

Course Specification

— (Postgraduate Programs)

Course Title: Molecular Immunology
Course Code: BIO-6016
Program: Master of Science in Applied Biology (Cell and Molecular Biology)
Department: Biology
College: Sciences
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: Pick Revision Date.

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A. General information about the course:

1. Course Identification:

1. Credit hours: (Lecture 2+ Lab 0)

2. Course type

A. ☐ University ☐ College ☐ Department ☒ Track

B. ☐ Required ☒ Elective

3. Level/year at which this course is offered: (undetermined)

4. Course General Description:

This course focuses on the molecular and cellular biology of the immune response, in particular the mechanisms through which the immune system identifies and combats various agents. Emphasis is placed on both the classical and the recent experimental findings that have shaped our present-day comprehension of immune recognition processes. The specific subtopics covered in this course include the diversifying nature of immunoglobulin receptors, the interactions between T cells and MHC molecules, the activation and signalling pathways of innate and adaptive immune responses, and the molecular mechanisms of hypersensitivities and autoimmune diseases.

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

None

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

None

7. Course Main Objective(s):

This graduate course aims to introduce the students to an in-depth understanding of the concepts of immune recognition. The emphasized topics include molecules of the immune response, diversification mechanisms of immunoglobulins and immunoglobulin receptors. The course content acquaints the students with the molecular mechanisms of immunodeficiency diseases and those mechanisms clarify the interaction between the cancer cells and immune system. The molecular Among the main course objectives are T cell and Major Histocompatibility Complex (MHC) interactions, signalling mechanisms of innate and adaptive immune responses.



2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning	-	-
3	Hybrid - Traditional classroom - E-learning	-	-
4	Distance learning	-	-

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

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	-
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
	Total	30

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

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Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Outline the basic concepts of the innate and adaptive immune responses	K1	-Lectures -Tutorials (Informative videos and internet resources). -Class discussion	-Assignments -Participation -Presentation -Written exams
1.2	Identify the main chemical molecules mediating the immune responses	K2	-Lectures -Tutorials (Informative videos and internet resources). -Class discussion	-Assignments -Participation -Presentation -Written exams
1.3	Describe the signaling downstream of innate and adaptive immune responses	K3	-Lectures -Tutorials (Informative videos and internet resources). -Class discussion	-Assignments -Participation -Presentation -Written exams
1.4	Explain the main molecular mechanisms of hypersensitivity, autoimmune, and immunodeficiency diseases	K4	-Lectures -Tutorials (Informative videos and internet resources). -Class discussion	-Assignments -Participation -Presentation -Written exams

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
2.0	Skills			
2.1	Relate the diversification of immunoglobulin receptors to the various immune reactions to a wide range of antigens	S1	-Demonstrations -Class discussions	-Presentation -Reports
2.2	Interpret and analyze the data of immune assays by employing critical thinking and the acquired knowledge in the area of molecular immunology	S2	-Demonstrations -Class discussions	-Presentation -Reports
2.3	Write a proposal and conduct experimental research work using the appropriate methods and techniques	S3	-Demonstrations -Class discussions	-Presentation -Reports
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate independence in performing lab work and show effective cooperation with a research team	V1	-Teamwork -Group Discussion	-Presentation -Group reports
3.2	Participate actively in discussions of immunology issues and communicate scientific data professionally via oral presentations and in writing format.	V2	-Group discussion -Seminars	-Presentation -Reports

C. Course Content:

No	List of Topics	Contact Hours
1.	General Introduction: Overview of the Immune System	2
2.	The Major Histocompatibility Complex (MHC): -General organization and inheritance, -MHC molecules and genes -Molecular mechanisms of antigen presentation on MHC class I and II molecules, -MHC and disease susceptibility	2
3.	Cytokines: -Properties of cytokines, -Cytokine receptors, cytokine secretion, -Cytokine antagonists -Cytokine-related diseases and therapeutic uses	2
4.	Immunoglobulins: -Structure and functions, -Expression of immunoglobulin genes, -Monoclonal and polyclonal antibodies -Antibody cloning and engineering antigens	4
5.	Signalling Pathways: -Downstream of receptors of the innate immune response: inflammasomes and autophagosomes	2
6.	Signaling pathways: -Downstream of the antigen receptors of T and B cells: T-cell Receptors (TCRs), structure and roles of TCRs, B-cell Receptors (BCRs), structure and roles of BCRs, immune checkpoints	4
7.	Molecular mechanisms of hypersensitivity	2
8.	Molecular mechanisms of autoimmune diseases	2



9.	Immunodeficiency Diseases	2
10.	Cancer and the Immune System	2
Total		30

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam-1	5 th week	20%
2.	Midterm exam-2	10 th week	20%
3.	Assignments, presentations, Reports, data search, attendance, participation	Throughout the course duration	20%
4.	Final exam	16 th week	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:

Essential References	Abbas A, Andrew Lichtman, Shiv Pillai. Cellular and molecular immunology. W.B. Saunders, (ed), 9th International Edition.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect

Assessment Methods (Direct, Indirect)

COUNCIL /COMMITTEE	BIOLOGY DEPARTMENT COUNCIL
REFERENCE NO.	23
DATE	23/8/1445

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