



Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	09

1.	Course Title	Mathematics Lab
2.	Course Number	0301273
3.	Credit Hours (Theory, Practical)	2
	Contact Hours (Theory, Practical)	2
4.	Prerequisites/ Corequisites	0301201
5.	Program Title	BSc. Mathematics
6.	Program Code	
7.	School/ Center	Science
8.	Department	Mathematics
9.	Course Level	Compulsory Specialization Requirement
10.	Year of Study and Semester (s)	2 nd or 3 rd year, 1 st , 2 nd , or summer semester.
11.	Other Department(s) Involved in Teaching the Course	None
12.	Main Learning Language	English
13.	Learning Types	<input type="checkbox"/> Face-to-face learning <input checked="" type="checkbox"/> Blended <input type="checkbox"/> Fully online
14.	Online Platforms(s)	<input checked="" type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams
15.	Issuing Date	13-10- 2024
16.	Revision Date	

17. Course Coordinator:

Name: Dr. Osama Alkam	Contact hours: 13:30 Sun., Tues. and 11:30 Mon., Wed.
Office number: Math 309	Phone number: 0096265355000 Ext. 22101
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18. Other Instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
Office number:
Phone number:
Email:
Contact hours:

19. Course Description:

As stated in the approved study plan.

Learn the package *Mathematica* and the *Wolfram* language. Use it to illustrate selected mathematical concepts, explore mathematical facts, build algorithms for problem-solving cases, do numerical and analytical computations, and do simulation studies and plot graphs. The selected topics cover various mathematical topics including basic algebra, linear algebra, number theory, calculus and trigonometry, differential equations, probability, and statistics. The course starts with training students to use the package and ends with making them able to write computer programs for solving specific mathematical problems.

20. Program Student Outcomes (SO's):

(To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

1. Identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of Mathematics and Science and/or technical topics to areas relevant to the discipline.
8. Utilize techniques, skills, and modern scientific tools such as mathematical packages, statistical software, graphing calculators, and online resources necessary for professional practice.

**21. Course Intended Learning Outcomes (CLO's):**

(Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

1. Understand and apply commands used in mathematical packages.
2. Identify the steps required to carry out a piece of research on a topic using mathematical packages.
3. Apply appropriate statements and commands relevant to mathematical modeling.
4. Demonstrate a reasoned argument for the solution of problems using mathematical packages.
5. Plan and design applications using mathematical packages.
6. Plan and design a piece of independent research using mathematical packages.
7. Deal with appropriate data relevant to mathematical packages.
8. Solve mathematical models using mathematical packages.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analyzing	evaluating	Creating
1		•		•		
2		•	•	•	•	
3	•	•	•			
4		•	•	•		
5		•	•	•	•	•
6		•	•	•	•	•
7				•	•	•
8				•	•	•



22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Course CLO's	Program SO's							
	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)	SO (8)
CLO (1)	•							•
CLO (2)	•							•
CLO (3)	•							•
CLO (4)	•							•
CLO (5)	•							•
CLO (6)	•							•
CLO (7)	•							•
CLO (8)	•							•

23. Topic Outline and Schedule:

The following is a rough plan based on *Mathematica*. As the course progresses, new topics may be included and/or some of the ones listed here may be deleted.

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types (Face to Face (FF)/ Blended(B)/ Fully Online (FO))	platform Used	Synchronous (S)/ Asynchronous(A) Lecturing	Evaluation Methods	Learning Resources
1	1.1	Introduction: front-end interface, kernel, menus and pallets.	A1, A2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	1.2	Mathematica as a calculator, numbers, symbolic algebraic and trigonometric computations.	A1, A2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
2	2.1	Practice. Solving a worksheet.	A1, A2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos



	2.2	The structure of Mathematica commands, arguments (compulsory and optional). Variables and constants, assignments, recursive functions	A1, A2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
3	3.1	Practice. Solving a worksheet.	A1, A2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	3.2	Lists: functions producing lists, functions and operations on lists. Heads, Domains and Predicates. List filtering using Cases and Select.	B1, B2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
4	4.1	Practice. Solving a worksheet.	B1, B2	Face to Face	Moodle and Teams	S	Exam	
	4.2	Lists: functions producing lists, functions and operations on lists. Heads, Domains and Predicates. List filtering using Cases and Select.	B1+B2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
5	5.1	Practice. Solving a worksheet.	B1, B2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	5.2	Logic and set theory: logical connectives, operations on set, Append, AppendTo, Prepend, and PrependTo, handling sets.		Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
6	6.1	Practice. Solving a worksheet.	B2, B2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	6.2	If and Which. Functions with multiple definitions. Sums and products. Loops: Do, For, While, and If Goto[Label]. Break and Continue. Nest, NestList. Fold, FoldList. NestWhile, NestWhileList, FoldWhile. And FoldWhileList	C1, C2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
7	7.1	Practice. Solving a worksheet.	C1, C2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	7.2	Modules and blocks.	C1, C2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
8	8.1	Practice. Solving a Worksheet	C1, C2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	8.2	Graphics (2 dimensional): Primitives and Directives. Cartesian and polar plots.	C1, C2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos



		Plotting functions, parametric curves, equations and regions.						
9	9.1	Practice. Solving a worksheet	C1, C2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	9.2	Graphics 3D: Primitives and Directives. Cartesian, Spherical and Cylindrical plots. Plotting functions, parametric curves and surfaces, 3D equations and solids.	C1, C2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
10	10.1	Practice. Solving a worksheet	C1, C2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	10.2	Single and multi-variable calculus, limits, differentiation and integration, areas and volumes. Optimization. Ordinary and partial differential equations with/without initial and/or boundary conditions.	D1, D2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
11	11.1	Practice. Solving a worksheet	D1, D2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	11.2	Single and multi-variable calculus, limits, differentiation and integration, areas and volumes. Optimization. Ordinary and partial differential equations with/without initial and/or boundary conditions.	D1, D2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
12	12.1	Practice. Solving a worksheet.	D1, D2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	12.2	Solving algebraic and non-algebraic equations. Basic number theoretic functions and commands. Solving number theoretic equations. Arrays and matrices. Nonlinear and linear equations and systems.	D1, D2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
13	13.1	Practice. Solving a worksheet.	D1, D2	Face to Face	Moodle and Teams	S	Exam	Lecture notes and Videos
	13.2	Solving algebraic and non-algebraic equations. Basic number theoretic functions and commands. Solving number theoretic equations.	D1, D2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos



		Arrays and matrices. Nonlinear and linear equations and systems.						
14	14.1	Statistics and probability. Inferential statistics. Data fitting.	D1, D2	Blended	Moodle and Teams	A	Exam	Lecture notes and Videos
	14.2	Practice. Solving a worksheet.	D1, D2	Face-to-face	Moodle and	S	Exam	Lecture notes and Videos
15	15.1	Revision	A1 to D2	Face-to-face	Moodle and Teams	S	Exam	Lecture notes and Videos
	15.2	Revision	A1 to D2	Face-to-face	Moodle and Teams	S	Exam	Lecture notes and Videos

24. Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Quiz #1	15	Weeks 1+2+3+4 material.	A1+A2+B1+B2	5	On Campus
Midterm	30	Weeks 5+6+7+8+9+10 material.	B1+B2+C1+C2	8	On Campus
Quiz #2	15	Weeks 11+12+13+14 material	C1+C2+D1+D2	12	On Campus
Final Exam	40		A1 to D2		On Campus

25. Course Requirements:

Each student must have:

- Account on Microsoft Teams

**26. Course Policies:**

1. Attendance of the weekly labs is compulsory. Any student unable to attend is required to notify the instructor in advance. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. Students who are absent for more than 10% of the labs without an excuse of sickness or due to other insurmountable difficulty, will be barred from the final examination also will get a failing grade in this course.
3. Student who are absent for more than 20% of the labs with an excuse of sickness or due to other insurmountable difficulty, will be dropped from the course.
4. Medical certificates should be approved by an authorized University physician to be accepted. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.
5. The first quiz, midterm, and second quiz will be practical in the lab. The final exam will be a multiple-choice Mathematics exam to be completely solved by Mathematica.
6. Grades of the first, second and midterm exams will be announced in detail for each part of the exam questions.
7. Cheating by any means, electronic or otherwise is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats on exams or on homework.

27. References:

- A-** Required book (s), assigned reading and audio-visuals:
1. Lecture notes and worksheets by Dr. Osama Alkam.
 2. Video lectures.
 3. Roozbeh, H. (2015). Mathematica: a problem centered approach, 2nd Edition, Springer, Germany.
- B-** Recommended books, materials, and media:
1. Wolfram, S. (2017). An elementary Introduction to the Wolfram Language, 2nd Edition, USA.
 2. Don, E. (2009). Schaum's Outlines: Mathematica, 2nd Edition.
 3. Mathematica help: documentation center.



28. Additional information:

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Name of the Instructor or the Course Coordinator: Dr. Osama Alkam	Signature:	Date: 13-10-2024
Name of the Head of Quality Assurance Committee/ Department: Prof. Manal Ghanem	Signature:	Date:
Name of the Head of Department: Prof. Baha Alzalg	Signature:	Date:
Name of the Head of Quality Assurance Committee/ School of Science: Prof. Emad A. Abuosba	Signature:	Date:
Name of the Dean or the Director: Prof. Mahmoud I. Jaghoub	Signature:	Date: