

COURSE SYLLABUS FORM

**American University of Beirut
Faculty of Arts and Sciences
Department BIOLOGY**

**Course Number and Title: 290AH “Immune systems of invertebrates and vertebrates”
Semester: Spring 2009-2010
Dr. Mike Osta**

1. COURSE DESCRIPTION

The immune system is responsible for the elimination of pathogenic microorganisms in both vertebrates and invertebrates. While innate immunity is common to both, adaptive immunity is a feature of vertebrates only. The course provides a basic understanding of the innate immune system of invertebrates (in particular arthropods) and vertebrates as well as the adaptive system of the latter. It describes how the innate immune system recognizes pathogens through several families of germline encoded pattern recognition receptors that activate downstream signalling pathways culminating in the activation of effector innate and adaptive responses that clear the infection. The course provides a detailed description of the immune cells in both vertebrates and invertebrates and their roles in defense against pathogens as well as the humoral factors involved in immune defense. Furthermore, the common ancestry of certain vertebrate and invertebrate immune pathways is stressed throughout the course as it is becoming more evident that humans share a common template for innate immunity with life forms as diverse as flowering plants and insects. Classes are centred on discussion oriented lectures to encourage critical and analytical thinking.

2. COURSE LEARNING OUTCOMES (CLOs)

Students completing the course will gain substantial knowledge on the molecular and cellular processes that orchestrate the innate and adaptive immune responses. On completing the course, students should demonstrate an understanding of:

- 1- The major features that distinguish innate and adaptive immunity
- 2- The molecular and cellular mechanisms of innate immune defense in model invertebrates
- 3- Characteristics and functions of the innate immune cells of vertebrates
- 4- Orchestrating the adaptive immune response by antigen presenting cells
- 5- Immunologic memory
- 6- The immune mechanisms leading to allergy and autoimmunity

Assessment of CLOs:

- Learning outcomes 1-2 are assessed 6 weeks after the start of the semester in a written exam
- Learning outcome 3 is assessed 11 weeks after the start of the semester in a written exam
- Learning outcomes 4-6 are assessed at the end of the semester in a written exam.

3. RESOURCES AVAILABLE FOR STUDENTS

Text book	Title:	Janeways Immunobiology
	Authors:	Kenneth Murphy, Paul Travers, Mark Walport
	Edition:	Latest
	Publisher:	Garland Science

4. GRADING CRITERIA

4.1. Course theory

First Exam	30%
Second Exam	30%
Final Exam	35%

4.2. Evaluation 5%

5. DETAILED COURSE SYLLABUS

I. Introduction to immunology

II. The innate immune system of arthropods

- A. The Immune system of *Drosophila melanogaster*
 - 1. Pattern recognition receptors and recognition of non-self
 - 2. *Drosophila* immune signalling pathways
 - 3. Effector immune mechanisms
 - a- Humoral effector mechanisms
 - b- Cell-mediated response
- B. The Immune system of the horseshoe crab
 - 1. humoral immune response
 - 2. cellular immune response and coagulation
- C. The prophenoloxidase cascade in the tobacco worm *Maduca sexta*
- D. Invertebrate ecological immunology

III. The vertebrate immune system

- A. The innate immune response
 - a- Cells of the innate immune system
 - b- Pattern recognition receptors
 - c- Cellular effector responses
 - d- Humoral effector responses (the complement system)
 - e- evolution of the innate immune system
- B. The adaptive immune response
 - a- Lymphoid tissues
 - b- B lymphocytes and their receptors

- c- T-lymphocytes and their receptors
- d- Antigen presentation and activation of the adaptive immune system
- e- Immunologic memory
- f- Autoimmunity and Allergy

6. COURSE POLICY

- 6.1.** Students missing more than 1/5 of lectures are subject to being dropped out of the course (see AUB catalogue, FAS attendance)

- 6.2.** There will be no make-up exams as a matter of policy. Any missed exam will be added to the final exam (i.e. final exam will become 70%). If you miss both exams you will get 0% on one of the exams and the other added on to the final exam.