



Course Specifications

Course Title:	Differential Equations
Course Code:	202366-3
Program:	Bachelor in Computer Engineering
Department:	Department of Computer Engineering
College:	Computers and Information Technology
Institution:	Taif University

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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input 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: 5/3
4. Pre-requisites for this course (if any): Calculus (2) (202263-3)
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	3	100%
2	Blended	0	0
3	E-learning	0	0
4	Distance learning	0	0
5	Other	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	45
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers: Basic concepts, 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, Ricatti's equation and applications of first order). The nonlinear of first order differential equations. The higher order differential equation, operators method, undetermined coefficients, Variation of parameters, and it's applications. Laplace transforms. Solution of linear systems of differential equations using Laplace transforms and matrix techniques and eigenvalues.

2. Course Main Objective

Describe different kinds of differential equations, be familiar with differential equations and their applications and describe the different systems of linear differential equations and their solutions

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
2	Skills :	
2.1	Use the differential equations to model real-life applications.	S1
2.2	Use the appropriate method to solve first order linear differential equations and linear equations with constant coefficients.	S1
2.3	Use separation of variables to solve differential equations and exact differential equations.	S1
2.4	Use variation of parameters to solve differential equations and method of undetermined coefficients to solve differential equations.	S1
2.5	Use the Wronskian to determine whether a system of functions is linearly independent	S1
2.6	Use Laplace transforms and their inverses to solve differential equations.	S1
2.7	Use matrix techniques and eigenvalues to solve systems of linear differential equations.	S1
3	Values:	

C. Course Content

No	List of Topics	Contact Hours
1	Basic concepts.	2
2	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, Ricatti's equation).	5
3	Applications of first order differential equations.	3
4	The second order differential equation.	3
5	The higher order differential equation.	2
6	Operator method for solving second differential equations.	5
7	Undetermined coefficients and variation of parameters for solving second differential equations.	7
8	Applications of higher order differential equations.	5
9	Laplace transforms.	5
10	Solution of differential equations using Laplace transforms.	3
11	Solution of linear systems of differential equations using matrix techniques and eigenvalues.	5
Total		45

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		
2.0	Skills		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Use the differential equations to model real-life applications .	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.2	Use the appropriate method to solve first order linear differential equations and linear equations with constant coefficients.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.3	Use separation of variables to solve differential equations and exact differential equations.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.4	Use variation of parameters to solve differential equations and method of undetermined coefficients to solve differential equations.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.5	Use the Wronksian to determine whether a system of functions is linearly independent	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.6	Use Laplace transforms and their inverses to solve differential equations.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.7	Use matrix techniques and eigenvalues to solve systems of linear differential equations.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
3.0	Values		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	Continues	10%
2	Midterm Exam	8	25%
3	Quizzes	Continues	15%
4	Final Exam	16	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 :

- Teaching staff provide at least 6 office hours for students to help them in the course as well as in any other academic issues.
- Consultation can also be done 24 hours/ 7days through university Edugate (Tawasol)
- Consultation also could be done through email which is available for all students at blackboard

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Dennis G. Zill, and Michael R Cullen, 'Differential Equations with Boundary-Value Problems', Cengage Learning. 7 th Ed. 2009
Essential References Materials	None.
Electronic Materials	None.
Other Learning Materials	None.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> A Lecture room appropriate for maximum 25 students with a personal computer, a data show and a smart board. A Lab room appropriate for maximum 15 students with a personal computer, a data show and a smart board.
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> None.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching	Students	Students' surveys and Students course evaluation
Improvement of Teaching	Course Coordinator	deficiencies based on the student Evaluation, faculty input, course file, and program assessment
Verifying Standards of Student Achievement	Curriculum Committee	<ul style="list-style-type: none"> Review CAF (Course assessment file) Alumni surveys. Periodic exchange and remarking of tests or a sample of assignments with staff at another

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	
Reference No.	
Date	

