Course Plan for Bachelor Program - Study Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-4.0E

Study Plan No.	**2021/2022**		**University Specialization**		**Bachelor of Pharmacy**	
Course No.	**0201336**		**Course Name**		**Immunology**	
Credit Hours	**2**		**Prerequisite *Co-requisite**		**Pharmaceutical Microbiology**	
Course Type	☐ Mandatory University Requirement	✓ University Elective Requirement	✓ Faculty Mandatory Requirement	✓ Support course family requirements	☑ **Mandatory Requirement**	✓ Elective Requirement
Teaching Style	☐ Full Online Learning		✓ **Blended Learning**		Traditional Learning	
Teaching Model	☐ 2 Synchronous: 1 Asynchronous		✓ **1 Face to Face: 1 Asynchronous**		2 Traditional	

Faculty Member and Study Divisions Information *(to be filled in each semester by the subject instructor)*

Name	Academic rank	Office No.	Phone No.	E-mail	
Sawsan Khdair	**Assistant pro.**	**237**		**Sawsan.khdair@zuj.edu.jo**	
Office Hours (Days/Time)	**Sunday, Tuesday (10-11)**		**Monday, Wednesday (11-12)**		
Division number	**Time**	**Place**	**Number of Students**	**Teaching Style**	**Approved Model**
				Blended Learning	**1Face to Face: 1 Asynchronous**

Brief Description

This course is intended to cover different aspects of immunology, starting with historical perspective and covering innate and adaptive immunity, immunogenicity, antibodies, humoral and cellular immune responses, immune regulation, immunopathology such as hypersensitivity, immunological tolerance and autoimmunity, and transplantation. The course also deals with immunization, as well as the diagnostic immunological technique. Moreover, the course will explain the immunotherapy for various immunological diseases.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc)	**1.** Jenni Punt, Sharon A. Stranford, Patricia, P. Jones, Judith A.Owen (**2019**): Kuby Immunology, 8th Edition, W.H. Freeman and Company, New York, USA.			
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	1. Golds by RA, Kindt TJ, and Osborne BA (**2011**): Kuby Immunology, 6th Edition, W.H. Freeman and Company, New York, USA. 2. Nairn R and Helbert M (**2008**): Immunology for Medical Students, 2nd Ed, Mosby Elsevier Ltd, Philadelphia, USA.			
Supporting Websites	-			
The Physical Environment for Teaching	☑ **Class room**	☐ Labs	☑ **Virtual Educational Platform**	☐ Others
Necessary Equipment and Software	- **Moodle, PC/laptop, smart cell phone, zoom**			

Supporting People with Special Needs	-
For Technical Support	**E-Learning & Open Educational Resources Center** **Email: elearning@zuj.edu.jo; Phone: +962 6 429 1511 ext. 425/362**

Course learning outcomes *(K= Knowledge, S= Skills, C= Competencies)*

No.	Course Learning Outcomes	The Associated Program Learning Output Code
Knowledge **The student should be able to:**		
K1	Recognize the cells, organs and tissues of the immune system and describe the microenvironments where immune cells mature and immune response developed.	**MK1**
K2	Describe the structural and the biological features of antigens, antibodies, and MHC molecule.	**MK3**
K3	Clarify the mechanisms of humoral immune response by B cells and cell-mediated cytotoxic immune response by T and NK cells.	**MK1**
Skills **The student should be able to:**		
S1	Distinguish between the innate and adaptive immunity.	**MS1**
S2	Differentiate between the different diseases caused by aberrant immune responses, such as infectious diseases, hypersensitivity diseases, autoimmune diseases and immunodeficiency diseases.	**MS2**
S3	Distinguish different modern medical practice in pharmacy, regarding vaccination, hypersensitivity and autoimmune diseases.	**MS1**
Competencies		
C1	Demonstrate the role of the immune system in maintenance of health and in the etiology of disease.	**MC2**

Mechanisms for Direct Evaluation of Learning Outcomes

Type of Assessment / Learning Style	Fully Electronic Learning	Blended Learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm Exam	%30	**%30**	%40	30%
Participation / Practical Applications	0	0	%10	30%
Asynchronous Interactive Activities	%30	**%20**	**0**	0
Final Exam	%40	%40	**%50**	40%

Note: *Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.*

Schedule of Simultaneous / Face-to-Face Encounters and their Topics

Week	Subject	Learning Style*	Reference ** (Pages in Course Book)
1	**1. Overview of the immune system**	**Lecture**	**1-27**
2	**Innate Immunity** **1. Factors of the innate (nonspecific) immunity** **a. Anatomic (physical) barriers** (skin and mucous membrane, etc...) **b. Physiological (chemical) barriers** (secretions, low pH, , interferon and other chemical mediators) **c. Phagocytic barrier** **d. Inflammatory barriers**	**Lecture**	**113-155**
3	**1. The Lymphoid system and hematopoiesis** **2.primary lymphoid organs** (bone marrow, thymus) **3. Secondary lymphoid organs** (lymph nodes, spleen, MALT, GALT, SALT) **4. Cells of the immune system** (granulocytes, agranulocytes, NK cells, etc.).	**Lecture**	**31-65**
4	**Adaptive immunity** **1. Antigens** **a. Immunogenicity vs antigenicity** **b. Factors influencing immunogenicity (**foreignness, molecular size weight, chemical composition or complexity, susceptibility to antigen processing and presentation) **c. Contribution of the biological system to immunogenicity** (genotype of the recipient animal, immunogen dosage and route of administration, adjuvants) **d. Haptens** **2. B cell and T cell epitopes**	**Lecture**	**76-84** Kuby Immunology, 6th Edition
5-6	**2. Antibodies (definition)** **a. Basic structure of immunoglobulin** (fine structure, immunoglobulin domains, variable-region domains, hypervariable regions, constant-region domains, hinge region) **b. Antibody classes** (IgM, IgG, IgA, IgE, IgD) **and biological activities** **c. Immunoglobulin mediated effector functions or consequences** (opsonization, activation of complement, ADCC, transcytosis) **d. Antigenic determinants on immunoglobulin** (isotypes, allotypes, idiotypes)	**Lecture**	**84-107** Kuby Immunology, 6th Edition

	e. Monoclonal antibodies (production and clinical uses of monoclonal antibodies).		
7	**The complement system** **1. Functions of complement** **2. The components of complement** **3. Complement activation** pathways (classical, alternative, and lectins) **4. Biological consequences of complement activation** (cell lysis, inflammatory response, opsonization of antigen, viral neutralization, clearness of immune complexes) **5. Complement components deficiencies.**	**Lecture**	**165-201**
8	**Adaptive immunity** **Major Histocompatibility Complex (MHC) and Antigen Presentation.** **1. General organization and inheritance of the MHC** **2. Location and function of MHC regions:** Class I MHC genes, Class II MHC genes, Class III MHC genes **3. Regulation of MHC expression and cellular distribution of MHC molecules** (Class-I restriction and Class-II restriction) **4. Antigen-Processing an Presentation Pathways**	**Lecture**	**249-287**
9	**Adaptive immunity** **Humoral Immune Response** **1. B-Cell Development, Activation, and differentiation** **2. Primary and secondary humoral immune responses** **3. Types of B-cell activation** (T-independent and T-dependent) **4. Cell cooperation in the antibody response** (role of B-cells, T-cells, and, APC)	**Lecture**	**321-334** **391-426**
	MID EXAM		
10	**Adaptive immunity** **Cell-Mediated Cytotoxic Responses** **1. general Principles of Effector T Cells** **2. The role of MHC in Cellular interaction required for the generation of the response** **3. Natural Killer Cells**	**Lecture**	**353-387**
11-12	**Allergy and Hypersensitivity** **1. Immediate (**Type I) **hypersensitivity** (allergen, mechanism of reaction, localized and generalized anaphylaxis, genetic factors in allergy, treatment of allergies) **2. Cytotoxic** (Type II) **hypersensitivity** (mechanism, examples such as transfusion reaction, hemolytic diseases of the newborn, and drug-induced type-II hypersensitivity, immunotherapy of type-II) **4. Immune Complex** (Type III) **hypersensitivity** (mechanism, examples such as serum sickness) **5. Cell-Mediated** (Type IV) **hypersensitivity** (mechanism, examples such as contact dermatitis and granulomatous	**Lecture**	**549-582**

	hypersensitivity)		
13	**Infectious diseases and Vaccines** **1. Passive (natural, artificial) and active (natural and artificial) immunizations** **2. Vaccines and immunization procedures** (killed and attenuated antigens, toxoid, subunit vaccine, peptide vaccine, etc.)	**Lecture**	**663-676**
14	**Tolerance, autoimmunity and transplantation** **1. Proposed mechanisms for induction of autoimmunity** (release of sequestered antigens, molecular mimicry, mimicry between MBP and viral peptides, inappropriate expression of Class-II MHC molecules, polyclonal B-cell activation) **2. Organ-specific autoimmune diseases (**direct cell damage, stimulating or blocking auto-antibodies) **3. Systemic autoimmune diseases** (direct cell damage or blocking auto-antibodies) **4. treatment of autoimmune diseases** (current therapies and therapeutic approaches)	**Lecture**	**593-616**
15	**Immunodeficiency diseases** **1. Primary Imunodeficiencies** **2. Secondary Imunodeficiencies** **3. Therapies and Therapeutic approaches**	**Lecture**	**681-722**
16	**Final Exam**	**-**	**-**

** Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.*
*** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.*

Schedule of Asynchronous Interactive Activities *(in the case of e-learning and blended learning)*

Week	Task / Activity	Reference	Expected Results
1	Watch a recorded lecture	Video on the E-learning platform	Watch the video
2	Watch a recorded lecture	Video on the E-learning platform	Answer questions on the E- exams portal/ Assignment
3	Watch a recorded lecture	Video on the E-learning platform	Watch the video
4	Watch a recorded lecture	Video on the E-learning platform	Answer questions on the E- exams portal/ Assignment
5	Self-study	A selected topic	Assignment/class room discussion
6	Watch a recorded lecture	Video on the E-learning platform	Watch the video

7	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
8	Self-study	A selected topic	Assignment/class discussion
9	**Midterm Exam**	-	-
10	Watch a recorded lecture	Video on the E-learning platform	Watch the video
11	Watch a recorded lecture	Video on the E-learning platform	Answer questions on the E- exams portal/ Assignment
12	Watch a recorded lecture	Video on the E-learning platform	Watch the video
13	Self-study	A selected topic	Assignment/class discussion
16	**Final Exam**	-	-