



Department of Biology

## Microbiology of Infectious Diseases with Lab

BIO2020 sections 1-2, BIO2020L sections 1-3  
Lecture (3 units) + Lab (1 unit)  
*Spring 2025*

**Lecture days/times:** MWF 11:00 – 11:55 am (-1), 12:15 – 1:10 pm (-2)  
**Lecture location:** Taylor 105  
**Lab days/times:** T 8:00 – 11:00 am (-1), R 9:00 am – 12:00 pm (-2), W 2:45 – 5:45 pm (-3)  
**Lab location:** Sator 105  
**Final Exam:** M 5/5 10:30 am – 1:00 pm (-1), W 5/7 10:30 am – 1 pm (-2)

<b>Instructor title and name:</b>	Dr. David Cummings
<b>Email:</b>	davidcummings@pointloma.edu
<b>Office location and hours:</b>	Monday 3:00-5:00 pm Or by appointment Rohr Science 176

### 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 course learning outcomes (CLOs): By the end of the semester, students will be able to

- describe the physical nature and life cycles of bacteria, viruses, protozoa, fungi, and helminths;
- distinguish different microorganisms from one another and the diseases they cause;
- recognize and distinguish specific 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.

## 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. Both lecture and lab grades will be combined into a single course grade that will be applied to both lecture and lab in your final transcript. Your final grade will be non-negotiable (unless an error was made in grading one or more assignments).

**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 cover approximately 50% new content and 50% 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 in-class lecture material, video lecture content, and everything assigned on the reading guides, whether it is covered in class or not.

**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.

**Chemistry review quiz (10 points)** – Chemistry is an important pre-requisite course 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 (10)	100 points
Chemistry review quiz (1)	10 points
Case studies (4)	40 points
Laboratory activities	155 points
<b>TOTAL</b>	<b>805 possible points</b>

#### Grade Scale Based on Percentages

A	B	C	D	F
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: Grades from lecture and lab will be combined to generate a single final grade for the course, which will be recorded for both lecture and lab on transcripts.

\*NOTE: Final percentages will be rounded to the nearest whole number and the letter grade assigned will be **non-negotiable** (unless a grading error was made).

#### LECTURE TOPICS AND SCHEDULE

WK 1 | January 13 - 17 | The Chemistry of Microbiology (CH.2) and Cell Structures and Function (CH.3)

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

WK 2 | January 20 – 24 | Cell Structures and Function (CH.3), Cell Morphology and Arrangement (CH.11), and Pathogenic Gram-Positive Bacilli (CH.19)

- **NO CLASS MONDAY – Martin Luther King Junior Day**
- Prokaryotic cells
- Gram-positive pathogenic bacteria
- Homework 2 (due Friday before class)

WK 3 | January 27 – 31 | Microbial Metabolism (CH.5) and 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 | February 3 – 7 | Microbial Metabolism (CH.5) and Exam 1

- Cellular respiration
- Fermentation
- **Exam 1 on Friday February 7**

WK 5 | February 10 – 14 | Microbial Nutrition and Growth (CH.6)

- Review exam 1 on Monday
- Nutrition and growth
- Homework 4 (due Friday before class)

WK 6 | February 17 – 21 | Microbial Genetics (CH.7)

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

WK 7 | February 24 – 28 | Antimicrobial Drugs (CH.10) and Case Study 2

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

WK 8 | March 3 – 7 | Exam 2

- Catch up/review day on Monday
- **Exam 2 on Wednesday March 5**
- Review exam 2 on Friday

WK 9 | March 10 – 14 | **SPRING BREAK**

WK 10 | March 17 – 21 | Viruses (CH.13)

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

WK 11 | March 24 – 28 | Pathogenic RNA Viruses (CH.25) and Case Study 3

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

WK 12 | March 31 – April 4 | Infection and Transmission (CH.14)

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

WK 13 | April 7 – 11 | Exam 3

- Review/catch-up day on Monday
- **Exam 3 on Wednesday April 9**
- Review Exam 3 on Friday

WK 14 | April 14 – 18 | Innate Immunity (CH.15)

- Innate Immunity
- Homework 9 (due Wednesday before class)
- **NO CLASS FRIDAY (Easter Recess)**

WK 15 | April 21 – 25 | Adaptive Immunity (CH.16), Immunization (CH.17)

- **NO CLASS MONDAY (Easter Recess)**
- Adaptive immune response
- Vaccines
- Homework 10 (due Friday before class)

WK 16 | April 28 – May 2 | GUT WEEK: Gram-Negative Bacilli (CH.20) and Case Study 4 + Final Review

- Pathogenic Gram-negative bacilli (CH.20)
- GITI case study (definitions due Wednesday before class)
- Review/catch-up day (Friday)

WK 17 | May 5 – 9 | Final Exam Week

- **Monday May 5th @ 10:30 am – 1 pm (-1)**
- **Wednesday May 7th @ 10:30 am – 1 pm (-2)**

## LAB LEARNING OUTCOMES

The goal of the Microbiology Lab is to expose students to the hands-on work of a clinical microbiologist in a safe learning environment.

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

- Transfer bacteria using aseptic technique;
- Perform streak plates, spread plates, and viable plate counts;
- Apply physical and chemical means of microbial control;
- Use a compound light microscope to view bacteria;
- Carry out antimicrobial susceptibility testing;
- Diagnose an oral infection and recommend appropriate antibiotic therapy.

## ASSESSMENT AND GRADING

A total of 805 points are possible in Microbiology of Infectious Diseases: 650 points in lecture (see separate syllabus) and another 155 points in lab. Both lecture and lab grades will be combined into a single course grade that will be applied to both lecture and lab in your final transcript.

**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 reports. 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.

**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.

**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 in lab.

Labs 1-6 (10 pts ea)	60 pts
Lab 7	20 pts
Quizzes 1-8 (5 pts ea)	35 pts
<i>Follow Your Gut</i> quiz	20 pts
<i>Follow Your Gut</i> infographic	20 pts
<b>TOTAL</b>	<b>155 pts</b>

## Lab Schedule

<b>Date</b>	<b>Lab topic</b>	<b>Comments</b>
<b>1/14-1/16</b>	<b>FIRST WEEK OF CLASSES</b>	<b>NO MICROBIOLOGY LABS</b>
1/21-1/23	Lab 1: Contamination and aseptic technique	Quiz 1
1/28-1/30	Lab 2: Isolation of individual species	Quiz 2 Lab report 1 due by midnight
<b>2/4-2/6</b>	<b>EXAM WEEK</b>	<b>NO MICROBIOLOGY LABS</b>
2/11-2/13	Lab 3: Physical controls on microbial growth	Quiz 3 Lab report 2 due by midnight
2/18-2/20	Lab 4: Chemical controls on microbial growth	Quiz 4 Lab report 3 due by midnight
2/25-2/27	Lab 5: The compound light microscope	Quiz 5 Lab reports 4 & 5 due by midnight
<b>3/4-3/6</b>	<b>EXAM WEEK</b>	<b>NO MICROBIOLOGY LABS</b>
<b>3/11-3/13</b>	<b>SPRING BREAK</b>	<b>NO MICROBIOLOGY LABS</b>
3/18-3/20	Lab 6: Staining bacteria	Quiz 6 Lab report 6 due by midnight
3/25-3/27	Lab 7: Diagnostic testing	Quiz 7
4/1-4/3	Lab 7: Diagnostic testing	Quiz 8
<b>4/8-4/10</b>	<b>EXAM WEEK</b>	<b>NO MICROBIOLOGY LABS</b>
<b>4/15-4/17</b>	<b>EASTER RECESS</b>	<b>NO MICROBIOLOGY LABS</b>
4/22-4/24	Lab 7: Diagnostic testing	<i>Follow Your Gut</i> quiz Intro to infographic Lab report 7 due by midnight
4/29-5/1	Gut week	<i>Follow Your Gut</i> infographic due before lab

## OFFICIAL UNIVERSITY INFORMATION

### 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 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.

### 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.