



BIOL 122: Allied Health Microbiology

Muskegon Community College

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Course Description: **BIOL 122 Allied Health Microbiology: 2 Credit Lecture/Laboratory course** (2 lecture contact hours/week and 2 laboratory contact hours/week for 7 ½ weeks). This microbiology course includes a study of the microorganisms which cause disease, the means of disease transmission, immunity to disease, antimicrobial therapy, and the agents used to control microbial growth. Emphasis will be placed on the pathogenic microorganisms of body systems. This course is a preparatory course for students entering into an allied health program. Note that it does not meet the requirements for degree programs at Muskegon Community College.

**Prerequisites/
Co-requisite** None.

Schedule/Sections: TBD (for current semester schedule go to MCC's website)

Required Material*:

1. Krasner, Robert I., Shors, Teri, **The Microbial Challenge, 3rd Edition**
2. Lammert, John M., **Techniques in Microbiology A Student Handbook**
3. Howell, Debra S., **Biology 122 Allied Health Microbiology Laboratory Supplement**
4. Four ParScore Sheets (orange color; form no. F=3652-PAR-L)
5. Miscellaneous: 3 pair of vinyl gloves, black permanent marker, black ink pen, colored pencils, three-Ring binder (course supplement), and note paper

*Required material for the course is subject to change each semester. Current course material will be provided prior to the start of each semester.

Technology Requirements*:

1. Computer with speakers and high speed internet access,
2. Computer operating system– Windows or Macintosh OS,
3. Web browser– FireFox or compatible with MCC's Learning Management System (LMS),
3. Microsoft Word or compatible software,
4. Microsoft PowerPoint or PowerPoint Viewer (free viewer – www.microsoft.com/downloads,
5. QuickTime Player (free version)- <http://www.apple.com/quicktime/download/>,
6. Flash Player- <http://get.adobe.com/flashplayer/>,
7. Printer

*Students taking this course will need a back-up technology plan so that all assignment due dates are met.

NEED HELP with a technology problem? 1-866-718-5170 (toll free, 24 hour student support).

Student Responsibilities:

You are responsible for submitting course assignments by the due date. Read through the course policies set forth below:

- Assessments/assignments are due on the date/time designated by the instructor. In addition to the completeness of the assessment, points will be deducted for grammatical and spelling errors. **Late work will not be accepted** and a grade of zero will be assigned to missed assessments/assignments. Missed exams require a call to the instructor on the test day or earlier with a valid excuse (*i.e., illness, funeral...*). Only one exam may be made-up per semester when an excused absence is granted. Missed exams must be made up within 48 hours, or as directed by the instructor.
- Four Unexcused Absences result in withdrawal from the course. This is defined by either one week of course inactivity or two missed assessments, whichever comes first. Withdrawing is the responsibility of the student. Failure to follow these guidelines will result in a course grade of “E” for the course.
- Cell phones must be turned off during all assessments and course sessions.
- Testing Procedures: Assessments are given during class time or in an instructor approved Testing Center (to be determined by the instructor). A photo identification card and a test response sheet are required at the time of the assessment.
- All email communication originating from MCC, including from your instructor, to a student will be via their MCC email account. Check your MCC email account weekly. Delete old emails from your in-box, both in the deleted file folder, and junk mail. Once a mailbox is full, it will no longer accept new mail.
- Academic Integrity/Behavior must be maintained: Mutual respect and civility are expected at all times with any type of communication. Please review the following netiquette link: www.albion.com/netiquette/corerules.html. In the event of academic dishonesty (consisting of cheating and plagiarism as defined in the MCC student handbook/planner) students will be dealt with on an individual basis and may result in dismissal from the course with a grade of E.

Lecture Format: Methods of instruction include, but are not limited to- lecture presentations, textbook assignments, laboratory reports, homework, class discussions, case history analyses, projects/papers, and self-study units.

Assessment	Points Possible	Assessment Site
Assignments, Lab Reports, and Quizzes	~30%	MCC campus
Online homework	~10%	Blackboard
Two Proctored Lecture Examinations	~60%	MCC campus

Evaluation: You are evaluated on the basis of your performance on assessments. The following Life Science Department percent grading scale will be used for all MCC Life Science/biology courses:

100 - 92.0	A	79.9 – 78.0	C+	61.9 – 60.0	D-
91.9 - 90.0	A-	77.9 – 72.0	C	59.9 and □	E
89.9 - 88.0	B+	71.9 – 70.0	C-		
87.9 - 82.0	B	69.9 – 68.0	D+		
81.9 - 80.0	B-	67.9 – 62.0	D		

Total lecture points earned divided by total lecture points possible x 100 = lecture percentage.
Grading Rubric: Will be made available online.

Posting of Grades: All quiz scores will be posted within a three day period following the assessment. Exam scores will be posted within a five day period following the assessment. Other assessment scores will be posted as announced by the instructor.

Review/Study Guidelines:

- 1) Complete all assignments on time and review repeatedly through the unit/module.
- 2) Study on a regular basis:
 - a. Review class notes as soon as possible after assigned. A minimum of 2-3 hours review time for each 1 hour of class work is recommended. This lecture/laboratory course requires approximately four hours of contact time per week and an additional 8-12 hours of review per week.
 - b. Rewrite class notes. Use outlines, diagrams/concept maps to help you focus on key points.
 - c. Form study groups early on and meet weekly.
 - d. Contact your instructor weekly if needed to clarify content. This may be accomplished by telephone, on-campus visits, or through instant messaging (IM).
 - e. Study a key concept and test your depth of knowledge. The following process requires you to organize the information, synthesize answers by writing out answers in a detailed, sequential format (excellent for preparing for essay questions).
 - i. Study one key concept from class material repeatedly in a variety of ways (textbook assignment, instructor material, lecture notes, worksheets, mind maps...).
 - ii. Take a blank sheet of paper and write down everything you know from memory.
 - iii. Compare your answer against course notes, text, worksheets...correct errors and repeat process until successful.
- 3) Attend all review sessions (time to be announced).

Statement on Student Behavior: Muskegon Community College is a community of scholars whose members include administrators, faculty, staff, and students. Mutual respect and civility are expected in the classroom or other college academic settings, as well as, in any communication.

- MCC has the duty of providing students with privileges, opportunities, and protections that best promote learning;
- Students have the right to a non-threatening learning environment;
- Students have the responsibility to refrain from infringing on the right of others to learn or the right of teachers to teach; and
- Any student whose behavior disrupts learning may be subject to disciplinary action as outlined in the Muskegon Community College *Student Handbook/Planner*.
- Please review the following Netiquette link: www.albion.com/netiquette/corerules.html.

Academic Integrity Policy: Muskegon Community College expects that all faculty and students will adhere to high standards of personal and academic honesty. This means that all academic work will be done by the student to whom it is assigned without unauthorized aid of any kind. Faculty members, for their part, will exercise care in the planning and supervision of academic work so that honest effort will be positively encouraged.

Academic dishonesty consists of, but is not limited to: Cheating. Cheating is defined as using or attempting to use, giving or attempting to give, and obtaining or attempting to obtain, materials or information, including computer material pertaining to a quiz, examination, or other work that a student is expected to do alone.

- Plagiarism. Plagiarism is defined as the use of another's words or ideas without acknowledgement.
- Penalties for violation of these standards of conduct may result in sanctions of up to and including suspension or expulsion from MCC

Statement on Dispute Resolution Process: Should a student not agree with a faculty member's decision or actions as they may relate to this policy, the following steps shall be followed:

1. A student suspected of academic dishonesty shall be notified in writing within two school days of the time the violation is discovered. Copies of the written notification shall also be filed with the department chair and Vice President of Student Services.
2. The student should try to reach resolution of the matter through direct discussion with the involved faculty member within three (3) school days of the written notification.
3. If the matter is not resolved in Step 2, the student shall bring the matter to the attention of the department chairperson of the involved faculty member.
4. If the matter is not resolved at the department chairperson level, the student shall bring the matter to the attention of the Vice President for Academic Affairs who shall render a decision within five school days of the receipt of the dispute information.
5. If a satisfactory solution is not reached at the Step 4 level, the student may file a written request with the Vice President of Student Services for a hearing before the disciplinary board. This meeting shall be held not more than 20 days following the written request. A student may request a hearing before the disciplinary board. The disciplinary and judicial procedures are outlined in the Muskegon Community College *Student Handbook/Planner*.

Statement on Special Services: Special Services is an important part of the broad range of services offered at Muskegon Community College. Our goal is to provide effective services, materials, and resources which enable students who are members of Special Populations to be successful. Contact 231-777-0309. Contact must be made during or before the first week of the course (contact your instructor also).

Course Website

Complete prior to the first day of class:

1. Go to www.muskegoncc.edu and click on My MCC. Log in using the username and password provided to you upon admission to MCC.
2. Click on the BIOL 122 course.
3. Read through the “welcome announcement” and follow the instructions on how to get started.
4. You must complete course work weekly in order to remain in this course.

NEED HELP with a technology problem? 1-866-718-5170 (toll free, 24 hour student support).

PEER CONTACT INFORMATION

Student Name	Telephone	Email

AVAILABILITY OF STUDENT PAPERS:

1. Exams are available for review for a one week period following posting of the grade. You may review exams in the biology office on campus during posted office hours. Student exams must be returned and are considered MCC property.
2. All student papers/exams will be available for review for up to two weeks beyond the semester. Student papers will be destroyed after that. Please set up an appointment with your instructor to review your work.

Topical Outline / Lecture and Lab Schedule / Reading Assignments

Week	Day	Topic	Reading Assignment
1	Wed.	<p>Lecture: Introduction to Microbiology.</p> <p>Intro Lab: Overview of laboratory procedures; Brightfield (compound) microscope; and Scientific Inquiry (Scientific Method)</p>	<p><i>The Microbial Challenge:</i> pp 2-26</p> <p><i>Techniques Handbook:</i> pp 1-5, 17-19, 74-83</p>
2	Wed.	<p align="center">QUIZ I (lecture and lab)</p> <p>Lecture: Cell Structure and Taxonomy; Acellular & Procaryotic Microbes</p> <p>Lab One: Microscope review; Preparation of Microorganism Stains and Wet Mounts; Aseptic technique</p>	<p><i>The Microbial Challenge:</i> pp 32-45, 73-92, 95-108</p> <p><i>Techniques Handbook:</i> pp 28-37,42-47, 87-95</p>
3	Wed.	<p align="center">QUIZ II (lecture and lab)</p> <p>Lecture: Microbial Metabolism and Genetics</p> <p>Lab Two: Culture Techniques; Biochemical Characteristics; Macroscopic Culture Characteristics</p>	<p><i>The Microbial Challenge:</i> pp 123-148</p> <p><i>Techniques Handbook:</i> pp 60-62, 94-98, 131-134, 137-138, 142-145, 164-165</p>
4	Wed.	<p align="center">QUIZ III (lecture and lab)</p> <p>Lecture: <u>Controlling Microbial Growth in Vitro</u> <u>Using Antimicrobial Agents to Control Microbial Growth in Vivo</u></p> <p>Lab Three: Sampling Techniques for Monitoring Microorganisms; Hand-washing experiment.</p>	<p><i>The Microbial Challenge:</i> pp 379-408</p> <p><i>Techniques Handbook:</i> pp – not used</p>
5	Wed.	<p align="center">EXAM I - Lecture and lab (Weeks 1-4)</p> <p>Lecture: <u>Microbial Ecology</u> <u>Epidemiology and Public Health</u> <u>Nosocomial Infections and Infection Control</u></p> <p>Lab Four: Immunity: Antigen-Antibody reactions.</p>	<p><i>The Microbial Challenge:</i> pp 48-51, 173-197, 414-426</p> <p><i>Techniques Handbook:</i> pp - not used</p>
6	Wed.	<p align="center">QUIZ IV (lecture and lab)</p> <p>Lecture: <u>Nonspecific Host Defense Mechanisms</u> <u>Specific Host Defense Mechanisms: An Introduction to Immunology</u></p> <p>Lab Five: Chemical and physical control of Microorganisms.</p>	<p><i>The Microbial Challenge:</i> pp 346-372</p> <p><i>Techniques Handbook:</i> pp 206-217</p>
7	Wed.	<p align="center">QUIZ V (lecture and lab)</p> <p>Lecture: <u>Major Viral, Bacterial, and Fungal Diseases of Humans Diseases</u> <u>'Clinical Specimens'</u></p> <p>Lab Six: Organisms of the Respiratory, Gastrointestinal Tract....</p>	<p><i>The Microbial Challenge:</i> pp 152-170, 201-224, 260-266, 337-341, 438-444, 466-482, 482-488</p> <p><i>Techniques Handbook:</i> pp 60-62.</p>
8	Wed.	Exam II - Lecture and lab (Weeks 5-7)	

Revised: 6-24-13

NOTE: Topical Outline may be modified with notice as needed.

GENERAL COURSE OBJECTIVES - After taking BIOL 122, you will-

- Recognize the major groups of microorganisms
- Understand and explain the structure of microorganisms
- Recognize the appearance of bacteria, fungi, and protozoans.
- Understand and explain how microorganisms grow and reproduce
- Learn and apply basic microbiology techniques
- Apply the scientific method in your laboratory investigations
- Understand how medical personnel monitor microbial presence in hospitals
- Understand how hospitals sample their environments for the presence of microorganisms.
- Possess knowledge concerning nosocomial diseases and understand how it applies to your life
- Learn and demonstrate the importance of hand washing in the control of nosocomial infections.
- Learn what means are available to you to control the growth of microorganisms inside and outside your body and apply that knowledge in the laboratory.
- Understand which microorganisms reside in your body and how they protect you from disease.
- Learn how organisms cause disease. Explain disease processes.
- Understand how your immune system deals with pathogenic microorganisms
- Understand and demonstrate physical and chemical means used to control microorganisms
- Recognize and explain major pathogenic organisms of the body systems

NOTE: Specific learning objectives are listed for both lecture and laboratory by week below.

Note to the student:

- Complete weekly learning objectives and textbook assignments
- Complete online weekly assessments

Week One (1) - Complete the following learning objectives:

- Define microbiology and explain how it impacts you
- Know the major contributions of: Anton Leeuwenhoek, Louis Pasteur, Robert Koch, and Carolus Linneaus. Explain how their contributions are applicable today.
- Learn the types of microscopes commonly used in microbiology.
- Demonstrate how to use a compound microscope.
- Identify the structures and explain the functions of a compound microscope.
- Understand and be able to apply the units used to measure microorganisms
- Understand how organisms are scientifically named
- Describe the major characteristics of eukaryotic organisms and their functions.
- Describe the major characteristics of prokaryotic organisms and their functions.
- Compare and contrast eukaryotic organisms to prokaryotic organisms.

Week Two (2) - Complete the following learning objectives:

- Learn and recognize the shapes of prokaryotes (bacteria)
- Describe the major characteristics of viruses.
- Compare and contrast viruses to prokaryotes
- List several important viral diseases of humans
- Identify and explain how the human immunodeficiency virus (HIV) infects humans and causes disease

Week Three (3) - Complete the following learning objectives:

- Explain the activity and characteristics of enzymes
- Understand and explain the basic structure of DNA
- Know the major nutrients needed by microbes
- Demonstrate and identify nutrient use by microbes
- Recognize the nutritional types that microbes represent
- Identify methods of gene transfer used by bacteria
- Describe the method of genetic engineering: know two products of genetic engineering

Week Four (4) - Complete the following learning objectives:

- Explain the phases of a bacterial growth curve
- Identify and explain the factors that affect microbial growth
- List examples of culture media used in microbiology
- Understand how heat destroys microorganisms
- Give examples of dry and moist heat methods used to kill microbes
- Describe other physical methods, including filtration, used to kill or inhibit microbes
- Explain the mechanism of action of each antimicrobial discussed in class
- Identify the group(s) of organisms against which each antimicrobial is most effective
- Recognize the toxic side effects of antimicrobials
- Describe two mechanisms by which microbes become resistant to antimicrobials
- Understand and explain what MRSA is
- Describe the proper procedures in the use of antimicrobials.
- Give examples of the various classes of chemicals used to inhibit or kill microbes
- Recognize the major uses of the classes of chemicals
- Demonstrate antimicrobial susceptibility testing on microbes

Week Five (5) - Exam I (wks. 1-4) and New Material

- EXAM I – lecture and lab material (weeks 1-4)

New Material - Complete the following learning objectives:

- Learn the patterns of symbiosis and be able to give examples of each
- Discuss the types of normal flora organisms found in the respiratory tract and on the skin
- Understand and be able to explain the following as they apply to infection and be able to define terms associated with:
 - Factors influencing occurrence of infections
 - Pathogenesis of infection leading to disease
 - Spread of infection
 - Why infections don't always occur
 - Treatment and prevention of infection/disease.
- Identify and explain how patterns of disease are studied in a community.
- Identify and explain the most common nosocomial infections and the microbes causing them

Week Six (6) - Complete the following objectives:

- Give examples of the types of nonspecific immunity (first line of defense)
- Explain the processes of phagocytosis and inflammation
- Apply nonspecific immunity processes when you are invaded by a pathogen
- Explain the characteristics of antigens (immunogens)
- Understand the role macrophages play in adaptive (specific) immunity
- Understand the formation of cells involved in adaptive immunity
- As they are related to humoral (antibody-mediated) immunity, be able to explain and apply the following concepts:
 - the immune response
 - classes of antibodies
 - structure and functions of antibodies
 - tests to detect antibodies
 - disorders
- As they are related to cellular immunity (CMI), be able to explain and apply the following concepts:
 - the immune response
 - tests to detect CMI
 - disorders
- Discuss the effects AIDS has on adaptive immunity.

Week Seven (7) - Complete the following objectives:

- Recall major differences between bacteria and viruses
- Know the modes of transmission of respiratory infections
- Recognize the etiologic agent(s), virulence factors, disease process, diagnosis, treatment, and prevention for the following diseases of the upper respiratory tract:
 - Diseases of *Streptococcus pyogenes*
 - Common cold
- Differentiate between symptoms of a bacterial pneumonia vs. a viral pneumonia
- Recognize the etiologic agent(s), disease process, diagnosis, treatment, and prevention for the following diseases of the lower respiratory tract:
 - Bacterial pneumonia
 - Influenza
 - Tuberculosis
 - Pneumocystosis
- Understand why it is necessary to periodically manufacture new vaccines for influenza outbreaks
- Understand and demonstrate proper culture handling of respiratory specimens
- Analyze and interpret case histories

Week 8: Exam II (weeks 5-8)

- **Exam II:** Includes weeks five through eight (lecture and laboratory material).