



**BIOLOGY 606-102: APPLIED BIOPROCESSING & IMMUNOLOGICAL
BASED THERAPIES**

INSTRUCTORS: Dr. John Yarotsky

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OFFICE: Central King Building 340C

OFFICE HOURS: By Appointment Only (Email)

COURSE SCHEDULE: T: 6:00pm – 8:50pm in CKB 315

PHONE: 973-642-7976

COURSE 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.

PREREQUISITES: permission from the Instructor

TEXT BOOKS:

- 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

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.

GRADING POLICY: Your final letter grade is based on lecture exams. The exams will each be worth **33.3%** of your grade.

Extra credit is not an option

Grading Scale	
A: 90% +	B+: 85-90%
B: 80-85%	C+: 75-80%
C: 65-75%	D: 50-65%
F: < 50%	

Attendance, Make-up, and Lateness Policy: Attendance is mandatory. Missed classes will result in a 5% deduction of the total grade for the exam that class covers.

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LEARNING OBJECTIVES: UPON SUCCESSFUL COMPLETION OF THIS COURSE, STUDENTS WITH 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 whose 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.

Academic Dishonesty: The course has a zero tolerance policy for academic dishonesty, including plagiarism. A zero on the assignment and consultation with the office of the Dean of Students to determine if further action is required will punish instances of dishonesty. If you have any questions about what constitutes plagiarism or cheating, please ask me or refer to the academic integrity code: <https://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

SCHEDULE AND COURSE OUTLINE:

WEEK	DATES	TOPICS
Week 1	Jan 21	Overview of the Immune System
Week 2	Jan 28	Cells and Organs of the Immune System
Week 3	Feb 4	Antigens and Antibodies-Immune Genes and Antibody Interactions
Week 4	Feb 11	Complement
Week 5	Feb 18	Class canceled due to weather
Week 6	Feb 25	Exam 1
Week 7	March 3	The MHC complex and Antigen Presentation/ T Cell Receptors
Week 8	March 10	B Cell Maturation, Activation and Differentiation Leukocyte Activation and Migration
Week 9	March 17	Spring Break-No class
Week 10	March 24	Cell-Mediated Cytotoxic Responses Tolerance, Autoimmunity and Transplant Immunology
Week 11	March 31	Exam 2
Week 12	April 7	Cancer and the Immune System/ Immune Responses to Infectious Diseases
Week 13	April 14	Cancer Immunotherapies- Drugs and Monoclonal Antibodies
Week 14	April 21	Cancer Immunotherapies- CAR-T, TIL, and T Cell Receptor Therapies
Week 15	April 28	Exam 3