



مركز الاعتماد  
وإضمان الجودة  
ACCREDITATION & QUALITY ASSURANCE CENTER



**The University of Jordan**

**Accreditation & Quality Assurance Center**

## **Course Syllabus**

**Course Name:**  
**Ordinary Differential Equations**

1	Course title	<b>Method of Applied Mathematics</b>
2	Course number	0301902
3	<b>Credit hours (theory, practical)</b>	3
	<b>Contact hours (theory, practical)</b>	3
4	Prerequisites/requisites	<b>none</b>
5	Program title	<b>Ph.D. in Mathematics</b>
6	Program code	
7	Awarding institution	<b>The University of Jordan</b>
8	Faculty	<b>Science</b>
9	Department	<b>Mathematics</b>
10	Level of course	<b>Elective specialization requirement</b>
11	Year of study and semester (s)	2 <sup>nd</sup> year
12	Final Qualification	<b>Ph.D. in Mathematics</b>
13	Other department (s) involved in teaching the course	<b>None</b>
14	Language of Instruction	<b>English</b>
15	Date of production/revision	<b>13/10/2020</b>

**16. Course Coordinator:**

Name: Dr. Mohammed Al Horani  
Office number: 22109  
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**17. Other instructors:**

*None*

**18. Course Description:**

Existence and uniqueness of ordinary equations: first-order ODEs, systems and n-th order ODEs, Poincare-Bendixon theory, stability theory of linear and almost linear systems, periodic solutions and generalized solutions of ordinary differential equations, nonlinear equations and stability, abstract Cauchy problem

**19. Course aims and outcomes:**

**A- Aims:**

- 1- To prove existence and uniqueness of some first-order ODEs
- 2- . To prove existence and uniqueness for systems and n-th order ODEs
- 3- To discuss the stability for some linear and nonlinear systems
- 4- To study the existence and uniqueness of the Abstract Cauchy problem

**B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to ...****B- Intended Learning Outcomes (ILOs):**

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

Successful completion of the course should lead to the following outcomes:

**A. Knowledge and Understanding Skills:** Student is expected to

- A1) Master the basic concepts of ordinary differential equation (ODE).
- A2) Select proper procedure to solve a given ODE.

**B. Intellectual Analytical and Cognitive Skills:** Student is expected to

- B1) Write down an ODE that represents a given model
- B2) Find if possible the Liapunov function

**Subject- Specific Skills:** Student is expected to

- C1) Solve a system of linear ODE's
- C2) prove the existence and uniqueness of some first-order ODEs
- C3) prove the existence and uniqueness of some higher-order ODEs

**D. Creativity /Transferable Key Skills/Evaluation:** Student is expected to

- D1) Be involved in the process of illustrating concepts, building algorithms and exploring facts.
- D2) Make critical comments on obtained results
- D3) Write reports, to be involved in general discussions with his class mates, and to do independent work.

**20. Topic Outline and Schedule:**

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
The method of successive approximations and Lipschitz condition	1+2		1		1
Nonlocal existence of solutions	3		2		1
Systems as vector equations	4		2	Home work 1	1
Existence and uniqueness of solutions to systems	5		3		1
Existence and uniqueness for linear systems	6		4		1
Equations of order n and revision	6+7		5	Home work 2	1
Stability of linear system	8		6	Mid term Exam	2
Almost linear system with applications	9+10		7		2
Liapunov's second method	11+12		8		2
Periodic solutions	13		9		2
Abstract Cauchy problem .	14+15		10	Home work 3	3

**21. Teaching Methods and Assignments:**

**Development of ILOs is promoted through the following teaching and learning methods:  
In order to succeed in this course, each student each student need to be an active participant in learning- both in class and out of class.**

- Class time will be spent on lecture as well as discussion of homework problems and some group work
- To actively participate in class, you need to prepare by reading the textbook and doing all assigned homework before class.
- You should be prepared to discuss your homework.
- You are encouraged to work together with other students and to ask questions and seek help from the professor, both in and out of class

**22. Evaluation Methods and Course Requirements:**

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

ILO/s	Learning Methods	Evolution Methods	Related ILO/s to the program
	Lectures	Exam	
	Published Papers	Presentation	
		Home work	

**23. 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.

**24. Required equipment:**

**25. References:**

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

1. An introduction to ordinary differential equations,  
Earl A. Coddington
2. The Qualitative Theory of Ordinary Differential Equations,  
C. Sparrow
3. Semigroups of linear operators and applications to partial differential equations,  
A. Pazy

B- Recommended books, materials, and media:

- (1) **Elementary differential equations and boundary value problem,**  
**Boyce-Diprima**
- (2) **Ordinary differential equations,**  
**M. Greengerg**

**26. Additional information:**

Name of Course Coordinator: **Mohammed Al Horani**

Signature: -----

Date: -----

Head of curriculum committee/Department: -----

Signature: -----

Head of Department: -----

Signature: -----

Head of curriculum committee/Faculty: -----

Signature: -----

Dean: -----

Signature: -----

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Course File