Syllabus
146:474 Immunology
Fall 2022
Rutgers University
Department of Cell Biology and Neuroscience

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Textbook: *Janeway's Immunobiology*, 10th Edition. (ISBN: 978-0393884890)

Course Description

This course will serve as an introduction to the immune system, with a focus on mammalian organisms (particularly humans). In general terms, we will uncover how the cells and organs of the immune system orchestrate protective responses to pathogen infection across distance and time in the body. While immunology encompasses a vast body of facts and terminologies, we will deemphasize rote memorization and classification. Instead, a primary goal of this 400-level course is to engage your critical thinking and problem-solving abilities, as well as to introduce you to primary research addressing contemporary immunological questions. During this course, we will undertake our studies guided by two principle understandings about the immune system in particular. These "enduring understandings" are the big picture ideas that tie together all the information in the course. They will inform the essential questions we explore in our studies and the learning objectives we will attempt to achieve by the end of the semester.

Enduring Understanding 1: Immunity is a complex process that is coordinated by multiple cell types across time, anatomic locations, and pathogenic stimuli.	
Essential Question 1A: How do the physical interactions of immune cells with pathogens and each other contribute to host immunity?	
Goal 1	Understand how host cells detect pathogens and distinguish self from nonself.
Goal 2	Understand the various innate immune responses that destroy or arrest the growth of pathogens.
Goal 3	Understand how antigen peptide processing and presentation instructs pathogen-specific immunity.
Goal 4	Understand how cytotoxic responses and programmed cell death control infection.
Essential Question 1B: How do immune cells coordinate their actions across space and time?	
Goal 1	Understand the triggers and anatomic features that contribute to immune cell development.
Goal 2	Understand the molecular signals that facilitate communication between immune cells.
Goal 3	Understand how immune cells are recruited to and maintained in developmental niches, key functional sites, and/or infected tissues.
Goal 4	Understand the concept of and key contributors to immunological memory.

Enduring Understanding 2: Immune responses are dynamically regulated and can result in both protective and pathological outcomes.	
Essential Question 2A: How are the intensity, duration, and outcomes of immune responses dynamically controlled?	
Goal 1	Understand the host regulatory signals that amplify or suppress immune responses.
Goal 2	Understand immune evasion strategies by pathogens and cancer cells, as well as host counter-adaptations to these strategies.
Goal 3	Understand the concept of "immune privilege," its purpose, and how it is maintained.
Essential Question 2B: What are the causes and consequences of poorly regulated immune responses?	
Goal 1	Understand the concepts of immunological tolerance, allergy, and autoimmunity.
Goal 2	Understand and distinguish between genetic and infectious immunodeficiency disorders.
Goal 3	Understand basic diagnostic and therapeutic strategies for infectious and immunological diseases.

CBN Learning Goals

1. **Master factual and conceptual knowledge in cell biology and neuroscience that will provide a solid foundation for success in advanced training and professional careers.**
    - We will cover a broad range of material in this course, including the foundational cell types, tissues, and molecular pathways that are central to immunological function.
    - Lecture modules and practice quizzes will be organized in ways that illuminate the common themes and concepts that underlie the complexities of the immune system. These organizing concepts include innate vs. adaptive immunity, cellular vs. humoral immunity, tolerance vs. autoimmunity, etc.

2. **Develop an ability to summarize, integrate and organize information.**
    - Practice quizzes, review sessions, and other exercises will focus on the application of learning towards problem solving, identifying patterns in complex information, and designing experiments capable of creating new knowledge.

3. **Use scientific reasoning to evaluate the potential for current research and new discoveries to improve our understanding of cell biology and neuroscience and its relevance to human health and to our society.**
    - After building foundational knowledge in the first two sections of the course, modules 11-14 will focus on heavily on the relevance of our learning to human diseases, including topics such as vaccination, HIV/AIDS, and cancer immunotherapy.
    - We will make frequent reference to the experiments and techniques used by scientists working at the forefront of immunological research, including flow cytometry, antibody-based molecular biology, etc.
    - -When possible, we will explore the foundational experiments and primary data that support our modern understanding of immunological processes.

Assessments and Course Activities

Lecture Modules: Lectures in this course will be organized into weekly modules on Canvas. Lectures are IN-PERSON. Slides and other supplemental content will be posted to Canvas. Instructors may post lecture recordings or other video content at their discretion, but in no case should students expect to rely exclusively on online/remote content. Each weekly module will cover about 1 chapter in the textbook. You are expected to attend all lectures and read the associated chapter before the end of each week.

Module Quizzes: Most lecture modules will have one or more quizzes with practice questions. These quizzes are **formative assessments**, meaning they are meant to help you gauge your mastery of the material, focus your learning, and practice with the style of questions you will find on the exams. As such, you may retake the quizzes as many times as you wish over the course of the week. Only your most recent score will be saved and counted towards your overall grade in the course. However, all practice quizzes MUST be completed by the last day of the weekly module. Generally, modules will open on Wednesday morning, so all practice quiz questions must be completed by 11:59PM on the following Tuesday. **Quizzes cannot be made up once the module closes under any circumstances.** There will generally be NO quiz on the weeks following an exam.

Exams: There will be four at-home, online exams on Canvas. Exams will be multiple choice questions that require some level of critical thinking in order to select the most appropriate answer. Exams will be open book/note/resource; however, exams will be timed, so you should not plan to overly rely on finding answers in external sources, as you will likely not complete the exam on time. **Exams must be taken on the indicated day in the course schedule between 12:00PM and 11:59PM.** You should plan your schedule on these days to reserve approximately 90 minutes to take the exam. **Exams will not be rescheduled or re-opened once started.** Individual exceptions will only be made in the event of a serious, prolonged, and documented illness or family emergency.

We will take certain measures to ensure the integrity of the exam process and minimize cheating. This will include strict time limits on exams, randomized question and answer orders, and a one-at-a-time question format. You will not be able to move backwards in the exam to a previous question once you submit an answer. Thus, you should carefully select your answer before moving to the next question. Importantly: we will NOT be using any remote proctoring software or lockdown browsers in this course.

Extra Credit: You may earn up to 9 percentage points of extra credit on the first exam by completing the first three levels of the game ImmuneQuest. ImmuneQuest is a turn-based strategy game that allows you to take on the role of various immune cells as they coordinate efforts in battling a bacterial infection. To download ImmuneQuest, visit immunequest.com and click on the orange button entitled "Students: Download Now." Once you have downloaded the game, you MUST register with the following information in order to receive credit: **Course Code: E4A3**

In addition, you must include your full name to receive points. You will receive 3 percentage points for completing each of the first three levels of Part 1 (for a maximum of 9 percentage points). You only need to complete the level to receive credit (you don't need a minimum score). These three levels are completely free, though, if you are inclined, you can pay for access to additional levels (no additional extra credit will be given for levels beyond the first three). In order to receive credit for this activity, levels must be completed by class time on **Sunday, September 25th at 11:59PM.** No extensions will be granted for this extra credit assignment.

Grading: Final course grades will be assigned according to the total points accumulated from scores on the assignments indicated below. Neither individual assignments nor final course grades will be "curved" in any way. Your final grade in the course will be determined by the weighted average of your scores using the following distribution:

Assignment	Value
Module Quizzes	30%
Exam 1	17.5%
Exam 2	17.5%
Exam 3	17.5%
Exam 4	17.5%

Final Grade	Final Average
A	90.0-100.0
B+	87.0-89.99
B	80.0-86.99
C+	77.0-79.99
C	70.0-76.99
D	60.0-69.99
F	0.0-59.99

Course Schedule:

Date	Day	Topic	Instructor	Reading
9/7	W	Basic Concepts	Daniels	Chapter 1
9/9	F	Hematopoeisis and Immune Tissues	Daniels	Chapter 1
9/14	W	Innate Immunity I	Daniels	Chapter 2
9/16	F	Innate Immunity II	Daniels	Chapter 2
9/21	W	Cytokines and Chemokines I	Daniels	Chapter 3
9/23	F	Cytokines and Chemokines II	Daniels	Chapter 3
9/28	W	**Exam 1**	Daniels	
9/30	F	Antigen Recognition I	Daniels	Chapter 4
10/5	W	Antigen Recognition II	Daniels	Chapter 4
10/7	F	Generation of Lymphocyte Receptors	Daniels	Chapter 5
10/12	W	Antigen Presentation I	Daniels	Chapter 6
10/14	F	Antigen Presentation II	Daniels	Chapter 6
10/19	W	**Exam 2**	Daniels	
10/21	F	Development and Survival of Lymphocytes I	Xie	Chapter 8
10/26	W	Development and Survival of Lymphocytes II	Xie	Chapter 8
10/28	F	Humoral Immune Responses I	Xie	Chapter 10
11/2	W	Humoral Immune Responses II	Xie	Chapter 10
11/4	F	T cell-mediated immunity I	Xie	Chapter 9
11/9	W	T cell-mediated immunity II	Xie	Chapter 9
11/11	F	Dynamics of Innate and Adaptive Immunity	Xie	Chapter 11
11/16	W	**Exam 3**	Xie	
11/18	F	Failures of Host Defense Mechanisms I	Jiang	Chapter 13
11/23	W	Failures of Host Defense Mechanisms II	Jiang	Chapter 13
11/25	F	Thanksgiving		
11/30	W	Allergy and Allergic Diseases I	Jiang	Chapter 14
12/2	F	Allergy and Allergic Diseases II	Jiang	Chapter 14
12/7	W	Autoimmunity and Transplantation	Jiang	Chapter 15
12/9	F	Vaccines and Immunotherapy	Jiang	Chapter 16
12/14	W	**Exam 4**	Jiang	

Course Policies and Resources

Academic Integrity Policy:
http://academicintegrity.rutgers.edu/academic-integrity-policy

Violations include: cheating, fabrication, plagiarism, denying others access to information or material, and facilitating violations of academic integrity.

Student-Wellness Services:
Just In Case Web App
http://codu.co/cee05e
Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)
(848) 932-7884
17 Senior Street, New Brunswick, NJ 08901
www.rhscaps.rutgers.edu/
CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Crisis Intervention:
http://health.rutgers.edu/medical-counseling-services/counseling/crisis-intervention
Report a Concern: http://health.rutgers.edu/do-something-to-help

Violence Prevention & Victim Assistance (VPVA)
(848) 932-1181
3 Bartlett Street, New Brunswick, NJ 08901
www.vpva.rutgers.edu
The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services
(848) 445-6800
Lucy Stone Hall, Suite A145, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / https://ods.rutgers.edu
Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.

Scarlet Listeners
(732) 247-5555
http://www.scarletlisteners.com
Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.