



Department of Biology

**BIO2020-1 Microbiology of Infectious Diseases**

Lecture (3 units) + Lab (1 unit)

*Fall 2023*

**Meeting days/times** MWF 12:15 pm – 1:10 pm

**Meeting location** Taylor Hall 314

**Final Exam:** Monday 12/11, 10:30 – 1:00 pm

<b>Instructor title and name:</b>	Dr. Dave Cummings
<b>Phone:</b>	619-849-2642
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<b>Office location and hours:</b>	Rohr Science 176, Monday 3:30-5:30 pm or by appointment

**PLNU Mission**

**To Teach ~ To Shape ~ To Send**

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

**Course Description**

A study of microbial physiology, the diseases associated with infections by certain pathogenic microbes and the vertebrate response to microbial infections. Does not apply toward the Biology major. Lecture and lab. Offered every year.

Prerequisite(s): CHE1003 (or CHE1052); BIO1040 (may be taken concurrently).

## Program and Course Learning Outcomes

The unifying theme of this course is pathogenesis, the detrimental interactions between microorganisms and their human hosts. Our main objectives will be to understand what pathogenic microorganisms are, how they cause disease, and how we may be able to control them.

Specific learning outcomes: By the end of the semester, students will be able to

- describe the physical nature and life cycles of bacteria and viruses;
- distinguish bacteria from viruses and the diseases they cause;
- recognize and distinguish diseases caused by enteric bacteria, Gram-positive rods, and Gram-positive cocci;
- evaluate different antibiotics for application to the different groups of bacterial pathogens;
- carry out and interpret fundamental microbiology lab procedures.

## Required Books and Mobile App

1. *Microbiology with Diseases by Taxonomy*. Sixth Edition. Robert W. Bauman, Pearson, 2019.  
<https://www.pearson.com/store/p/microbiology-with-diseases-bytaxonomy/P100001156922/9780135800010#> (E-Book)
2. *Follow Your Gut*. Rob Knight, Simon & Schuster, 2015. ISBN 978-1476784748
3. *The Sanford Guide to Antimicrobial Therapy app*:  
<https://www.sanfordguide.com/products/digital-subscriptions/sanford-guide-to-antimicrobial-therapy-mobile/> Discount instructions sent by email.

## Course Credit Hour Information

In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a four-unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 150 total hours meeting the course learning outcomes. The time estimations are provided in the Canvas modules.

## Assessment and Grading

A total of 805 points are possible in the class: 650 points in lecture and another 155 points in lab.

**Exams (500 points)** – There will be four exams, including the final, in this course, each worth 125 points. Exam questions will be focused on material from lecture (as opposed to lab). Exams 2 and 3 will be cumulative, with approximately 20% of the points coming from questions associated with the previous chapters (*i.e.*, those on which you have already been tested). The final exam will be approximately 25% on new content and 75% on the cumulative material covering the entire semester. If you have a legitimate conflict with an exam date/time, you must inform the instructor prior to the week of the exam to arrange for a makeup exam. Students are responsible for all lecture material AND everything on the reading guides, whether or not it is covered in class.

**Homework (100 points)** – Weekly homework will be assigned (10 points each). Due dates can be found in the course schedule posted here and on Canvas. These assignments are usually due on Fridays prior to class time.

**Chemistry review quiz (10 points)** – Chemistry is an important pre-requisite for BIO2020. To ensure that you remember basic chemistry terminology and principles, you will be given a quiz early in the semester. The instructor will inform you in advance of the topics you can expect on the quiz.

**Case studies (40 points)** – Learning infectious disease principles in context can be a powerful way to ensure retention of the material. At four strategic points in the semester, students will be assigned a case study describing a real infection. All of class time on the due date will be dedicated to discussion, and two or three questions from the case studies will be found on the exams.

**Laboratory activities (155 points)** – The BIO2020 lab is designed to expose the student to some of the essential tools of the microbiologist in a safe, controlled environment. More details can be found below.

**Point breakdown**

Exams (4)	500 points
Homework assignments	100 points
Chemistry review quiz	10 points
Case studies (4)	40 points
Laboratory activities	155 points
<b>TOTAL</b>	<b>805 possible points</b>

**Grade Scale Based on Percentages**

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>
A 92-100	B+ 88-89	C+ 78-79	D+ 68-69	F 59 or lower
A- 90-91	B 82-87	C 72-77	D 62-67	
	B- 80-81	C- 70-71	D- 60-61	

\*NOTE: Final percentages will be rounded to the nearest whole number and the letter grade assigned will be non-negotiable.

**Final Examination Policy**

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the [Class Schedules](#) site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

### **Incompletes and Late Assignments**

All assignments are to be submitted/turned in by the indicated due date and time, including assignments posted in Canvas. Exceptions will only be granted in extremely unusual circumstances.

### **Spiritual Care**

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If you have questions, a desire to meet with the chaplain, or prayer requests, you can contact your professor or the [Office of Spiritual Life and Formation](#).

### **State Authorization**

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

### **PLNU Copyright Policy**

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

### **PLNU Academic Honesty Policy**

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

### **Artificial Intelligence (AI) Policy**

Use of Artificial Intelligence (AI) tools (*e.g.*, ChatGPT, iA Writer, Marmot, Botowski) is not permitted, and use of these tools will be treated as plagiarism.

### **PLNU Academic Accommodations Policy**

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center ([EAC@pointloma.edu](mailto:EAC@pointloma.edu) or 619-849-2486). Once a student's eligibility for an accommodation has

been determined, the EAC will issue an academic accommodation plan (“AP”) to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (*i.e.*, ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student’s responsibility to make the first contact with the EAC.

### **Language and Belonging**

Point Loma Nazarene University faculty are committed to helping create a safe and hospitable learning environment for all students. As Christian scholars we are keenly aware of the power of language and believe in treating others with dignity. As such, it is important that our language be equitable, inclusive, and prejudice free. Inclusive/Bias-free language is the standard outlined by all major academic style guides, including MLA, APA, and Chicago, and it is the expected norm in university-level work. Good writing and speaking do not use unsubstantiated or irrelevant generalizations about personal qualities such as age, disability, economic class, ethnicity, marital status, parentage, political or religious beliefs, race, gender, sex, or sexual orientation. Inclusive language also avoids using stereotypes or terminology that demeans persons or groups based on age, disability, class, ethnicity, gender, race, language, or national origin. Respectful use of language is particularly important when referring to those outside of the religious and lifestyle commitments of those in the PLNU community. By working toward precision and clarity of language, we mark ourselves as serious and respectful scholars, and we model the Christ-like quality of hospitality.

You may report an incident(s) using the [Bias Incident Reporting Form](#).

### **PLNU Attendance and Participation Policy**

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive an “F” grade.

## CLASS SCHEDULE

WK 1 | August 28 – September 1 | The Chemistry of Microbiology (CH.2) + Cell Structures and Function (CH.3)

- Basic chemistry review
- Eukaryotic cells
- Homework 1 (due Friday before class)

WK 2 | September 4 – 8 | Cell Structures and Function (CH.3) + Pathogenic Gram-Positive Bacteria (CH.19)

### **NO CLASS MONDAY – MLK DAY**

- Prokaryotic cells
- Gram-positive pathogens
- Homework 2 (due Friday before class)

WK 3 | September 11 – 15 | Microbial Metabolism (CH.5) + Case Study 1

- Enzymes and energy
- Carbohydrate catabolism overview
- Homework 3 (due Friday before class)
- UTI case study (definitions due Friday before class)

WK 4 | September 18 – 22 | Microbial Metabolism (CH.5) + Exam 1

- Cellular respiration
- Fermentation
- **Exam 1 (Friday September 22)**

WK 5 | September 25 – 29 | Microbial Nutrition and Growth (CH.6)

- Nutrition and growth
- Homework 4 (due Friday before class)

WK 6 | October 2 – 6 | Microbial Genetics (CH.7)

- Overview of replication, transcription, and translation
- Horizontal gene transfer
- Homework 5 (due Friday before class)

WK 7 | October 9 – 13 | Antimicrobial Drugs (CH.10) + Case Study 2

- Antibiotics and resistance
- Homework 6 (due Friday before class)
- RTI case study (definitions due Friday before class)

WK 8 | October 16 – 18 | Review/Catch-up + Exam 2

- Monday: Catch up/review day
- **Exam 2 (Wednesday October 18)**

### **NO CLASS FRIDAY – FALL BREAK**

WK 9 | October 23 – 27 | Viruses (CH.13)

- Bacteriophage
- Human viruses
- Homework 7 (due Friday before class)

WK 10 | October 30 – November 3 | Pathogenic RNA Viruses (CH.25) + Case Study 3

- Influenza viruses
- Coronaviruses
- Viral infection case study (definitions due before class Friday)

WK 11 | November 6 – 10 | Infection (CH.14)

- Virulence factors
- Modes of transmission
- Homework 8 (due Friday before class)

WK 12 | November 13 – 17 | Catch-up/Review + Exam 3 + Innate Immunity (CH.15)

- Exam review (Monday)
- **Exam 3 (Wednesday November 15)**
- Innate immunity

WK 13 | November 20 – 24 | Innate Immunity

- Innate immunity
- Homework 9 (due Monday before class)

**NO CLASS WEDNESDAY OR FRIDAY – THANKSGIVING BREAK**

WK 14 | November 27 – December 1 | Adaptive Immunity (CH.16) + Immunization (CH.17)

- Adaptive immune response
- Vaccines
- Homework 10 (due Friday before class)

WK 15 | December 4 – 8 | GUT WEEK: Gram-Negative Bacilli (CH.20) + Case Study 4 + Final Exam Review

- Pathogenic Gram-negative bacilli (CH.20)
- GITI case study (definitions due Wednesday before class)
- Final exam review (Friday)

WK 16 | December 11 – 15 | Final Exam Week

- **Final exam on Monday December 11, 10:30 am – 1 pm**

## LAB DETAILS

**BIO2020L-1A: T 1:30 – 4:30 pm (Sator 105)**

**BIO2020L-1B: R 9 am – 12 pm (Sator 105)**

## ASSESSMENT AND GRADING

A total of 805 points are possible in Microbiology of Infectious Diseases: 650 points in lecture and another 155 points in lab.

**Weekly quizzes (35 points).** A 5-question, 5-point quiz will be given at the beginning of each regular lab period; quizzes missed because of tardiness cannot be made up. The focus will be on the assigned preparation for the week (see schedule below). The lowest quiz grade will be dropped.

**Lab reports (80 points).** After each of the labs is complete, you will turn in a lab report with your partner. Each pair must turn in their own lab report – identical answers between teams will be given a grade of zero. There are six 10-point lab report. In lieu of a lab practical, the final lab activity, which each student will do on his/her own, is three weeks long and worth 20 points.

***Follow Your Gut* (40 points).** One 20-point quiz will be given covering this short book by Rob Knight. This is an open-book quiz, but there will be a time limit of 1 hour, so thorough preparation is essential. The goal is not to *memorize* what you read, but to *understand* it. The additional 20 points will come from an infographic you and your partner will create on the gut microbiome. Additional instructions will be provided at a later date.

### Point breakdown

8 Weekly quizzes at 5 points each	35 points
6 Lab reports	60 points
1 Final lab report	20 points
1 <i>Follow Your Gut</i> quiz	20 points
1 <i>Follow Your Gut</i> microbiome presentation	20 points
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TOTAL	155 points possible

\*NOTE: At the end of the semester, your lab and lecture grades will be combined into a single grade that will be assigned to both lecture and lab.

\*NOTE: Final percentages will be rounded to the nearest whole number and the letter grade assigned will be **non-negotiable**.



## LAB SCHEDULE

Date	Lab topic	Comments
<b>8/29, 8/31</b>	<b>FIRST WEEK OF CLASSES</b>	<b>NO MICROBIOLOGY LABS</b>
9/5, 9/7	Lab 1: Contamination and aseptic technique	Quiz 1
9/12, 9/14	Lab 2: Isolation of individual species	Quiz 2 Lab report 1 due by midnight
<b>9/19, 9/21</b>	<b>EXAM WEEK</b>	<b>NO MICROBIOLOGY LABS</b>
9/26, 9/28	Lab 3: Physical controls on microbial growth	Quiz 3 Lab report 2 due by midnight
10/3, 10/5	Lab 4: Chemical controls on microbial growth	Quiz 4 Lab report 3 due by midnight
10/10, 10/12	Lab 5: The compound light microscope	Quiz 5 Lab reports 4 & 5 due by midnight
<b>10/17, 10/19</b>	<b>FALL BREAK</b>	<b>NO MICROBIOLOGY LABS</b>

10/24, 10/26	Lab 6: Staining bacteria	Quiz 6  Lab report 6 due by midnight
10/31, 11/2	Lab 7: Diagnostic testing	Quiz 7
11/7, 11/9	Lab 7: Diagnostic testing cont'd	Quiz 8
<b>11/14, 11/16</b>	<b>EXAM WEEK</b>	<b>NO MICROBIOLOGY LABS</b>
<b>11/21, 11/23</b>	<b>THANKSGIVING BREAK</b>	<b>NO MICROBIOLOGY LABS</b>
11/28, 11/30	Lab 7: Diagnostic testing cont'd	<i>Follow Your Gut</i> quiz  Intro to infographic  Lab report 7 due by midnight
12/5, 12/7	Gut week	<i>Follow Your Gut</i> infographic due before lab