COURSE DESCRIPTIONS

Faculty	Science and Information Technology				
Department	Mathematics			NQF level	Elective Specialization requirement
Course Title	Software Applications in Mathematics	Code	505714	Prerequisite	
Credit Hours	3	Theory		Practical	3
Course Leader	Dr: Belal Batiha	email	b.batiha@jadara.edu.jo		
Lecturers	Dr: Belal Batiha	emails	b.batiha@jadara.edu.jo		
Lecture time	15-18 Saturday	Classroom	D101	Attendance	
Semester	First	Production	2020	Updated	17/10/2022

Short Description
Mathematica package is used in a computer Lab to illustrate selected mathematical concepts, explore some mathematical facts, build algorithms for problem solving cases, do numerical and analytical computations, do simulation studies and plot graphs. The selected topics can cover a wide range of mathematical topics such as geometry, calculus, linear algebra, linear programming, differential equations, probability, statistics, number theory, Fourier and Laplace transforms. The course starts in training on using the package and ends with writing Mathematica programs to solve some specific Mathematical problems.

Course Objectives
1- Know the programs available in the mathematics package.   2- Know the language of Mathematica.   3- Write programs to solve some practical problems.   4- Design teaching aided material through simulation and animation.

Learning Outcomes
A. Knowledge and Understanding Skills: Student is expected to
a1) Recall main mathematical concepts, facts, algorithms, and applications from several mathematical topics such as foundation of mathematics, linear algebra, number theory, calculus, differential equations, probability, and statistics in order to apply Mathematica in solving problems related to these topics.
B. Intellectual Analytical and Cognitive Skills: Student is expected to
b1) Explore Mathematica Package including its syntax, commands and capabilities of solving mathematical problems.   b2) Analyze a situation, design a plane to understand it or to solve a problem related to it, write a Mathematica block that can help in that situation, test the produced code, and implement it.

C. Subject- Specific Skills: Student is expected to.
c1) Interpret computer output and make critical comments on obtained results.

D. Creativity /Transferable Key Skills/Evaluation: Student is expected to
d1) Produce animated graphs that illustrate some mathematical concepts or facts. From the above stated topics   d2) Master the process of building algorithms and exploring facts, together with strengthening his ability in logical thinking.

Teaching and Learning Methods

In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.
- The instructor will spend most of the class time on presenting the new material as well as on discussing homework problems.
- Group work in this class is encouraged.
- To actively participate in class, you need to prepare by reading the textbook and to do all assigned problems before class. (Problems will be assigned each class period, then to be discussed the following period).
- You should be prepared to discuss your homework at each class meeting.
- You are encouraged to work together with other students and to ask questions and seek help from your professor, both in and out of class.

Assessment Methods

-Med Exam
Assignments (Reports /Quizzes/ Seminar / Tutorials ….)
Final Examination

Course Contents					
Week	Hours	CLOs	Topics	Teaching & Learning Methods	Assessment Methods
1.	3	A1, A3, B2, B3. C2	Basic, Advanced, Navigation, Syntax, Notebook, Mathematical Constant, Expression and Equation	Theory, Practical	Quizzes Assignments
2.	3	A1, B1, B2	Basic Commands: Calculus, Linear Algebra,Tables, Lists and Vectors	Theory, Practical	Quizzes Assignments
3.	3	A1, B3. A3, B2, D2	Basic Commands :Visualizing Function - Graphics and Plots 2D, Graphics and Plots 3D	Theory, Practical	Quizzes Assignments
4.	3	A1, B3. A3, B2, D2	Basic Commands :Number Theory, Statistics	Theory, Practical	Quizzes Assignments
5.	3	A1, B1, D2	Basic Commands : Differential Equations	Theory, Practical	Assignments
6.	3	A1, B1,	Basic Commands: Geometric Computation, Loops	Theory,	Assignments

				Practical	
		D2		Practical	
7.	3	A2, C3	Review for Med Exam Med Exam	Theory, Practical	Assignments
8.	3	A2, C3	Programming Activities : Basics	Practical	Med Exam
9.	3	A2, C3	Programming Activities	Theory, Practical	Assignments
10.	3	B3, D2	Programming Activities	Theory, Practical	Assignments
11.	3	B3, D2	Programming Activities	Theory, Practical	Quizzes Assignments
12.	3	B3, D2	Introduction : What is LATEX, Before You Start, Document Structure: Essentials , Troubleshooting , Creating a Title, Sections ,Labeling, Table of Contents	Theory, Practical	Quizzes Assignments
13.	3	A1	Typesetting Text : Font Effects , Coloured Text , Font Sizes, Lists, Comments & Spacing , Special Characters	Theory, Practical	Quizzes Assignments
14.	3	A1	Tables , Figures , Inserting Equations	Theory, Practical	Quizzes Assignments
15.	3	A2. B1, B2,	Mathematical Symbols ,Inserting References	Practical	Quizzes Assignments
16.	3	A2. B1, B2,	Final Exam	Practical	Final Exam

Infrastructure	
Textbook	1- Wolfram Mathematica Tutorial Collection MATHEMATICS AN ALGORITHMS.1- 2- LATEX Tutorials
References	1- Programming with Mathematica 2- More Math Into LATEX
Required reading	
Electronic materials	https://www.wolfram.com/mathematica/online/?src=google&420&gclid=EAIaIQob ChMIgrOiqoWY7QIVFrvVCh24BgPSEAAYASAAEgL8CPD_BwE
Other	ماثيماتيكا الرياضيات باستخدام الحاسوب

Course Assessment Plan							
Assessment Method	**Grade**	**CLOs**					
		a1	b1	b2	c1	d1	d2
First (Midterm)	30	5	5	5	5	5	5
Second (if applicable)	0						
Final Exam	50	10	10	10	10	5	5
Coursework							
Coursework assessment methods — Assignments							
Case study							
Discussion and interaction							
Group work activities							
Lab tests and assignments	5		5				
Presentations	10			5	5		
Quizzes	5	5					
Total	100	20	20	20	20	10	10

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.