LECTURE | |
| 2/14 | F | NO LECTURE | |
| 2/17 | M | Bacterial Genetics: Horizontal Gene Transfer | Chapters 8.6-8.9; 13.3 |
| 2/19 | W | Bacterial Genetics: Horizontal Gene Transfer | Chapters 8.6-8.9; 13.3 |
| 2/21 | F | DISCUSSION: <i>Revenge of the Microbes</i> | Revenge... Chapters 5-6 & 8 |
| 2/24 | M | EXAM II | Chapters 6, 7, 8.6-8.9;13.3; RM 5-6 & 8 |
| 2/26 | W | The Immune System: Innate Host Defenses | Chapter 14 |
| 2/28 | F | The Immune System: Innate Host Defenses | Chapter 14 |
| 3/3-3/7 | M, W, F | NO LECTURE (Spring Recess) | |
| 3/10 | M | The Immune System: Adaptive Defenses | Chapter 15 |
| 3/12 | W | The Immune System: Adaptive Defenses | Chapter 15 |
| 3/14 | F | The Immune System: Adaptive Defenses | Chapter 15 |
| 3/17 | M | EXAM III | Chapters 14 & 15 |
| 3/19 | W | Skin Infections: <i>Staphylococcus</i> , <i>Streptococcus</i> & HSV | Chapter 22 |
| 3/21 | F | Skin Infections: <i>Staphylococcus</i> , <i>Streptococcus</i> & HSV | Chapter 22 |
| 3/24 | M | Respiratory Infections: Pneumonias & TB | Chapter 21 |
| 3/26 | W | Respiratory Infections: "The Great Plague" | Movie |
| 3/28 | F | Respiratory Infections: Influenza | Chapter 21 |
| 3/31 | M | Intestinal Pathogens: Cholera, E. coli, Shigellosis & Salmonellosis | Chapter 24 |

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| 4/2 | W | Intestinal Pathogens: Cholera, <i>E. coli</i> , Shigellosis & Salmonellosis | Chapter 24 |
| 4/4 | F | DISCUSSION: <i>Revenge of the Microbes</i> | Revenge... Chapters 7, 9-11 |
| 4/7 | M | EXAM IV | Chapters 22, 21 & 24; RM 7, 9-11 |
| 4/9 | W | Genitourinary Infections: Gonorrhoea, Chlamydia & Syphilis | Chapter 25 |
| 4/11 | F | Genitourinary Infections: HSV & AIDS | Chapter 25 |
| 4/14 | M | Nervous System Infections: Meningitis, Botulism & Polio | Chapter 26 |
| 4/16 | W | Nervous System Infections: Meningitis, Botulism & Polio | Chapter 26 |
| 4/18-4/21 | F, M | NO LECTURE (Easter Break) | |
| 4/23 | W | Antimicrobial Medications | Chapter 20 |
| 4/25 | F | EXAM V | Chapters 25, 26 & 20; RM |
| 4/29 | T (8:30am) | Case Study Presentations | |

TENATIVE LAB SCHEDULE

| DATE | DAY | EXERCISE | EXERCISE | LAB REPORT DUE |
|-----------|------|--|------------|----------------|
| 1/15 | W | Introduction to Safety and Laboratory Guidelines | | |
| 1/17 | F | Ubiquity of Microorganisms / Introduction to the Microscope | 1, 3 | |
| 1/22 | W | Ubiquity (day 2) / Oil Immersion Lens / Simple Stains | 1, 4, 5 | 3 |
| 1/24 | F | Differential and Other Special Stains (Gram Stain) | 6 | 1, 4, 5 |
| 1/29 | W | NO LAB | | |
| | | QUIZ #1 /Pure Culture & Aseptic Technique/ Chemically Defined, Complex, Selective & | | |
| 1/31 | F | Differential Media | 2, 7 | 6 |
| 2/5 | W | Pure Culture (day 2)/Media (day 2) / Quantitation of Microorganisms | 2, 7, 8 | |
| 2/7 | F | Quantitation (day 2) / Aerobic and Anaerobic Growth | 8, 9 | 2, 7 |
| 2/12-2/14 | W, F | NO LABS | | |
| 2/19 | W | Aerobic and Anaerobic Growth (day 2)/Selection of Bacterial Mutants Resistant to Antibiotics | 9, 16 | |
| 2/21 | F | Resistant Mutants (day 2) / Transformation | 16, 17 | 9 |
| 2/26 | W | Resistant Mutants (day 3) / Transformation (day 2) | 16, 17 | |
| 2/28 | F | QUIZ #2 /Normal Skin Biota / Transformation (day 3) | 22, 17 | 16 |
| 3/5-3/7 | W, F | NO LABS (Spring Recess) | | |
| 3/12 | W | Normal Skin Biota (day 2) / Streptococci & Respiratory Microorganisms | 22, 23 | 17 |
| 3/14 | F | Normal Skin Biota (day 3) / Streptococci (day 2) | 22, 23 | |
| 3/19 | W | Normal Skin Biota (day 4) / Streptococci (day 3) / Antibiotics | 22, 23, 14 | |
| 3/21 | F | Normal Skin Biota (day 5) / Antibiotics (day 2) / Antiseptics and Disinfectants | 22, 14, 15 | 23 |
| 3/26 | W | Gram Negative Rods / Antiseptics and Disinfectants (day 2) | 24, 15 | 14, 22 |
| 3/28 | F | QUIZ #3 / Gram Negative Rods (day 2) | 24 | 15 |
| 4/2 | W | Clinical Unknown Identification | 25 | 24 |
| 4/4 | F | Clinical Unknown Identification (day 2) | 25 | |
| 4/9 | W | Clinical Unknown Identification (day 3) / Epidemiology | 25, 30 | |
| 4/11 | F | Clinical Unknown Identification (day 4) / Epidemiology (day 2) | 25, 30 | |
| 4/16 | W | LAB PRACTICUM | | 25,30 |
| 4/18 | F | NO LAB (Easter Recess) | | |
| 4/23 | W | Laboratory Cleanup and Checkout | | |