ESOGU CIVIL ENGINEERING DEPARTMENT

COURSE INFORMATION FORM

Course Name	Course Code
DIFFERENTIAL EQUATIONS	151413558

Semester	Number of Course Hours per Week		ECTS
	Theory	Practice	
3	3	0	4

Course Category (Credit)				
Basic Sciences	Engineering Sciences	Design	General Education	Social
2	2			

Course Language	Course Level	Course Type
Turkish	Undergraduate	Compulsory

Prerequisite(s) if any	-
Objectives of the Course	To introduce the basic concepts required to understand, construct, solve and interpret differential equations. To teach methods to solve differential equations of various types. To give an ability to apply knowledge of mathematics on engineering problems.
Short Course Content	First-Order Differential Equations and Solution Methods, Applications of First-Order Differential Equations, Higher Order Linear Homogeneous and Nonhomogeneous Differential Equations and Solution Methods, Applications of Second-Order Differential Equations, Systems of Linear Differential Equations.

	Learning Outcomes of the Course	Contributed PO(s)	Teaching Methods *	Measuring Methods **
1	Classify differential equations according to certain features.	1, 2	1, 6, 11	A, D
2	Solve first order linear equations and nonlinear equations of certain types and interpret the solutions.	1, 2	1, 6, 11	A, D
3	Solve second and higher order linear homogeneous differential equations with constant coefficients.	1, 2	1, 6, 11	A, D
4	Solve second and higher order linear nonhomogeneous differential equations with constant coefficients.	1, 2	1, 6, 11	A, D
5	Solve systems of linear differential equations.	1, 2	1, 6, 11	A, D
6	Apply differential equations to model engineering problems.	1, 2	1,6, 11	A, D
7				
8				

*Teaching Methods 1:Expression, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Trouble/Problem Solving, 11:Induvidual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation
**Measuring Methods A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam
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Main Textbook	Diferansiyel Denklemler ve Uygulamaları, M. Aydın, B. Kuryel, G. Gündüz, G. Oturanç
Supporting References	Diferansiyel Denklemler, Branson R., Costa G., Çeviren: Hacısalihoğlu H., Nobel Akademik Yayıncılık, 2016. Differential Equations for Engineers and Scientists, Çengel Y.A., Palm W.J., McGraw Hill, 2012.
Necessary Course Material	Calculator, pencil, notebook, eraser

	Course Schedule
1	Introduction (Basic Concepts, Classification of Differential Equations)
2	First-Order Differential Equations (Separable Equations, Homogeneous Equations)
3	First-Order Differential Equations (Exact Equations, Integrating factor)
4	First-Order Differential Equations (Linear Equations, Bernoulli Equations)
5	Applications of First-Order Differential Equations
6	Applications of First-Order Differential Equations
7	Higher Order Linear Differential Equations (Homogeneous Equations with Constant Coefficients)
8	Mid-Term Exam
9	Higher Order Differential Equations (Nonhomogeneous Equations with Constant Coefficients, Method of Undetermined Coefficients, Method of Variation of Parameters)
10	Second-Order Linear Differential Equations (Method of Variation of Parameters)
11	Higher Order Differential Equations (Operator Methods)
12	Applications of Second-Order Differential Equations (Free Vibrations)
13	Applications of Second-Order Differential Equations (Forced Vibrations)
14	Systems of First-Order Linear Equations (Homogeneous systems with Constant Coefficients)
15	Systems of First-Order Linear Equations (Nonhomogeneous systems with Constant Coefficients)
16,17	Final Exam

Calculation of Course Workload			
Activities	Number	Time (Hour)	Total Workload (Hour)
Course Time (number of course hours per week)	14	3	52
Classroom Studying Time (review, reinforcing, prestudy,….)	14	2	28
Homework			
Quiz Exam			
Studying for Quiz Exam			
Oral exam			
Studying for Oral Exam			
Report (Preparation and presentation time included)			
Project (Preparation and presentation time included)			
Presentation (Preparation time included)			
Mid-Term Exam	1	1.5	1.5
Studying for Mid-Term Exam	1	10	10
Final Exam	1	1.5	1.5
Studying for Final Exam	1	20	20
	Total workload		113
	Total workload / 30		3,8
	Course ECTS Credit		4

Evaluation	
Activity Type	**%**
Mid-term	30
Homework	20
Final Exam	50
Total	100

RELATIONSHIP BETWEEN THE COURSE LEARNING OUTCOMES AND THE PROGRAM OUTCOMES (PO) (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)		
NO	**PROGRAM OUTCOME**	**Contribution**
1	Sufficient knowledge of engineering subjects related with mathematics, science and own branch; an ability to apply theoretical and practical knowledge on solving and modeling of engineering problems.	5
2	Ability to determine, define, formulate and solve complex engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods.	4
3	Ability to design a complex system, a component and/or an engineering process under real life constrains or conditions, defined by environmental, economical and political problems; for that	
4	Ability to develop, select and use modern methods and tools required for engineering applications; ability to effective use of information technologies.	
5	In order to investigate engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results.	
6	Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence.	
7	Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language.	
8	Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement.	
9	Understanding of professional and ethical issues and taking responsibility	
10	Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development.	
11	Knowledge of actual problems and effects of engineering applications on health, environment and security in global and social scale; an awareness of juridical results of engineering solutions.	
12		

LECTUTER(S)				
Prepared by	Assist.Prof.Dr. Ayten Günaydın	Res.Assis.Dr. Meltem Eryılmaz Yıldırım		
Signature(s)				

Date:06.06.2024