

## Biology

### Immunology

#### IDENTIFICATION

CODE : BS-4-S1-EC-COIMMUN  
ECTS : 3.0

#### HOURS

Lectures : 24.0 h  
Seminars : 0.0 h  
Laboratory : 8.0 h  
Project : 0.0 h  
Teacher-student  
contact : 32.0 h  
Personal work : 37.0 h  
Total : 69.0 h

#### ASSESSMENT METHOD

Final Examination  
Practical work Report

#### TEACHING AIDS

Pdf of the lecture, reviews on  
various topics, textbook in English  
available at INSA's library

#### TEACHING LANGUAGE

English

#### CONTACT

M. HEDDI Abdelaziz  
abdelaziz.heddi@insa-lyon.fr  
MME RIBEIRO LOPES  
Melanie  
melanie.ribeiro-lobes@insa-lyon.fr  
MME ZAIDMAN Anna  
anna.zaidman@insa-lyon.fr

#### AIMS

##### SKILLS:

This module contributes to the competencies below [level] with associated capabilities:  
C1. Apply a scientific approach [hypothetical-deductive] to translate and solve a biological  
problem [level 1]  
C8. Use the main techniques for exploring biological functions [level 1]  
C14. Develop and validate biotechnological manufacturing processes [level 1]  
- Understand how the immune system works to develop health research protocols and  
develop immunostaining techniques in functional exploration.

##### KNOWLEDGE:

Functioning of the immune system and industrial applications

##### OBJECTIVES :

Define key terms like antigen, antibody, cytokines, and chemokines.  
List the primary organs and cells involved in the immune system.  
Recall the differences between innate and adaptive immunity.  
Understanding: Demonstrate a comprehensive understanding of how the immune system  
functions & is regulated.  
Illustrate how various cells and molecules of the immune system interact against pathogens.  
Explain the regulatory mechanisms that balance immune responses.  
Applying:  
Predict outcomes when certain immune components are absent or dysfunctional, and of  
specific immunomodulatory drugs or treatments on the immune system.  
Analyzing: Demonstrate the capacity to analyze and interpret immunological experiments.  
Evaluate experimental design, methodology, and data in immunology research.  
Interpret the results of immunological assays and experiments, identifying their significance.  
Evaluating:  
Critically assess experiments related to immunological concept or therapy.  
Compare and contrast the immunological mechanisms behind various immunotherapy or  
vaccines.  
Evaluate the implications of specific genetic mutations on immune function.  
Creating:  
Design an experiment to test a specific hypothesis related to immune function.  
Propose strategies to produce an immunological diagnosis tool.

#### CONTENT

1. Introduction to Immunology: Introduction to the Immune System. General concepts:  
recognition, specificity, and memory, innate immunity, acquired immunity.
2. Mechanisms of innate immunity [recognition and effector mechanisms].
3. Molecules at the heart of adaptive immunity: TCR BCR MHC CD4 and CD8 antibodies; 8;  
Antigens [notions of antigenicity, immunogenicity, haptens].
4. Generation of antibody diversity and selection of LBs
5. Generating TCR diversity and LT learning
6. LT in action [diversity of functions]
7. LB activation and antibody effector mechanisms
8. Unconventional lymphocytes, mucosal immunity,
9. The immune system in action: [a] against extracellular bacteria; [b] against intracellular  
bacteria; [c] against viruses;
10. Immunotherapies: vaccination, serotherapy, immunosuppression

TP - immunological and immunochemical techniques: use of antibodies, immunoprecipitation,  
immunodiffusion, immunoelectrophoresis, ELISA techniques, immunocytochemistry, flow  
cytometry.

#### INSA LYON

##### Campus LyonTech La Doua

20, avenue Albert Einstein - 69621 Villeurbanne cedex - France  
Phone +33 [0]4 72 43 83 83 - Fax +33 [0]4 72 43 85 00  
[www.insa-lyon.fr](http://www.insa-lyon.fr)

## BIBLIOGRAPHY

Basic Immunology: Functions and Disorders of the Immune System - A. K. Abbas - ELSEVIER  
Cellular and molecular immunology - Abbas - 9th edition - ELSEVIER- 2018

## PRE-REQUISITE

Good bases in molecular biology and cellular biology.

## INSA LYON

### Campus LyonTech La Doua

20, avenue Albert Einstein - 69621 Villeurbanne cedex - France  
Phone +33 [0]4 72 43 83 83 - Fax +33 [0]4 72 43 85 00

[www.insa-lyon.fr](http://www.insa-lyon.fr)