	Course name: MATH201 Differential Equations			**Department:** CENG, EE,CE, MSE			Semester	
							3	
	Methods of Education						Credit (ECTS)	
	Lecture	Recitation/ (Etud)	Lab	Project/Field Study	Homework	Other	Total	**6**
	56	0	0	0	28	86	170	
Language	English							
Compulsory/Elective	Compulsory							
Prerequisites	Calculus I and II							

Course Contents

Weeks	Subjects
1	First Order Differential Equations and Mathematical Models
2	Separable Equations and Applications Linear First-Order Equations
3	Substitution Methods and Exact Equations Homogeneous Equations Bernoulli Equations
4	Second-Order Linear Equations: An Introduction Wronskians of Solutions
5	Linear Second-Order Equations with Constant Coefficients Nonhomogeneous Equations and Undetermined Coefficients
6	Cauchy-Euler Equations Variation of Parameters
7	Higher Order Differential Equations
8	The Laplace Transform
9	General Properties of Transforms
10	The Inverse Laplace Transforms Solution of Initial Value Problems using Laplace Transform
11	Periodic and Piecewise Continuous Input Functions Transforms of Periodic Functions
12	Introduction to Systems of Differential Equations The Method of Elimination
13	The Eigenvalue Method for Homogeneous Systems
14	Matrix Exponentials and Linear Systems Fundamental Matrix Solutions Matrix Exponential Solutions

Course Objectives	▪ This course provides an introduction to the basic theoretical concepts and applications of ODEs. ▪ It aims to introduce students the real life systems modelled by means of differential equations and their appropriate solution techniques.
Learning Outcomes and Competences	By the end of this course, a student will be able to: **1.** identify ODEs and their qualitative properties **2.** appreciate the importance of establishing the existence and uniqueness of solutions **3.** solve analytically a wide range of first order ODEs as well as Initial Value Problems (IVPs) **4.** solve analytically a wide range of higher order linear homogeneous /nonhomogeneous ODEs with constant coefficients **5.** solve higher order nonlinear differential equations **6.** use Laplace transform for the solution of a wide range of ODEs and the systems formed by ODEs **7.** solve the linear ODEs/system of ODEs with various right side functions including zero, constants, exponentials, sinusoids, step functions, impulses, and superpositions of these functions
Textbook and /or References	**1.** *Differential Equations and Boundary Value Problems: Computing and Modeling by* C.H.Edwards, D.E. Penney and D.T. Calvis, 5th Edition, Pearson, 2015. **2.** *Elementary Differential Equations and Boundary Value Problems* by W.E. Boyce, R.C. Diprima and D.B. Meade, 11th Edition, John Wiley and Sons, 2009. **3.** *Fundamentals of Differential Equations* by R.K. Nagle, E.B. Saff and A.D. Snider, 8th Edition ,Pearson, Addison Wesley,2012.

Assessment Methods and Criteria

In-Term Studies	Quantity	Percentage%
Mid-terms	1	40
Quizes	0	0
Assignments	0	0
Attendance	0	0
Practice	0	0
Project	0	0
Final Examination	1	60
Total	**2**	**100**

ECTS Allocated Based on Student Workload

Activities	Quantity	Duration	Total Work Load
Course Duration	14	4	56
Hours for off-the-c.r.study	14	4	56
Assignments	7	4	28
Mid-terms	1	10	10
Project/Field Study	0	0	0
Final Examination	1	20	20
Total	**37**	**42**	**170**

Instructors	