

University of Arkansas – Fort Smith
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General Syllabus:

BIOL 4923 Immunology

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisite: BIOL 3803/3801 Genetics/Laboratory

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

Fundamental mechanisms of the immune system with applications in basic research and medicine. Topics include the mechanisms of induction, regulation, and expression of the cellular and humoral immune responses, immunochemistry, antigen-antibody reactions, immunogenetics, immunopathologies, and immunodeficiencies.

B. Additional Information - None

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Distinguish between innate and adaptive immunity and how these two types of host defenses differ with regard to combating infections.
2. Analyze the organization of the cells and organs of the immune system and how they relate to the processing of foreign substances and the development of the immune system.
3. Explain how the cells interact with each other in the formation of an immune response.
4. Describe the molecular basis by which the immune system identifies pathogens
5. Examine the cell and molecular mechanisms mediating antigen-antibody interactions, antigen processing and presentation, and the genetic mechanisms that result in the diversity in immunoglobulin structure responsible for antigen recognition.
6. Describe cell mediated effector responses, inflammation and the roles that cytokines and complement cascades play in the mediation of these processes.
7. Explain the basis of Immunodeficiency, autoimmune reactions, hypersensitivity

reactions, and the immune response to infectious agents.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students analyze mechanisms associated with immunology and predict immune responses to specific infections.

Communication Skills (written and oral)

Written assignments are required. Short paragraphs are required to answer some test questions.

Global and Cultural Perspectives:

Students investigate how plant immunology related biotechnology, such as vaccines, will be used to solve global epidemic problems.

Ethical Decision Making

Students will investigate the ethical dilemmas associated with genetic modification immune responses and the use of those responses to fight “incurable” infections.

III. Major Course Topics

- A. Immunology as an experimental science
 - 1. History of field
 - 2. Scientific method
- B. Overview: Immunity
 - 1. Innate
 - 2. Adaptive
- C. Cells of the Immune System
 - 1. Cells of innate immune system
 - 2. Cells of adaptive immune system
- D. Organs of the Immune System
 - 1. Bone marrow
 - 2. Thymus
 - 3. Lymph nodes
 - 4. Spleen
 - 5. Tonsils
 - 6. Other lymphatic organs
 - 7. Barriers
- E. Antigen and antibody: Structure and function
 - 1. Antigens
 - 2. Antibodies
 - 3. Generation of antibody diversity: Immunoglobulin genes
 - 4. Presentation of antigen by major histocompatibility complex molecules
- F. T-cells

1. Receptor and antigen recognition
2. Activation, maturation, and differentiation
- G. B-cells
 1. generation, activation, and differentiation
- H. Complement system
 1. Proteins
 2. Function
- I. Cytokines
 1. Interferon
 2. Interleukin
 3. Cell-cell communication in the immune system
- J. Immune response to infection
 1. Inflammation
 2. Leukocyte recirculation
- K. Special topics
 1. AIDS and the immune system
 2. Vaccines
 3. Allergies and other hypersensitive reactions
 4. Autoimmunity
 5. Transplantation immunology
 6. Cancer and the immune system