

BIO 370 Microbiology

Spring Semester 2018

Lecture: MWF 9:00-9:50 a.m.

Room: CTL

Lab: Thursdays 2:30-5:20 p.m.

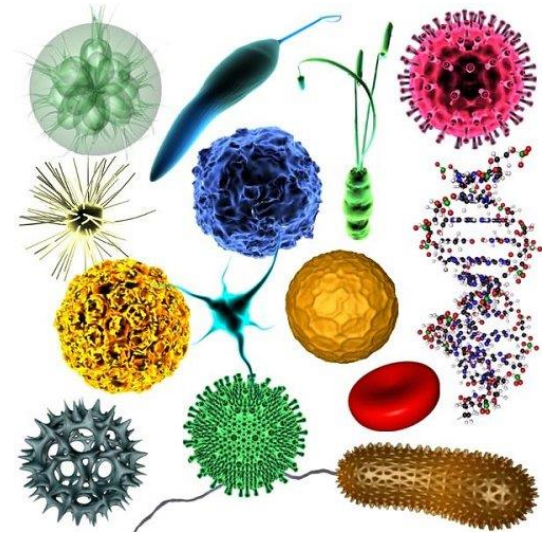
Room: SCI2003

Instructor: **Smirla Ramos-Montañez, Ph.D.**

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Hours: MWF 11:00 am to 12:00 pm or by appointment Room: SCI2002



Catalog Description:

Topics of study include the **taxonomy**, **morphology**, **physiology**, **pathogenicity** and **industrial uses** of microorganisms. Emphasis will be placed on bacteria with some discussion of fungi, protists and viruses. Includes lecture and laboratory. Prerequisites: PHS 111, 112 or 211, 212 and BIO 101, 102 or 221, 222. Lab fee required.

Course Objectives:

Through participation in learning activities for the course and given the information from lectures, the text, outside reading and laboratory experiments, students will be able to demonstrate knowledge of:

- a) **basic taxonomy of microorganisms and a brief history of the development of microbiology.**
- b) **structure and function of microorganisms**
- c) **bacterial metabolism and metabolic pathways**
- d) **the way that microorganisms interact with both human and non-human hosts in beneficial, neutral and detrimental ways.**
- e) **Impact of microorganisms and their products to the environment.**

Student Learning Outcomes:

1. **Students will be able to classify microorganisms into eukaryotes, bacteria and archaea and describe characteristics for classification**
2. **Students will be able to identify basic bacterial cell morphologies and discuss bacterial cell structures and their functions.**
3. **Students will be able to provide examples of how microbial metabolism affects survival and growth of microorganisms.**
4. **Students will be able to compare and contrast commensal, symbiotic and pathogenic relationships between microorganisms, human and non-human hosts.**
5. **Students will be able to provide examples and discuss how humans utilize and harness microbes and their products.**

Learning Activities: Activities that the student will be involved in to meet the course objectives include:

1. Attending lectures
2. Participating in in-class activities
3. Attending laboratory sessions
4. Reading assigned materials
5. Discussion of current topics and events

6. Completing experiments in the lab
7. Completing lecture examinations
8. Identification and characterization of laboratory unknowns
9. Completing assigned laboratory reports
10. Completing lab practical examination

The mission of the Department of Natural Sciences and Health is to help students gain a solid foundation in mathematics, the sciences, and health in order to help them achieve their goals in their selected field of service and to confront the technological, social, moral, and spiritual challenges to be faced in the future.

Department of Natural Sciences and Health Major Outcomes

Upon completion of the major, students will be able to:

- 1) Demonstrate a comprehension of the fundamental concepts, theories, language and historical context of the biological sciences.
- 2) Demonstrate the ability to integrate the disciplines within the sciences and mathematics in order to critically approach and evaluate theories, quantitatively analyze data, and solve problems.
- 3) Understand and apply scientific methodologies through the formulation of hypotheses, use of current research technologies and statistical applications, and the evaluation and presentation of results.
- 4) Effectively communicate their approach to data analysis and problem solving in both written and oral form.
- 5) Demonstrate the use of basic technical skills related to the practice of biology.
- 6) Articulate their worldview of the integral relationship science and faith have in relation to the ethical, moral and spiritual issues of our society.

Required Text:

Talaro, Kathleen, P. and Barry Chess. Foundations in Microbiology, 9th edition. McGraw Hill Publishers, New York, NY 2015. ISBN 978-0-07-352260-9

Brown, Alfred E., Benson’s Microbiological Applications, 14th edition., Complete Version, McGraw Hill Publishers, New York, NY, 2015. ISBN 978-1-25-991982-4

Evaluation:

Students will demonstrate their achievement of course objectives through three lecture examinations, a lab practical examination and one combined lecture/lab final. Additionally lab reports, good lab technique and identification of bacterial unknowns (submitted in pure culture and with an ID flow chart for each organism) will be graded. Grading in this course will be based on a point system with points earned in both lecture and lab. Lab attendance and completion of activities is ESSENTIAL for course completion.

Grading:

A point system is used in this course. There are tentatively 1000 possible points. The following is a breakdown of possible points:

	<u>Points</u>
Lecture examinations (3)	300
Lab Practical	50
Lecture final	150
Attendance and participation	100
Laboratory notebook	50

Quizzes (Lab & Lecture)	50
Laboratory unknowns (4)	200
Unknown identification @ 50 points each	
Media use-above \$40 deducts points from unknowns	
Dichotomous key	50
Laboratory technique and cleanup	50
Total*	1000 points

Grades will be assigned based on a percentage of the total points earned divided by the total points possible. The breakdown of grades is 100- 90=A, 89-80=B, 79-68=C, 67-58=D, less than 58=F but maybe subject to slight modifications at the instructors discretion. Plusses and minuses will be awarded for the top and bottom of each grade range, respectively.

*****You MUST pass the laboratory portion of the course with >60% in order to pass the course.**

*****Total Points are subject to change at the instructor's discretion*****

***Note:** The provisions of this syllabus may be added to, deleted from, or changed if, in the mind of the instructor, it becomes necessary to do so to achieve the course objectives. The student will be advised, in advance, of any such changes. Posting to the course website or sending by email constitutes notification of change (7 days advance notice).*

Examinations (Lecture examination, lab practical and lecture final) 500 Points

Material from text, lectures and labs may be covered in multiple choice, matching, and short answer questions. All material covered in class and outside of class as assigned work will serve as material for examinations. Lab practical will test techniques and procedures used in lab.

No make-up Exams will be given!!!!

If you must miss an exam it is your responsibility to make arrangements to take it prior to the exam date. If absence on the day of the exam is unexpected due to illness or a family emergency proper documentation needs to be presented in order to take the exam. In these cases, the student will take a different test than the one provided to the rest of the class covering the same content.

Attendance and participation 100 points

You are expected to attend all classes and labs. You are responsible for all class material and activities in the event you are absent. Attendance and participation are graded, there are certain number of points from in-class assignments and quizzes if you miss one of these the points for that day are forfeit, unless you are participating in a mandatory WPC sanctioned event. **You are expected to participate fully in each class, which means coming prepared to class.**

Laboratory Notebook 50 points

You are required to keep records of all of your laboratory work in a laboratory notebook. The purpose of the lab notebook is to record what you have done, how you did it, and the observations you made as a result. It should be detailed enough so that another person can check for errors or potential problems in your work by reading your notebook. More details will be provided in a separate handout.

Laboratory unknowns 200 points

You will use techniques learned in lab during the first part of the semester to identify four microorganisms in a mixed culture. To successfully complete this exercise you will turn in four pure

cultures of each organism with an ID flow chart and a report. Additionally you will have to complete the identification of these unknowns within a specific budget.

Course Policies:

Disabilities

Any student who has a documented disability that may require accommodation to fully participate in this class should contact Jann McCaul, Disabilities Services at 503-517-1577 or jmccaul@warnerpacific.edu as soon as possible. Students with an Accommodation Plan through the CLCC should make an appointment with Dr. Ramos to discuss their accommodation plan as soon as the semester starts. Other items that should be discussed with the instructor include emergency medical information and/or special arrangements in case the building must be evacuated. Any student who believes that s/he has a disability that may impair their academic performance should make an appointment to see me and discuss your needs. In order to receive an accommodation, your disability must be on record.

Cheating and Plagiarism:

Cheating on tests or other assignments **will not be tolerated** and will be dealt with as. You may discuss your homework with classmates, but your answers must be in your own words. Using someone else's ideas (even if you synthesize it) without giving them credit is plagiarism. It is against the law and academic policy. I am not lenient in this area. If writing assignments are found to be substantially identical, both students will get zero credit for the assignment. Repeated or egregious offenses will be reported to the Division Chair and/or Dean. Any student observed with a cell phone during an exam – whether they are looking at it or not – will immediately be given a zero for that exam.

Assignments:

All written assignments are to be typed unless otherwise stated. All assignments are due at the beginning of the class period of the day assigned or they will be considered late.

E-mail attachments will not be accepted without prior authorization.

Points earned: All points will be awarded as specified in this syllabus. Extra credit opportunities are not guaranteed, but may be made available to the whole class throughout the term; they are not available upon individual request. Grades will only be changed in case of miscalculation or clerical error.

Technology: Cell phones must be on vibrate during lectures and labs; no text messaging is allowed. Laptops / iPads, etc. may be used for note-taking, but not for email, social media, or any other form of entertainment during class.

Class information site: The course syllabus, outline, assignments, laboratory protocols, any changes, updates, or announcements made during the course will be posted online at the following website: <http://classpages.warnerpacific.edu/sramos>. The course website will be password protected and may be accessed using the information provided the first day of class.

General Safety Guidelines for the course and additional information:

1. To complete some of the laboratory exercises it will be necessary to come to the lab outside of regular scheduled times. It is your responsibility to arrange your schedule to complete the laboratory exercises on time. The laboratory will be available outside of scheduled times through the use of your access card. Please remember that while in the lab all of the general safety guidelines apply and you should be mindful of others sharing the space.
2. No instructional material or supplies (Petri dishes, bacteria, microscopes, instructor's books, etc.) can leave the lab.
3. There is no eating or drinking in the laboratory. No food or drink will be stored in the lab either. All backpacks and coats will be stored in the adjacent lab while lab is in session.
4. A lab coat will be worn during all laboratory exercises. Students will be responsible for cleaning the lab coat periodically.
5. You should follow the following guidelines:
 - a. Long hair needs to be tied in a ponytail or bun, away from your face, laboratory equipment and cultures.
 - b. No open toe shoes in lab. This is meant to protect your feet in case of spilled reagents or broken glassware.
 - c. Use of long pants is highly recommended but if you choose to wear skirts or shorts these should at least cover your thighs.
6. Hands need to be washed at the beginning and at the end of each lab and all surfaces will need to be decontaminated with BacDown.
7. All cultures (broth, plates and slants) will be labeled with:
 - a. Organism Name
 - b. Media type
 - c. Date
 - d. Your name
 - e. Incubation temperatureMisplaced, unlabeled and/or abandoned culture tubes will be autoclaved and disposed of.
8. The lab will be maintained in a clean state. All contaminated items must be autoclaved and disposed of in the special biohazard container. Do not put live cultures into the garbage or sink.
9. All stock cultures and student's cultures are private. No one is allowed to sample other cultures without the consent of the owner.
10. Do not bring visitors to the lab and make sure that you wash your hands before going home. We are working with pathogenic bacteria and you want to assure they stay in the lab and don't go home with you.
11. Be careful and use good lab technique with reagents, cultures and equipment. While occasional mishaps are understandable the safety of you and your classmates is of the highest importance. If the instructor judges that a student is a threat to the safety of the class, after appropriate warning, that student will be dropped from the class.

Tentative Outline for class

Week	Date	Lecture	Lab Topics	Lab Book Number
1	1/8 to 1/12	- Main themes of Microbiology -Chemistry of Biology (Chapters 1 and 2)	-Lab Intro (safety, notebook, dichotomous keys) -Ubiquity -Aseptic Technique -Microscopy	1, 7 and 9
2	1/15 to 1/19	1/15-No class-MLK Day -Tools of the Laboratory -Prokaryotic cells (Chapters 3 and 4)	-Smear preparation -Pure culture technique -Simple staining -Negative staining	10, 11, 12, 13
3	1/22 to 1/26	-Prokaryotic cells -Eukaryotic cells (Chapter 4 and 5)	-Gram staining -Capsular staining -Spore staining -Acid fast staining	14,15,16,17
4	1/29 to 2/2	Introduction to Viruses (Chapter 6)	-Culture media preparation and stock cultures -Enumeration of bacteria	19,20,21
5	2/5 to 2/9	Review for Exam 1 Friday Feb. 9 -Exam 1 (Chapters 1 to 6)	-Effects of temperature, oxygen, pH on microbial growth	27,28,29
6	2/12 to 2/16	-Microbial nutrition, ecology and growth -Microbial metabolism (Chapters 7 and 8)	-Commensalism, synergism and antagonism	54,55,56
7	2/19 to 2/23	2/19 – No class-President’s Day -Microbial metabolism -Microbial genetics (Chapter 8 and 9)	-Antimicrobial testing (antibiotic, antiseptic), effectiveness of hand scrubbing and mouth wash	34,35,36
8	2/26 to 3/2	-Genetic Engineering (Chapter 10)	-Gram Negatives	69
9	3/5 to 3/9	-Chemical agents for Microbial control	-Gram Positives	67,68

		(Chapter 11)		
10	3/12 to 3/16	Review for Exam 2 Friday March 16- Exam 2 (Chapters 7 to 11)	-Intro to "Unknowns" and special Gram Positive section	Part 8 of the book and special handout
11	3/19 to 3/23	Host-Pathogen Interactions (Chapters 12 and 13)	-Unknowns	Part 8 of the book and special handout
12	3/26 to 3/30	SPRING BREAK NO CLASS		
13	4/2 to 4/6	Clinical Microbiology (Select topics from Ch.17 to 25)	-Unknown -Bacterial genetics	65, 66 and special handout
14	4/9 to 4/13	Environmental Microbiology (Chapter 26)	-Unknown -Bacterial genetics	65, 66 and special handout
15	4/16 to 4/20	Industrial Microbiology (Chapter 27) Review for Exam 3 Friday April 20- Exam 3	-Food preparation and fermentation	Special handout
16	4/23 to 4/27	Wrap-up and review for final exam	-Lab clean-up and notebook due	
17	4/30 to 5/4	FINALS WEEK Final exam: Monday April 30 8:00-9:45 am		