

**JAMESTOWN COMMUNITY COLLEGE**  
**State University of New York**

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**INSTITUTIONAL COURSE SYLLABUS**

**Course Title:** Immunology

**Course Abbreviation and Number:** BIO 2840

**Credit Hours:** 4

**Course Type:** Lecture/Lab

**Course Description:** Students will study the mechanisms needed to establish normal immunity, as well as the biological problems that can arise in allergies, autoimmunity, and chronic inflammation. As such they will learn about diseases from which so many suffer. In addition, during laboratories, students will be engaged in individual research projects to learn invaluable standard operating procedures for laboratory work, like good note keeping, making reagents, etc. The research projects will be used as a vehicle for them to learn the important biotechnology techniques and concepts that have developed out of the field of immunology, as well as to prepare them for an undergraduate research experience should they choose. Special emphasis will be placed on the nexus between immunology, molecular biology, and pathophysiology.

Prerequisite: BIO 2560 or Prerequisite/Corequisite: BIO 2800

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**General Education Requirements Met**

**SUNY**

Natural Sciences

**JCC**

Applied Learning

Scientific Reasoning

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**Student Learning Outcomes:**

Students who demonstrate understanding can:

1. Understand how to implement standard operating procedures for a biotechnology lab including good lab practices, techniques, and professional notekeeping.
  2. Describe the mechanisms leading to normal immunological responses, including clonal selection theory, mechanisms of allergic/hypersensitivity reactions, T cell mediated immunity and humoral immunity.
  3. Describe basic mechanisms leading to antibody diversity and the molecular mechanisms leading to it.
  4. Describe basic mechanisms of hypersensitivity
  5. Describe the anatomy of the immune system and leukocyte trafficking.
  6. Describe the organization and operation of the BCR and TCR
  7. Describe what an antigen is and the process of antigen processing and presentation, as well as the intercellular communication that is used to modulate the immune response
  8. Demonstrate an understanding of the methods scientists use to explore natural phenomena, including observation, hypotheses development, measurement and data collection, experimentation, evaluation of evidence, and employment of data analysis or mathematical modeling. [SUNY Gen Ed – Natural Sciences]
  9. Application of scientific data, concepts, and models in one of the natural sciences. [SUNY Gen Ed – Natural Sciences]
  10. Effectively apply knowledge and skills to a real-world experience, creative project, or independent intellectual investigation. [JCC Gen Ed – Applied Learning]
  11. Thoughtfully reflect on connections between concepts studies in the classroom & insights gained from an applied learning experience/project. [JCC Gen Ed – Applied Learning]
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**Topics Covered:**

- Introduction to the immune system- self vs non-self and pathophysiology
- What is an antigen?
- Innate vs Adaptive Immune Response and the Liaison
- Mononuclear phagocytes
- Cells of the immune system
- Cells of the immune system, Clonal Selection Theory and soluble mediators
- Complement
- Tissues and organs of the immune system
- Tissues and organs of the immune system and lymphocyte trafficking
- Leukocyte Extravasation Paradigm and Inflammation
- Cytokines and cytokine receptors

- Antibodies- classification and structure
- B cells and B cell development
- Generation of antibody diversity
- Antibody Class switch
- T cell development
- T cells and T cell Receptors
- T cell activation and T cell activation pathways
- Major Histocompatibility Complex
- Antigen Presentation
- Antigen processing by the lysosomal compartment for MHC class II
- The proteasome and processing of antigen for class I MHC presentation
- Cell cooperation in the immune response and B cell development
- B cell activation, differentiation and costimulation
- T dependent and T independent antigens
- Immune Regulation/Tolerance
- The immune system and disease
- Hypersensitivity
- Autoimmunity
- Basic Anatomy of the Immune System and Leukocyte Trafficking
- Techniques: ELISA, Polymerase Chain Reaction/Reverse Transcriptase- Polymerase Chain Reaction, Ouchterlony
- Isolation and manipulation of leukocytes, magnetic cell separation techniques, Protein purification techniques, etc.

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### Information for Students

- Expectations of Students
  - [Civility Statement](#)
  - [Student Responsibility Statement](#)
  - [Academic Integrity Statement](#)
- [Accessibility Services](#)  
Students who require accommodations to complete the requirements and expectations of this course because of a disability must make their accommodation requests to the Accessibility Services Coordinator.
- [Get Help: JCC & Community Resources](#)
- [Emergency Closing Procedures](#)
- Course grade is determined by the instructor based on a combination of factors, including but not limited to, homework, quizzes, exams, projects, and participation. Final course grade can be translated into a grade point value according to the following:
 

A=4.0	B+=3.5	B=3	C+=2.5	C=2	D+=1.5	D=1	F=0
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- Veterans and active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, VA appointments) are welcome and encouraged to communicate these to the instructor.

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**Effective Date:** Fall 2023