



Faculty: Science	
Department: Mathematics	Program: Bachelor's

## Course Plan

### First: Course Information

Course Name	ODE 1		Course Number	0301203	
Credit Hours	3 hours	Theoretical	3 hours	Practical	0 hours
Prerequisite	0103102	Section Number: 1		Lecture Time:	
Level in JNQF	7				
Type Of Course	<input type="checkbox"/>	Obligatory Faculty Requirement		<input type="checkbox"/>	Elective University Requirement
	<input type="checkbox"/>	Obligatory University Requirement		<input type="checkbox"/>	Faculty Requirement
	<input type="checkbox"/>	Course Elective Specialty Requirement		<input checked="" type="checkbox"/>	Obligatory Specialization Requirement
Type of Learning	<input checked="" type="checkbox"/>	Face-to-Face Learning			
	<input type="checkbox"/>	Blended Learning (2 Face-to-Face + 1 Asynchronous)			
	<input type="checkbox"/>	Online Learning (2 Synchronous + 1 Asynchronous)			

### Third: Course Description

Solutions of Ordinary Differential equations: (first order, second order, and higher order) with applications to Mechanics and Physics, Laplace transforms and their applications to solve Ordinary differential equations, Series solution of simple ordinary differential equations of second order.

### Fourth: Course Objectives

Upon completion of this course, the student should be able to

1. Understanding the concepts of differential equation, solution of equation, particular solution, nonhomogeneous differential equation, higher order differential equation, Laplace transform, series solution.
2. Follow and to construct a formal mathematical form of general solution.
3. Demonstrate an understanding of the relationship of solving first order, second order and higher order differential equations.
4. Independently explore related topics using resources other than the text.

### Fifth: Learning Source

<b>Main Reference</b>		<b>A first course in differential equations</b>								
<b>Author: Zill &amp; Collen</b>		<b>Issue No.: 10<sup>th</sup> Edition</b>				<b>Publication Year:2013</b>				
<b>Additional Sources &amp; Websites</b>		<b>Elementay differential equations &amp; BVPs by Boyce &amp; Diprima</b>								
<b>Teaching Type</b>	<input checked="" type="checkbox"/>	<b>Classroom</b>	<input type="checkbox"/>	<b>Laboratory</b>	<input type="checkbox"/>	<b>Workshop</b>	<input type="checkbox"/>	<b>MSTeams</b>	<input checked="" type="checkbox"/>	<b>Moodle</b>

### Sixth: Learning Outcomes

Level descriptor according to (JNQF)	CILOs Code	CILOs	Associated PILOs Code Choose one PILO for each CILO*	Assessment method** Choose at least two methods	Scores out of 100 State the total score identified for each CILO	Minimum acceptable Score/percentage (%) The percentage should not be less than 50% ***
<b>Knowledge</b>	K1	Define and illustrate the concept of differential equation, general solution, Laplace transform, series solution.	PK1	First Exam, Second Exam, Final Exam	10	5 (50%)
	K2	Comprehend basic properties of Laplace transform	PK2	First Exam, Second Exam, Final Exam, Assignment	22	11 (50%)
	K3	Comprehend the theorem of existence and uniqueness of solution of ODE	PK2			
	K4	Comprehend basic properties of first ODE	PK2			
	K5	Comprehend the fundamental formulas for solving first ODE	PK2			
	K6	Comprehend the techniques of solving second ODE with constant coefficients	PK2			
	K7	Define and illustrate the concept of wronskian	PK2			

<b>Skills</b>	S1	Employ basic properties of Euler equation	PS1	First Exam, Assignment	6	3 (50%)
	S2	Employ the properties of ODE of higher order	PS2	First Exam, Second Exam, Final Exam, Assignment	36	18 (50%)
	S3	Find the complementary solution of ODE	PS2			
	S4	Determine the particular solution of ODEs	PS2			
	S5	Write the general solution of ODEs	PS2			
	S6	Discuss the properties of power series.	PS2			
	S7	Find the Laplace transform of different functions	PS2			
	S8	Solve the ODE by Laplace transform	PS2			
	S9	Solve the ODE by series solution method	PS2			
	S10	Find the inverse Laplace transform of some functions	PS3	Second Exam, Final Exam	10	5 (50%)
	S11	Prove some fundamental properties of power series and classify the singular points	PS3			
<b>Competencies</b>	C1	Working in a team to handle some advanced topics in number theory	PC3	Assignment	4	2 (50%)
	C2	Develop the personal skills and capacity to carry responsibility	PC1	Second Exam, Final Exam, Assignment	12	6 (50%)

\*Refer to document ( ) and page 2 in document ( )

\*\* Refer to document ( )

\*\*\*80% of the students must achieve the minimum acceptable percentage or higher for each CILO

## Seventh: Course Structure

Lecture Date	Intended Teaching Outcomes (ILOs)	Topics	Teaching Procedures*	Teaching Methods***	References***
	K1,C1	Definition of a differential equation	Face-to-Face	Lectures and discussion	(Zill) 2-4
	K1,K2,K5,S3,C1,C2	Classification of differential equation	Face-to-Face	Lectures and discussion	(Zill) 4-17
	K1,K2,S1,S3,K4,S2	1 <sup>st</sup> ODE. Separable equation	Face-to-Face	Lectures and discussion	(Zill) 45-51
	K1,K2,S3,C1,C2	Homogeneous equation	Face-to-Face	Lectures and discussion	(Zill)
	K1,K2,S3,S1,S2	Exact equation	Face-to-Face	Lectures and discussion	(Zill) 63-69
	K1,K2,S3,C1,S2	Integrating factor	Face-to-Face	Lectures and discussion	(Zill) 54-56
	K1,K2,S3,S1,C2	Linear equation	Face-to-Face	Lectures and discussion	(Zill) 54-61
	K1,K2,S3,S4,C1,C2	Bernoulli equation	Face-to-Face	Lectures and discussion	(Zill) 73
	K1,K2,S4,C1,C2	Transformation and substitution method	Face-to-Face	Lectures and discussion	(Zill) 71-75
	K1,K2,S3,S4,C2	Transformation and substitution method	Face-to-Face	Lectures and discussion	(Zill) 71-75

<b>First Exam</b>					
	K1,K2,K6,S3,C1,C2	2 <sup>nd</sup> order linear D.E.: Homogeneous equation with constant coefficient	Face-to-Face	Lectures and discussion	(Boyce) 137-145
	K1,K2,S3,K7,C1,C2 S4,S5	Nonhomogeneous differential equation: Method of undetermined coefficient	Face-to-Face	Lectures and discussion	(Boyce) 157-186
	K1,K2,S3,S8,C1,S5,C2	Variation of parameter method	Face-to-Face	Lectures and discussion	(Boyce) 186-192
	K1,K2,S3,C1,S4,C2	Higher ODE.: Homogeneous equation with constant coefficient	Face-to-Face	Lectures and discussion	(Zill) 132-139
	K1,K2,S3,C1,C2,S5	Nonhomogeneous differential equation: Method of undetermined coefficient	Face-to-Face	Lectures and discussion	(Zill) 139-156
	K1,K2,S3,C1,C2,S5	Variation of parameter method	Face-to-Face	Lectures and discussion	(Zill) 156-162
	K1,K2,S3,C1,S5	Cauchy Euler equation	Face-to-Face	Lectures and discussion	(Zill) 162-169
	K1,K2,S3,S7,S4,C1	Reduction of order	Face-to-Face	Lectures and discussion	(Zill) 129-131
	K1,K3,S3,C1,C2,S11	Examples and applications	Face-to-Face	Lectures and discussion	(Zill)232-238
	K1,K3,S3,C1,C2,S10	Series solution near an ordinary point	Face-to-Face	Lectures and discussion	(Zill) 238-247
<b>Second Exam</b>					
	K1,K4,S3,C1,C2,S6,S7	Solution of I. V. P. by Laplace transform	Face-to-Face	Lectures and discussion	(Zill) 281-302
	K1,K4,S3,C1,C2,S8, S9	Step functions	Face-to-Face	Lectures and discussion	(Zill) 307-312
	K1,K4,S3,C1,C2,S7,S8	Differential equations discontinuous coefficients	Face-to-Face	Lectures and discussion	(Zill) 302-305
	K1,K4,S3,C1,C2,S5,S11 ,S10	Integral equation	Face-to-Face	Lectures and discussion	(Zill) 305-307
<b>Final Exams</b>					

## Eighth: Assessment methods

Methods	Direct Teaching	Specific Course Output to be measured																			
		*State the score identified for each CILO for each method of assessment out of 100 **If any CILO will not be assessed in the course, mark NA.																			
		K1	K2	K3	K4	K5	K6	K7	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	C1	C2
First Exam	20	4	3	4					4	3	2										
Second Exam	20	2			1	1	1					2		3	2	2	2		2		2
Final Exam	50	4	4			3	3			3	2		2			3	2	16			8
Assignment	10							2	2					2							4
<b>Total</b>	<b>100</b>	<b>10</b>	<b>22</b>						<b>6</b>	<b>30</b>						<b>18</b>	<b>4</b>	<b>10</b>			

## ninth: Course Policies

- All course policies are applied on all teaching patterns (online, blended, and face-to-face Learning) as follows:
  - Punctuality.
  - Participation and interaction.
  - Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).