هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Differential Equations**
Course Code:	**2023103-4**
Program:	**Bachelor in Mathematics.**
Department:	**Mathematics and Statistics Department**
College:	**Faculty of sciences**
Institution:	**Taif university**

Differential Equations-TU

Table of Contents

A. Course Identification 3

6. Mode of Instruction (mark all that apply) 3

B. Course Objectives and Learning Outcomes 3

1. Course Description 3

2. Course Main Objective 3

3. Course Learning Outcomes 4

C. Course Content 4

D. Teaching and Assessment 5

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods 5

2. Assessment Tasks for Students 5

E. Student Academic Counseling and Support 5

F. Learning Resources and Facilities 5

1.Learning Resources 6

2. Facilities Required 6

G. Course Quality Evaluation 6

H. Specification Approval Data 6

Differential Equations_TU

A. Course Identification

1. Credit hours:4
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 7th level / 3th year
4. Pre-requisites for this course (if any)**:** Ordinary differential equations (2022201-4)
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**5Hr /Week**	100
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	50
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

In this course, we will study the total differential equations and methods for solving them, definition of partial differential equations (PDEs), formation of PDEs, solving PDEs of the first order in different ways, solving PDEs of second order with constant coefficients homogeneous and non-homogeneous. We explain the method for solving PDEs of second order with constant coefficients with irregular order homogeneous and non-homogeneous and solve PDEs with variable coefficients. We explain the method of separation of variables to solve PDEs. Solving hyperbolic, Elliptic and parabolic PDEs and PDEs of non-linear first order. Solving PDEs by using Laplace transformation.

2. Course Main Objective

The student will be taught as follows:

1. Describing the total differential equations in the three variables and the methods for solving its.
2. Recognizing the different methods for solving the linear and nonlinear partial differential equations.

Differential Equations-TU

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Memorize the various methods for solving partial differential equations.	K2
1.2	Outline the difference between kinds of partial differential equations.	K2
2	**Skills:**	
2.1	Explain basic concepts of analytical solutions for the partial differential equations.	S5
2.2	Analyze the different types of the partial differential equations.	S5
2.3	Show the partial differential equations in some problems in applied sciences and mathematical physics	S5
3	**Values:**	
3.1	Work effectively within groups and independently.	V1

C. Course Content

No	List of Topics	Contact Hours
1	**Introduction - Total differential equations and methods of solving them**	5
2	**Definition of partial differential equations, Formation of partial differential equations**	5
3	**Solving partial differential equations of the first order in different ways**	5
4	**Nonlinear first order Partial differential equation in the different ways and methods for solving the nonlinear first order PDE's.**	5
5	**Solving partial differential equations of second order with constant coefficients homogeneous and non-homogeneous- Review.**	5
6	**Midterm exam,** **Solving partial differential equations of second order with constant coefficients with irregular order homogeneous and non-homogeneous**	5
7	**Solving partial differential equations with variable coefficients and Cauchy Euler problem**	5
8	**Classification of PDE's, Solving hyperbolic, Elliptic and parabolic partial differential equation Parabolic partial differential equation.**	5
9	**The separation variables method to solve the PDE's.**	5
10	**Laplace transformation to solve the PDE's.**	5
Total		50

Differential Equations-FU

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding:**		
1.1	Memorize the various methods for solving partial differential equations.	• Lectures • Group discussions	• Quizzes Assignments
1.2	Outline the difference between kinds of partial differential equations.	• Lectures • Group discussions	• Exams • Assignments
2.0	**Skills:**		
2.1	Explain basic concepts of analytical solution partial differential equations.	• Interactive classes Group discussions	• Quizzes Assignments
2.2	Analyze the different types of the partial differential equations.	• Lectures • Group discussions	• Exams • Quizzes
2.3	Show the partial differential equations in some problems in applied sciences and mathematical physics	• Lectures Self-learning through the website	• Exams • Quizzes Assignments
3.0	**Values:**		
3.1	Work effectively within groups and independently.	Projects.	Through the oral presentation of the projects.
3.2	Articulate ethical behavior associated with institutional Guidelines in classroom, and in Lab.	• Lectures • Group discussions	• Exams • Quizzes

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	**Quizzes + Home works**	**Continues**	**10 %**
2	**Midterm exam**	**5^{th}-6^{th}**	**30 %**
3	**Class Work (Homework- report- class test….)**	**8^{th}**	**10 %**
4	**Final exam**	**11^{th}**	**50 %**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

6 hours per week (as defined in the teaching schedule of the faculty member) for academic advice and consultations.
Teaching staff is also available using Blackboard web site and Taif University "Edugate" System.

F. Learning Resources and Facilities

Differential Equations-TU

1.Learning Resources

Required Textbooks	Ravi P. Agarwal and Donal O'Regan,Ordinary and Partial Differential Equations, 1 edition, Springer Verlage 2009.
Essential References Materials	Victor Henner, Tatyana Belozerova, Mikhail Khenner, Ordinary and Partial Differential Equations, A K Peters/CRC Press; 1 edition (28 February 2013)
Electronic Materials	http://fac.ksu.edu.sa/sites/default/files/syllabusmath425_0.pdf
Other Learning Materials	**Software package as Maple software or MATLAB**

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	**Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students - Laboratories equipped with suitable numbers of computers**
Technology Resources (AV, data show, Smart Board, software, etc.)	**Maple and MATLAB softwares**
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	**Wi-Fi internet connections**

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Indirect
Quality of learning resources	Peer Reviewer Students	Direct Indirect
Extent of achieving the course learning outcomes	Peer Reviewer Students	Direct Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department of Mathematics and Statistics
Reference No.	11
Date	12-7-1443 H

Different Equations - TU