Department of Geomatics Engineering / Faculty Of Engineering And Architecture / Department of Geomatics Engineering

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS
MAT205	DIFFERENTIAL EQUATIONS	4.00	0.00	0.00	4.00	6.00

Course Detail

Course Language	:	English
Qualification Degree	:	Bachelor
Course Type	:	Compulsory
Preconditions	:	Not
Objectives of the Course	:	The techniques of analytical solution of ordinary differential equations will be teached in this lesson.
Course Contents	:	Introduction to differential equations and their classification, Autonomous equation, Separable equations, Homogeneous equations, Exact equations and integrating factor, Bernoulli equations, Reduction of order, Second-order homogeneous equations, Second-order non-homogeneous equations and Method of Undetermined coefficients, Variation of parameters, Higher-order equations, Power series method, Laplace transforms, Fourier series, Separation of variables for Partial differential equations.
Recommended or Required Reading	:	1) William E. Boyce & Penny, Richard C. DiPrima (2005). Elemantary Differential Equation and Boundary Value Problems: John Wiley & Sons, Inc. 2) Dennis G. Zill (2013). A First Course in Differential equations with Modeling Applications
Planned Learning Activities and Teaching Methods	:	Face to face education
Recommended Optional Programme Components	:	Prerequisite course: MAT101- Calculus I
Instructors	:	Assoc. Prof. Dr. Halis Can Koyuncuoğlu
Instructor's Assistants	:	none
Presentation Of Course	:	None
En Son Güncelleme Tarihi:	:	7/21/2024 9:53:11 AM

Course Outcomes

Upon the completion of this course a student :

1 will be able to identify a differential equations and categorize their class. To describe the relationship between the initial value(s) and the interval of the existence of the solution

2 will be able to describe first-order differential equations and their various applications. Will be able to construct a solution for Autonomous, separable, homogeneous, exact, linear, and Bernoulli equations.

3 Will be able to describe the higher-order differential equations. Will be able to solve the higher-order differential equations by transforming them into the first-order equations. Will be able to solve the higher-order homogeneous and nonhomogeneous differential equations by Method of Undetermined coefficient and Variation of parameters methods.

4 will be able to construct the solution of ODE using the tehcniques of series

5 will be able to identify the Laplace transform. To apply the Laplace transform to the differential equations. will be able to describe Heaviside and Dirac-delta functions. To demonstrate the piecewise-defined functions by Heaviside functions

6 will be able to recognize the Fourier series. will be able to apply the technique of separation of variables to the PDE(s)

Preconditions

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS

Weekly Contents

	Teorical	Practice	Laboratory	Preparation Info	Teaching Methods	Course Learning Outcomes
1.Week	*Introduction to differential equations and their classifications. Some basic models. Types of solutions of ODE and verification of solution. The interval of the existence of the solution.				*Face to face and interactive education.	
2.Week	*Autonomous, Separable and Homogeneous Equations				*Face to face and interactive education	
3.Week	*Exact equations, Integrating factors				*Face to face and interactive education	
4.Week	*First order linear ODE, Bernoulli equation				*Face to Face and interactive education	
5.Week	*Theory of Higher Order Equations: linearly dependency & independency, superposition principle, reduction of order.				*Face to face and interactive education.	
6.Week	*Second order homogeneous-nonhomogeneous equations, Method of Undetermined coefficient(UC)				*Face to face and interactive education	
7.Week	*Second order Non-homogeneous differential equation, Method of Variation of parameters.				*Face to face and interactive education	
8.Week	*Midterm Exam					
9.Week	*Method of Undetermined coefficient and Variation of parameters for Higher order differential equationsç				*Face to face and interactive education	
10.Week	*Power series Method				*Face to face and interactive eduation	
11.Week	*Power series Method, Laplace transform.				*Face to face and interactive education	
12.Week	*Inverse Laplace transform, Describing piecewise functions by Heaviside functions. Dirac Delta function. Laplace transform of the DEs with unit step and Dirac delta functions				*Face to face and interactive education	
13.Week	*Convolution Theorem, Differentiation of Laplace transform, Introduction to Partial Differential Equations (PDEs), Fourier Series				*Face to face and interactive education	
14.Week	*Solving PDEs by Method of Separation of variables, Solution of Heat transfer equation				*Face to face and interactive education	

Assesment Methods %

6 Midterms : 40.000

10 Final : 60.000

ECTS Workload

Activities	Count	Time(Hour)	Sum of Workload
Vize / Midterms	1	2.00	2.00
Final / Final	1	2.00	2.00
Bütünleme / Make-up	1	2.00	2.00
Derse Katılım / Attending lectures	13	4.00	52.00
Ders Öncesi Biresysel Çalışma / Individual study before lecture	26	1.00	26.00
Teorik Ders Anlatım / Theoretical Lecturing	13	4.00	52.00
Problem Çözme	13	2.00	26.00
Ara Sınav Hazırlık / Preparation for midterm	1	5.00	5.00
Final Sınavı Hazırlık / Preparation for final	1	5.00	5.00
		Total :	172.00
		Sum of Workload / 30 (Hour) :	6
		ECTS :	6.00

Program And OutcomeRelation

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11
L.O. 1	5	0	0	0	0	0	0	0	0	0	0
L.O. 2	5	0	0	0	0	0	0	0	0	0	0
L.O. 3	5	0	0	0	0	0	0	0	0	0	0
L.O. 4	5	0	0	0	0	0	0	0	0	0	0
L.O. 5	5	0	0	0	0	0	0	0	0	0	0
L.O. 6	5	0	0	0	0	0	0	0	0	0	0