جامعة الزيتونة الأردنية
Al-Zaytoonah University of Jordan

Course Syllabus

According to JORDAN National Qualification Framework (JNQF)

Course Name: Applied mathematics

Course Number: 0101475

General Course Information:

Course Title	Applied mathematics
Course Number	0101475
Credit Hours	3 credit hours
Education Type	Hybrid learning
Prerequisites/Co-requisites	Partial Differential Equations 0101374
Academic Program	Mathematics
Program Code	
Faculty	Faculty of Information Technology
Department	Mathematics
Level of Course	4
Academic Year /Semester	2023/2024 1st Semester
Awarded Qualification	BS'c
Other Department(s) Involved in Teaching the Course	-
Language of Instruction	English
Date of Production	2021-2022
Date of Revision	16-10-2023

Course Coordinator:

Coordinator's Name	Amer Dababneh
Office No.	127
Office Phone Extension Number	380
Office Hours	11:00 - 12:30
E-mail	dababneh.amer @zuj.edu.jo

Other Instructors:

Instructor Name	
Office No.	
Office Phone Extension Number	
Office Hours	
Email	

Course Description *(English/Arabic)*:

English	In this course students apply what they studied in the previous courses by studying series solutions of ordinary differential equations, Boundary value problems, Eigen values and eigen functions, Fourier series, Fourier coefficients, Solutions of wave, Laplace and heat equations by Fourier series, Fourier solutions of the boundary value problems
Arabic	في هذا المساق يقوم الطلاب بتطبيق ما تم دراسته سابقا من خلال حل المعادلات التفاضلية باستخدام متسلسلات القوى، مسائلة القيم الحدودية ، القيم اذاتية والاقترانات الذاتية، متسلسلات فورير، معاملات فورير، حل معادلة الموجة و معادلة لابلاس ومعادلة الحرارة، حل مسائلة القيم الحدودية باستخدام بطريقة فورير.

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

Elementary Differential Equation and Boundary Value Problems, By William E.Boyce & Richard C. Diprima, 10th edition, 2013.

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

1. Fourier series and Orthogonal Functions, Harry F. Davis, 1989/ Allyn and Bacon.
2. Fourier analysis and its Applications, Andres Vertblad, 2003 / Springer-Verlage, New York
3. Mathematical Methods, Dr. S. Sivaiah, 2013, ISBN: 9789380856476.
4. A Basic Course in Applied Mathematics, by J. Bystrom, L. Persson, F. Stromberg- Lulea University of Technology, 2010

Course Educational Objectives (CEOs):

CEO1	Students will be able to apply mathematical concepts and techniques to solve real-world problems in various fields.
CEO2	Students will be capable of solving a wide range of differential equations, both ordinary and partial, and apply them to real-world problems
CEO3	Students will possess strong analytical skills, enabling them to break down complex problems into manageable components and apply appropriate mathematical methods

Intended Learning Outcomes (ILO's):

Intended learning outcomes (ILOs)		Relationship to CEOs	Contribution to PLOs	Bloom Taxonomy Levels*	JNQF Descriptors**
K	Knowledge and Understanding				
ILO1-k	Introduce the Power Series solution technique to Ordinary Differential Equations	CEO 1	PLO1-K	Remembering	K
ILO2-k	Learn the concept of Fourier series expansion of functions.	CEO 3	PLO2-K	Analysing	K
S	Intellectual skills				
ILO3-s	Use power series methods to solve differential equations	CEO 2	PLO6-S	Applying	S
ILO4-s	Formulate and define boundary value problems	CEO 3	PLO6-S	Applying	S
ILO5-s	Examine the convergence properties of Fourier series	CEO 3	PLO6-S	Applying	S
C	Subject specific skills				
ILO6-c	Apply above mentioned concepts to a wide range of mathematical and physical problems	CEO 1 CEO 2 CEO 3	PLO12-C	Applying	C
ILO7-c	Cooperate to work effectively in the group assignments.	CEO 1 CEO 2 CEO 3	PLO12-C	Applying	C

***Bloom Taxonomy Levels:**

Level #	1	2	3	4	5	6
Level Name	Remembering	Understanding	Applying	Analysing	Evaluating	Creating

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

Program Learning Outcome (PLOs):

	(PLOs)	JNQF Descriptors**		
		K	S	C
1.	Knowledge of the main concepts in pure mathematics.	√		
2.	Knowledge of the main concepts in applied mathematics.	√		
3.	Explain concepts, principles and theories in the fields of probability and statistics.	√		
4.	Possession of technological culture related to the fields of mathematics and its applications.	√		
5.	Making use of mathematical logic in practical life.	√		
6.	Engaging scientific methodology as a way of thinking and as a tool in facing problems.		√	
7.	Applying mathematical software packages in problem solving.		√	
8.	Being capable of data analysis.		√	
9.	Capability of teaching according to modern educational techniques.		√	
10.	Develop creative and innovative methods of teaching mathematics.			√
11.	Showing the ability to work under ethical and professional standards within teams.			√
12.	Gaining critical thinking and scientific research skills.			√

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

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

- **Face to Face (F2F)**
- **Hybrid** *(One – To - One)*
- **Online**

Schedule of Simultaneous and their Topics:

Week	First Lecture (F2F)	Second Lecture	ILOs	PLOs	JNQF Descriptors*
1	Review of initial value problems, First order I.V.P.	Activity: (Video) Review of power series.	ILO1-K	PLO1-K	K
2	Series solution of ordinary differential equation about an ordinary point.	Activity: (PDF file) Classification of ordinary and singular points Frobinius method, Solution around regular singular point, part I.,	ILO3-S	PLO6-S	S
3	Solution around regular singular point, part II.	Activity: (Exersise) Periodic functions	ILO4-S	PLO6-S	S

4	The orthogonally of sine's & cosines. Normalization of functions.	Activity: (Video) Fourier series of function with period 2π.	ILO5-S	PLO6-S	S
5	Even and Odd functions,	Activity: (Homework) Sine and Cosine series.	ILO2-K	PLO2-K	K
6	Change of interval, functions of period 2P	Activity: (Exercise) functions of period 2P	ILO3-S	PLO6-S	S
7	Convergence of a Fourier series	Uniform convergence. (PDF file, self-reading)	ILO2-K	PLO2-K	K
Midterm Exam (30%)					
9	Integration of Fourier series	Activity: (PDF file) Differentiation of Fourier series	ILO1-K	PLO2-K	K
10	Parsival's identity..	Activity: (PDF file) Finite sine and cosine Fourier transforms	ILO1-K	PLO2-K	K
11	Generalized sine and cosine transforms.	Activity: (Video) Eigenvalue and Eigenfunction problem, part 1	ILO3-S	PLO6-S	S
12	Eigenvalue and Eigenfunction problem, part 2	Activity: (Homework) Finding the particular solution for higher order nonhomogeneous linear differential equations.	ILO5-S	PLO6-S	**S**
13	Orthogonality of the Eigenfunctions	Activity: (Exercise) Fourier series with respect to the Eigenfunction.	ILO6-S	PLO12-C	C
14	Equation of a vibrating string	Activity: (PDF file) Equation of a heat flow of a rod.	ILO7-C	PLO12-C	C
15	**Projects Discussion**				
16	**Final Exam**				

* **K: Knowledge, S: Skills, C: Competency**

Teaching Methods and Assignments:

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

- Lecture.
- learning through problem solving.

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, 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 ZUJ E-Learning Platform at https://exams.zuj.edu.jo/
- E-learning plan
- Satisfaction questionnaires for online and face-to-face learning

Assessment Tools Implemented in the Course:

- Final Exam
- Midterm Exam
- Quizzes
- Homework

Responsible Persons and their Signatures:

Course Coordinator	Dr. Amer Dababneh	**Completed Date**	**October 2023**
		Signature	

Received by (Department Head)		**Received Date**	/ /
		Signature	