

Clinical Microbiology Lecture

Temple University

Fall 2017

SYLLABUS

- I **Course Number and Title:** BIOL 2001 – Clinical Microbiology
- II **Prerequisites:** CHEM 1021/1031/1041/1951 and BIOL 1012/2112/2912 and KIN 1224
- III **Placement:** Main Campus TR 8-9:20 am
SERC 110B
- IV **Credit Allocation:** 4 semester hours (3 hours lecture, 3 hours lab)
- V **Faculty:**

Angela Bricker, Ph.D.

BioLife 248C

Phone 215-204-8578

ABricker@temple.edu

Office Hours: Tues 9:30-11:30, Wed 9-11, By Appointment

Michelle McGowan, Ph.D.

BioLife 248E

Phone 215-204-6141

McgowanM@temple.edu

Office Hours: Thurs 11-2, By Appointment

VI Student and Faculty Academic Rights and Responsibilities

I am committed to students of all abilities achieving success in this course with hard work and support. If you have a condition or situation that may impact your ability to succeed in this course, please speak to me privately so we can work out the best possible solution.

I happily work with Disability Resources and Services (DRS, <http://disabilityresources.temple.edu/>) for students with documented accommodations, but if you have an accommodation please speak with me about it in person – the lab environment often leads to situations that are best addressed individually.

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has a policy on Student and Faculty Academic Rights and Responsibilities (Policy 03.70.02), which can be accessed through the following link: <http://policies.temple.edu/PDF/99.pdf>

Withdrawal Policy: The last day to withdraw from this course is Tuesday, October 24. You cannot withdraw after this date.

VII Course Objectives: A year after this course is over, students can:

1. Remember and articulate terminology and disease-microbe relationships. (Foundational Knowledge)
2. Analyze infectious disease situations and coordinate an appropriate medical response. (Application of Knowledge)
3. Relate the role of microbiology with personal and public health. (Integration of Knowledge)
4. Interact with patients, public, and family in a medically responsible and healthy manner. (Human Dimension)
5. Live rationally and wisely with microbes in the real world. (Caring)
6. Identify and employ reliable sources of information regarding identification, diagnosis, and treatment of infectious disease. (Learning How to Learn)

VIII Course Overview

This course provides an introduction to the microorganisms that cause infectious diseases around the world. The course consists of three modules presented in lectures that are shaped by principles of active learning. Laboratory learning experiences will involve testing scientific principles related to lecture content, and are integrated to support concepts introduced during lectures.

IX Relationship to Conceptual Framework

The course focus is clinical microbiology and emphasizes the recognition, diagnosis, treatment, and control of infections seen in healthcare environments and the community.

Module 1 Fundamentals

- a. Biochemistry
- b. Microbial physiology
- c. Metabolism
- d. Growth and control
- e. genetics

Objectives

- Activate prior learning in biochemistry and biological principles
- Use physiological principles to distinguish among medically relevant groups of microbes
- Relate microbial physiology to microbes' ability to interact with the host

- Connect microbes' metabolic needs with their ability to grow in specific sites or under specific conditions
- Integrate awareness of microbes' physiological requirements to understand methods of controlling them in the environment
- Connect microbial genetics with the emergence of new traits or strains of microbes, and understand the challenges and dangers this represents to healthcare

Module 2 Microbe-Host Interactions

- a. Principles of disease and epidemiology
- b. Mechanisms of pathogenicity
- c. Innate immunity
- d. Adaptive immunity
- e. Practical immunology
- f. Immunological disorders
- g. Antimicrobial drugs

Objectives

- Identify the interaction between the outbreak of disease and the cause, source, and method of spread
- Assess the relationship of normal microbes with people in the context of good and poor health; identify the factors that can change the balance from a healthy to an unhealthy relationship between patient and microbes
- Relate the paths by which microbes infect a patient to the establishment of a disease state
- Integrate the molecular pathways of the different types of immunity to understand its role in fighting microbial infection
- Develop an appreciation of the ways in which a malfunctioning immune system can cause disease
- Investigate the ways in which immunology has been harnessed to develop medical tests
- Analyze the mode of action and utility of various clinically relevant classes of antibiotics

Module 3 Microbes and Disease

- a. Skin and eyes
- b. Nervous system
- c. Cardiovascular and lymphatic systems
- d. Respiratory system
- e. Digestive system
- f. Urinary and reproductive systems

Objectives

- Connect common microbes with the diseases they cause, relevant diagnostic procedures, and treatments
- Understand the impact of infectious disease on patient health and well-being

X Teaching Methods

- Lectures
- Mastering Microbiology online assignments and study tools
- Discussion and in-class activities
- Case Studies
- Laboratory

XI Evaluation

- 3 Examinations – 45%
- Mastering Microbiology homework assignments – 10%
- In-class activities – 15%
- Laboratory grade, based on lab exercises, quizzes, and lab practical exam – 30%

XII Exam and Assessment Policy

Exams will start at 8:00 am. You will not be permitted to enter the room after 8:40 am. You will be seated by the instructor. Bring #2 pencils with erasers. You will not be permitted to wear sunglasses, hats with visors, or headsets/earbuds of any kind. You may not have dictionaries or other books, cell phones, calculators, or electronic devices of any kind on your desk during the examination unless approved by me.

IF YOU CANNOT TAKE THE EXAM, YOU MUST CONTACT ME THE DAY OF THE EXAM. It may be possible to make alternate arrangements, but only if you communicate promptly.

Assessments may be assigned and performed wholly in class, or partially in class and partially as homework. Generally, late work will not be accepted, but if you contact me in a timely fashion, we can discuss your specific situation.

XIII Required Textbooks

1. **Tortora, Funke, and Case (2015) *Microbiology: An Introduction* 12th Edition.**
Pearson

There are several versions available of this text:

Hardcover text, e-text access, Mastering Microbiology code: ISBN: 9780321928924

Binder-ready text, e-text access, Mastering Microbiology code: ISBN: 9780133983722

E-text and Mastering Microbiology code: ISBN-13: 9780133995411

Mastering Microbiology code ONLY: ISBN-13: 9780133904796

NOTE: if you cannot afford a copy of the textbook, you may purchase a previous edition. You will be responsible for all the material in the current edition. I place two copies of the current text on reserve in the library, so it is possible to compare.

YOU MUST PURCHASE THE MASTERING MICROBIOLOGY ACCESS CODE: there will be regular online assignments from this resource, and it has excellent study tools as well.

2. Customized Lab Manual: *Clinical Microbiology Laboratory, BIOL 2001* (ISBN 13:9781307058772, includes access code). Available at the Temple University Bookstore.

XIV Course Policy

- Attendance at lecture is expected.
- Lecture participation will be noted, and often graded.
- Laboratory attendance is mandatory.
- All email communication with instructors must be conducted through a Temple University email account; email from private accounts will not be read. Please do not forget to sign your email communications, particularly if your email address is anonymous (tu1234@temple.edu)
- Weather: for Temple University closing information, call 215-204-1975 (Information Hotline), sign up for TUALerts, listen to Temple University radio (WRTI 90.1 FM), or KYW (1060 AM). Temple University's Main Campus closing number is 101.

<i>Date</i>	<i>Lecture #</i>	<i>Lecture Topic</i>	<i>Chapters</i>	<i>Assigned</i>
August 29	1	Introduction/ Syllabus Review	Chapt. 1	
August 31	2	Chemical Principles – Review Microscopy	Chapt. 2 pp. 62-68	
September 5	3	Cell Physiology	Chapt. 4	HW1
September 7	4	Microbial Metabolism and Growth	pp. 110-117, 131-133, 139	
September 12	5	Control of Microbial Growth	Chapt. 6, 7	HW2
September 14	6	Microbial Genetics	Chapt. 8	HW3
September 19	7	Eukaryotic Microbes	Chapt. 12	
September 21	8	Viruses and Prions	Chapt. 13	HW4
September 26	9	Principles of Disease Epidemiology	Chapt. 14	HW5
September 28	10	Catch Up and/or Case Study		
October 3	11	Mechanisms of Pathogenicity	Chapt. 15	
October 5	12	EXAM 1	LECTURE 1-9	
October 10	13	GROUP EXAM 1		
October 12	14	Innate Immunity	Chapt. 16	HW6

<i>Date</i>	<i>Lecture #</i>	<i>Lecture Topic</i>	<i>Chapters</i>	<i>Assigned</i>
October 17	15	Adaptive Immunity	Chapt. 17	HW7
October 19	16	Vaccines Tests	Chapt. 18	HW8
October 24	17	Immunological Disorders	Chapt. 19	HW9
October 26	18	Antimicrobial Drugs	Chapt. 20	HW10
October 31	19	Catch up and/or Case Study		
November 2	20	EXAM 2	LECTURE 11-18	
November 7	21	GROUP EXAM 2		
November 9	22	Diseases of the Skin and Eyes	Chapt. 21	HW11
November 14	23	Diseases of the Nervous System	Chapt. 22	HW12
November 16	24	Diseases of the Cardiovascular and Lymph	Chapt. 23	HW13
November 28	25	Diseases of the Respiratory System	Chapt. 24	HW14
November 30	26	Diseases of the Digestive System	Chapt. 25	HW15
December 5	27	Diseases of the Genitourinary Tract	Chapt. 26	HW16
December 7	28	Catch Up and/or Case Study		
December 19		FINAL EXAM SERC 110B 8-10am	LECTURE 22-27	

Syllabus for Clinical Microbiology Laboratory

BIOL2001

Fall Semester 2017

Instructors and Contact Information:

Michelle H. McGowan, Ph.D.

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Angela L. Bricker, Ph.D.

Room: 248C, BioLife Science Bldg.

Phone: 215-204-8578

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Office Hours: Tuesday 9:30 a.m. – 11:30 a.m. and Wednesday 9 a.m. – 12 p.m. or by appointment

Lisa Rutkowski, Ph.D.

Room: 352A, BioLife Science Bldg.

Email: lisa.rutkowski@temple.edu

Office Hours: Monday 12 – 1p.m. and Thursday 12 – 1 p.m. or by appointment

Isabel Gines, M.S.

Room: 352A, BioLife Science Bldg.

Email: Isabel.gines@temple.edu

Office Hours: Wednesday 2 – 4 p.m. or by appointment

Laboratory:

All Labs Meet in Room 128, BioLife Science Bldg.

Section 001 – Tuesday 9:30 a.m. – 12:20 p.m.

Section 002 – Tuesday 1:30 – 4:20 p.m.

Section 003 – Wednesday 9:00 – 11:50 a.m.

Section 004 – Wednesday 1:00 – 3:50 p.m.

Section 005 - Wednesday 5:00 – 7:50 p.m.

Section 006 – Thursday 9:30 a.m. – 12:20 p.m.

Section 007 – Thursday 1:30 – 4:20 p.m.

Section 008 – Friday 9:00 – 11:50 a.m.

Section 009 – Friday 1:00 – 3:50 p.m.

Laboratory Materials:

Customized Lab Manual: *Clinical Microbiology Laboratory, BIOL 2001*

(ISBN-9781307058772) Available at the Temple University Bookstore. You will use the code in your lab manual to register for Connect through Canvas. The two Connect exercises (Microscopy and Isolation Methods) for extra credit are in the Assignments section of Canvas. This is the link to the registration information via Youtube:

https://www.youtube.com/watch?v=f_GrvJ0w2gU

A formal lab notebook is required. Please make sure the notebook is bound. Spiral notebooks are unacceptable.

Lab coats, gloves, protective eyewear will be provided. Regarding proper clothing, legs and feet must be covered. Anyone wearing shorts or open-toed shoes will be denied entry to lab. Each student will be assigned a locker in which to store belongings other than lab-related materials.

Attendance:

Laboratory attendance is **MANDATORY**. Students are permitted one (1) lab absence per semester due to a valid reason such as illness, injury, family emergency, or religious observance. If possible, try to make up the missed lab period during the same week. Otherwise, you will not receive credit for any work performed during that week of lab. Two (2) missed labs will result in a 20% final lab score deduction. Three (3) or more missed labs will result in your repeating the entire course. Also note, you **MUST** attend the lab section for which you are registered. You are only permitted to attend one (1) lab section for which you are not registered per semester. A 5% deduction will be taken from your total lab score for each additional occurrence. For instance, if you have a total score of 300 but attended two (2) lab sections for which you were not registered, 15 points (5%) will bring your score down to 285. If this happened three (3) times, a 10% deduction (30 points) will bring your score down to 270 and so forth.

Lateness:

Please be prompt. Entering the room after lab has started is not only disruptive but can be a safety issue as well. If you arrive 10 minutes late, you will not be permitted to remain in the lab. If possible, you must then make-up the lab that week in another section or risk losing credit for any work performed that week. If you do not attend lab that week, you will be marked absent.

Cell Phones and Texting:

The use of these devices during lab is disruptive and may also pose safety issues. Please place them on silent mode and use them only in the case of an emergency.

Preparation:

You must come to lab prepared by reading the assigned material beforehand. Students who come to lab unprepared are more liable to make mistakes and perhaps cause accidents.

Canvas:

Please check Canvas frequently. This site contains important information concerning lab grades, background and supplemental information, instructions for submitting assignments, etc....

Academic Honesty:

Academic dishonesty will not be tolerated in this course. The information given below regarding university policy on plagiarism and cheating may be found in the Temple University 2016-2017 Undergraduate Bulletin and can be accessed using:

<http://bulletin.temple.edu/undergraduate/about-temple-university/student-responsibilities/#academichonesty>

Plagiarism is the unacknowledged use of another person's labor, another person's ideas, another person's words, or another person's assistance. Normally, all work done for courses -- papers, examinations, homework exercises, laboratory reports, oral presentations -- is expected to be the individual effort of the student presenting the work. Any assistance must be reported to the instructor. If the work has entailed consulting other resources -- journals, books, or other media -- these resources must be cited in a manner appropriate to the course. It is the instructor's responsibility to indicate the appropriate manner of citation. Everything used from other sources -- suggestions for organization of ideas, ideas themselves, or actual language -- must be cited. Failure to cite borrowed material constitutes plagiarism. Undocumented use of materials from the World Wide Web is plagiarism.

Academic cheating is, generally, the thwarting or breaking of the general rules of academic work or the specific rules of the individual courses. It includes falsifying data; submitting, without the instructor's approval, work in one course which was done for another; helping others to plagiarize or cheat from one's own or another's work; or actually doing the work of another person.

The penalty for academic dishonesty can vary from receiving a reprimand and a failing grade for a particular assignment, to a failing grade in the course, to suspension or expulsion from the university. The penalty varies with the nature of the offense, the individual instructor, the department, and the school or college.

Students who believe that they have been unfairly accused may appeal through the school or college's academic grievance procedure. For more information see [Grievances](#).

Disability Resources and Services:

Any student who may need an accommodation based on a disability should contact the [instructor](#) and the Disability Resources and Services (DRS) office as soon as possible. The

website may be found at <http://disabilityresources.temple.edu/> and the following is the contact information for the DRS office:

100 Ritter Annex

1301 Cecil B. Moore Avenue

Philadelphia, PA 19122

215-204-1280 (Voice) 215-204-6794 (Fax)

drs@temple.edu

Grading:

Your lab score comprises 30% of your entire course grade. It is based on four (4) criteria:

1. As a group (lab bench) you will submit a **worksheet** by the end of a particular lab period as directed by the instructor. Worksheets are designed to help you use critical thinking for self-directed analyses and assessments of the lab exercises at hand. Please note that all worksheets on specific topics precede corresponding quizzes.
2. Announced **quizzes** will be given at the beginning of the lab period. Make sure you arrive on time so that you will have the fully allotted time to take the quiz. At the end of the semester, your lowest quiz score will be dropped. NOTE: There are no make-up quizzes.
3. Your **technique grade** will be based on your ability to successfully perform a Gram stain as well as obtain isolated colonies using the dilution streak plate method. For both techniques, you are allowed to use your lab manual/notes.

Regarding the Gram stain, you must heat-fix specimens, perform the staining procedure, and demonstrate proficiency in using the microscope by focusing the stained bacteria using the immersion oil lens (100X). Note that the Gram stain procedure is still widely used in diagnostic labs. The ability to distinguish Gram positive from Gram negative microorganisms can impact appropriate treatments for infection.

Successfully performing the dilution streak plate method will comprise the second half of your technique grade. You will dilution streak a mixed broth culture onto a TSA plate. Your score will be based on your ability to use aseptic technique to isolate colonies. This technique highlights the importance of obtaining “pure” cultures further testing and analyses.

4. You will have a **cumulative lab practical exam** at the end of the semester. Please use the study guide that is posted on Canvas to help you prepare for this test.
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5. You will have the opportunity to gain **extra credit** by performing virtual lab sessions using Connect linked to Canvas. The virtual exercises, Microscopy and Isolation Methods, will better prepare you for the actual work in the laboratory and enhance your understanding of the subject matter.

Point Breakdown:

<u>Criteria</u>	<u>Point Values</u>
I. Worksheets	
8 Worksheets	
10 pts. / worksheet x 8 worksheets	80
II. Quizzes	
7 Quizzes (drop lowest score)	120
20 pts. / quiz x 6 quizzes	
III. Technique Grade	
Gram stain	10
Dilution streak plate	10
IV. Lab Practical	80
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<u>TOTAL POINTS</u>	300

Connect Extra Credit Assignments are worth 10 points each (20 points total).

**COURSE SYLLABUS FOR CLINICAL MICROBIOLOGY LAB (BIOL 2001)
FALL SEMESTER 2017**

<u>Week</u>	<u>Exercise</u>	<u>Topic</u>
1 – 8/28	--	No Labs This Week
2 - 9/4	--	Introduction and Laboratory Safety
	1	The Microscope
	2	Handling and Examining Cultures
3 - 9/11	3	Heat-fixing, Simple Staining, and Hanging Drop Microscopy – Extra Credit Due
4 - 9/18	4	Gram Stain
	5 and handout	Acid-Fast Stain
	handout;	Endospore Stain
	power pts.	Demonstrations: Capsule and Flagella Stains
5 - 9/25	8	Streaking Technique to Obtain Pure Cultures
	11	The Autoclave
	12; power pts.	Disinfectants Technique Grade – Gram Stain Isolation Methods – Extra Credit Due
6 - 10/2	13; power pts.; excel sheet; handout	Antimicrobial Agent Susceptibility Testing and Resistance

7 - 10/9	18; word; power pts.; handout	Staphylococci Technique Grade – Dilution Streak Plate
8 - 10/16	19; word; power pts.; handout	Streptococci, Pneumococci, and Enterococci
9 - 10/23	22 15 16 power pts.	The <i>Enterobacteriaceae</i> Some Metabolic Activities of Bacteria Activities of Bacterial Enzymes
10 - 10/30	power pts. handouts	Enzyme-Linked Immunosorbent Assay (ELISA) – HIV Simulation Kit Forensic Blood Grouping
11 - 11/6	24 handout	Urine Cultures Determination of a Bacteriophage Titer
12 - 11/13	30 31 word; power pts.	Fungi: Yeasts and Molds Protozoa

Thanksgiving Holiday – No Labs Week of November 20, 2017

13 - 11/27 **Cumulative Laboratory Practical Exam**

**DUE DATES FOR CLINICAL MICROBIOLOGY LAB (BIOL2001)
FALL SEMESTER 2017**

<u>Week</u>		<u>What's Due</u>
1	8/28	N/A
2	9/4	Worksheet #1: Safety, Microscopy, and Handling and Examining Cultures
3	9/11	Quiz #1: Safety, Microscopy, and Handling and Examining Cultures Connect – Extra Credit: Microscopy
4	9/18	Worksheet #2: Heat-fixing, Staining, and Hanging Drop Procedures
5	9/25	Quiz #2: Heat-fixing, Staining, and Hanging Drop Procedures Worksheet #3: The Autoclave and Disinfectants Technique Grade – Gram Stain Connect – Extra Credit: Isolation Methods Due
6	10/2	Quiz #3: The Autoclave and Disinfectants Worksheet #4: Antimicrobials
7	10/9	Technique Grade – Dilution Streak Plate
8	10/16	Quiz #4: Antimicrobials Worksheet #5: Staphylococci, Streptococci, Pneumococci, and Enterococci

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| 9 | 10/23 | Quiz #5: Staphylococci, Streptococci, Pneumococci, and Enterococci |
| 10 | 10/30 | Worksheet #6: <i>Enterobacteriaceae</i> , ELISA and Blood Grouping (Serology) |
| 11 | 11/6 | Quiz #6: Enterobacteriaceae, ELISA and Blood Grouping
Worksheet #7: Urine Culture Techniques and Bacteriophage Titer |
| 12 | 11/13 | Quiz #7: Urine Culture Techniques and Bacteriophage Titer
Worksheet #8: Fungi and Protozoa |
| 13 | 11/27 | Cumulative Laboratory Practical Exam |