



**Course Syllabus**  
**According to JORDAN National Qualification**  
**Framework (JNQF)**

**Course Name: Engineering Mathematics**

**Course Number: 403200/4032111**

### General Course Information:

Course title	Engineering mathematics
Course number	403200
Credit hours	3, theory
Education type	[Face-to-Face]
Prerequisites/corequisites	1102182 calculus 2
Academic Program	Civil engineering
Program code	03
Faculty	Engineering
Department	Civil engineering
Level of course	2 <sup>nd</sup>
Academic year /semester	First Semester 2022-2023
Awarded qualification	B.Sc
Other department(s) involved in teaching the course	-
Language of instruction	English
Date of production/revision	2022/2023

### Course Coordinator:

Coordinator's name	Dr. Ethar Al-Essa
Office No	4208
Office Phone extension number	
Office Hours	Sun, Tue, [12:00-1:30] Thur. [11:00-1:00] Wed.[10:00-11:00]
Email	Ether.alessa@iu.edu.jo

### Other Instructors:

Instructor name	
Office No	
Office Phone extension number	
Office Hours	
Email	

### Course Description (English/Arabic):

English	Differential equation: first-order differential equations, linear second-order differential equations, higher order linear differential equations with constant coefficients, Laplace transforms, Fourier series, partial differential equations.
Arabic	المعادلات التفاضلية الخطية من الدرجة الأولى والثانية، المعادلات التفاضلية من الدرجات الأعلى ذات المعاملات الثابتة، تحويلات لابلاس، متسلسلات فوريير، المعادلات التفاضلية الجزئية.

**Textbook:** Author(s), Title, Publisher, Edition, Year, Book website.

H.C. TANEJA “Advanced Engineering mathematics” international publishing house 2015.  
<https://www.ikbooks.com/books/book/engineering-computer-science/core-engineering/advanced-engineering-mathematics/9789382332640/>

**References:** Author(s), Title, Publisher, Edition, Year, Book website.

1. Bird.J.Higher Engineering mathematics, fourth Edition , Elsevier 2004,

**Course Educational Objectives (CEOs):**

1.	Enable the student to understand the basic concept of differential equations.
2.	Learn student how to solve different kinds of first order differential equations.
3.	Learn student how to solve different kinds of second order differential equations, higher order differential equations and partial differential.
4.	Introduce the student to apply the concept Fourier series and Laplace transform.

**Intended Learning Outcomes (ILO's):**

	Subject Intended learning outcomes (ILOs) describe what students are expected to know and be able to do at the end of the course. These outcomes are related to the knowledge, skill and competence that students acquire:	Relationship to CEOs	Contribution to PLOs	Bloom Taxonomy Levels*	Descriptors**
A	<b>Knowledge and Understanding:</b>				
A1	The students will be able to explain the basic concepts of ordinary differential equation and partial differential equations.	1	1,7	1	K
A2					
A3					
B	<b>Intellectual skills:</b>				
B1					
2					
B3					
C	<b>Subject specific skills:</b>				
C1	The students will be able to solve different kinds of first order differential equations using several methods and utilize these differential equation to solve mathematical problem in civil engineering.	2	1,7	3	K ,C
C2	The students will be able to Solve second order differential equations, higher order	3	1,7	3	K ,C

	differential equations and partial differential equations and utilize these differential equation to solve mathematical problem in civil engineering.				
C3	The students will be able to use Fourier series, Laplace in solving mathematical problem.	4	1,7	3	K,C
C4					
D	Transferable skills:				

**\*Bloom Taxonomy Levels**

Level #	1	2	3	4	5	6
Level Name	Knowledge	Comprehension	Application	Analysis	Evaluation	Synthesis

**\*\* Descriptor (National Qualification Framework Descriptors): K : Knowledge, S: Skill, C: Competency.**

**Program Learning Outcome (PLOs):**

Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the (CE) program will demonstrate:		Descriptors**		
		K	S	C
1.	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	K		
2.	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			C
3.	An ability to communicate effectively with a range of audiences.		S	
4.	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.			C
5.	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.		S	
6.	An ability to develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgment to draw conclusions.		S	
7.	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	K		C

**\*\* Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)**

**Weekly Schedule (please choose the type of teaching)**

☒ **Face to Face**

☐ **Hybrid (2 Lectures Face – To - Face +1 Lecture Asynchronous)**

☐ **Hybrid (1 Lectures Face – To - Face +1 Lecture Asynchronous)**

☐ **Online (2 Lectures Synchronous +1 lecture Asynchronous)**

Week	First Hour (Sunday)	Second Hour (Tuesday)	Third Hour (Thursday)	Ach. ILOs	Ach. PLOs	Descriptors*
1	Course syllabus, Introduction to Basic concept of ordinary	Basic concept of ordinary differential equations and	Variable separable form.	A1,C1	PLO1,7	K,C

	<b>differential equations and partial differential equations.</b>	<b>partial differential equations.</b>				
2	homogenous, equation	homogenous, equation	Non-homogenous, equation	C1	PLO1,7	K,C
3	Linear first order differential equation	Linear first order differential equation	Linear first order differential equation	C1	PLO1,7	K,C
4	Bernoulli	Bernoulli	Bernoulli	C1	PLO1,7	K,C
5	the Riccati and Clairaut,s equation	the Riccati and Clairaut,s equation	the Riccati and Clairaut,s equation	C1	PLO1,7	K,C
6	Second order differential equation using variation parameter	Second order differential equation using variation parameter	Second order differential equation using variation parameter	C2	PLO1,7	K,C
7	Second order differential equation using variation parameter	Second order differential equation using variation parameter	Second order differential equation using variation parameter	C2	PLO1,7	K,C
8	Second order differential equation using undetermined coefficients	Second order differential equation using undetermined coefficients	Second order differential equation using undetermined coefficients	C2	PLO1,7	K,C
9	Second order differential equation using undetermined coefficients	Second order differential equation using undetermined coefficients	Second order differential equation using undetermined coefficients	C2	PLO1,7	K,C
10	Application of order differential equation in civil engineering	Application of order differential equation in civil engineering	Application of order differential equation in civil engineering	C1,C2	PLO1,7	K,C
11	Application of order differential equation in civil engineering	Application of order differential equation in civil engineering	Application of order differential equation in civil engineering	C1,C2	PLO1,7	K,C
12	Laplace Transform	Laplace Transform	Laplace Transform	C4	PLO1,7	K,C
13	Laplace Transform	Laplace	Laplace Transform	C4	PLO1,7	K,C
14	Fourier series of function, Fourier series expansion of even and add function	Fourier series of function, Fourier series expansion of even and add function	Fourier series of function, Fourier series expansion of even and add function	C4	PLO1,7	K,C
15	Fourier series of function, Fourier series expansion	Fourier series of function, Fourier series expansion	Final Exam	C4	PLO1,7	K,C

	of even and add function	of even and add function				
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\* K: Knowledge, S: Skills, C: Competency

## Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Interactive videos
- Practice Labs
- Discussion Forums
- ✓ Quizzes
- Other Interactive online activities
- Reports

## Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **20%**
- Midterm **30%**
- Final Exam **50%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

## Required equipment:

- **PC / Laptop with webcam and mic**
- **Internet Connection**
- **Access to the IU E-Learning Platform at:**  
**<https://elearn.iu.edu.jo/course/view.php?id=2097>**
- **E-learning plan**
- **Satisfaction questionnaires for online and face-to-face learning**
- **Software for e-learning**
- **Training**

### Assessment Tools implemented in the course:

- ✓ Final Exam
- ✓ Midterm Exam
- ✓ Quizzes
- ✓ Homework
- Practice Labs
- Discussion Forums
- Periodic reports for learning assessment
- Improvement plans for online or face-to-face teaching
- Others:.....

### Responsible Persons and their Signatures:

<b>Course Coordinator</b>	<b>Dr. Ethar Al -Essa</b>	<b>Completed Date</b>	<b>16/ 10 / 2022</b>
		<b>Signature</b>	
<b>Received by</b> (Department Head)	<b>Dr.</b>	<b>Received Date</b>	<b>16/ 10 / 2022</b>
		<b>Signature</b>	