POINT LOMA NAZARENE UNIVERSITY	**Department of Biology** **BIO2020-1: Microbiology of Infectious Diseases (3 units)** **BIO2020L-1A and -1B: Microbiology of Infectious Diseases Lab (1 unit)**
Fall 2022	

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Office hours every Monday from 2-5 pm. Or, e-mail me with your availability to set up an alternative appointment time.	
Lecture every M/W/F 12:15 – 1:10 pm in Ryan Learning Center room 102	
Lab every T 1:30-4:30 pm (1A) or R 9 am-12 pm (1B) in Sator Hall lab 105	
Final exam on Friday December 16, 10:30-1:00 pm	

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).

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 RESOURCES

1. ***Microbiology With Diseases by Taxonomy,*** 6th Edition. Robert W. Bauman, Pearson. https://www.pearson.com/store/p/microbiology-with-diseases-by-taxonomy/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.
4. ***Safety glasses for lab.*** Note: these are not required if you wear reading glasses in lab.

ASSESSMENT AND GRADING

Assessment and grading:

A total of 800 points are possible in the class: 650 points in lecture and another 150 points in lab.

Exams **(500 points)** –There will be four multiple-choice 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 semi-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 (enterobacteria and coronaviruses) 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.

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

Chemistry review quiz **(10 points)** – Chemistry is an important pre-requisite to 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 **(30 points)** – Learning infectious disease principles in context can be a powerful way to ensure retention of the material. At three strategic points in the semester, students will be assigned a case study describing a real infection. Pre-class worksheets will be assigned and should be typed up and turned in on the due date prior to lecture (4 pts each). All of class time on the due date will be dedicated to an in-class worksheet (6 pts each), and two or three questions from the case studies will be found on the exams.

Laboratory activities **(150 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 in the separate lab syllabus.

Point breakdown

Exams (4)	500 points (62%)
Homework assignments	100 points
Chemistry review quiz	10 points
Case studies (3)	30 points
Participation/Attendance	10 points
Laboratory activities	150 points (19%)
TOTAL	800 possible points

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: 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**.

CLASS SCHEDULE

WK 1 | August 30 – September 2 | The Chemistry of Microbiology (CH.2) and Cell Structures and Function (CH.3)

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

WK 2 | September 6 – 9 | Cell Structures and Function (CH.3) and Pathogenic Gram-Positive Bacteria (CH.19)

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

WK 3 | September 12 – 16 | 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 | September 19 – 23 | Microbial Metabolism (CH.5) and Exam 1

- Cellular respiration
- Fermentation
- Exam 1 (Friday September 23)

WK 5 | September 26 – 30 | Microbial Nutrition and Growth (CH.6)

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

WK 6 | October 3 – 7 | Microbial Genetics (CH.7)

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

WK 7 | October 10 – 14 | 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 | October 17 – 21 | Viruses (CH.13)

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

WK 9 | October 24 – 28 | Pathogenic RNA Viruses (CH.25) and Exam 2

- Influenza viruses
- Exam 2 (Friday October 28)

WK 10 | October 31 – November 4 | Infection (CH.14)

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

WK 11 | November 7 – 11 | Innate Immunity (CH.15)

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

WK 12 | November 14 – 18 | Adaptive Immunity (CH.16), Immunization (CH.17)

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

WK 13 | November 21 | Exam 3, Thanksgiving Break

- Exam 3 (Monday November 21)

WK 14 | November 28 – December 1 | GUT WEEK: Pathogenic Gram-Negative Bacilli (CH.20) and Case Study 3

- Specific Gram-negative bacilli
- GITI Case study (definitions due Friday before class)

WK 15 | December 5 – 8 | COVID-19 (CH.25) and Review for Final Exam

- Coronaviruses in general
- SARS-CoV-2
- COVID-19

WK 16 | December 12 – 16 | Final Exam Week

- Final Exam on Friday December 16, 10:30 am – 1 pm

LAB DETAILS

ASSESSMENT AND GRADING

A total of 800 points are possible in Microbiology of Infectious Diseases: 650 points in lecture and another 150 points in lab.

*NOTE: Lab grades are combined with lecture grades and only one final grade is assigned to the entire course.

Weekly quizzes (40 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).

Lab reports (70 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 eight 10-point lab reports and I will drop your lowest grade.

***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	40 points
8 Lab reports	70 points
1 *Follow Your Gut* quiz	20 points
1 *Follow Your Gut* microbiome presentation	20 points
TOTAL	150 points possible

Lab calendar:

Date	Lab topic	Comments
8/30, 9/1		**NO LAB**
9/6, 9/8	Lab 1: Contamination and aseptic technique	Quiz 1
9/13, 9/15	Lab 2: Isolation of individual species	Quiz 2 Lab report 1 due by midnight
9/20, 9/22		**NO LAB – EXAM WEEK**
9/27, 9/29	Lab 3: Physical controls on microbial growth	Quiz 3 Lab report 2 due by midnight
10/4, 10/6	Lab 4: Chemical controls on microbial growth	Quiz 4 Lab report 3 due by midnight
10/11, 10/13	Lab 5: The compound light microscope	Quiz 5 Lab reports 4 & 5 due by midnight
10/18, 10/20	Lab 6: Staining bacteria	Quiz 6 Lab report 6 due by midnight
10/25, 10/27		**NO LAB – EXAM WEEK**
11/1, 11/3	Lab 7: Diagnostic testing	Quiz 7
11/8, 11/10	Lab 8: Diagnostic testing (week 2)	Quiz 8
11/15, 11/17	*Follow Your Gut* introduction to infographic	*Follow Your Gut* quiz Lab report 7 due by midnight (20 pts)
11/22, 11/24		**NO LAB – THANKSGIVING WEEK**
11/29, 12/1	*Follow Your Gut*	*Follow Your Gut* Infographic due Instructions will be posted on Canvas
12/6, 12/8		**NO LAB – DEAD WEEK**