COURSE DESCRIPTIONS

Faculty	Science and Information Technology				
Department	Computer Science			**NQF level**	1
Course Title	Computer applications in the medical field	**Code**	891117	**Prerequisite**	-
Credit Hours	2	**Theory**	1	**Practical**	1
Course Leader	Prof. Dr. Mohammad Al-Batah	**email**	albatah@jadara.edu.jo		
Lecturers	Prof. Dr. Mohammad Al-Batah	**emails**	albatah@jadara.edu.jo		
Lecture time	11.30-12.30	**Classroom**	D104+Distance learning		
Semester	Second	**Production**	2021-2022	**Updated**	
Awards	Bachelor Degree			**Attendance**	Fulltime

Short Description

This course provides an introduction to and overview of computer science applications in various medical fields. Most parts of the course will be hands-on and will introduce data science concepts and methods through the analysis of real-life medical data. The main covered topics include an overview of biomedical data science, electronic health records systems, knowledge representation, image processing, data visualization, data transformation, data clustering, features extraction, features selection, and data classification. In knowledge representation, we will show how to use programming languages to represent diseases and symptoms for developing expert medical systems. In data classification, we will apply various machine learning algorithms and evaluate the performance using different methods.

Course Objectives

Upon completion of this course, students should be able to:

1. Demonstrate an ability to use the key components of the electronic health record (EHR) system.
2. Describe how to use programming languages for developing expert medical systems.
3. Apply and explain the essential approaches in biomedical data science for data preprocessing, visualization, and explorative analysis.
4. Choose the appropriate tools and techniques for image embedding, image grid, and ranking features.
5. Design and apply machine learning algorithms to a wide range of medical problems.

Learning Outcomes
A. Knowledge - Theoretical Understanding
The student upon completion this course will be able to a1: recognize the field of biomedical data science, and the applications of electronic health records systems (K1).
B. Knowledge - Practical Application
The student upon completion this course will be able to a2: distinguish between various programming languages for knowledge representation and developing expert medical systems (K2). a3: Apply the techniques for image analytics, data visualization, data transformation, data clustering, features extraction, and feature selection (K5).
C. Skills - Generic Problem Solving and Analytical Skills
The student upon completion this course will be able to b1: analyze the medical data using different classification methods, create a simple prediction model and calculate the performance (S1).
D. Skills - Communication, ICT, and Numeracy
b2: demonstrate an ability to share discussion in biomedical data science applications. Also, the student will be able to demonstrate capacities of working in a team to develop predictive models (S3).
E. Competence: Autonomy, Responsibility, and Context
Teaching and Learning Methods
Lectures, Data mining tools, Group work, and discussion. work on examples and do case studies. Distance Learning, using Microsoft Teams Platform and E-learning system.
Assessment Methods
• Home works (at least 1 Home works) • Quizzes • Exams (Midterm exam, final exam)

Course Contents					
Week	**Hours**	**CLOs**	**Topics**	**Teaching & Learning Methods**	**Assessment Methods**
1	2	a1	Overview of Biomedical Data Science	Presentation & discussions	
2	2	a1	Healthcare Data, Information, and Knowledge	Presentation & discussions	Quizzes
3	2	a1	Electronic Health Records Systems	Presentation & discussions	Quizzes& Assignment
4	2	a2	Knowledge Representation and Programming Languages	Presentation & case studies	Quizzes
5	2	a3	Image Processing	Presentation & discussions	Assignment
6	2	a3	Data Visualization	Presentation & case studies	
7	2	a3	Data Collection, Preprocessing, and Transformation	Presentation &	Quizzes

				discussions	
8	1	a1,a2, a3	Data Clustering	Presentation & case studies	Quizzes& Assignment
9	1:30	a1,a2, a3	Midterm Exam		
10-11	4	a1, a2, a3	Features Extraction	Presentation & case studies	Quizzes
12-13	4	a1, a2, a3	Features Selection and Ranking	Presentation & discussions	Quizzes& Assignment
14-15	4	a3, b1	Data Classification and Machine Learning algorithms	Presentation & case studies	Quizzes
16	2	a3, b1,b2	Data Predictions, Model Performance, and Evaluation	Presentation & case studies	Quizzes or assignment
17	2	a1,a2, a3, b1,b2	Final exam		

Infrastructure	
Textbook	**Introduction to Biomedical Data Science**, Hoyt, R. and Muenchen, R. First edition, 2019. eBook ISBN: 978-1-79476-180-3 Textbook supplements are available at: http://informaticseducation.org/
References	**Health Informatics**, Practical Guide, Robert E. Hoyt, William R Hersh. Seventh Edition, 2018. eBook ISBN: 978-1-387-82750-3
Required reading	
Electronic materials	Supplemental materials have been shared on the class web site/E-Learning system & Microsoft Teams.
Other	1. **Data Preparation and Exploration**: Applied to Healthcare Data. Robert Hoyt, Robert Muenchen, November 2020. eBook (pdf): ISBN: 978-0-9887529-0-0 2. **Biomedical Informatics Computer Applications in Health Care and Biomedicine**, Fourth Edition, Edward H. Shortliffe, James J. Cimino, 2014, eBook ISBN 978-1-4471-4474-8

Course Assessment Plan							
Assessment Method		**Grade**	**CILOs**				
			a1	**a2**	**a3**	**b1**	**b2**
First (Midterm)		30	10	10	10		
Second (if applicable)							
Final Exam		50	10	10	10	10	10
Coursework							
Coursework assessment methods	Assignments	5			1	2	2
	Case study						
	Discussion and interaction	10	2	2	2	2	2
	Group work activities						
	Lab tests and assignments						
	Presentations						
	Quizzes	5	1	1	1	1	1
Total		100%	23	23	24	15	15

Plagiarism
Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code). Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.