



كلية الصيدلة جامعة الزيتونة الأردنية
Faculty of Pharmacy
Al-Zaytoonah University of Jordan

" نحو تعليم صيدلاني متميز "

Toward Excellence in Pharmaceutical
Education

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"Tradition and Quality"

Detailed Course Description - Course Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-3.0E
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Faculty	Pharmacy	Department	Pharmacy
Course number	0201336	Course title	Immunology
Number of credit hours	2	Pre-requisite/co-requisite	Pharmaceutical Microbiology (0201331)

Brief course 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, tumor immunology as well as the diagnostic immunological technique. Moreover, the course will explain the immunotherapy for various immunological diseases.

: يهدف هذا المساق إلى تغطية جوانب مختلفة في علم المناعة، بدءاً من المنظور التاريخي وتغطي الحصانة الطبيعية والمكتسبة، العوامل المحفزة لجهاز المناعة، والأجسام المضادة، والاستجابات المناعية الخلوية (السائلة) والخلوية، والتنظيم أو المناعي، وزراعة الأعضاء، والأمراض المتعلقة بجهاز المناعة مثل فرط الحساسية، والأمراض الناتجة من الاستجابة المناعية لبعض المستقبلات الذاتية. كما يتناول المساق أنواع وكيفية تحضير المطاعيم لبعض الأدوية و لمختلف الأمراض المناعية.

Course goals and learning outcomes	
Goal 1	Introduce the nomenclature of immunology and the components of the immune system.
Learning outcomes	1.1. Describe the types of immune responses and their general properties. 1.2. Describe the cells, organs and tissues of the immune system and their structure-function relationships. 1.3. Differentiate between the innate and adaptive immunity.
Goal 2	Discuss the cellular and molecular basis of antigen recognition and the specificities of B and T lymphocytes components.
Learning outcomes	2.1. Explain the structural and biological features of an antigen. 2.2. Understand of the structure and the types of the antibodies and how these proteins recognize antigens, which are the effector molecules of B lymphocytes. 2.3. Describe the genetics and biochemistry of MHC molecules, which they are the basic components of T lymphocytes recognition.
Goal 3	Apply the knowledge of the basic mechanisms of innate and adaptive immunity to understand immunologic defenses against microbes and tumors, reaction against transplants, diseases caused by abnormal immune responses and their therapy.
Learning outcomes	3.1. Explain the mechanisms of humoral immune response by B cells and cell-mediated cytotoxic immune response by T and NK cells. 3.2. Understand the diseases caused by aberrant immune responses, so-called hypersensitivity diseases, and differentiation between autoimmune and immunodeficiency diseases and their treatment. 3.3. Describe the impact of modern medical practice in pharmacy, especially in vaccination hypersensitivity and autoimmune diseases.
Textbook	1. Goldsby RA, Kindt TJ, and Osborne BA (2011): Kuby Immunology, 6 th Ed, W.H. Freeman and Company, New York, USA.



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	2. Nairn R and Helbert M (2008): Immunology for Medical Students, 2 nd Ed, Mosby Elsevier Ltd, Philadelphia, USA.
Supplementary references	1. Murphy K, Travers P, and Walport M (2008): Janeway's Immunobiology, 7 th Ed, Garland Science, New York, USA. 2. Delves PJ, Martin SJ, Burton DR, and Roitt IM (2006) Roitt's Essential Immunology, 11 th , Blackwell Publishing Ltd, Oxford, UK. 3. Rosen FS and Geha RS (2004) Case Studies in Immunology, A Clinical companion, 4 th Ed, Gerlad Publishing New York, USA 4. Playfair JHL and Chain BM (2005); Immunology at Glance, 8 th Ed, Gower Medical Publishing Ltd, London, UK. 5. Parham P (2005): The Immune System, 2 nd Ed, Gerland Science, New York, USA. 6. Playfair JL and Lydyard PM (2000): Medical Immunology, 2 nd . Ed, Churchill Livingstone, London.

Course timeline

Week	Number of hours	Course topics	Pages (textbook)	Notes
01	1 1	1. Historical Perspective and terminology (immune, immunity, susceptibility, immunology, immune system, non-specific immunity, specific immunity) 2. Innate and Adaptive Immunity	1-22	Chapter 1
02	1 1	1. Factors of the innate (nonspecific) immunity a. anatomic (physical) barriers (skin and mucous membrane, etc...) b. physiological (chemical) barriers (secretions, low pH, and other chemical mediators) c. Cellular defenses (phagocytic cell) d. Inflammatory barriers, fever, molecular defenses (complement, interferon) e. Acute phase proteins (IL-6, CRP, lectins) f. Adaptive (specific, acquired) immunity.	52-69	Chapter 3
03	1 1	1. The Lymphoid system and hematopoiesis 2. primary lymphoid organs (bone marrow, thymus) 3. Secondary lymphoid organs (lymph nodes, spleen, MALT, GALT, SALT) 4. Lymphocyte traffic (circulation) 5. Cells of the immune system (granulocytes, agranulocytes, NK cells, etc).	23-49	Chapter 2
04	1 1	1. Antigens 2. Immunogenicity (immunogens) versus antigenicity (antigens) 3. Factors influencing immunogenicity	76-84	Chapter 4



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		(foreignness, molecular size weight, chemical composition or complexity, susceptibility to antigen processing and presentation) 4. Contribution of the biological system to immunogenicity (genotype of the recipient animal, immunogen dosage and route of administration, adjuvants) 5. Epitopes 6. Haptens and the study of antigenicity.		
05	1 1	1. Antibodies (definition) 2. Basic structure of immunoglobulin (fine structure, immunoglobulin domains, variable-region domains, hypervariable regions, constant-region domains, hinge region) 3. Deducing antibody structure (papain, pepsin, mercaptoethanol reduction and alkylation)	84-94	Chapter 4
06	1 1	4. Antibody classes (IgM, IgG, IgA, IgE, IgD) and biological activities 5. Immunoglobulin mediated effector functions or consequences (opsonization, activation of complement, ADCC, transcytosis) 6. Antigenic determinants on immunoglobulin (isotypes, allotypes, idiotypes) 7. Monoclonal antibodies (production and clinical uses of monoclonal antibodies).	94-107	Chapter 4
07	1 1	1. The complement system (definition) 2. Functions of complement 3. The components of complement 4. Complement activation pathways (classical, alternative, and lectins) 5. Biological consequences of complement activation (cell lysis, inflammatory response, opsonization of antigen, viral neutralization, solubilization of immune complexes) 7. Complement components deficiencies.	168-185	Chapter 7
08	1 1	1. Major Histocompatibility Complex (MHC)(definition) 2. General organization and inheritance of the MHC 3. Location and function of MHC regions: Class I MHC genes, Class II MHC genes, Class III MHC genes 4. MHC haplotypes. 5. Congenic MHC mouse strains.	189-217	Chapter 8



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		<p>6. MHC molecules and genes. 7. Organization of Class I and Class II genes. 8. Regulation of MHC expression and cellular distribution of MHC molecules (Class-I restriction and Class-II restriction) 9. Evidence for different Antigen-Processing and Presentation Pathways 10. MHC and immune responsiveness 11. MHC and disease susceptibility 12. Self-MHC-restriction of T-cells.</p>		
09	1 1	<p>1. B-Cell Generation, Activation, and differentiation 2. Humoral Immune Response (definition) 2. Primary and secondary immune responses (definition and differences) 3. Types of responses according to types of antigens (T-independent and T-dependent) 4. Cell cooperation in the antibody response (role of B-cells, T-cells, and, APC) 5. Regulation of the response.</p>	271-297	Chapter 11
10	1 1	<p>1. Cell-Mediated Cytotoxic Responses (definition) 2. general Principles of Effector T Cells 3. The role of MHC in Cellular interaction required for the generation of the response 4. Natural Killer Cells 5. Differences between humoral and cellular immune responses</p>	351-366	Chapter 14
11	1 1	<p>1. Immunopathology (Hypersensitivity, definition) 2. Immediate (Type I) hypersensitivity (allergen, mechanism of reaction, localized and generalized anaphylaxis, genetic factors in allergy, treatment of allergies)</p>	371-386	Chapter 15
12	1 1	<p>3. 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 and Arthus reaction) 5. Cell-Mediated (Type IV) hypersensitivity (mechanism, examples such as contact dermatitis and granulomatous hypersensitivity)</p>	388-396	Chapter 15



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13	1 1	<p>1. Immunization and Vaccination (definitions) 2. Passive (natural, artificial) and active (natural and artificial) immunizations 3. Vaccines and immunization procedures (killed and attenuated antigens, toxoid, subunit vaccine, peptide vaccine, etc)</p> <hr/> <p>The use of adjuvants</p> <p>5. Current progresses in vaccinations and usage of the recent approaches.</p>	476-488	Chapter 19
14	1 1	<p>1. Immunopathology (Tolerance and autoimmunity) 2. 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)</p> <hr/> <p>3. Organ-specific autoimmune diseases (direct cell damage, stimulating or blocking auto-antibodies) 4. Systemic autoimmune diseases (direct cell damage or blocking auto-antibodies) 5. treatment of autoimmune diseases (current therapies and therapeutic approaches)</p>	402-421	Chapter 16
15	1 1	<p>1. Immunopathology (Transplantation immunology) 2. Immunologic basis of graft rejection 3. Specificity and memory of the rejection response (autograft acceptance, first-set and second-set rejection) 4. Role of cell-mediated response 5. Transplantation antigens and tissue typing</p> <hr/> <p>6. Mechanisms involved in graft- versus- host (HVG) rejection 7. Clinical manifestation of graft rejection (hyperacute, acute, chronic) 8. Graft-versus -host rejection (GVH). 9. General immunosuppressive therapy (mitotic inhibitors, corticosteroids, cyclosporine A, FK506, and Rapamycin, total lymphoid irradiation) 10. Specific immunosuppressive therapy (Immunotherapy by using immunotherapeutic agents)</p>	426-436	Chapter 17
16	1 1	Laboratory Techniques commonly used in Immunology	547-560	Chapter 22



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		1. Measurement of Antigen-Antibody Interactions 2. Application of immunological testing <hr/> 3. Antibody affinity, antibody avidity, cross-reactivity 4. Immunological tests (skin test, LTT, precipitation test, agglutination test, immunofluorescent test, Western blotting, ELISA, immunoprecipitation, radioimmunoassay,		
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Theoretical course evaluation methods and weight	First exam 25% Second exam 25% Final exam 50%	Practical (clinical) course evaluation methods	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%
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Approved by head of department		Date of approval	
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Extra information (to be updated every semester by corresponding faculty member)

Name of teacher	Dr. Sawsan Khdair	Office Number	236
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Office hours			