



DEPARTMENT OF PHYSICIAN ASSISTANT EDUCATION

MASTER OF SCIENCE IN MEDICINE

4 UNITS

MSM 6003 FOUNDATIONS IN MEDICAL SCIENCE

FALL 2025

Biochemistry	
Meeting days and times: Tuesdays, 8:00am-9:00am	Instructor title and name: Ariane Jansma, Ph.D. Office location and hours:
Dates: 9/3-12/18	Phone: Email: ajansma@pointloma.edu
Meeting location: Balboa Campus, Room 154	Final Exam: December 17, 8:00am
Microbiology	
Meeting days and times: Varies by week	Instructor title and name: Dave Cummings, PhD
Dates: 9/4-12/16	Phone: Email: dcummings.pointloma.edu
Meeting location: Balboa Campus, Room 154	Final Exam: October 29, online
Immunology	
Meeting days and times: Varies by week	Course Coordinator title and name: Dr. Toan Do, MD A&I Fellow UC San Diego
Dates: 9/4-10/23	Phone: Email: tt001@health.ucsd.edu
Meeting location: Balboa Campus, Room 154	Final Exam: December 17, 3:00pm
Genetics	
Meeting days and times: Mondays, 5:30pm-7:30pm	Instructor title and name: Sara Turner-Cooper, Ph.D., PA-C Office location and hours:
Dates: 9/9-10/21	Phone: Email: scooper@pointloma.edu
Meeting location: Balboa Campus, Room 154	Final Exam: November 3, 5pm

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

The course will provide instruction in the basic sciences of medicine integral to understanding human disease. The course will cover topics in pathology, pathophysiology, biochemistry, immunology, microbiology, and genetics.

COURSE GOALS

The student will be provided with:

1. Lectures covering the relevant didactic content and the opportunity to connect this content to the application of the material to clinical case discussions.

PROGRAM LEARNING OUTCOMES

The content in this course will contribute to the student's proficiency in this/these area(s):

3. Recommend and interpret common diagnostic and screening tests. (MK, IC, PC, PR, PB, SB)

COURSE LEARNING OUTCOMES

Successful completion of this course requires demonstration of the skills and knowledge outlined here at, minimally, the ADVANCED BEGINNER level:

1. Apply knowledge of molecular, biochemical, cellular, and systems-level mechanisms that maintain homeostasis, and of the dysregulation of these mechanisms, to the prevention, and diagnosis of disease. (MK2; MK3; MK4)
2. Apply the mechanisms of general and disease-specific pathological processes in health and disease to the understanding of common human disorders. (MK2; MK3; MK4)
3. Use the principles of genetic transmission, molecular biology of the human genome, and population genetics to obtain and interpret family history and ancestry data, to order genetic tests and to assess patient risk. (MK1; MK2; MK3; MK4)
4. Apply principles of the biology of microorganisms in normal physiology and disease to explain the etiology of disease, identify preventive measures, and predict response to therapies. (MK1; MK2; MK3; MK4; MK5)

Initials indicate PA core competency required to meet the PLO/CLO.

PA Core Competencies:

MK = Medical Knowledge

IC = Interpersonal Skills & Communication

PC = Patient Care

PR = Professionalism

PB = Practice-based Learning

SB = Systems-based Practice

INSTRUCTIONAL OBJECTIVES

Upon completion of the **BIOCHEMISTRY** section of this course, the student will be able to:

1. Identify the major macromolecules (proteins, nucleic acids, carbohydrates, and lipids) and explain the ways molecular structure determines their properties. Knowledge, B1.01c
2. Explain the principles of enzymatic reactions, including controls such as feedback, competitive, and noncompetitive inhibition, and allosteric effects. Comprehend, B1.01c
3. Explain how membrane gradients and electron transport act to generate and store energy. Comprehend, B1.01c
4. Apply knowledge of biological systems and their interactions to explain how the human body functions in health and disease. Application, B1.01c, B2.02c
5. Explain how the regulation of major biochemical pathways for energy production, coupled with the synthesis/degradation of macromolecules function to maintain health and identify major forms of dysregulation in disease. Comprehend, B1.01c, B2.02c

Session Topics

- Proteins, Enzymes
- Glycolysis, Krebs Cycle
- Oxidative Phosphorylation, ATP Synthesis
- Carbs I: Gluconeogenesis & Glucose homeostasis
- Carbs II: Glycogen, Pentoses, Other Sugars
- Lipids I: Fatty Acid Synthesis & Oxidation
- Lipids II: Complex Lipids, Lipoproteins
- Amino Acids, Nitrogen Metabolism
- Porphyrins and Hemoglobin

Upon completion of the **GENETICS** section of this course, the student will be able to:

1. Explain how variation at the gene level affects the chemical and physical properties of biological systems, and how this, in turn, influences health. Comprehend, B1.01c, B2.02e
2. Describe the major forms and frequencies of genetic variation and their consequences on health in different human populations. Comprehend, B1.01c, B2.02e
3. Describe the various patterns of genetic transmission within families and implications for the health of family members. Comprehend, B1.01c, B2.02e

Session Topics

- Nucleotides, DNA
- RNA. Protein Synthesis
- Human Genetics and Inheritance
- Microbial Genetics

Upon completion of the **MICROBIOLOGY** section of this course, the student will be able to:

1. Explain the structure, function, metabolism, and virulence factors of pathogens and how they contribute to the infectious disease process. Knowledge, Comprehension, B1.01c, B2.02c
2. Apply the principles of host-pathogen interactions and knowledge of pathogen structure, genomics, life-cycle, transmission, and pathogenesis to the prevention, diagnosis, and treatment of infectious disease. Application, B1.01c, B2.02c

- Evaluate probable explanations for pathogen behavior in an infected patient. Evaluation, B1.01c, B2.02c

Session Topics

- Pathogenic eukaryotes, prokaryotes, and viruses
- The human microbiome
- Infection and transmission
- Antibiotics and resistance

Upon completion of the **IMMUNOLOGY** section of this course, the student will be able to:

- Apply knowledge of the mechanisms for distinction between self and non-self (tolerance and immune surveillance) to the maintenance of health, autoimmunity, and transplant rejection. Application, B1.01c, B2.02c
- Apply knowledge of the molecular basis for immune cell development to diagnose and treat immune deficiencies. Application, B1.01c, B2.02c
- Apply knowledge of the mechanisms utilized to defend against intracellular or extracellular microbes to the development of immunological prevention or treatment. Application, B1.01c, B2.02c

Session Topics

- Basic Immune System Function
- Autoimmunity, Immune Deficiency
- Hypersensitivity, Vaccines

Note: Superscripts identify the Bloom's Taxonomy level for each objective.

UNIT INSTRUCTION

UNIT	HOURS	LECTURES
Unit I	15	ORIENTATION BIOCHEMISTRY
UNIT I EXAM		
Unit II	15	GENETICS
UNIT II EXAM		
Unit III	15	MICROBIOLOGY
UNIT III EXAM		

Unit IV	15	IMMUNOLOGY
UNIT IV EXAM		

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

Note: Texts prefaced with double asterisks are provided in Access Medicine.

Biochemistry and Genetics:

Lippincott Illustrated Reviews: Biochemistry, 7e (2017) by Denise Ferrier PhD
 ISBN: 978-1496344496

Microbiology and Immunology:

Mims Medical Microbiology and Immunology, 6e (2018) by Richard Goering MSc PhD
 Paperback ISBN: 978-0702071546
 eBook ISBN: 9780702072024

Case Studies in Immunology: A Clinical Companion, 7e (2016) by Raif Geha and Luigi Notarangelo
 ISBN-13: 978-0815345121
 ISBN-10: 9780815345121

****Harrison's Principles of Internal Medicine 20/E (Vol.1 & Vol.2) 20th Edition by Dennis L. Kasper, Anthony S. Fauci, Stephen Hauser, Dan Longo, J. Larry Jameson, Joseph Loscalzo**
 ISBN-13: 978-1259644030
 ISBN-10: 0071802150

LEARNING MODALITIES

Modalities include lectures, on-line pre-lecture activities, and reading assignments. The class schedule and assignments can be found in Canvas.

ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. However, we recognize that as adults you have other life responsibilities and challenges that may interfere. Ultimately you are responsible for your education and your ability to demonstrate mastery of the course and program objectives.

1. You MUST attend:
 1. PE and clinical skills labs appropriately dressed and with all necessary equipment
 2. examinations on the date and time for which they are schedule
 3. community learning groups
2. We expect
 4. active participation in all class activities.
 5. completion of all class preparatory assignments prior to commencement of class.

6. respect for the class, peers and faculty.
7. on-time arrival for all classes, laboratories, learning groups or any scheduled activities.
Routine tardiness demonstrates a lack of professionalism and will not be tolerated

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. Incompletes will only be assigned under extremely unusual circumstances. Students failing an examination or practicum must complete the designated remediation (See REMEDIATION below) within the assigned time.

FINAL EXAMINATION POLICY

Successful completion of this class requires taking the final examinations (written and practical) **on their respective scheduled days**. No requests for early examinations or alternative days will be approved.

ASSESSMENT AND GRADING

Written examinations – MSM 6003 will include (4) unit exams, one for each of the four units.

The final course grade will be calculated based on the following distribution:

Unit written examinations:

1. Biochemistry	25%
2. Genetics	25%
3. Microbiology	25%
4. Immunology	25%

TOTAL	100%
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In order to pass this course, students must achieve a cumulative average of C (70%) or greater on the written exams. At the end of this course, the student will be expected to perform at the “advanced beginner” level.

All assignments and evaluations must be completed in the timeframe determined by the course director. Students receiving less than 70% on an examination must meet with the course instructor and faculty advisor. Students receiving less than 70% on any two written examinations will be referred to Student Progress and Promotions Committee. For additional information on this policy, refer to the PA Program Student Handbook.

Grading will be in keeping with Point Loma Nazarene University policy for graduate programs and will be as follows:

A = 93-100	C = 73-76
A- = 92-90	C- = 70-72
B+ = 87-89	D+ = 67-69
B = 83-86	D = 63-66
B- = 80-82	D- = 60-62
C+ = 77-79	F = 0-59

REMEDIATION

Remediation is the process by which both the student and the program are assured that performance indicating a deficiency in knowledge or skills is subsequently demonstrated to be satisfactory. This may include a re-test over missed material, a skills demonstration or a review of missed material with completion of corrected answers. It is important to note that this is content remediation, not grade remediation and no grade will be changed based on these activities.

Within 48 hours of the posting of a grade of <70%, the student MUST contact the course director to discuss the student's performance and create a remediation plan. Unless otherwise directed by the course director, remediation activities must be completed within 5 days.

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. For all student appeals, faculty and students should follow the procedures outlined in the University Catalog. See [Graduate Academic and General Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

ARTIFICIAL INTELLIGENCE (AI) POLICY

You are allowed to use Artificial Intelligence (AI) tools (e.g., ChatGPT, Gemini Pro 1.5, Grammarly, Perplexity, etc.) in this course. Any work that utilizes AI-based tools must be clearly identified as such, including the specific tool(s) used. Please use the following sources to guide your citations when using AI.

[MLA Style Center: Citing Generative AI](#)

[APA Style: How To Cite ChatGPT](#)

[Chicago Manual of Style: Citing Content Developed or Generated by AI](#)

SEXUAL MISCONDUCT AND DISCRIMINATION

Point Loma Nazarene University faculty are committed to helping create a safe learning environment for all students. If you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that help and support are available through the Title IX Office at pointloma.edu/Title-IX. Please be aware that under Title IX of the Education Amendments of 1972, it is required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at pointloma.edu/title-ix

PLNU ACADEMIC ACCOMMODATIONS POLICY

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities in accordance with the Americans with Disabilities Act (ADA). Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2533). Once a student's eligibility for an accommodation has been determined, the EAC will work with the student to create an Accommodation Plan (AP) that outlines allowed accommodations. Professors are able to view a student's approved accommodations through Accommodate.

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. Accommodations are not retroactive so clarifying with the professor at the outset is one of the best ways to promote positive academic outcomes.

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. Students cannot assume that

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because they had accommodations in the past, their eligibility at PLNU is automatic. All determinations at PLNU must go through the EAC process. This is to protect the privacy of students with disabilities who may not want to disclose this information and are not asking for any accommodations.

This syllabus is subject to change. Students are encouraged to check course messages and emails in order to remain current.

ARC-PA standards (5th edition) addressed in this course: B1.01(c), B2.02(c), B2.02(e)