The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Course Name:
Partial Differential Equations II

Course Syllabus

1	**Course title**	Partial Differential Equations II
2	**Course number**	(0331422)
3	**Credit hours**	3
	Contact hours (theory, practical)	3
4	**Prerequisites/corequisites**	(0301221)
5	**Program title**	B. Sc.
6	**Program code**	
7	**Awarding institution**	The University of Jordan
8	**School**	Faculty of Science
9	**Department**	Mathematics
10	**Course level**	College requirement
11	**Year of study and semester (s)**	All Semesters
12	**Other department (s) involved in teaching the course**	None
13	**Main teaching language**	English
14	**Delivery method**	On Campus
15	**Online platforms(s)**	●☐Moodle ●Microsoft Teams ☐Skype☐Zoom ☐Others…………
16	**Issuing/Revision Date**	3Nov, 2022

17 Course Coordinator:

Name:Prof. Nabil Shawagfeh   Contact hours:2:30 – 4 (Mon, Wed)

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18 Other instructors:

> Name:
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19 Course Description:

> **As stated in the approved study plan.**
>
> **First order differential equation in two independent variables; semilinear and quasilinear equations; first order non-linear equations; second order linear equations; canonical forms; Green's function method; transforms method.**

20 Course aims and outcomes:

A- Aims:

1. Classify PDEs as linear, semi-linear, quasilinear and nonlinear,

2. Solve first-order PDEs in two independent variables,

3. Find the canonical forms of PDEs of second order,

4. Solve second-order PDEs by characteristics method,

5. Use transform methods for solving PDEs,

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

SLOs ⟍ SLOs of the course	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)
1Classify and reduced first and second order PDE into canonical form	●							
2Solve first order PDE using (Methods of characteristics and Lagrange method)	●	●						
3 Solve second order PDE with higher dimension using (separation of variable integral transform)	●	●						
4 Use PDE to model-real world problem (Heat equation , Wave equation, Laplace equation)	●	●					●	●

21 . Topic Outline and Schedule:

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous/ Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Review on differential equation	1	Face to Face	Moodle		Exam	Text book
	1.2	Classification of function and PDE	1	Face to Face	Moodle		Exam	Text book
	1.3	Construction of PDE	1,2	Face to Face	Moodle		Exam	Text book
2	2.1	Solution of quasi-linear	1,2	Face to Face	Moodle		Exam	Text book
	2.2	Lagrange method	1,2	Face to Face	Moodle		Exam	Text book
	2.3	Lagrange method	1,2	Face to Face	Moodle		Exam	Text book
3	3.1	Cauchy problem	1,2	Face to Face	Moodle		Exam	Text book
	3.2	Characteristics method	1,2	Face to Face	Moodle		Exam	Text book
	3.3	Characteristics method	1,2	Face to Face	Moodle		Exam	Text book
4	4.1	Fully nonlinear	1,2	Face to Face	Moodle		Exam	Text book
	4.2	Fully nonlinear	1,2	Face to Face	Moodle		Exam	Text book
	4.3	Complete integral	1,2	Face to Face	Moodle		Exam	Text book
5	5.1	Exercises		Face to Face	Moodle		Exam	Text book
	5.2	First Exam		Face to Face	Moodle		Exam	Text book
	5.3	Classification of second order PDE	1	Face to Face	Moodle		Exam	Text book
6	6.1	Reduction to canonical form	1	Face to Face	Moodle		Exam	Text book
	6.2	Reduction to canonical form	1	Face to Face	Moodle		Exam	Text book
	6.3	General solution	2	Face to Face	Moodle		Exam	Text book
7	7.1	Exercises		Face to Face	Moodle		Exam	Text book
	7.2	Boundary value problem	1,2	Face to Face	Moodle		Exam	Text book

	7.3	Applications	1,2,7	Face to Face	Moodle		Exam	Text book
8	8.1	Applications	1,2,7	Face to Face	Moodle		Exam	Text book
	8.2	Fourier Series-review	1,2,7	Face to Face	Moodle		Exam	Text book
	8.3	Separation of variables – review	1,2,7	Face to Face	Moodle		Exam	Text book
9	9.1	Applications (Two variables)	1,2,7	Face to Face	Moodle		Exam	Text book
	9.2	Higher order BVP – Heat	1,2,7,8	Face to Face	Moodle		Exam	Text book
	9.3	Higher order BVP – Heat	1,2,7,8	Face to Face	Moodle		Exam	Text book
10	10.1	Higher order BVP – Wave	1,2,7,8	Face to Face	Moodle		Exam	Text book
	10.2	Higher order BVP – Wave	1,2,7,8	Face to Face	Moodle		Exam	Text book
	10.3	Higher order BVP – Laplace	1,2,7,8	Face to Face	Moodle		Exam	Text book
11	11.1	Higher order BVP – Laplace	1,2,7,8	Face to Face	Moodle		Exam	Text book
	11.2	Exercises	1,2,7,8	Face to Face	Moodle		Exam	Text book
	11.3	Non homogenous BVP-Heat	1,2,7,8	Face to Face	Moodle		Exam	Text book
12	12.1	Non homogenous BVP-Wave	1,2,7,8	Face to Face	Moodle		Exam	Text book
	12.2	Non homogenous BVP-Laplace	1,2,7,8	Face to Face	Moodle		Exam	Text book
	12.3	Mid Term Exam		Face to Face	Moodle		Exam	Text book
13	13.1	Integral Transform	1,2	Face to Face	Moodle		Exam	Text book
	13.2	Finite Transform	1,2	Face to Face	Moodle		Exam	Text book
	13.3	Application (Heat)	1,2,7	Face to Face	Moodle		Exam	Text book
14	14.1	Application (Wave)	1,2,7	Face to Face	Moodle		Exam	Text book
	14.2	Application (Laplace)	1,2,7	Face to Face	Moodle		Exam	Text book
	14.3	Infinite Transform	1,2	Face to Face	Moodle		Exam	Text book
15	15.1	Applications	1,2,7,8	Face to Face	Moodle		Exam	Text book
	15.2	Applications	1,2,7,8	Face to Face	Moodle		Exam	Text book
	15.3	Exercises	1,2,7,8	Face to Face	Moodle		Exam	Text book

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:					
Evaluation Activity	**Mark**	**Topic(s)**	**SLOs**	**Period (Week)**	**Platform**
First Exam	20		1,2,7		On Campus
Mid Term	30		1,2,7,8		On Campus
Final Exam	50		1,2,7,8		On Campus

23 Course Requirements

Each student must have:
- Computer
- Account on Microsoft Teams

24 Course Policies:

1. 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.

2. 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.

3. 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.

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

5. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on home works.

25 References:

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

1- Partial Differential Equations for Scientists and Engineers by TynMyint-U and LokenathDebnath.
2- Applied Partial differential Equations by DonaldW.Trim.
3- Partial Differential Equations by W.E. Williams.

26 Additional information:

Name of Course Coordinator: Prof. **Nabil Shawagfeh**----Signature: ---------- Date: 3/11/2022---
Head of Curriculum Committee/Department: Prof. Ahmad Al Zghoul-- Signature: ------------------ ------------------
Head of Department: -Prof. Manal Ghanem - Signature: -M. Ghanem
Head of Curriculum Committee/Faculty: -------------------------------------- Signature: ----
Dean: Mahmoud Jaghoub Signature: --