The University of Jordan

الجامعة الاردنية

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	02/11/2024
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1.	Course Title	Numerical Methods
2.	Course Number	0301472
3.	Credit Hours (Theory, Practical)	3
	Contact Hours (Theory, Practical)	3
4.	Prerequisites/ Corequisites	Partial Differential Equation I (0301321)
5.	Program Title	B.Sc. in Mathematics
6.	Program Code	
7.	School/ Center	Science
8.	Department	Mathematics
9.	Course Level	Obligatory specialization requirement
10.	Year of Study and Semester (s)	4th year, 1st and 2nd semesters
11.	Other Department(s) Involved in Teaching the Course	None
12.	Main Learning Language	English
13.	Learning Types	☐Face to face learning ☑Blended ☐Fully online
14.	Online Platforms(s)	☐Moodle ☑Microsoft Teams
15.	Issuing Date	02/11/2024
16.	Revision Date	02/11/2024

17. Course Coordinator:

Name: Prof. Baha Alzalg   Contact hours: TBA

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18. Other Instructors:

Name: Prof. Shaher Momani	Contact hours:
Office number:	Phone number:
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19. Course Description:

Numerical analysis; numerical methods in linear algebra; numerical methods for ordinary and partial differential equations.

20. Program Student Outcomes (SO's):

SO1. 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.

SO2. Formulate or design a system, process, procedure or program to meet desired needs.

SO5. Reflect the impact of technical and/or scientific solutions in economic, environmental, and societal contexts.

SO7. Utilize research methods, critical and creative thinking skills to assess and analyze information) to solve problems properly, then draw valid reasoning and logical conclusions leading to true consequences.

SO8. 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.

CLO1. Apply appropriate theories, principles and concepts relevant to the numerical analysis.

CLO2. Formulate a reasoned argument from a variety of sources relevant to numerical analysis.

CLO3. Analyze and interpret information from a variety of sources relevant to numerical analysis.

CLO4. Select a reasoned argument to the solution of familiar and unfamiliar problems relevant to numerical analysis.

CLO5. Plan practical activities using techniques and procedures appropriate to numerical analysis.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
CLO (1)	●	●	●			
CLO (2)		●	●	●	●	
CLO (3)		●		●	●	
CLO (4)	●	●	●	●		
CLO (5)		●	●		●	●

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

Program SO's / Course CLO'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)		●			●			●

23. Topic Outline and Schedule:

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types Face to Face (FF) Blended (BL) Fully Online (FO)	Platform Used	Synchronous (S) Asynchronous (A)	Evaluation Methods	Learning Resources
1	1.1	Introduction and syllabus	1	FF	Boards	S		Textbook
	1.2	Review of calculus (Taylor's theorem), Round-off errors	1	FO	Teams	A		Textbook

2	2.1	Bisection method	1,5	FF	Boards	S		Textbook
	2.2	Fixed-point iteration method	1,2,4	FO	Teams	A		Textbook
3	3.1	Newton's method for nonlinear functions, Secant method	1,5	FF	Boards	S		Textbook
	3.2	Newton's method for nonlinear systems	5	FO	Teams	A		Textbook
4	4.1	Error analysis for iterative methods	1,2,4	FF	Boards	S		Textbook
	4.2	Interpolation and the Lagrange polynomials	1,2,4	FO	Teams	A		Textbook
5	5.1	Neville's method	3,5	FF	Boards	S		Textbook
	5.2	Divided differences	1	FO	Teams	A		Textbook
6	6.1	Divided differences, Review of Midterm Exam	1,2	FF	Boards	S		Textbook
	6.2	Divided Differences	1	FO	Teams	A		Textbook
7	7.1	**Midterm Exam**		FF		S		
	7.2	Hermite interpolation, Numerical differentiation	5	FO	Teams	A		Textbook
8	8.1	Numerical differentiation-	1	FF	Boards	S		Textbook
	8.2	Numerical differentiation	2,4	FO	Teams	A		Textbook
9	9.1	Numerical integration	1,2,4	FF	Boards	S		Textbook
	9.2	Composite numerical integration-	1,2	FO	Teams	A		Textbook
10	10.1	Composite numerical integration	3,5	FF	Boards	S		Textbook
	10.2	Euler's method: Technique	1,3	FO	Teams	A		Textbook
11	11.1	Review of Second Exam		FF	Boards	S		Textbook
	11.2	Euler's method: Convergence	1,2,4	FO	Teams	A		Textbook
12	12.1	**Second exam**		FF		S		
	12.2	Higher-order Taylor's method	3,5	FO	Teams	A		Textbook
13	13.1	Runge-Kutta methods	3,5	FF	Boards	S		Textbook
	13.2	Matrix factorization	1,3	FO	Teams	A		Textbook
14	14.1	Iterative techniques for linear systems	1,5	FF	Boards	S		Textbook
	14.2	Fibonacci search optimization method	1,3	FO	Teams	A		Textbook
15	15.1	Fibonacci search optimization method-	5	FF	Boards	S		Textbook
	15.2	Review of Final Exam	1	FO	Teams	A		Textbook
16		**Final Exam**						

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
Midterm exam	30 %	TBA	1-4	Monday 18/11/2024	On Campus
Second exam	20 %	TBA	1-4	Monday 23/12/2024	On Campus
Final exam	50 %	All topics	1-5	15/1/25 - 27/1/25	On Campus

25. Course Requirements:

Each student must have:

- Account on Microsoft Teams.
- Scientific Calculator.

26. Course Policies:

A. Attendance policies: Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.

B. Absences from exams and submitting assignments on time: If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.

C. Health and safety procedures: Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.

D. Honesty policy regarding cheating, plagiarism, misbehavior: Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on home works.

E. Grading policy: Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.

F. Available university services that support achievement in the course: Math library, Computer lab.

27. References:

A- Required book(s), assigned reading and audio-visuals:
- Numerical Analysis. Authors: Richard L. Burden, J. Douglas Fairs, Annette M. Burden, 10th edition, Publisher: Cengage Learning.
B- Recommended books, materials, and media:
- Numerical Mathematics and Computing. Authors: E. Ward Cheney, David R. Kincaid, 7th edition. Publisher: Cengage Learning.

28. Additional information:

	Signature:	Date:
Name of the Instructor or the Course Coordinator: **Prof. Baha Alzalg**	………………………	02/11/2024
Name of the Head of Quality Assurance Committee/ Department of Mathematics: **Prof. Manal Ghanem**	………………………	………………
Name of the Head of Department: **Prof. Baha Alzalg**	………………………	………………
Name of the Head of Quality Assurance Committee/ School of Science: **Prof. Emad A. Abuosba**	………………………	………………
Name of the Dean or the Director: **Prof. Mahmoud I. Jaghoub**	………………………	………………