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	08

1.	**Course Title**	**Method of Applied Mathematics**
2.	**Course Number**	0331471
3.	**Credit Hours (Theory, Practical)**	3
	Contact Hours (Theory, Practical)	3
4.	**Prerequisites/ Corequisites**	0331412
5.	**Program Title**	B.S.c. in Mathematics
6.	**Program Code**	
7.	**School/ Center**	Science
8.	**Department**	Mathematics
9.	**Course Level**	Elective Specialization Requirement
10.	**Year of Study and Semester (s)**	4 year
11.	**Other Department(s) Involved in Teaching the Course**	
12.	**Main Learning Language**	
13.	**Learning Types**	■Face to face learning ☐Blended ☐Fully online
14.	**Online Platforms(s)**	☐Moodle ■Microsoft Teams
15.	**Issuing Date**	7/10/2024
16.	**Revision Date**	7/10/2024

17. Course Coordinator:

Name: Nabil Shawagfeh Contact hours: Sun, Tue (11-12)

Mon, Wed (10-11)

Office number: … Phone number: 22078

Email: shawagnt@ju.edu.jo

18. Other Instructors:

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

19. Course Description:

Integral equations; integral transforms; asymptotic techniques: algebraic equations and integrals; complex analytic methods: conformal mapping and harmonic analysis.

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.
2. Formulate and design a model, process, procedure or program to meet desired needs.

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. Recognize and classify linear integral equations: Fredholm and Volterra IEs.
2. Use different methods to find exact and approximate solutions of Fredholm and Volterra IEs.
3. Use Laplace transform to solve Volterra IEs.
4. Recognize the gauge function and order symbols.
5. Use perturbation method to find approximate solution of algebraic equations.
6. Use perturbation technique to find approximate solution of ordinary differential equation.

7. Determine the straightforward approximation of Duffing equation for small ε & uniform approximation
8. Introduce the notion of complex functions and mapping.
9. Solve Dirichlet problems using harmonic functions under analytic mappings
10. Recognize the conforml mappings and using conformal mappings to solve larger class of boundary value problem.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
1	√					
2	√	√	√	√	√	
3	√	√	√			
4	√					
5	√	√	√	√	√	
6		√	√	√	√	
7		√	√	√	√	
8	√	√				
9		√	√	√		
10	√	√	√	√		

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)
1- Recognize and classify linear integral equations: Fredholm and Volterra IEs.	•	•						
2- Use different methods to find exact and approximate solutions of Fredholm and Volterra IEs.	•	•						
3- Use Laplace transform to solve Volterra IEs.	•	•						
4 -Recognize the gauge function and order symbols.	•	•						
5 -Use perturbation method to find approximate solution of algebraic equations.	•	•						
6- Use perturbation technique to find approximate solution of ordinary differential equation.	•	•						
7- Determine the straightforward approximation of Duffing equation for small ε & uniform approximation	•	•						
8- Introduce the notion of complex functions and mapping.	•	•						
9- Solve Dirichlet problems using harmonic functions under analytic mappings	•	•						
10- Recognize the conforml mappings and using conformal mappings to solve larger class of boundary value problem.	•	•						

23. Topic Outline and Schedule:

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types (Face to Face (FF)/ Blended/ Fully Online)	Platform Used	Synchronous (S) / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1	1.1	Integral equations with separable kernels	1, 2	Face to Face	Moodle		Exam	Text book
	1.2	Integral equations with separable kernels	1, 2	Face to Face	Moodle		Exam	Text book
2	2.1	Integral equations with separable kernels	1, 2	Face to Face	Moodle		Exam	Text book
	2.2	Integral equations with separable kernels	1, 2	Face to Face	Moodle		Exam	Text book
3	3.1	Method of successive approximations	1, 2	Face to Face	Moodle		Exam	Text book
	3.2	Method of successive approximations	1, 2	Face to Face	Moodle		Exam	Text book
4	4.1	Fredholm Theorems	1, 2	Face to Face	Moodle		Exam	Text book
	4.2	Fredholm Theorems	1, 2	Face to Face	Moodle		Exam	Text book
5	5.1	First Exam		Face to Face	Moodle		Exam	Text book
	5.2	Laplace transform for solving VIE	3	Face to Face	Moodle		Exam	Text book
6	6.1	First Exam		Face to Face	Moodle		Exam	Text book
	6.2	Gauge function and order symbols	4	Face to Face	Moodle		Exam	Text book
7	7.1	Perturbation methodto algebraic equations	5	Face to Face	Moodle		Exam	Text book
	7.2	Perturbation	5	Face to Face	Moodle		Exam	Text book

		methodto algebraic equations						
8	8.1	Perturbation technique to ODE	6	Face to Face	Moodle		Exam	Text book
	8.2	Perturbation technique to ODE	6	Face to Face	Moodle		Exam	Text book
9	9.1	The straight forward approximation Of Duffing equation	7	Face to Face	Moodle		Exam	Text book
	9.2	The straight forward approximation Of Duffing equation	7	Face to Face	Moodle		Exam	Text book
10	10.1	Uniform Expansion Lindstedt-Poincare Method	7	Face to Face	Moodle		Exam	Text book
	10.2	Uniform Expansion Lindstedt-Poincare Method	7	Face to Face	Moodle		Exam	Text book
11	11.1	Mid Term		Face to Face	Moodle		Exam	Text book
	11.2	Complex functions and mapping.	8	Face to Face	Moodle		Exam	Text book
12	12.1	Complex functions and mapping.	8	Face to Face	Moodle		Exam	Text book
	12.2	Complex functions and mapping.	8	Face to Face	Moodle		Exam	Text book
13	13.1	Harmonic function	9	Face to Face	Moodle		Exam	Text book
	13.2	Harmonic function	9	Face to Face	Moodle		Exam	Text book
14	14.1	Conforml mappings and	9	Face to Face	Moodle		Exam	Text book

		boundary value problem.						
	14.2	Conforml mappings and boundary value problem.	9	Face to Face	Moodle		Exam	Text book
15	15.1	Conforml mappings and boundary value problem.	10	Face to Face	Moodle		Exam	Text book
	15.2	Conforml mappings and boundary value problem.	10	Face to Face	Moodle		Exam	Text book

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
First Exam	20		1		
Mid Term	30		1,2		
Final Exam	50		1,2		

25. Course Requirements:

Each student must have:

- Computer
- Account on Microsoft Teams

26. Course Policies:

Class attendance of students at the beginning of the lecture is recoded.
Assignment is given to the students at regular intervals for them to solve and submit.
Late or no submission of assignments carries penalties or loss of grade points.
Absences recorded in each lecture with making excuses, if any.

When absence from the test provides a formal excuse.

Exiting during the lecture since Formal justification or excuse forces.
Mobile phone use in the classroom is Forbidden.

27. References:

A- Required book (s), assigned reading and audio-visuals:

1. Linear Integral Equations, R. P. Kanwal, 1971.
2. Introduction to Perturbation Techniques, A. H. Nayfeh, 1993.
3. Complex Variables and Applications, J. W. Brown & R. V. Churchill, 2009.

B- Recommended books, materials, and media:

1. Linear and nonl inear i ntegra l equat ions, Abdul -Maj id Wazwaz 2011 .
   a f i rs t course in compl ex analys is w i th applicat ions, D . Z i l l , P . Shanahan 2003 .

28. Additional information:

Name of the Instructor or the Course Coordinator: **Prof. Nabil Shawagfeh**	Signature: ……	Date: ……
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: ……