**The Hashemite University**

الجامعـــــــــة
الهاشميـــــــــة

**Faculty of Pharmaceutical Sciences**

# Syllabus: Immunology and Vaccines (131702458)
# Second Semester of the academic year

| COURSE INFORMATION | |
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| **Course Name:** Immunology and Vaccines (blended learning)<br>**Semester:** Second<br>**Department:** Department of Clinical Pharmacy and Pharmacy Practice<br>**Faculty:** Pharmaceutical Sciences | **Course Code:** 131702458<br>**Section:** As per the semester<br>**Core Curriculum**: Compulsory – 2019 Study plan<br>**JNQF Level:** 7 |
| **Day(s) and Time(s):** : According to HU courses timetable/semester<br>**Classroom:** As per the semester | **Credit Hours:** 2<br>**Prerequisites**: Pharmaceutical microbiology (131701354) |

## COURSE DESCRIPTION

This course focuses on the study of the immune system of humans that has evolved to protect against infection by pathogens. The course will provide a basic understanding of human immunology and its relationship to health and disease. Immunology overlaps with many other biological disciplines including biochemistry, molecular biology, cell biology, genetics, physiology, and microbiology, it relies on methods and concepts derived from these disciplines and in turn makes a major contribution to them.

This course aims to teach basic immunology and its role in disease and treatment. It also includes a section on vaccine types and their mechanism of action and a section on pharmacogenomics and drug response based on genetic differences.

## DELIVERY METHODS

The course will be delivered through a combination of active learning strategies. These will include:

- PowerPoint lectures and active classroom-based discussion
- Collaborative learning through small groups acting in an interdisciplinary context.
- E-learning resources: e-reading assignments and practice quizzes through Model and Microsoft Team

## FACULTY INFORMATION

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| **Name** | **Dr. Muna Oqal** |
| **Academic Title:** | **Assistant Professor** |
| **Office Location:** | **Faculty of Pharmaceutical Sciences, 3rd floor, office number: 3438** |
| **Telephone Number:** | **3438** |
| **Email Address:** | **munak@hu.edu.jo** |
| **Office Hours:** | **As announced per the semester**<br>*Please send an e-mail ( munak@hu.edu.jo) to meet at any other time.* |

## REFERENCES AND LEARNING RESOURCES

**Required Textbook**

**1.** Advanced Concepts in Human Immunology: Prospects for Disease Control, Pooja Jain Lishomwa C. Ndhlovu *Editors*, 2020.

**Suggested Additional Resources**:

1. Basic Immunology, Abbas and Lichtman, 6th Edition, 2019
2. Essentials of Clinical Immunology, Chapel & Haeney, 7th Edition, 2022

## COURSE OBJECTIVES

After course completion students will be able to:

1. Develop and understanding of the principles of immunology and vaccines.
2. Provide the theoretical knowledge and understanding of the the basic understanding of human immunology and its relationship to health and disease.
3. Develop the ability to employ the knowledge of the molecular and cellular basis of the immune system in solving and building its relationship to health and disease.
4. Obtain an understanding of the role of the principals of immunological treatments including anti-inflammatory, anti-cancer, immunosuppressive, vaccines and antigen and antibody-based treatment.
5. Acquire positive attitudes towards further studies in the topics of immunology and vaccines.

## COURSE INTENDED LEARNING OUTCOMES (CILOs)

**A. Foundational Knowledge**

A.1 Student should describe major components and functions of the immune system.

A.2 Student should understand: the organs and cells of the immune system, antigen and antigen-based treatment, principles of innate immunity, inflammation, leukocyte activation and migration, tumor immunology and anti-neoplastic drugs, hypersensitivity and anti-allergic treatment, and transplantation immunology and immunosuppressive treatment.
A.3 Recognize the concepts of vaccines and its application in preventing diseases.

**B. Essentials for Practice and Care**

B.1 Design prevention, intervention, and educational strategies for individuals and communities to manage infectious and inflammatory disease and improve health and wellness related to medications
B.3 Use modern literature search methods to obtain information about immunology and vaccines topics and write reports.

**C. Approach to Practice and Care**

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C.1 Identify types of current vaccines; explore and prioritize potential strategies; design, implement, and evaluate a viable solution related drug regimen
C.2 Educate all audiences by determining the most effective and enduring ways to impart .information and assess understanding regarding various vaccines and anti-inflammatory drugs
C.3 Communicate verbally and nonverbally as a healthcare team member when interacting with an individual, group, or organization regarding various related-medications and vaccines by .demonstrating mutual respect, understanding, and values to meet patient care needs

**D. Personal and Professional Development**

D.1 Develop a positive attitude towards the topics of immunology and vaccines and be able to elaborate the concept of immunology and immunotherapy.
D.2 Display positive self-esteem, confidence, and creative decision when working with others and when facing novel problems or challenges.
D.3 Exhibit behaviors and values that are consistent with the trust given to the profession of pharmacy by patients, other healthcare providers, and society.

**E. Pharmaceutical Product Expert (This point is added for some courses)**
E.1 To be able to distinguish between different types of vaccines in the market and their benefits to patients.

## ACADEMIC SUPPORT

It is The Hashemite University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their instructor to ensure that their individual needs are met. The University through its Special Need section will exert all efforts to accommodate for individual's needs.
**Special Needs Section:**

**Tel:** **00962-5-3903333 Extension: 4209**
**Location:** **Students Affairs Deanship/ Department of Student Welfare Services**
**Email**: **amalomoush@hu.edu.jo**
**amalomoush@staff.hu.edu.jo**

## COURSE REGULATIONS

***Participation***
Class participation and attendance are important elements of every student's learning experience at The Hashemite University, and the student is expected to attend all classes. A student should not miss more than 15% of the classes during a semester. *Those exceeding this limit of 15% will receive a failing grade regardless of their performance*. It is a student's responsibility to monitor the frequency of their own absences. **Attendance record begins on the first day of class irrespective of the period allotted to drop/add and late registration. It is a student's responsibility to sign-in; failure to do so will result in a non-attendance being recorded.**

In exceptional cases, the student, with the instructor's prior permission, could be exempted from attending a class provided that the number of such occasions does not exceed the limit allowed by the University. The instructor will determine the acceptability of an absence for being absent. A student who misses more than 25% of classes and has a valid excuse for being absent will be allowed to withdraw from the course.

On average, students need to spend 12 hrs of study and preparation weekly. At the beginning of the lectures, students should be on time and should not leave before the end of the lecture without an accepted excuse. **If the student missed a class, it is him/her responsibility to find out about any announcements or assignments they have missed.** For any clarification, students should communicate with their instructor at her posted office hours or by appointment. Students should listen well to the lecture, if anyone has a question, he/she should ask the instructor. Students can find the course material at the course Microsoft team after the lecture.

**Sharing of course materials is forbidden.** No course material including, but not limited to, course outline, lecture hand-outs, videos, exams, and assignments may be shared online or with anyone outside the class. Any suspected unauthorized sharing of materials, will be reported to the university's Legal Affairs Office. If a student violates this restriction, it could lead to student misconduct procedures.

***Plagiarism***

Plagiarism is considered a serious academic offence and can result in your work losing marks or being failed. HU expects its students to adopt and abide by the highest standards of conduct in their interaction with their professors, peers, and the wider University community. As such, a student is expected not to engage in behaviours that compromise his/her own integrity as well as that of The Hashemite University.

Plagiarism includes the following examples, and it applies to all student assignments or submitted work:

- **Use of the work, ideas, images or words of someone else without his/her permission or reference to them.**
- **Use of someone else's wording, name, phrase, sentence, paragraph or essay without using quotation marks.**
- **Misrepresentation of the sources that were used.**

**The instructor has the right to fail the coursework or deduct marks where plagiarism is detected**

***Missed Assessments***

In all cases of assessment, students who fails to attend an exam on the scheduled date without prior permission, and/or are unable to provide a medical note, will automatically receive a failure grade for this part of the assessment.

In cases where a student misses an assessment on account of a medical reason or with prior permission; in line with university regulations an incomplete grade for the specific assessment will be awarded and an alternative assessment or extension can be arranged.

***Cheating***

Cheating, academic disconduct, fabrication and plagiarism will not be tolerated, and the university policy will be applied. Cheating policy: The participation, the commitment of cheating will lead to applying all following penalties together:

- Failing the subject, he/she cheated at
- Failing the other subjects taken in the same course
- Not allowed to register for the next semester
- The summer semester is not considered as a semester

***Student Complaints Policy***

Students at The Hashemite University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

## COURSE ASSESSMENT

***Course Calendar and Assessment***

Students will be graded through the following means of assessment and their final grade will be calculated from the forms of assessment as listed below with their grade weighting taken into account. The criteria for grading are listed at the end of the syllabus

Students will be graded through the following means of assessment:

| Course Assessment Plan | | | | | | |
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| **Assessment** | **Grade Weighting** | **Deadline Assessment** | **CILOs** | | | |
| | | | **A** | **B** | **C** | **D** |
| First Exam | 25% | ~ 6th week | A | B | C | D |
| Second Exam | 25% | ~ 10th week | A | B | C | D |
| Quizzes/ Homework/ Assignments /Projects | 10% | During the semester | | | C | D |
| Final Exam | 40% | ~ 15th /16th week | A | B | C | D |

**Description of Exams**
Test questions will predominately come from the material presented in the lectures. Semester exams will be conducted during the regularly scheduled lecture period. The exam will consist of a combination multiple-choice, short answer, match, true and false, calculation problems, and/or descriptive questions.
**Homework:** Will be given for the selected chapters, while the chapter in progress you are supposed to work on them continuously and submit in the announced date.
You are also expected to work on in-chapter examples, self-tests and representative number of end of chapter problems. The answers of self-tests and end of chapter exercises are given at the end of the book.

**Quizzes:** Announced quizzes will be given during or/and at the end of each chapter based upon the previous lectures.

No make-up exams, homework or quizzes will be given. Only documented absences will be considered as per HU guidelines.

Grades are not negotiable and are awarded according to the following criteria*:

| Letter Grade | Description | Grade Points |
|---|---|---|
| A+ | Excellent | 4.00 |
| A | | 3.75 |
| A- | | 3.50 |

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| B+ | Very Good | 3.25 |
| B | | 3.00 |
| B- | | 2.75 |
| C+ | Good | 2.50 |
| C | | 2.25 |
| C- | | 2.00 |
| D+ | Pass | 1.75 |
| D | Pass | 1.50 |
| F | Fail | 0.00 |
| I | Incomplete | - |

## WEEKLY LECTURE SCHEDULE AND CONTENT DISTRIBUTION

Note: For Physical Pharmacy 2 sections with 2 lecture periods per week (S/T or M/W ), one lecture period covers 1.5 lecture hours (80 minutes). The course content specifies the sections in chapters of the reference textbooks that will be included in quizzes, homework and exams.

**75% of the lectures are delivered by face-to-face learning, while 25% are recorded and given via Microsoft teams.**

| | | Course Content | | | | |
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| **Week Numbe** | **No. of Hours** | **CILOs** | **Chapters in the main reference** | **Subject** | **Delivery Methods** | **Assessment Methods** |
| **1-2** | **4** | A,B,C,D | **Ref 1** | **Introduction, History, Organs and Cells of the Immune System**<br>-Definition of Immunology<br>-Importance of Immunology<br>-Historical background of Immunology<br>-Modern Immunology<br>-Outline the major principles of the human immune response (innate immunity, humoral immunity, and adaptive immunity) | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Quizzes<br><br>Homework |
| **3-4** | **4** | A, ,B, C,D | **Ref 1** | **Antigen Structure, Processing and Presentation** | PowerPoint Lectures<br><br>Active | Exams<br><br>Quizzes |

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| | | | | -Definition of antigens and epitopes<br>-Types and sources of antigens<br>-Antigen processing and presentation<br>-The roles of Major Histocompatibility Complex (MHC)<br>-Discuss the role of antigen presentation in generating immunity | Classroom-Based Discussions | Homework |
| **5-6** | **3** | A, B, C, D | **Ref 1** | **Antibodies Structure and Function**<br><br>-Immunoglobulin structure and binding site/s<br>-Immunoglobulin classes and their characteristics<br>-the role of Immunoglobulins in neutralization, opsonisation antibody-dependent cellular cytotoxicity (ADCC), complement and mucosal immunity<br>-Introduction to artificial antibodies including monoclonal and polyclonal antibodies | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Quizzes<br><br>Homework |
| **6-7** | **3** | A, B, C, D | **Ref 1** | **Antigen Antibody Reaction**<br>-Discussion of general principles of antigen-antibody interactions<br>-Definition and importance of affinity, avidity, and cross reactivity<br>-Laboratory methods used for visualizing Antigen-Antibody Reactions | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Quizzes<br><br>Homework |
| **7-8** | **6** | A, B, C,D | **Ref 1** | **Innate Immunity** | PowerPoint Lectures | Exams |

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| | | | | -Discuss the concept of innate immunity - features, importance.<br>-Explain how the innate immune system recognizes foreign antigens in general.<br>-Outline the components of the innate immune system.<br>-Discuss how these components combat various foreign antigens | Active Classroom-Based Discussions | Quizzes<br><br>Homework |
| **8-9** | **2** | A, B, C, D | **Ref 1** | **Inflammation and leukocyte migration**<br>-Overview of the inflammatory process: initiation, inflammation, resolution, benefits and liabilities<br>-Major constituents<br>-Clinically relevant inflammatory processes<br>-Control of inflammation | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Homework<br><br>Quizzes |
| **9-10** | **5** | A, B, C, D | **Ref1** | **Adaptive Immunity**<br>-Humoral immunity<br>-Cellular immunity | Active Classroom-Based Discussions | Exams<br><br>Homework<br><br>Project |
| **10-11** | **3** | A, B, C, D | **Ref 1** | **Cytokines**<br>-Definition and general properties of cytokines<br>-Classification of cytokines<br>-Cytokine receptor<br>-Biological functions of cytokines<br>-Cytokine and disease | Active Classroom-Based Discussions | - |
| **11-12** | **3** | A, B, C, D | **Ref 1** | **Tolerance and Autoimmunity**<br>-Define and discuss the general characteristics of tolerance<br>-Define the main factors that influence the development of tolerance | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Homework<br><br>Quizzes |

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| | | | | -Identify the main mechanisms of tolerance induction in B and T cells<br>-Identify the mechanisms involved in the development of autoimmunity<br>-Approach to treatment of autoimmune diseases | | |
| **12-13** | **3** | A, B, C, D | **Ref 1** | **Tumor immunology**<br>-Introduction to tumours types and aetiology<br>-Tumours associated antigens and markers<br>-Evidence for Immune Reactivity to Tumors<br>-Discuss immune protection against tumours and immune surveillance system<br>-Discuss immune mediated tumour growth<br>-Provide an overview of experimental cancer therapies | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Homework<br><br>Quizzes |
| **13-14** | **3** | A, B, C, D | **Ref 1** | **Immune Deficient Diseas**<br>-Outlines different types of autoimmune deficiencies<br>-Differentiates primary and secondary autoimmune deficiencies<br>-Discus the common characteristics and the major clinical diseases of<br>1. B cell deficiency<br>2. T cell deficiency<br>3. Combined deficiency<br>4. Phagocytic deficiency<br>5. Compliment deficiency | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Homework<br><br>Quizzes |

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| **14-15** | **3** | A, B, C, D | **Ref 1** | **Human Immunodeficienc Virus (HIV)**<br><br>-Morphology<br>-Types of HIV<br>-Origins of HIV<br>-Epidemiology<br>-Transmission<br>-Pathogenesis and Virulence Factors<br>-Clinical Manifestations<br>-Laboratory Tests<br>-Treatment | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Homework<br><br>Quizzes |
| **15-16** | **3** | A, B, C, D | **Ref 1** | **Immunization**<br>-Differentiates active and passive immunity<br>-To understand the types of currently used vaccines, the differences, and the mechanisms of protection<br>-Vaccination scheme, routes of administration, and common side effects<br>-To understand how to develop a vaccine and the general requirements for vaccine development and adjuvants<br>-To understand the new concept of vaccines against non-microbes such as self or tumour molecules | PowerPoint Lectures<br><br>Active Classroom-Based Discussions | Exams<br><br>Homework<br><br>Quizzes |
| **16** | **-** | | | **University Final Exams** | | |