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| **1** | **Course title** | **Immunology and Genetics** |
| **2** | **Course number** | **1213302** |
| **3** | **Credit hours** | 3(theory) |
| **Contact hours (theory, practical)** | 48 (theory) |
| **4** | **Prerequisites/corequisites** | 1203253 |
| **5** | **Program title** | Pharmacy |
| **6** | **Program code** |  |
| **7** | **Awarding institution**  | The University of Jordan |
| **8** | **School** | PharmD |
| **9** | **Department** | Biopharmaceutics & Clinical Pharmacy |
| **10** | **Level of course**  | undergraduate |
| **11** | **Year of study and semester (s)** | Spring semester of the 3rd year |
| **12** | **Final Qualification** | Pharmacy |
| **13** | **Other department (s) involved in teaching the course** | NA |
| **14** | **Language of Instruction** | English |
| **15** | **Teaching methodology** | [ ] Blended [ ] Online CLASSES |
| **16** | **Electronic platform(s)** | [x] Moodle [x] Microsoft Teams [ ] Skype [ ] Zoom [ ] Others………… |
| **17** | **Date of production/revision** | Feb. 20. 2022 |

**18 Course Coordinator:**

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| Name: Prof. Areej AssafOffice number: 132Phone number: 2336Email: areej\_assaf@ju.edu.jo |

**19 Other instructors:**

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| Name: Email:  |

**20 Course Description:**

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| This course is made of 1 credit hour medical genetics course and 2 credit hours Immunology course. The Medical genetics course provides students with knowledge of basic principles of human medical genetics, types and disorders. The Immunology course provides the ground knowledge and ability to give the student a broad understanding of the immune system and its functions. Topics include: activation and regulation of innate and adaptive immunity and the principles governing vaccination; the molecular basis of antigen specificity; antibody structure and interaction with antigens; disorders of the immune system; tumor and transplantation immunology.Case studies are used extensively to highlight and explain the biochemical disorders underlying clinical diseases.The syllabus is covered in a program of lectures. |

**21 Course aims and outcomes:**

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| Aims:This course is expected:1. To increase students’ knowledge about genetic diseases and their diagnosis.
2. To provide students with the ability to differentiate between the different genetic diseases.
3. To increase students’ knowledge about the immune system and its diseases.
4. To provide students with the ability to differentiate between humoral and cellular immune response

**After completion of this course the student will be able to:** **A) Foundational knowledge**Develop, integrate, and apply knowledge from the foundational sciences in genetic and immunological diseases (learner)**Remember**1. Recall facts, terms, basic concepts, and information regarding: human genetic disorders and abnormal immune disorders.
2. Identify diagnostic and treatment methods for genetic disorders and immunological abnormalities.

**Understand**1. Explain and outline the different forms of genetic disorders and the methods of altering the immune response.

**Applying** 1. Differentiate between chromosomal abnormalities, single gene and polygenetic diseases.
2. Differentiate between humoral and cellular immune response.

**B) Skills essential to practice doctor of pharmacy** Proactively investigates new knowledge, approaches or behavior and takes steps to evaluate and improve performance (Self-learner)1. Proactively investigate, collect and interpret information related to genetic and immunological disorders through browsing the internet based professional web sites, medical guidelines & journal databases (MEDLINE, e-library)

**C) Attitudes and behaviors necessary for personal and professional development** Exhibit behaviors and values which are consistent with the trust given to the profession by patients, other healthcare providers, and society (Professional)1. Demonstrate integrity by not cheating and not committing plagiarism
2. Demonstrate respect to professors and classmates by observing active listening inside the classroom

**For the medical genetic course:****Have an understanding of the role of genetic factors in health and disease** * Understand how changes to DNA and chromosomes can affect gene function or dosage
* Understand the Chromosomes and chromosome abnormalities
* Understand the Single gene (Mendelian) inheritance disorders and the Polygenic and Multifactorial Disorders
* Understand the use of polymorphisms as genetic markers
* Be aware of the role of both genetic and environmental factors in multifactorial conditions such as congenital anomalies, cancer, diabetes and psychiatric illness
* Be aware of genes of population and mapping of the genes.

**Be able to identify patients with, or at risk of, a genetic condition** * Be able to take a family history and construct and interpret a pedigree
* Understand the clinical implications of the following genetic phenomena: incomplete penetrance, variation in expression, anticipation and new mutations
* Be aware of the possibility of heterogeneity in a genetic disease and the potential impact on diagnosis
* Understand the principles of risk estimation in Mendelian disease
* Be aware of examples of clinical indicators that suggest an inherited predisposition to cancer

**Be able to describe clinical features of common genetic disorders.*** Understand the genetics of behavior
* Understand the genetics of immunity
* Understand the genetics of cancer
* Be aware of the genes and biochemistry; in born errors of metabolism
* Be aware of the genes on the drugs and treatment; pharmacogenetics
* Understand genetic testing and gene therapy.

**For the immunology course:** The expected learning outcomes of this course is to attain a working knowledge of current immunological principles as they relate to the cells and molecules of the immune system, how they interact in defending the body against invading microorganisms, how they develop and acquire the ability to recognize antigens, and finally how they malfunction in autoimmune diseases and how they become inadequate in immune deficiency states. Furthermore, students will extend and solidify their understanding of the presented principles through critical readings from the primary research literature. Reading of research papers will help introduce students to research techniques and also help them appreciate the value of scientific research. |

**22. Topic Outline and Schedule:**

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| **Week** | **Lecture** | **Topic** | **Teaching Methods\*/platform** | **Evaluation Methods\*\*** | **References** |
| **GENETICS** |  |
| 1 | 1.1 | * Introduction
* Chromosomes and chromosome abnormalities
 | Microsoft Teams | Exams, Quizzes | **1 & 2** |
| 1.2 | * Chromosomes and chromosome abnormalities
* Single gene (Mendelian) inheritance disorders
 | Microsoft Teams | Exams, Quizzes | **1 & 2** |
| 2 | 2.1 | * Polygenic and Multifactorial Disorders
* Mutation and human disease
 | Microsoft Teams | Exams, Quizzes | **1 & 2** |
| 2.2 | * Mutation and human disease
* Genes in Populations
 | Microsoft Teams | Exams, Quizzes | **1 & 2** |
| 3 | 3.1 | * Mapping disease loci
* The genetics of behavior
 | Microsoft Teams | Exams, Quizzes | **1 & 2** |
| 3.2 | * Genes and biochemistry; biochemical genetics
 | Microsoft Teams | Exams, Quizzes | **1 & 2** |
| 4 | 4.1 | * Genetics of cancer
 | Microsoft Teams | Exams, Quizzes | **1 & 2** |
| 4.2 | * Genes and drugs and treatment; pharmacogenetics
* Genetic testing and gene therapy
 | Microsoft Teams | Exams, Quizzes | **1 & 2** |
| **IMMUNOLOGY** |  |
| 5 | 5.1 | Introduction to the immune system and innate Immunity | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 5.2 | Innate ImmunityAdaptive (acquired) Immunity. | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 6 | 6.1 | Adaptive (acquired) Immunity.  | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 6.2 | Cytokines | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 7 | 7.1 | Cytokines  | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 7.2 | MIDTERM EXAM |  |
| 8 | 8.1 | Vaccines (Immunization) | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 8.2 | Hypersensitivity reactions. Types I & II  | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 9 | 9.1 | * Hypersensitivity reactions. Types I & II
* Hypersensitivity reaction. Types III & IV
 | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 9.2 | Hypersensitivity reaction. Types III & IV  | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 10 | 10.1 | Autoimmunity | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 10.2 | Primary Immunodeficiency | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 11 | 11.1 | Acquired Immunodeficiency | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 11.2 | Acquired Immunodeficiency | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 12 | 12.1 | Transplantation | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 12.2 | Tumor Immunology | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 13 | 13.1 | Tumor Immunology | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 13.2 | Genetics of immunity  | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 14 | 14.1 | Immunotherapy  | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 14.2 | Immunotherapy & gene therapy | Microsoft Teams | Exams, Quizzes | **3 & 4** |
| 15 | 15.1 |  Final Exam Weeks |   |
| 15.2 |  Final Exam Weeks |   |

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* Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting
* Evaluation methods include: Homework, Quiz, Exam, Drop Quizzes…etc

**23 Evaluation Methods:**

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| Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

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| **Evaluation Activity** | **Mark** | **Topic(s)** | **Period (Week)** | **Platform** |
|  Assignment |   5 | Will be decided later |  After midterm period |  e-learning/Lmsystem |
| Drop Quiz |  5 | During Lecture meetings | 1-14 | Google forms |
|  Quiz |   10 |   Immunology topics |  10 |  Lmsystem |
|  Mid-Term Exam |   30 |  To the end of innate immunity |  8 |  Lmsyst/Classes  |
| Final Exam |  50 | All | 15-16 | Lmsyst/Classes |

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**24 Course Requirements (e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):**

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| Students should have a computer or smart phone with internet.Have Microsoft Teams using the University email.Lectures will be once a week online/in class for each student and the drop quizzes will be done for all ( in class and on line).  |

**25 Course Policies:**

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| **A- Attendance policies:** All students should attend the meetings. Those who should be in class and those who are online will all be with the same policies as in class rooms.**B- Absences from exams and submitting assignments on time:** Is not allowed unless with an acceptable reason. **C- Health and safety procedures:** **D- Honesty policy regarding cheating, plagiarism, misbehavior:****E- Grading policy:****F- Available university services that support achievement in the course:** |

**26 References:**

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| A- Required book (s), assigned reading and audio-visuals:1. Human Genetics, concepts and applications, Lewis. 2010. ISBN: **0071220046 (pbk.)**
2. Medical genetics (Oxford Core Texts).
3. The Genetic Basis of Common Diseases. Richard A. King, Jerome I. Rotter, and Arno G. Motulsky. 2002. ISBN:**0195125827**
4. Medical genetics at a glance Pritchard, D. J. (Dorian J.) Korf, Bruce R.  ISBN: **9780470656549 (pbk.)**
5. Immunology for Medical Students. Roderick Narin and Matthew Helbert. c2007. ISBN: **9780323043311 (pbk.)**
6. Medical Immunology. Parslow, Stites, Terr and Imboden. Lange Medical Books / McGraw-Hill Medical Publishing Division, New York : c2001. 10th ed. ISBN: **0838563007 (pbk.)**
7. Problem-based immunology. Gorczynski, Reginald M. Stanley, Jacqueline. C2006. ISBN: **9781416024163 / 1416024166**
8. Course Notes:

 Lecture and Practical Notes. By staff members1. Facilities Required for Teaching and Learning

 Audio-visual aids. Intelligent screen |

**27 Additional information:**

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| **Course Material and Announcements:** Students need to use the e-learning page at the JU website in order to get all lecture handouts and guidelines which will be uploaded there. In addition, course related announcements and exam results will be posted on the e-learning page and **it is the responsibility of each student to check the site regularly**.Username and password to access the course on the e-learning page will be provided to students in the beginning of the semester.**Grievance Policy**According to the general policies applied at the University of Jordan for grievance, when there is a complaint or conflict between a student and an academic/staff member or another student, the following procedures must be followed:1. The student writes a formal complaint describing the situation of conflict to the Dean of the School or the President of the University.
2. Dean or President will first try to resolve the controversy by meeting/listening to both parties.
3. If agreement was not possible, Dean or president forms an investigation committee which will follow, within a specified timeline, the general policies for relevant circumstances. The following points are considered:

a.       The committee will meet/talk to both parties and witnesses (if applicable) within two weeks of conflict.b.      All meetings and discussions are documented according to the university policies.c.       Results/ recommendations will be sent to the Dean or President who is responsible for their implementation |

Name of Course Coordinator: ---- Prof. Areej Assaf----Signature: ------------------ Date: 20.02.2022---

Head of Curriculum Committee/Department: ---------------------------- Signature: --------------------------

Head of Department: ---------Dr Maysa Suyagh------------------------- Signature: -----------------------

Head of Curriculum Committee/Faculty: ---------------------------------------- Signature: -------------------

Dean: ---------------------------------------------------------- Signature: -------------------------------------------