Course Specification
(Postgraduate)

Course Title:	Partial Differential Equations
Course Code:	202659-3
Program:	Master of Applied Mathematics
Department:	Mathematics and Statistics Department
College:	Faculty of Sciences
Institution:	Taif University
Version:	1
Last Revision Date:	20/05/2023

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (3) h				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☐Required		☒ Elective	
3. Level/year at which this course is offered: Level 3				
4. Course general Description:				
This course introduces the fundamental concepts of Partial Differential Equations: D'Alembert method to solve partial differential equations (wave equation on the real number set – bounded interval- the space). Laplace method to solve the partial differential equations with initial conditions. Fourier method to solve the partial differential equations with initial conditions. Separation variables Method to solve the wave- heat and Laplace equations in polar- spherical and cylindrical coordinates. Super position principle to solve non-homogeneous partial differential with initial conditions. Green function for partial differential equations. Solutions the nonlinear partial differential equations.				
5. Pre-requirements for this course (if any):				
Non				
6. Pre-requirements for this course (if any):				
Non				
7. Course Main Objective(s):				
The student will be taught as follows: **1. Study D'Alembert method to solve partial differential equations** **2. Study Laplace method to solve the partial differential equations with initial conditions** **3. Study Fourier method to solve the partial differential equations with initial conditions.** **4. Study separation variables Method to solve the wave- heat and Laplace equations in polar- spherical and cylindrical coordinates** **5. Study separation variables Method to solve the Laplace equations in polar- spherical and cylindrical coordinates** **6. Study super position principle to solve non-homogeneous partial differential with initial conditions.**				

7.	**Study Green function for partial differential equations. Solutions the nonlinear partial differential equations.**

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	NA
3.	**Field**	NA
4.	**Tutorial**	NA
5.	**Others (specify)……**	NA
	Total	

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Recognize D'Alembert method to solve partial differential equations.**	K1	Lectures, group discussion `	Exams, Quizzes, Assignments
1.2	**Describe Laplace method to solve the partial differential equations with initial conditions.**	K3	Lectures, group discussion	Exams, Quizzes, Assignments
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	**Apply Separation variables Method to solve the wave- heat and Laplace equations in polar- spherical and cylindrical coordinates.**	S1	Lectures, group discussion	Exams, Quizzes, Assignments, report
2.2	**Demonstrate** Green function for partial differential equations. Solutions the nonlinear partial differential equations.	S5	Lectures, group discussion	Exams, Quizzes, Assignments, report
3.0	**Values, autonomy, and responsibility**			
3.1	**Participate** effectively within groups and independently.	V1	Collaborative Learning Self-learning	Scientific activity
3.2	**Give** responsibility for learning importance and continuing personal and professional development.	V2	Lectures	Assignments

C. Course Content:

No	List of Topics	Contact Hours
1.	D'Alembert method to solve partial differential equations	3
2.	Laplace method to solve the partial differential equations with initial conditions.	3
3.	Fourier method to solve the partial differential equations with initial conditions..	3
4.	Separation variables method to solve the wave equations in polar and spherical coordinates.	3
5.	Separation variables method to solve the wave equations cylindrical coordinates.	3
6.	Separation variables method to solve the heat equations in polar and spherical coordinates.	3
7.	**First Midterm exam**	3
8.	Separation variables method to solve the heat equations in cylindrical coordinates.	3
9.	Separation variables method to solve the Laplace equations in polar and spherical.	3

10.	Separation variables method to solve the Laplace equations in cylindrical coordinates.	3
11.	Super position principle to solve non-homogeneous partial differential with initial conditions.	3
12	Green function for partial differential equations.	3
13.	**Second Midterm exam**	3
14.	Solutions the nonlinear partial differential equations.	3
15	**Revision.**	3
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes + home works+ oral presentation +written test+ group project	Continues	30%
2.	Final exam	16 th	70%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Introduction to Partial Differential Equations. ISBN-13: 978-0691043616 ISBN-10: 0691043612
Supportive References	Partial Differential Equations: Second Edition ISBN-13: 978-0821849743 ISBN-10: 0821849743
Electronic Materials	Lectures available in Blackboard https://www.amazon.com/Partial-Differential-Equations-Graduate-Mathematics/dp/0821849743
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show, Blackboard

Items	Resources
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leader	Direct& Indirect
Effectiveness of students' assessment	Faculty, Program Leader	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct& Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	
DATE	October 2023

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