



# Course Specification

## (Bachelor)

**Course Title:** Immunology

**Course Code:** BIOL 436

**Program:** Biology

**Department:** Biology Department

**College:** College of Science

**Institution:** Majmaah University

**Version:** 3<sup>rd</sup>

**Last Revision Date:** 22/December/2023



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## A. General information about the course:

### 1. Course Identification

#### 1. Credit hours: (4 (3+1) )

Equivalent to ECTS Credit Points: 6

#### 2. Course type

- A.  University  College  Department  Track  Others
- B.  Required  Elective

#### 3. Level/year at which this course is offered: (7<sup>th</sup> / 4<sup>th</sup>)

#### 4. Course General Description:

This course introduces the fundamental cellular and molecular principles of the human immune system. It covers major topics such as immune cells, antigens, antibodies, and innate and adaptive immunity. Selected lectures also address mucosal immunity and the immune system in health and disease.

#### 5. Pre-requirements for this course (if any):

BIOL-231

#### 6. Co-requisites for this course (if any):

N/A

#### 7. Course Main Objective(s):

Students will learn the core cellular and molecular principles of the immune system, including antigen recognition, antibody diversity, and the mechanisms of innate and adaptive immunity. They will understand key processes such as antigen presentation, inflammation, mucosal immunity, and immune regulation. The course also introduces applied areas including vaccination, autoimmunity, allergy, transplantation, and tumor immunology.

### 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	88%
2	E-learning	10	12%
3	Hybrid <ul style="list-style-type: none"> <li>Traditional classroom</li> <li>E-learning</li> </ul>	NO	NO
4	Distance learning	NO	NO





### 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	30
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
<b>Total contact hours</b>		<b>75</b>

### Workload (based on the academic semester)

No	Activity	Workload (in hours)
1.	<b>Contact Hours</b>	75
2.	<b>Self-Study hours or Academic learning hours</b> ( Assessment, quizzes, reports, discution , Library,research..)	60
<b>Total workload</b>		<b>135 hours</b>
<b>Equivalent to ECTS Credit Points</b>		<b>6</b>

### B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>			
1.3	Identify the organs and cells responsible for defense in the immune system. etc.	K3	Traditional-based learning	Quizzes Midterm, final examination, E-exam
<b>2.0</b>	<b>Skills</b>			
2.3	Demonstrate immune response pathways and perform tests to assess and interpret immune system strengths and weaknesses.	S3	Traditional-based learning	Quizzes Midterm, final examination, E-exam
2.4	Distinguish the appropriate methods of immunization	S4	laboratory-based learning	Lab reports and Practical exams



Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	against diseases caused by various microorganisms.			
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.2	Develop students' ability to use multimedia responsibly, make informed decisions, and collaborate effectively as part of a team.	V2	Traditional-based learning	Homework and Assignment

### C. Course Content

No	List of Topics (Lecture)	Contact Hours
1.	<p>Components of the immune system and their roles in immunity:</p> <ul style="list-style-type: none"> <li>• Definition of Immunology</li> <li>• Main tasks of the immune system</li> <li>• Characteristics of innate and adaptive immunity</li> <li>• Barriers against infection</li> <li>• Inflammation</li> <li>• Process of Phagocytosis</li> </ul>	4
2.	<p>Adaptive Immunity</p> <ul style="list-style-type: none"> <li>• Natural Active immunity</li> <li>• Artificial Active immunity</li> <li>• Natural passive immunity</li> <li>• Artificial passive immunity</li> <li>• Comparison of active and passive acquired immunity</li> </ul> <p>Lymphoid organs</p> <ul style="list-style-type: none"> <li>• Primary and secondary lymphoid organ</li> </ul> <p>Comparison of primary and secondary lymphoid organs</p>	5
3.	<p>Cells of the immune system</p> <ul style="list-style-type: none"> <li>• Role of Immune Cells</li> <li>• Stem cells</li> <li>• Neutrophils, Eosinophils, Basophils, Mast cells and Macrophages</li> <li>• Mechanism of APC upon infection</li> <li>• Lymphocytes</li> <li>• Types of B-lymphocytes and T-lymphocytes</li> <li>• Function of B and T-lymphocytes</li> </ul>	5



	<ul style="list-style-type: none"> <li>• Development, Proliferation and maturation of B and T-lymphocytes</li> </ul>	
	Mechanism of B and T cell activation	
4.	<p>Molecules of the immune system</p> <ul style="list-style-type: none"> <li>• The complement system – its types and activation and roles during infection</li> <li>• Structural basis of antibody diversity</li> <li>• B cells activation and antibody production</li> <li>• Function of immunoglobulins</li> </ul> <p>Types of immunoglobulins</p>	4
5.	<p>Antigens</p> <ul style="list-style-type: none"> <li>• Structure of antigen</li> <li>• Chemical nature of antigen</li> <li>• Essential factors for antigenicity</li> <li>• Function of antigen</li> <li>• Types of antigens</li> <li>• Antigen-Antibody Binding</li> </ul> <p>Hapten</p>	4
6.	<p>Immune response</p> <ul style="list-style-type: none"> <li>• Factors Causing Immune Response</li> <li>• Role of Immune Response</li> <li>• Devices Used in Immune Response</li> <li>• Mechanism of Immune Response</li> <li>• Humoral immune response</li> <li>• Cell mediated immune response</li> <li>• Different Between Primary and Secondary Humoral Immune Response</li> </ul> <p>Factors Influencing the Antibody Formation</p>	5
7.	<p>Immunological memory in adaptive immunity and vaccination</p> <ul style="list-style-type: none"> <li>• Immunological memory and the secondary immune response</li> <li>• Memory B and T cells</li> <li>• Immunological memory and viral infections</li> <li>• Immunological basis for the protective effect of vaccination</li> <li>• Adjuvants and vaccines</li> <li>• Current approaches to vaccine production</li> </ul> <p>Vaccination and public health</p>	4
8.	<p>Autoimmune diseases</p> <ul style="list-style-type: none"> <li>• Classification of autoimmune diseases</li> <li>• Antibody-mediated autoimmune diseases</li> </ul>	5





	<ul style="list-style-type: none"> <li>• autoimmune haemolytic anemia</li> <li>• autoimmune thrombocytopenia</li> <li>• myasthenia gravis</li> <li>• Grave's disease</li> <li>• Pernicious anemia</li> </ul> <p>Systemic lupus erythematosus</p>	
9.	<p>Allergy and other hypersensitivities</p> <ul style="list-style-type: none"> <li>• Hypersensitivity reactions and their effector mechanisms</li> <li>• IgE in immunity and allergy</li> <li>• IgE-mediated allergic disease</li> <li>• Immunological basis of allergy</li> <li>• Clinical symptoms of allergy</li> <li>• Anaphylaxis</li> <li>• Testing for allergy</li> <li>• Treatment of allergy</li> <li>• Type II hypersensitivity</li> </ul> <p>Type III hypersensitivity</p>	5
10.	<p>Transplantation immunology</p> <ul style="list-style-type: none"> <li>• Types of graft</li> <li>• Graft acceptance and rejection</li> </ul> <p>Immunodeficiency diseases</p> <ul style="list-style-type: none"> <li>• AIDS</li> </ul> <p>Immunotechniques</p>	4
<b>Total</b>		<b>45</b>

No	List of Topics (Practical)	Contact Hours
1.	<p>Introduction to "Practical Immunology" Definition of Immunology</p> <ul style="list-style-type: none"> <li>• Features of antigen and antibody reactions</li> <li>• Affinity</li> <li>• Avidity</li> <li>• Cross Reactivity</li> <li>• Specificity</li> <li>• Antigen antibody tests</li> </ul>	4
2.	<p>Detection of Antigen and antibody reactions in the lab</p> <ul style="list-style-type: none"> <li>• Precipitin Reaction</li> <li>• Application of Precipitin Reaction</li> <li>• Agglutination</li> <li>• Cytolysis</li> <li>• Complement Fixation</li> <li>• Flocculation</li> </ul>	4



	<ul style="list-style-type: none"> <li>Opsonization</li> </ul>	
3.	<p>Immunotechniques</p> <ul style="list-style-type: none"> <li>Double Immunodiffusion</li> <li>Radial immunodiffusion</li> <li>Immunoelectrophoresis</li> <li>Rocket Immunoelectrophoresis</li> <li>Countercurrent Immunoelectrophoresis</li> </ul>	4
4.	<p>Immunotechniques</p> <ul style="list-style-type: none"> <li>Radioimmunoassay (RIA)</li> <li>Immunoelectron Microscopy</li> <li>Immunofluorescence</li> <li>Enzyme-Linked Immuno Sorbent Assay (ELISA)</li> </ul>	4
5.	<p>Immunotechniques</p> <ul style="list-style-type: none"> <li>VDRL Test for Syphilis</li> <li>Brucella Agglutination Test</li> <li>ABO Blood Typing Rh Blood Typing</li> <li>Widal Test</li> </ul>	4
6.	<p>Immunotechniques</p> <ul style="list-style-type: none"> <li>Coomb's Test</li> <li>HLA Typing</li> <li>Hybridoma Technology</li> <li>Well-Felix Test</li> </ul>	4
7.	<p>Laboratory Experiments</p> <ul style="list-style-type: none"> <li>Total Count of Blood Cells</li> <li>Procedure for Red Cell Counts</li> <li>Procedure for White Blood Cell</li> </ul>	4
8.	<p>Laboratory Experiments</p> <ul style="list-style-type: none"> <li>ABO Blood Grouping</li> <li>Rh Blood Grouping</li> <li>Production of Antiserum</li> </ul>	2
<b>Total</b>		<b>30</b>





## D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments / Homework/Quiz	Week 2-15	10 %
2.	Mid-term Exam 1	Week 5-7	10 %
3.	Mid-term Exam 2	Week 11-12	10 %
4.	Bb electronic exam	Week 13	10 %
5.	Practical Exam	Week 15	20 %
6.	Final Exam	Week 16-17	40 %

\*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

<b>Essential References</b>	<p>Lauren Sompayrac, How the Immune System Works(2022) Wiley-Blackwell; 7th edition, ISBN-10 : 1119890683-ISBN-13 : 978-1119890683</p> <p>Janeway's Immunobiology (Immunobiology: The Immune System ) (2011) Garland Science; 8 edition</p>
<b>Supportive References</b>	<p>Cellular and Molecular Immunology 10th Edition - February 19, 2021 Authors: Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai</p>
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>• <a href="https://pubmed.ncbi.nlm.nih.gov/">https://pubmed.ncbi.nlm.nih.gov/</a> <a href="https://alison.com/course/introduction-to-immunology-revised?utm_source=google&amp;utm_medium=cpc&amp;utm_campaign=PPC_Tier-2_Course-1721_Introduction-to-Immunology-Revised&amp;utm_adgroup=Course-1721_Introduction-to-Immunology-Revised&amp;gclid=CjwKCAiApvebBhAvEiwAe7mHSCkxiYQbZ75Q-hcqZsXFgNLSO_R8zA-F90n6Pu_ew6mPHPqSYFLTKxoCto4QAvD_BwE">https://alison.com/course/introduction-to-immunology-revised?utm_source=google&amp;utm_medium=cpc&amp;utm_campaign=PPC_Tier-2_Course-1721_Introduction-to-Immunology-Revised&amp;utm_adgroup=Course-1721_Introduction-to-Immunology-Revised&amp;gclid=CjwKCAiApvebBhAvEiwAe7mHSCkxiYQbZ75Q-hcqZsXFgNLSO_R8zA-F90n6Pu_ew6mPHPqSYFLTKxoCto4QAvD_BwE</a></li> </ul>
<b>Other Learning Materials</b>	---

### 2. Required Facilities and equipment

Items	Resources
<p><b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)</p>	<ul style="list-style-type: none"> <li>• The number of seats in classrooms and lab. is suitable and no need for extra seats.</li> <li>• The classrooms provided with smart board and e-podium and laboratories provided with smart board.</li> </ul>





Items	Resources
<b>Technology equipment</b> (projector, smart board, software)	The classrooms are provided with smart board and e-podium
<b>Other equipment</b> (depending on the nature of the specialty)	None

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of Students assessment	Program Leaders	Direct
Quality of learning resources	Students	Indirect
The extent to which CLOs have been achieved	Faculty	Direct
Other		

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

<b>COUNCIL /COMMITTEE</b>	Biology Department Council
<b>REFERENCE NO.</b>	07
<b>DATE</b>	04/04/1446 - 07/10/2024

