HASAN KALYONCU UNIVERSITY
Faculty of Engineering
Course Description Form

COURSE: Differential Equations				
CODE: MATH212	**SEMESTER:** SPRING			
LANGUAGE: ENGLISH	**TYPE:** COMPULSORY			
PRE-REQUISITES:- **CO-REQUISITES:-**	**THEORY**	**PRACTICAL**	**CREDIT**	**ECTS**
WEEKLY HOURS:3	3	0	3	5

CONTENT OF THE COURSE:
Classification of differential equations, solutions, initial value and boundary value problems, existence of solutions, First-Order Equations for which exact solutions are obtainable, Solution methods of high order linear differential equations, Electric circuit problems, Laplace Transform; definitions, theorems, examples, solution of linear, constant-coefficient initial-value problems, theorems, convolution integral and theorem, Impulse function and response, system function. Systems of Linear Differential Equations, Solutions of systems of linear differential equations.

OBJECTIVE OF THE COURSE:
To create the necessary infrastructure for the solution of differential equations in engineering courses and applications.

WEEKLY SCHEDULE	
Week	**Topics**
1	Classification of differential equations, solutions, initial value and boundary value problems, existence of solutions.
2	Separable differential equations and solution methods
3	Finding Integrating factor
4	Homogeneous differential equations and solution methods
5	Linear differential equations and solution methods.
6	Bernoulli differential equations and solution methods.
7	Riccatti differential equations and solution methods.
8	MIDTERM
9	Solution methods of high order linear differential equations.
10	Laplace Transform; solution of linear, constant-coefficient initial-value problems.
11	Laplace Tansform; theorems, convolution integral and theorem.
12	Nonhomogeneous Equations, Method of Undetermined Coefficients
13	Method of Variation of Parameters, Cauchy-Euler Equation
14	Review.

TEXTBOOK: Fundamentals of Differential Equations, Global Edition, 9/E, Nagle, Saff, Snider, Pearson.
REFERENCE BOOKS: Differential Equations, Paul's Online Notes, Paul Dawkins.

INSTRUCTOR(S):	Assoc. Prof. Dr. Ece Yetkin ÇELİKEL
FORM PREPARATION DATE:	02.03.2020

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
LO1	3	0	0	0	0	0	0	0	0	0	0
LO2	3	1	0	0	0	0	0	0	0	0	0
LO3	3	2	0	0	0	0	0	0	0	0	0
LO4	3	0	0	0	0	0	0	0	0	0	0
LO5	3	0	0	0	0	0	0	0	0	0	0
LO6	3	0	0	0	0	0	0	0	0	0	0
LO7	3	0	0	0	0	0	0	0	0	0	0
	PO: Program Outcomes | LO: Learning Outcomes Values: 0: None | 1: Low | 2: Medium | 3: High										

LEARNING OUTCOMES OF THE COURSE:

LO1: Recognizes basic DE types and grasps basic definitions, the meaning of solution functions, the initial-value problem concept.
LO2: Recognize 1st order equation types for which exact solutions are available, and should be able to solve them; separable, linear, exact and those reducible to them.
LO3: Understands solution character of homogeneous and nonhomogeneous linear DE's, the relation between them, and solves linear DE's with constant coefficients by two methods; (i) applying the method of undetermined coefficients, and (ii) using the method of variation of parameters.
LO4: Analyzes electrical circuits by solving linear DE's with constant coefficients.
LO5: Grasps definitions of Laplace and inverse Laplace transforms, their basic properties, performs simple transform calculations and solves linear DE's with constant coefficients by means of Laplace transform.
LO6: Understands the concepts of impulse function and response, system function, convolution integral and convolution t heorem of Laplace transform.
LO7: Solves systems of linear DE's with constant coefficients in Laplace domain and by means of the matrix exponential and understands the equivalance of the two.

CONTRIBUTION OF THE COURSE TO VOCATIONAL EDUCATION

With the help of this course, students gain advanced mathematics knowledge for solving problems involving mathematics and formulas in the field of engineering.