

GAU, Faculty of Engineering

Course Unit Title	Differential Equations	
Course Unit Code	MT206	
Type of Course Unit	Compulsory, All engineering students	
Level of Course Unit	2 nd Year BSc	
National Credits	4	
Number of ECTS Credits Allocated	7 ECTS	
Theoretical (hour/week)	4	
Practice (hour/week)	-	
Laboratory (hour/week)	-	
Year of Study	2	
Semester when the course unit is delivered	4	
Mode of Delivery	Face to Face, E-learning activities	
Language of Instruction	English	
Prerequisites and co-requisites	Knowledge of Calculus 1, 2 and 3 is necessary	
Recommended Optional Programme Components	-	
Objectives of the Course:		
<ul style="list-style-type: none"> ➤ Introduce the students into differential equations arising in engineering, applied mathematics and physics ➤ General introduction to ordinary differential equations, initial boundary value problems, and their classification ➤ Introduce first order and higher order differential equations. Power series solutions of linear differential equations. Laplace transforms and their applications. Systems of Linear First-Order Differential Equations ➤ Comprehend the various methods of solution for the ordinary differential equations of engineering, applied mathematics and physics 		
Learning Outcomes		
When this course has been completed the student should be able to		Assesment.
1	Know about what the differential equations and Laplace Transformations are	1
2	Solve first order and higher order differential equations by using certain methods	1
3	Know and solve initial value and boundary value problems	1
4	Apply their knowledge in other courses	1
Assesment Methods: 1. Written Exam, 2. Assignment 3. Project/Report, 4.Presentation, 5 Lab. Work		
Course's Contribution to Program		
		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	5
2	Ability to design and conduct experiments as well as to analyze and interpret data	-
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	-
4	Ability to apply systems thinking in problem solving and system design	2
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	3
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	-
7	Ability to express their ideas and findings, in written and oral form	-
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	-
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	1
CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate 4: High, 5:Very High)		

Course Contents			
Week		Exams	
1	Introduction to Differential Equations		
2	First Order Differential Equations		
3	Separable Differential Equations		
4	Linear Differential Equations		
5	First Order Linear Differential Equations and solutions by Substitution		
6	Higher Order Differential Equations	Quiz	
7	Second Order Homogeneous Differential Equations		
8		Midterm	
9	Second Order Non-Homogeneous Differential Equations		
10	Cauchy-Euler Equations		
11	Series Solutions of Linear Equations		
12	The Laplace Transform		
13	Systems of Linear First Order Differential Equations		
14	Course in Review		
15		Final	
Recommended Sources			
Textbook: A First Course in Differential Equations with Modeling Applications; Zill D. G.; Brooks/Cole Publishing Company, 9 th Edition, 2009.			
Supplementary Material (s): Any textbooks or references on differential equations can be used.			
Assessment			
Attendance & E-learning	15%		
Quiz (Written)	15%		
Midterm Exam (Written)	30%		
Final Exam (Written)	40%		
Total	100%		
ECTS Allocated Based on the Student Workload			
Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including the Exam week)	15	4	60
Labs and Tutorials	-	-	-
Assignments	-	-	-
Project/Presentation/Report Writing	-	-	-
E-learning Activities	13	4.5	58.5
Quizzes	1	13	13
Midterm Examination	1	15	15
Final Examination	1	20	20
Self Study	15	2	30
Total Workload			196.5
Total Workload/30 (h)			6.55
ECTS Credit of the Course			7