Microbiology Laboratory Syllabus Winter 2018

Instructors	e-Mail	Days	Time	Section
ROOM 200 Labs				
Bianca Pereira	bianca.pereira@wayne.edu	T/Th	9:00 - 11:20 am	21602-003
Qing Chen	qing.chen2@wayne.edu	T/Th	11:30 am - 1:50 pm	21603-004
Duong Nguyen	dy1074@wayne.edu	T/Th	2:00 - 4:20 pm	21605-006
Mahmoud Suliman	fx2967@wayne.edu	T/Th	4:30 - 6:50 pm	21615-008
Abu Ramim	gg3939@wayne.edu	W/F	8:00 - 10:20 am	21601-002
Shashwat Mishra	fc2427@wayne.edu	W/F	11:30 am - 1:50 pm	21604-502
Tha Luong	thaluong.bio@gmail.com	W/F	2:00 - 4:20 pm	21606-007
Behdokht Jan Fada	ga2861@wayne.edu	W/F	4:30 - 6:50pm	21616-009
ROOM 404 Labs				
George Darany	gd5012@wayne.edu	T/Th	11:30 am - 1:50 pm	21619-013
Justin Dykema	gb5417@wayne.edu	T/Th	2:00 - 4:20 pm	21620-014
Becky Jackson	au7371@wayne.edu	W/F	8:00 - 10:20 am	22541-015
Becky Jackson	au7371@wayne.edu	W/F	11:30 am - 1:50 pm	21617-011
Sudeshna Biswas	gi1698@wayne.edu	W/F	2:00 - 4:20 pm	21618-012

Lab Location: RM 200 and RM 404 Shapero Hall

Course Objectives:

Upon the successful completion of this laboratory, the student should be able to:

1. Safely handle and grow pure cultures of microorganisms.
2. Perform standard microbial procedures such as dilutions, pipetting, and enumeration of microbial populations.
3. Use the light microscope correctly.
4. Isolate and identify microbes from natural samples such as soil and the human body.
5. Perform and interpret basic immunological and biochemical assays.

Lab Manual:

Microbiology: Laboratory Theory and Application 4th Edition Customized for Wayne State University
Michael J. Leboffe and Burton E. Pierce
ISBN-10: 1-61731-455-2 ISBN-13: 978-1-61731-455-1

Handouts:

In addition to the laboratory manual, some supplemental material will be provided as handouts for downloading off of the Lecture Section of the Blackboard website under General Lab Materials.

Grading:

Daily Quizzes. We will be using the i>Clicker system. **Students must purchase the i>clicker2 which is available at the Bookstore**. Students will be asked to answer 5 questions at the beginning of each lab. **Once the quiz starts, the doors to the lab will be closed, and students will not be permitted to enter the lab until after the quiz is finished.** Questions will cover the lab material assigned for that day and at minimum the lab day prior. The five lowest daily quiz scores will be dropped. Throughout the semester notebook prelab checks will be incorporated and will constitute the 5 points for that day's quiz. **Prelab checks that replace the daily quiz cannot be dropped.** During the first two weeks of the semester (while students are purchasing and registering their clickers), the Lab Instructors will be able to hand grade the questions for scoring. **Starting with the third week of lab, students must have and use their clickers to have their quiz answers scored. Quizzes will not be hand graded for any reason after this time.** Students must be sure to have their clickers registered and work out any user issues during the first two weeks of the semester while hand grading is available. Any students having issues with their clickers should notify their TA of the issue and should contact iClicker2 to have them resolved. Students with clicker issues after the second full week of classes will have to use any quizzes that can not be scored using the i>clicker2 as part of the five they are allowed to drop. In the event that a student

changes clickers during the semester, it is the student's responsibility to inform his/her TA that the clicker has been changed. Failure to inform TAs regarding clicker changes will result in the loss of points for the daily quizzes. At the end of the semester, the percentage of correct responses will be calculated and added to the final grade.

There are no makeups for quiz questions missed either because a student is late, absent, or because of user issues with the clickers.

Any student that is marked absent will receive a zero for their daily quiz score.

Laboratory notebooks. Keeping a well-organized and thorough laboratory notebook is an essential part of laboratory research. It is absolutely essential that you write your pre-lab: introduction, purpose statement, and protocols in your laboratory notebooks BEFORE you arrive at lab to do the actual experiments. Throughout the semester laboratory instructors will perform random pre-lab notebook inspections mentioned above to be sure that students are prepared to safely perform the laboratory experiments. Individuals who have not written their protocols in their notebooks will be penalized 5 points. Some of the experiments performed in lab will be completed in groups. It is the student's responsibility to obtain all results from all groups in the lab and incorporate these results in their notebooks. After the data from the experiments are obtained, the results, discussions and conclusions can be written to complete that entry in the notebook. Notebooks will also be collected and graded three times throughout the semester. **Notebooks will only be accepted in the laboratory classroom during your regular laboratory session**. Students will be notified one week prior to the date that notebooks are to be collected. Failure to turn in the notebook **at the beginning of lab** and during normal laboratory hours on the due date will result in a 10% penalty. An additional 10% penalty will be assessed **for each business day the notebooks are late**. The first time notebooks are collected the maximum grade will be 15 points. Each of the remaining two times the notebooks are collected the maximum grade will be 30 points. These grades will be based upon the criteria discussed in the *Keeping a Laboratory Notebook* handout. Students should have their notebooks with them each laboratory period with all sections except "results" and "discussion" completed before lab begins.

Laboratory Exams: Two major laboratory exams will be given. Students will be tested on the degree to which they have achieved the course objectives described above. The first exam will be given at mid-term and will be a combination of written (short answer and multiple choice) questions and some practical stations. The second exam will be entirely in the form of a laboratory practical and will be given during the last laboratory period. The laboratory practical will be comprehensive. These exams will include application of the skills and knowledge acquired during the semester to solve microbiological problems as well as evaluation of the student's technical competency and knowledge. Improperly or incompletely spelled names of microorganisms will be marked off.

No make-up exams will be given for laboratory midterms or practicals.

Electronic devices, other than an iClicker2, are not permitted in lab. Having such a device at your student bench during a daily quiz, the Midterm Exam, or the Final Lab Practical will be considered cheating, and the student will receive a failing grade for the course.

Grade Disputes:
A one (1) week period will be granted after the return of a notebook or lab exam, or the posting of your daily quiz score online to challenge a score. After the 1-week period, there will be no room to challenge your score. Students should submit any score challenges in writing to their laboratory instructor before this one-week period ends.

PLEASE NOTE: This week to challenge a score starts after the Graduate Teaching Assistant hands back the graded item or posts the quiz score online, not from the time at which you decide to pick it up or check your score on Blackboard.

It is the student's responsibility to check his/her scores on Blackboard. If a score is missing or incorrect, then the student must contact his/her TA in a timely manner. Scores will not be adjusted after the week to challenge has passed.

For the Final Lab Practical and final notebook collection, the time allotted for grade dispute will be adjusted to approximately two days after these items are handed back to allow for assigning of final grades by the Instructor.

Attendance:
Students are only permitted in the lab room while their lab instructor is present. Students should not enter the lab until given entry by their instructor.

Students can only attend the lab section **for which they are officially registered. Attendance in the laboratory portion of the course is mandatory.** Students who are absent from **one-fourth (7 or more)** laboratory periods, *total*, will not be allowed to continue in the laboratory and will automatically receive a grade of "0" for the laboratory portion of the course. Once a student has accrued the maximum number of absences, he or she will no longer be permitted to participate in the lab as it would be considered a safety hazard for the rest of the students in the course.
Students must contact their laboratory instructor via email as soon as possible in the event of their absence.
Students who leave the laboratory before completing their experiments or who come to lab more than 20 minutes late will be marked absent. Laboratory experiments that are missed due to a student's absence cannot be made up. Students who miss a lab should get the results from persons in their laboratory section.
In addition, students who are absent from **two or more** *consecutive* laboratory periods must obtain written permission from Dr. Higgs, in person during her office hours, before returning to class. This policy is designed to protect students and instructors from individuals who are not properly trained in the safe handling of microbes and laboratory equipment.

Students must wear their Personal Protection Equipment (lab coats and goggles) and have proper attire when in lab. If you do not have your lab coat or you are not wearing proper attire, then you will not be allowed into the lab. You will also be marked absent and will not be allowed to answer the daily quiz questions or hand in your notebook. Please refer to the Lab Safety Rules handout for more information regarding proper dress code while in lab.

Any student that is asked to leave the lab, for any reason, will be marked absent and be given a zero for their daily quiz score.

Failure to wear proper attire on the days of exams will, at minimum, result in a penalty of 10% of the total points possible on the exam.

Lab Issues: All lab concerns should first be brought to the attention of your lab instructor, then the lab coordinator (Krystyn Purvis), and then the lecturer for the course.

Krystyn Purvis' email address: Krystyn@wayne.edu

Lab Rules:
Students are responsible for reading and abiding by the rules stated in the Laboratory Safety Rules handout. Failure to follow these rules could result in loss of points, removal from the lab, or a failing grade in the course.

Summary of Laboratory Grading Criteria

Lab Quizzes	100 points (daily)
Lab Notebooks	75 points (15+30+30) (announced – one week notification)
Midterm Exam	75 points
Final Lab Practical	150 points
Lab Total	400 points

Laboratory Supplies:
Research Laboratory Notebook (see above)
Blue, Sharpie marker (other colors are not permitted)
Splash-proof lab goggles (Students are not permitted to use safety glasses.)
Lab Coat (Laboratory Safety Rules)
iClicker 2
All other supplies will be provided.

Your laboratory instructor will provide information regarding the purchase of lab coats and notebooks.

Students with disabilities:
If you have a documented disability that requires accommodation, please register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library within the Student Academic Success Services Department.
The SDS telephone number is 313-577-1851 or 313-577-3365; (TTY--telecommunication device for hearing impaired students).
Once you have your accommodations in place, I will be happy to meet with you privately during office hours to discuss your needs.
Please be aware that a delay in getting this documentation may also delay the facilitation of your needed accommodations. **Accommodations and services cannot be guaranteed if students choose not to follow the procedures for registering with Student Disability Services in a timely manner.** Accommodations and services can be revisited as needed, but they **are not retroactive** and cannot be guaranteed if procedures are not followed with reasonable, advanced notice.

Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please refer to the SDS website for further information about students with disabilities and the services provided for faculty and students: http://studentdisability.wayne.edu/

Students with accommodation letters must provide their instructor and the lab coordinator with the letter prior to the third week of lab.

Microbiology Laboratory Schedule

Week	Lab	Date	Experiment/Exercise	Lab Book: Experiment	Lab Book: Pages
1	1	T. January 9	**Check-in**		
		W. January 10	Lab safety, syllabus and course requirements.	Handouts and Intro	1-9
			Reading assignment - read and complete Microscopy exercise posted on Blackboard	Handout	
1	2	Th. January 11	**Microscopy and Survey of Microorganisms**		
		F. January 12	Assign microscopes		
			Ubiquity of Microorganisms; part I	2-1	55,57-58
			Introduction to the Light Microscope	3-1 (no pre-lab needed) Microscopy Exercise replaces pre-lab	141-149
		LAB COATS REQUIRED BEFORE NEXT LABORATORY			
2	3	T. January 16	**Microscope Slide Techniques; Bacterial Morphology**		
		W. January 17	*Turn in completed Microscopy Handout before class begins.*	*Microscopy Handout*	
			Common Aseptic Transfers and Inoculation Methods	*1-3 (Read Only) -- no prelab needed* 2-2, 2-4 (use terms from these exercises in the results	27; 29-38
			Ubiquity of Microorganisms: Cultural Characteristics; part II	section of Ex. 2-1)	63-72; 79
			Bacterial Structure and Simple Staining	3-5	181-188
2	4	Th. January 18	**Bacterial Morphology and Cytology**		
		F. January 19	Negative Stain	3-6	191-192
			Capsular Staining	3-9	211-212
		Starting with the next laboratory session, Daily quiz questions will be scored via the i-clickers. Students must purchase and register their i<clickers in order to have their answers scored.			
3	5	T. January 23	**Bacterial Morphology and Cytology**		
		W. January 24	The Gram Stain	3-7	195-200
			Motility Test: semisolid media	5-28	437-438
3	6	Th. January 25	*Record results of Exercise 5-28*	*5-28*	437-438
		F. January 26	**Bacterial Morphology and Cytology**		
			Acid-Fast Stain (Ziehl-Neelsen Method)	3-8	203-207
			Bacterial Endospores (Schaeffer-Fulton Method)	3-10	215-218
4	7	T. January 30	**Culture Methods: Preparation of microbial media.**		
		W. January 31	Culture Media Preparation and Steam Sterilization.	1-2	21-26
4	8	Th. February 1	**Microbial Nutrition and Pure Culture Methods**		
		F. February 2	Microbial Growth Requirements	1-2	21-26
			Streak plate (omit pour plate technique)	1-4	41-46
			Selective and Differential Media		
			Phenylethyl Alcohol Agar	4-1	235-238
			Mannitol Salt Agar	4-4	253-254
			MacConkey Agar	4-5	259-262
			Eosin Methylene Blue Agar	4-6	267-268
			Hektoen Enteric Agar	4-7	273-274
			Biosafety Cabinet	Refer to Lab Lecture	
5	9	T. February 6	**Microbial Nutrition and Pure Culture Methods**		
		W. February 7	*Record results of streak plate and where growth is present*	*1-4*	*25-28*
			Pick isolated colonies from streak plate and make pure cultures.	*1-4*	25-28
			Selective and Differential Media		
			Record results of Ex. 4-1, Ex. 4-4, Ex. 4-5, Ex. 4-6, Ex. 4-7	*4-1, 4-4, 4-5,4-6, 4-7*	*235-238; 253-254; 259-262; 267-268; 273-274*
			Eukaryotic Microbes: The Fungi		
			The Fungi- Common Yeasts and Molds (Day #1)	12-1	783-791
5	10	Th. February 8	*Check pure cultures for good isolation and record results.*		
		F. February 9	**Eukaryotic Microbes: The Fungi**		
			The Fungi- Common Yeasts and Molds (Day #2)	12-1	783-791
			Bacterial Population Counts		
			Standard Plate Count (Viable Count)	6-1	467-472
			Using Glass Pipettes	Appendix C (read only)	839-842
			Bacterial Viruses		
			Viruses: Isolation of Bacteriophage from Sewage: Enrichment	6-5	497-501
6	11	T. February 13	*Results of Standard Plate Count (Viable Count)*	*6-1*	467-472
		W. February 14	**Bacterial Viruses**		
			Viruses: Isolation of Bacteriophage from Sewage: Filtration and Seeding	6-5	497-501
6	12	Th. February 15	Mid-term Written Examination: 75 points		
		F. February 16	Mid-term Written Examination: 75 points		

Week	Lab	Date	Experiment/Exercise	Lab Book Experiment	Lab Book Pages
7	13	T. February 20	*Bacterial Viruses*		
		W. February 21	*Determine Titer of virus in samples*	6-5	497-501
			Determine the efficacy of membrane filtration	6-5	497-501
			Environmental Influences on Microbial Growth		
			Oxygen requirements of microorganisms	2-6, 2-7,2-8	91-92,95-96,99-100
			Temperature: Effects on Growth	*2-9*	*103-104*
			Osmotic Pressure and Bacterial Growth	*2-11*	*113-115*
			Identification of Bacteria: Unknowns Day #1	Refer to the lab lecture	
7	14	Th. February 22	*Record results of Exercises 2-6, 2-7,2-8,2-9*	2-6, 2-7,2-8	91-92,95-96,99-100
		F. February 23	*Record results of Exercise 2-9*	*2-9*	*103-104*
			Record results of Exercise 2-11	*2-11*	*113-115*
			Identification of Bacteria:		
			Unknowns Day #2	Refer to the lab lecture	
			Morphology and Cultural Characteristics		
8	15	T. February 27	Identification of Bacteria		
		W. February 28	*Record results of Unknowns Day#2*		
			Identification of Bacteria: Unknowns Day #3	Refer to the lab lecture	
			Physiological Characteristics: Oxidation and Fermentation Tests	5-3, 5-4, 5-6, 5-8	303-306,311-314,321-323, 333-336
8	16	Th. March 1	Identification of Bacteria		
		F. March 2	Record results of Unknowns Day #3	Refer to the lab lecture	
			Physiological Characteristics: Miscellaneous Tests (Day #4)	5-9, 5-12, 5-20, 5-21	339-341, 357-358, 393-396, 401-403
9	17	T. March 6	Identification of Bacteria		
		W. March 7	*Record results of Unknowns Day#4*		
			Identification of Bacteria: Unknowns Day #5		
			Physiological Characteristics: Hydrolytic Reactions	5-13, 5-15, 5-16. 5-18	361-363, 371-372, 375-376, 383-385
9	18	Th. March 8	*Record results of Unknowns Day#5*	*Refer to the lab lecture*	
		F. March 9	Form a Hypothesis regarding the identify of your Unknown bacterium		
			The API 20E Identification System	5-29	441-446
10	19	T. March 13	*No Classes -- Spring Break*		
		W. March 14	*No Classes -- Spring Break*		
10	20	Th. March 15	*No Classes -- Spring Break*		
		F. March 16	*No Classes -- Spring Break*		
11	21	T. March 20	*Add reagents and record results of API-20E Test Strip*	*5-29*	441-446
		W. March 21	*Identify unknown based upon API Analytical Profile Index*	*5-29*	441-446
			Molecular Diagnostics and Cloning: Practice with Pipettors	Refer to the lab lecture	
			Tranfers using a digital pipette	Appendix D (read only)	843-846 (read only)
11	22	Th. March 22	Molecular Diagnostics and Cloning: PCR	10-4	713-720
		F. March 23			
12	23	T. March 27	Agarose gel electrophoresis and restriction digestion	Refer to the lab lecture	
		W. March 28	Confirm PCR product -- Agarose Gel Electrophoresis	Appendix G (read only)	857-862
			Digest PCR product and cloning vector with restriction endonuclease	10-2	693-698
12	24	Th. March 29	Gel analysis of restriction digests and DNA	Refer to the lab lecture	
		F. March 30	Analyze digestion pattern of digested PCR product: Identify microorganism		
			Ligate PCR products to digested vector		
13	25	T. April 3	Transfrom E. coli with ligated DNA	Refer to the lab lecture	
		W. April 4	Transform E. coli DH5 cells with ligated DNA and transfrom E. coli		
			Plate transformed cells on selective medium		
13	26	Th. April 5	Replicaplate transformants to identify vectors containing cloned DNA	Refer to the lab lecture	
		F. April 6	Ultraviolet Light: Lethal Effects	2-13	64-65
			Antibiotic Sensitivity Testing	7-3	529-533
14	27	T. April 10	*Record results of Exercise 2-13*	*2-13*	64-65
		W. April 11	*Record results of Exercise 7-3*	*7-3*	529-533
			Medical Microbiology and Immunology		
			Identification of Gram Positive Pathogens: Staphylococcus Day#1	Refer to the lab lecture	
				4-4, 5-14, 5-25, 5-27	253-254, 367-368, 423-425, 433-434
			E-Test and MICs Day #1	Refer to the lab lecture	
14	28	Th. April 12	Medical Microbiology and Immunology		
		F. April 13	Read Results of Identification of Gram Positive Pathogens	Refer to the lab lecture	
			Identification of Gram Positive Pathogens: Staphylococcus Day#2	Refer to the lab lecture	
			E-Test and MICs Day #2	Refer to the lab lecture	
15	29	T. April 17	Medical Microbiology and Immunology		
		W. April 18	Record Results of E-test and MICs		
			Review for Practical		
15	30	Th. April 19	LABORATORY FINAL - LAB PRACTICAL: Comprehensive, 150 points		
		F. April 20	LABORATORY FINAL - LAB PRACTICAL: Comprehensive, 150 points		