

MONTGOMERY COUNTY COMMUNITY COLLEGE
Department of Math/Science

- COURSE TITLE:** **BIO 141: Clinical Microbiology I**
- COURSE CREDIT:** **Four Credits**
Lecture – Approximately 3 hours/week (Room 304)
Laboratory – Approximately 3 hours/week (Room 305)
- PREREQUISITES:** Students should have taken at least one semester of college level biology and chemistry (CHE 131 or CHE 151 & BIO 121, BIO 130 or BIO 151). This course **may not** be taken concurrently with ESL courses. Students without these prerequisites should contact the instructor prior to registering.
- COURSE SCHEDULE:** **Spring 2006:** January 18 – May 2
Final Exam Week: May 4-5, 8-10
Monday-Wednesday: Lecture 1:30-2:30 p.m.
Laboratory 2:30-4:35 p.m.
- LECTURER:** **Ms. Elaine Venuti, MT(ASCP), MS**
Microbiology Department: Room 324, Science Center
Voice Mail: 215-641-6443
E-mail: evenuti@mc3.edu
Office Hours: MW 11:00 a.m.-12:00 Noon
TTH 9:00-9:30 a.m.; 1:30-2:30 p.m. & by appointment
- REQUIRED TEXTS:**
- Title:** *Bailey & Scott's Diagnostic Microbiology*
Author: Betty Forbes, Daniel Sahm, Alice Weissfeld
Edition: Eleventh, 2002
Publisher: Mosby
- Title:** *Microbiology: An Introduction: Brief Edition*
Author: Tortora, Funke, and Case
Edition: 7th or 8th Brief Edition
Publisher: Benjamin Cummings Publishing, Inc.
- The Diagnostic Microbiology Text must be purchased within the first week. The introductory text will be provided by the department. Both texts will be used for BIO 241.
- REQUIRED LAB MANUAL:**
- Title:** *BIO140: Microbiology Laboratory Manual*
Author: Judy Earl
The manual will be provided to the student on the first day of class.
- COURSE DESCRIPTION:** BIO 141 is the first part of a two-part Medical Technology course for MLT students. It examines the

microbial world with emphasis on the morphology and biological properties of bacteria and their relationship to man. It enables the student to understand how infectious disease is spread, how bacteria are isolated and identified, how microbes are controlled and the nature and use of antimicrobial agents.

COURSE OBJECTIVES:

A. LECTURE

1. To acquire a knowledge and understanding of the basic nature and replication mechanisms of bacteria.
2. To understand the diversity of diseases caused by bacteria.
3. To be able to describe how pathogens are transmitted.
4. To be able to select appropriate infection control methodologies pertinent to the student's health care occupation as well as their own personal health.
5. To be able to discuss laboratory tests and methods for diagnosis of infectious disease.
6. To be able to define susceptibility testing methods and rationale for each choice.

COURSE OBJECTIVES:

B. LABORATORY

At the end of the course the student shall:

1. List and observe all rules of the Microbiology laboratory.
2. Be able to use the binocular microscope to identify microorganisms.
3. Be able to perform all steps of a Gram stain resulting in the correct identification of bacteria. (Evaluation by instructor and lab aide.)
4. Practice aseptic technique as observed by the instructor and lab aide.
5. Be able to perform streak dilution from agar and broth cultures resulting in well-isolated colonies and a culture without cross-contamination. (Evaluation by instructor and lab aide.)

COURSE OBJECTIVES: (cont'd.)

B. LABORATORY

6. Be able to define and select diagnostic media for the isolation and presumptive or definitive identification of all bacteria presented in the laboratory.
7. Perform sensitivity testing of bacteria.

COURSE REQUIREMENTS:

A. LECTURE

1. A lecture format will be employed. Periodic exams, and a final will be given.
2. Students are responsible for all reading assignments in the textbook as well as all lecture material, A-V presentations and supplemental material. Lecture outlines will be provided. PowerPoint presentations will be available for download through Blackboard. **You will need to spend a minimum of two hours of study for each hour of laboratory course time.**
3. Attendance at all lectures is mandatory. Five absences (excused or unexcused) will result in a grade of F.
4. Make-up exams will be given only in extreme circumstances at the discretion of the instructor. **One exam may be missed with no penalty.** An unexcused absence for an exam will result in a grade of zero.
5. Extra credit is not permitted.
6. A student may **withdraw** from the course NO LATER than March 7 without a signature, with a grade of "W." A withdrawal form must be submitted to the registrar. Failure to attend class is **not** an official withdrawal and will result in a final grade of "F." After this date an instructor's signature is required; this will be determined on an individual basis when extenuating circumstances exist. **Please note: It is the student's responsibility to deliver the signed form to the registrar.**
7. All cell phones and pagers MUST be turned off before entering the classroom. Conversations with your peers and disruptive behaviors during the lecture are distracting to others and may result in your dismissal from class.
8. College policy is followed regarding cheating and plagiarism. Cheating on a quiz or exam will result in a grade of zero on that quiz or exam. Further disciplinary action may be taken.

COURSE REQUIREMENTS:

B. LABORATORY

1. A combined lecture and lab format will be employed; worksheets will be collected.
2. **Students should prepare for the laboratory by reading the daily lab assignment in advance.** It is helpful to outline the lab procedure and make notes of questions you wish to ask during the lecture portion of lab. Be sure you read and understand the objective before and after each lab.
3. **LAB sessions CANNOT be made up;** five absences (Excused or Unexcused) will result in an automatic grade of F.
4. Technique will be observed by the lecturer and laboratory aide and includes use of the microscope and other equipment, observation of lab rules, ability to isolate organisms, ability to perform and read Gram stains, and ability to identify “unknowns.”
5. Most of the labs will require that a worksheet be turned in the day of your lab. Come to lab prepared.
6. Protective lab clothing is required. Students without protective clothing will be dismissed from lab for that period and will be assessed an unexcused absence.
7. Periodic lab quizzes will be given. No make-ups are allowed. **One quiz may be missed without penalty.**

GRADING POLICY:

Written lecture and lab quizzes/examinations: All or some of the following: definitions, multiple choice, fill-in-the-blanks, true or false, matching and short essays. Refer to the objectives. To achieve good grades in this course you should plan on spending two hours study time for each hour of class time. The focus of the exams and quizzes will be on the lecture/lab material; however, you ARE responsible for all assigned readings, handouts, etc.

Laboratory Worksheets: Data collection, interpretation, and analysis. Refer to the objectives.

Laboratory Practical: Microscopic and macroscopic specimens presented for identification, description or discussion of principle of test, or actual identification of an organism.

GRADING POLICY: (cont'd.)

FINAL GRADE

Lecture

- | | |
|---|-----|
| 1. Chapter exams | 40% |
| 2. Final Exam (Cumulative)
TBA – May 4-5, 8-10 | 25% |

No one will be allowed to take the Final Exam early.

Laboratory

- | | |
|---------------------------|------------|
| 1. Quizzes | 5% |
| 2. Technique, Worksheets | 5% |
| 3. Correct ID of unknowns | 10% |
| 4. Lab Practical | <u>15%</u> |

Total 100%

You must achieve an average grade of 70% in BOTH THE LAB AND THE LECTURE in order to receive a grade of “C” for the course.

GRADE CRITERIA:

- A = 90 - 100
B = 80 - 89
C = 70 - 79
D = 60 - 69
F = 0 - 59

STUDENTS WITH DISABILITIES:

Students with disabilities may be eligible for accommodations in this course. Please contact the Director of Services for Students with Disabilities in College Hall 131 at (215) 641-6575 for more information. At the West Campus, contact the Coordinator of Disability Services in the Student Development Center at (610) 718-1853.

COURSE OBJECTIVES

BIO 141: CLINICAL MICROBIOLOGY I

This is part one of the clinical microbiology course for students in the Medical Laboratory Technician program at Montgomery County Community College. The major emphasis is on the bacteria, particularly their relationships with humans, some diseases that these organisms cause, the morphological and physiological differences that are the basis of their identification, and methods for their control. This information is applied to techniques commonly used for the isolation and identification of those pathogenic bacteria that are most often encountered in the clinical microbiology laboratory. A summary of the information that will be covered in this course is given below.

BY THE END OF THE COURSE, YOU SHOULD BE FAMILIAR WITH:

A. Bacteria as a cause of human disease

1. Place bacteria and other disease producing organisms in their correct taxonomic classification.
2. Define: pathogen, non-pathogen, opportunist, virulent, avirulent, attenuated.
3. Give the distinguishing characteristics for each of these groups of bacteria in which they are found: The true bacteria, the branching bacteria, mycoplasmas, chlamydia, and rickettsia.
4. Give the scientific name of at least one member of each of the groups in #3 above.
5. Describe the ways in which infections are transmitted.
6. Relate invasiveness and toxin production to pathogenesis.

B. The major morphological characteristics of commonly encountered bacteria that have medical importance

1. Describe the morphological characteristics associated with medically important bacteria.
2. Name the structures found in all bacterial cells and give their functions.
3. State the function of the structures found in some but not all bacterial cells: Capsules, endospores, fimbriae, pili, flagella and plasmids.

C. Elementary biochemistry and bacterial physiology

1. Define and give relevant examples of polymers, monomers, and macromolecules.
2. Describe the nutritional requirements of bacteria and relate these to energy sources and building blocks.
3. Describe the environmental requirements of bacteria.
4. Give a general description of an enzyme based on its biochemistry, function, and mode of action.
5. Relate ATP to: nucleic acids, nucleotides, and energy transfer.
6. Relate the metabolic activities of bacteria to glucose utilization and the production of energy.
7. Describe bacterial growth and relate it to the growth curve.

D. The basic techniques of the diagnostic microbiology laboratory

1. Perform simple techniques related to light microscopy.
2. Obtain and work with pure cultures of bacteria.
3. Recognize commonly isolated bacteria by colony morphology and growth characteristics.
4. Know how to use selective and differential media in the isolation and identification of pathogens from routine specimens.
5. Perform and interpret the results of biochemical tests used for identification of medically important bacteria.

E. The fundamental nature of antimicrobials and antimicrobial susceptibility testing

1. Define the terms: Antibiotic, semi-synthetic agent, synthetic agent.
2. Describe what is meant by the spectrum of antimicrobial activity.
3. Describe dilution methods for sensitivity testing and relate these to the minimal inhibitory concentration (MIC) and the minimal bacteriocidal concentration (MBC).
4. Select appropriate antimicrobials for testing based on the organism isolated.
5. Interpret susceptibility results – both Kirby-Bauer and MIC.
6. Describe genetic mechanisms for the development of antimicrobial resistance in bacteria.

F. Fundamentals of sterilization and disinfection

1. Define and correctly use the terms *contamination*, *sterilization*, and *disinfection*.
2. Describe physical methods for sterilization and disinfection.
3. Describe chemical methods for sterilization and disinfection.

G. All of the following bacteria with respect to:

1. Gram stain reaction and cellular morphology
2. Pathogenicity
3. Relationship to normal flora
4. Characteristics important in identification

Staphylococcus aureus
S. epidermidis
S. saprophyticus
Streptococcus species
Enterococcus species
Neisseria gonorrhoeae
Neisseria meningitidis
Moraxella lacunata
Moraxella catarrhalis
Haemophilus species
Bordetella pertussis
Eikenella corrodens
Francisella tularensis
Legionella pneumophila
Pasteurella multocida
Vibrio species
Burkholderia species
Mycoplasma species
Mycobacterium species
Borrelia burgdorferii

Citrobacter species
E. coli
Enterobacter species
Klebsiella species
Morganella species
Proteus species
Providencia species
Salmonella species
Serratia species
Shigella species
Yersinia species
Acinetobacter species
Campylobacter species
Helicobacter pylori
Pleisiomonas species
Pseudomonas species
Stenotrophomonas species
Chlamydia trachomatis
Rickettsia species
Actinomyces species

Bacillus anthracis
Bacillus species
Corynebacterium species
Erysipelothrix rhusiopathiae
Gardnerella vaginalis
Lactobacillus species
Listeria monocytogenes
Nocardia species
Bifidobacterium species
Clostridium species
Eubacterium species
Peptostreptococcus species
Propionibacterium species
Bacteroides species
Porphyromonas species
Prevotella species
Veillonella species
Treponema pallidum

BIO 141: CLINICAL MICROBIOLOGY I LECTURE SCHEDULE

2006 – Spring

Mon.-Wed.

SUBJECT	DATE
Chapter 1 (T)	Review course syllabus; Introduction to Microbiology 1/18
Chapter 2 (T)	Chemical Principles 1/23
Chapter 9 (B)	Microscopy 1/25
Chapter 4 (T), Chapter 7 (B)	EXAM 1 ; Prokaryotic Cells Eukaryotic Cells 1/30 2/1
Chapter 5 (T), 7 (B)	Microbial Metabolism 2/6
Chapter 6 (T), 10 (B)	Microbial Growth, Microbial Media 2/8
Chapter 19, 20 (B)	EXAM 2 ; Aerobic Gram Positive Cocci 2/13
Chapter 19, 20 (B)	Aerobic Gram Positive Cocci (continued) 2/15
Chapter 25 (B)	Enterobacteriaceae 2/20
Chapters 26, 27 (B)	Non-fermenting Gram Negative Rods 2/22
Chapters 31, 39 (B)	EXAM 3 ; Curved Gram Negative Rods 2/27
Chapters 37, 40-43 (B)	Haemophilus; Fastidious Gram Negative Rods 3/1
Chapters 33-36 (B)	Fastidious GNR; The Hacek Group 36
Chapter 45 (B)	Aerobic Gram Negative Diplococci 3/8
HAPPY SPRING BREAK	
	3/13 – 3/19
Chapters 21-24 (B)	EXAM 4 ; Aerobic and Facultative Gram Positive Rods 3/20
Chapters 45-47 (B)	Anaerobic Bacteriology 3/22
Chapter 51 (B)	Spirochetes 3/27
Chapter 49 (B)	Unusual Bacteria: Rickettsia and Chlamydia 3/29
Chapter 48 (B)	EXAM 5 ; Mycobacteria 4/3
Chapter 48 (B)	Mycobacteria (continued) 4/5
Chapters 20 (T), 15 (B)	Antimicrobial Action and Resistance 4/10
Chapters 16-17 (B)	Antimicrobial Susceptibility Testing 4/12
Chapter 1 (B)	EXAM 6 ; Specimen Collection, Transport, Processing Culture Interpretation and Workflow 4/17 4/19
Chapters 7 (T), 2 (B)	Control of Microbial Growth: Sterilization/Disinfection 4/24
	Review for Lab Practical and Final Exam 4/26
Last Class	LAB PRACTICAL – Must be taken on scheduled day 5/1
5/4 – 5/5 or 5/8 – 5/10	FINAL EXAM – To Be Announced
THIS CLASS SCHEDULE IS SUBJECT TO CHANGE T = TORTORA, B = BAILEY & SCOTT EXAMS MAY BE GIVEN DURING LAB PERIODS	

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BIO 141: CLINICAL MICROBIOLOGY I LABORATORY SCHEDULE

2006 – Spring

Mon.-Wed.

<u>SUBJECT</u>	<u>DATE</u>	
LAB 1	Rules of the Microbiology Lab	1/18
LABS 2 & 3	The Microscope; Organisms in the Environment	
LABS 2 & 3	Complete: Microscope & Organisms in the Environment	1/23
LAB 4	QUIZ 1 ; Bacterial Morphology: Smears and the Gram Stain	1/25
LAB 4	The Gram Stain (continued)	1/30
LAB 5	Wet Mounts and Motility	2/1
LABS 6, 7	QUIZ 2 ; Bacteriological Media; Aseptic Technique & Isolation	2/6
	Bacteriological Media; Aseptic Technique & Isolation	2/8
LAB 8	ID of Staphylococci	2/13
LABS 8 & 10	Complete ID of Staphylococci; Set Up Throat Cultures	2/15
LAB 9	QUIZ 3 ; Growth and ID of Streptococci; Continue Throat Culture	2/20
LABS 9 & 10	Complete Strep ID; Complete Throat Culture	2/22
LAB 11	Gram Negative ID; Conventional Testing	2/27
LAB 11	Complete Gram Negative ID: Conventional Testing	3/1
LAB 11	QUIZ 4 ; Gram Negative ID: API	3/6
LAB 11	Gram Negative ID: Complete API	3/8
	HAPPY SPRING BREAK	3/13 – 3/19
LAB 16	Urine Cultures	3/20
LAB 16	Complete Urine Cultures	3/22
LAB 12	QUIZ 5 ; Haemophilus ID	3/27
LAB 12	Complete Haemophilus ID	3/29
LABS 13 & 14	ID of Neisseria and Moraxella; ID of Gram Positive Bacilli	4/3
LABS 13 & 14	Complete ID of Neisseria, Moraxella and Gram Positive Bacilli	4/5
LAB 15	QUIZ 6 ; ID of Anaerobes	4/10
LABS 15 & 17	Complete ID of Anaerobes; Begin Kirby-Bauer for Antimicrobials	4/12
LABS 17 & 18	Complete Kirby-Bauer; Begin Unknowns 1 & 2	4/17
	Continue Unknowns 1 & 2; Begin Unknowns 3 & 4	4/19
LAB 18	Unknowns 1 & 2 Due; Continue Unknowns 3 & 4; Begin Unknowns 5 & 6	4/24
	Unknowns 3 & 4 Due; Continue Unknowns 5 & 6	4/26
LAB 19	Unknowns 5 & 6 Due; Review for Lab Practical	5/1
	LAB PRACTICAL – MUST BE TAKEN ON SCHEDULED DAY	
	THE LAB SCHEDULE IS SUBJECT TO CHANGE	

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SIGNATURE FORM

I verify, by signing this form, that I have received and read the syllabus for BIO 140; that I understand the attendance and withdrawal policies. I also understand the policy regarding tests/quizzes and exams.

I also verify, by signing this form, that I have successfully completed all prerequisites as detailed in the syllabus.

I, the undersigned, have received a copy of the Laboratory Rules and Guidelines which I have read, understood, and agree to abide by.

NAME: _____

STUDENT ID #: _____

CLASS DAY and TIME: _____

DATE: _____