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| POINT 19 02 LOMA NAZARENE UNIVERSITY | *** Department of Biology**<br><br>***BIO2020: Microbiology of Infectious Diseases**<br><br>***Lecture (3 units) + Lab (1 unit)** |
| Fall 2021 | |

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| **Meeting days: M/W/F** | **Instructor title and name: Dr. David Cummings** |
| **Meeting times: 12:15-1:10 pm** | **Phone: 619-849-2642** |
| **Meeting location: BAC 151** | **Email: davidcummings@pointloma.edu** |
| **Final Exam: Dec 15, 10:30-1:00pm** | **Office location: Rohr Science 162** |
| | **Office Hours: On Zoom every Monday from 2-5 pm. Or, e-mail me with your availability to set up a one-on-one 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).

## 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, 2019. 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.

## 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 4-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

**Assessment and grading:**

A total of 850 points are possible in the class: 700 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 coronavirus) 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 (approximately10 points each). Due dates can be found in the course schedule posted on CANVAS (Calendar). 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.

***Participation/Attendance/Group Learning*** **(60 points)** – BIO2020 will meet every Monday, Wednesday, and Friday. Attendance will periodically be taken at these synchronous lectures. In addition, there will be group learning opportunities most weeks. Your participation in these discussion boards, group assignments, etc. will contribute towards your participation grade.

***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**

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| Exams (4) | 500 points |
| Homework assignments | 100 points |
| Chemistry review quiz | 10 points |
| Case studies (3) | 30 points |
| Participation/Attendance/Group Learning | 60 points |
| Laboratory activities | 150 points |
| TOTAL | 850 possible points |

**Grade Scale Based on Percentages**

| A | B | C | D | F |
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| 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.

## 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.

## INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Late work will only be accepted in extremely unusual circumstances.

## 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.

## PLNU ACADEMIC ACCOMMODATIONS POLICY

While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

## PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all **synchronous** class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions (virtual or face-to-face), 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 the appropriate grade for their work and participation. In some courses, a portion of the credit hour content will be delivered **asynchronously** and attendance will be determined by submitting the assignments by the posted due dates. See Academic Policies in the Undergraduate Academic Catalog. If absences exceed these limits but are due to university excused health issues, an exception will be granted.

**Asynchronous Attendance/Participation Definition**

A day of attendance in asynchronous content is determined as contributing a substantive note, assignment, discussion, or submission by the posted due date. Failure to meet these standards will result in an absence for that day. Instructors will determine how many asynchronous attendance days are required each week.

## 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 students have questions, a desire to meet with the chaplain or have prayer requests you can contact the Office of Spiritual Development.

## USE OF TECHNOLOGY

In order to be successful in the online environment, you'll need to meet the minimum technology and system requirements; please refer to the *Technology and System Requirements* information. Additionally, students are required to have headphone speakers compatible with their computer available to use. If a student is in need of technological resources, please contact student-tech-request@pointloma.edu.

Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work.

**CLASS SCHEDULE**

WK 1 | August 31 – September 3 | 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 | September 6-10 | 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 13-17 | 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 20-24 | Microbial Metabolism (CH.5) and Exam 1

- Cellular respiration
- Fermentation
- Exam 1 (September 24)

WK 5 | September 27 - October 1 | Microbial Nutrition and Growth (CH.6)

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

WK 6 | October 4-8 | Microbial Genetics (CH.7)

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

WK 7 | October 11-15 | 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 18-22 | Viruses (CH.13)

- Bacteriophage
- Human viruses
- Homework 7 (due Wednesday by the end of class)
- No class – Fall break (October 22)

WK 9 | October 25-29 | Pathogenic RNA Viruses (CH.25) and Exam 2

- Influenza viruses
- Exam 2 (Friday October 29)

WK 10 | November 1-5 | Infection (CH.14)
- Virulence factors
- Modes of transmission
- Homework 8 (due Friday before class)

WK 11 | November 8-12 | Innate Immunity (CH.15)
- Innate immunity
- Homework 9 (due Friday before class)

WK 12 | November 15-19 | Adaptive Immunity (CH.16), Immunization (CH.17)
- Adaptive immune response
- Vaccines
- Homework 10 (due Wednesday before class)
- Exam 3 (Friday November 19)

WK 13 | November 22 | Thanksgiving week
- Exam 3 Follow Up (Monday)
- Thanksgiving Break – NO CLASS OR LAB (Wednesday through Friday)

WK 14 | Nov. 29 – December 2 | 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 6 – December 10 | Coronavirus Week + Review for Final Exam

WK 16 | December 13 - 17 | Final Exam Week
- Final Exam on Wednesday December 15 at 10:30 am - 1 pm