



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 Transform; 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.

EVALUATION SYSTEM:		
IN-TERM STUDIES	QUANTITY	PERCENTAGE (%)
Midterm Exam	1	40
Homework	0	0
Labworks	0	0
Quiz	0	0
Final Exam	1	60
TOTAL		
CONTRIBUTION OF INTERM STUDIES TO OVERALL GRADE	1	40
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE	1	60
TOTAL		100

COURSE CATEGORY:	PERCENTAGE (%)
Mathematics and Basic Sciences	%60
Engineering	%40
Engineering Design	%0
Social Sciences	%0

TABLE OF ECTS / WORKLOAD:			
Activities	QUANTITY	Duration (Hour)	Total Workload
Course Duration	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	14	7	98
Mid-term	1	2	2
Final examination	1	2	2
Homework	0	0	0
Quiz	0	0	0
Total Work Load			141
Total Work Load / 30			4,7
ECTS Credit of the Course			5

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:	PROGRAM OUTCOMES:
<p>LO1:Recognizes basic DE types and grasps basic definitions, the meaning of solution functions, the initial-value problem concept.</p> <p>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.</p> <p>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.</p> <p>LO4:Analyzes electrical circuits by solving linear DE's with constant coefficients.</p> <p>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.</p> <p>LO6:Understands the concepts of impulse function and response, system function, convolution integral and convolution theorem of Laplace transform.</p> <p>LO7:Solves systems of linear DE's with constant coefficients in Laplace domain and by means of the matrix exponential and understands the equivalence of the two.</p>	<p>PO1: Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.</p> <p>PO2: Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.</p> <p>PO3: Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.</p> <p>PO4: Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.</p> <p>PO5: Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions.</p> <p>PO6: Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.</p> <p>PO7: Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions.</p> <p>PO8: Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.</p> <p>PO9: Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice.</p> <p>PO10: Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development.</p> <p>PO11: Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.</p>