NJIT BIOLOGY

Course Syllabus

Spring 2024

BIOLOGY 606: Applied Bioprocessing & Immunological Based Therapies

INSTRUCTOR:	John Yarotsky, PhD	**PHONE:**	973-642-7976
OFFICE:	CKB 340C	**EMAIL:**	yarotsky@njit.edu
LECTURES:	Wed 6-9 PM Kupf 211		
OFFICE HOURS:	***Wed 3-6***		

DESCRIPTION:

THIS COURSE BUILD UPON THE CONCEPTS COVERED IN BIOLOGY 605. STUDENTS WILL LEARN HOW THE IMMUNE SYSTEM FUNCTIONS AND HOW DISEASE STATES RELATE TO THE FUNCTIONAL ASPECTS OF THE IMMUNE SYSTEM. ONCE A BASIC UNDERSTANDING OF THE IMMUNE SYSTEM IS COVERED THE CLASS WILL FOCUS ON HOW MODERN BIOTECHNOLOGY IS BEING USED TO HARNESS AND ALTER THE IMMUNE SYSTEM IN ORDER TO FIGHT DISEASE. THOSE TOPICS WILL THEN BE INTEGRATED INTO A THOROUGH UNDERSTANDING OF BIOPROCESSING IN PHARMACEUTICAL INDUSTRIES. THIS COURSE IS FOR PROFESSIONAL SCIENCE MASTER'S STUDENTS WITH LIMITED KNOWLEDGE OF BIOLOGY.

GOALS-

STUDENTS WILL GAIN A THOROUGH UNDERSTANDING OF IMMUNE FUNCTION AND DISORDER. BIOTECHNOLOGICAL INNOVATIONS WILL BE PRESENTED AND STUDENTS WILL LEARN HOW BIOLOGICS ARE PRODUCED IN ORDER TO ALTER AND ENHANCE IMMUNE FUNCTION. STUDENTS WILL BE GIVEN INFORMATION REGARDING CUTTING EDGE AND RAPIDLY EVOLVING IMMUNOLOGICALLY BASED THERAPIES THAT ARE BEING DEVELOPED TO COMBAT DISORDERS SUCH AS AUTOIMMUNE DISEASES AND CANCERS.

TEXTBOOKS:

KINDT, THOMAS. (2007) IMMUNOLOGY SIXTH EDITION. W.H. FREEMAN AND COMPANY, NEW YORK, NEW YORK. ISBN-13: 978-1-4292-0211-4

ANALYTICAL CONSIDERATIONS FOR CELLULAR THERAPY MANUFACTURING, CHRIS WIWI

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COURSE OUTLINE

WEEK	DATES	TOPICS
Week 1	Jan 17	Intro: Overview of the Immune System
Week 2	Jan 24	Cells and Organs of the Immune System
Week 3	Jan 31	Antigens and Antibodies-Immune Genes and Antibody Interactions
Week 4	Feb 7	Complement
Week 5	Feb 14	**Exam 1**
Week 6	Feb 21	The MHC complex and Antigen Presentation/ T Cell Receptors
Week 7	Feb 28	B Cell Maturation, Activation and Differentiation Leukocyte Activation and Migration
Week 8	March 6	Cytotoxicity, Hypersensitivity, and Autoimmunity
Week 9	March 10-16	**Spring Break-No class**
Week 10	March 20	Gene Therapy
Week 11	March 27	**Exam 2**
Week 12	April 3	Transplants, Infectious Diseases, and Cancers
Week 13	April 10	Cancer Therapies
Week 14	April 17	Cell-based Immunotherapies
Week 15	April 24	**Exam 3**

BIOLOGY 605: Principles of Bioprocessing

LEARNING OBJECTIVES/GOALS: Upon successful completion of this course, students will be able to:

1. DESCRIBE IN A BROAD VIEW WHAT THE IMMUNE SYSTEM IS AND HOW IT RELATES TO HEALTH
2. DEFINE KEY ELEMENTS OF BOTH INNATE AND ADAPTIVE IMMUNITY AND CONTRAST THEIR INDIVIDUAL ROLES IN MAINTAINING HEALTH
3. IDENTIFY SPECIFIC CELLS OF THE IMMUNE SYSTEM AND DESCRIBE THEIR ROLES AND INTERACTIONS
4. DESCRIBE HOW BIOTECHNOLOGIES LIKE VACCINES USE THE IMMUNE SYSTEM TO COMBAT INFECTION AND MAINTAIN HEALTH
5. UNDERSTAND HOW ABERRANT IMMUNE RESPONSES GENERATE DISEASES LIKE AUTOIMMUNE DISORDERS
6. DESCRIBE IN DETAIL THE ROLE OF THE IMMUNE SYSTEM IN ORGAN TRANSPLANT REJECTION
7. DEFINE KEY BIOCHEMICAL PATHWAYS WHO'S OVER OR UNDER-EXPRESSION ALLOW CERTAIN CANCERS TO DEVELOP AND EVADE IMMUNE DETECTION
8. DESCRIBE THE PROCESS OF MANUFACTURING BIOLOGICALLY-BASED THERAPIES FOR DISEASES LIKE CANCER.
9. IDENTIFY THE ADVANTAGES AND DISADVANTAGES OF CURRENT IMMUNOLOGICALLY BASED THERAPIES.
10. DEFINE CURRENT FDA GUIDELINES FOR BIOLOGICALLY-BASED IMMUNOTHERAPIES AND GOOD MANUFACTURING PROCESSES.

EXAMINATIONS:

- Your final letter grade is based on lecture exams. The exams will each be worth 30% of your grade. The remaining 10% of your grade is based on attendance and class participation.
- **Distance learners:**You must have a laptop of iPad with a working webcam in order to take the online exams. The software used to monitor the exams does not work with Chromebooks or Android Tablets. Therefore, you MUST have a computer that has a working webcam and runs on either Apple's IOS operating system or a PC that runs Windows. If you do not you must drop the class because you cannot take the exams.
- Exams will require the student to download the Lockdown Browser and Respondus Monitoring Software. Instructions for downloading and installing these are found in the Canvas page for the course.

- "Exams will be proctored using both Respondus LockDown Browser+Monitor and Webex. Students will be required to join a Webex meeting from their phone with their cameras on, and to access the exam through LockDown Browser on a Mac or Windows PC with webcam. Students must follow all instructions related to environment checks and camera positioning."
- Extra credit is not an option.

ATTENDANCE POLICY:

Attendance is mandatory. Participation in the class is also mandatory. You must attend class in person or, for distance learning students, with your webcam on and your microphone muted unless you wish to ask a question. Microphones should be muted to ensure that feedback will not occur when one voice travels through multiple microphones at once.

⍟ **If you are a distance learning student:** You must have a computer of some kind with both a working webcam and microphone. The class will be held via Webex and participation and attendance are required portions of the class. Your webcam must be turned on and your face must be visible. You will have your microphone muted unless you are speaking. Speaking is not only encouraged but necessary during this class but feedback will result if everyone leaves their mics on at all times. So, please self monitor and be diligent about turning your mic on and off at appropriate times.

Grade Scale:

A=90-100
B+=85-89
B=80-84
C+=75-79
C=70-74
D=65-69
F=64 or lower

This course will strictly adhere to the NJIT Honor Code!! Both the lecture and the lab will have zero tolerance for violations to the NJIT's University Code on Academic Integrity!!