



Course Specifications

Course Title:	Ordinary Differential Equations
Course Code:	2022201-4
Program:	Bachelor in Mathematics.
Department:	Department of Mathematics and Statistics
College:	Faculty of science
Institution:	Taif university

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Ordinary Differential Equations-TU

A. Course Identification

1. Credit hours: (4) Hours
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 5 th Level, 2 th year
4. Pre-requisites for this course (if any): (Calculus II) (2022104-4)
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

<p>1. Course Description</p> <p>This course introduces ordinary differential equations. Study the first order differential equation and the methods for solving it such as, separation of variables, homogeneous equations, exact equations, linear equations, Bernoulli's Equations and Ricatti's Equation. Illustrate the nonlinear first order differential equation and the methods for solving it. Study the second and higher order differential equation with constant and variable coefficient, Homogeneous and non-homogeneous equations, Operator's method, undetermined coefficient, variation of parameters method for solving the higher order differential equations. Use the power series for solving the ordinary differential equations. Study the Laplace transform and using the Laplace for solving the differential equation.</p>
<p>2. Course Main Objective</p> <p>The student will be taught as follows:</p> <ol style="list-style-type: none"> 1- Describing the differential equations and types of the differential equation. 2- Demonstrating all methods for solving the ordinary differential equation and its applications.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Recognize the methods for solving the ordinary differential equations.	K2
1.2	Outline the series method and Laplace transformations for solving the ordinary differential equations.	K2
2	Skills:	
2.1	Apply the method for solving the first and higher order ordinary differential equations.	S5
2.2	Demonstrate the solutions of ordinary differential equations by using the power series and Laplace transformation	S5
2.3	Use the ordinary differential equations in some problems in applied sciences and mathematical physics.	S5
3	Values:	
3.3	Show act responsibility and ethically in conducting their assignment	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to the course (description of the course, discussion on the textbooks related to the course, teaching strategies and assessment methods) A general review on some essential notions in analysis related to the course. Basic concepts and composition of ordinary differential equation	5
2	Solve the differential equation of the first order and first-degree (Separation of variables, Homogeneous and Non- Homogeneous Equations, Exact differential equations)	5
3	Solve the differential equation of the first order and first-degree (Integrating factors, Linear and Bernoulli's Equations, Ricatti's Equation)	5
4	Solve the nonlinear differential equation of the first order and higher degree	5
5	ODEs of second order and higher orders: an introduction, superposition theorems, set of fundamental solutions, workian	5
6	Midterm exam, Linear Second order and Higher-order Differential Equations with constant coefficient (operator method-undetermined coefficient-Variation of parameter method)	5
7	Linear Second order and Higher-order Differential Equations with variables coefficient.	5
8	Series solutions of linear equations: an introduction to power series, ordinary points, singular points, application of series method around regular points to solve an ODE.	5
9	Laplace transforms: definition of Laplace transforms, inverse transforms, transforms of derivatives. Application of Laplace transform to solve an initial value problem	5
10	Laplace transforms: some operational properties, translation property, derivative of a transform and more applications for solving an initial value problem	5
Total		50

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	Describe the methods for solving the ordinary differential equations.	<ul style="list-style-type: none"> Lectures Group discussions 	<ul style="list-style-type: none"> Quizzes Assignments
1.2	Outline the series method and Laplace transformations for solving the ordinary differential equations.	<ul style="list-style-type: none"> Lectures Group discussions 	<ul style="list-style-type: none"> Exams Assignments
2.0	Skills:		
2.1	Apply the method for solving the first and higher order ordinary differential equations.	<ul style="list-style-type: none"> Interactive classes Group discussions 	<ul style="list-style-type: none"> Quizzes Assignments
2.2	Demonstrate the solutions of ordinary differential equations by using the power series and Laplace transformation	<ul style="list-style-type: none"> Lectures Group discussions 	<ul style="list-style-type: none"> Exams Quizzes
2.3	Use the ordinary differential equations in some problems in applied sciences and mathematical physics.	<ul style="list-style-type: none"> Lectures Self-learning through the website 	<ul style="list-style-type: none"> Exams Quizzes Assignments
3.0	Values:		
3.1	Demonstrate act responsibility and ethically in conducting their assignment	<ul style="list-style-type: none"> Lectures 	Assignments

2. Assessment Tasks for Students

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

1. Learning Resources

Required Textbooks	Steven Krantz, Differential Equations Demystified, McGraw-Hill Professional Publishing, 1st edition 2004.
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Essential References Materials	Bronson, Richard Book: Schaum's outlines of differential equations Publisher: McGraw-Hill Professional Publishing 2010.
Electronic Materials	https://www.mathworks.com/help/matlab/
Other Learning Materials	Matlab tutorial

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.)	Matlab software
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

قسم الرياضيات والإحصاء
Mathematics and Statistics
Department

