



MARMARA UNIVERSITY - FACULTY OF ENGINEERING

2020-2021 Spring

MATH2059 Numerical Methods

COURSE DESCRIPTION FORM

Offering Department		Department of Computer Engineering		Undergraduate must course (4th semester)					
Course Code		MATH2059							
Course Name		Numerical Methods							
Language of Instruction		English							
ECTS		4							
Contact Hours		Theoretical (T): 3		Practice (U): 0		Laboratory(L): 0			
Pre-requisites		MATH1001 Calculus I							
Instructor/Assistant		Instructor		Prof. Dr. Çiğdem Eroğlu Erdem		cigdem.erdem@marmara.edu.tr			
		Assistant		Serap Korkmaz		serap.korkmaz@marmara.edu.tr			
Course Materials		Mandatory		-- S. C. Chapra, R. P. Canale, Numerical Methods for Engineers, 7th edition, McGraw Hill, 2015. -- S. C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, 3rd Edition, McGrawHill, 2012.					
				The course materials, assignments and announcements are shared via the course web page: https://classroom.google.com Class code: o76m5g6 Please visit the above link and click on the plus sign at top right corner to join the class using the class code.					
		Recommended		R. L. Burden and J. D. Faires, Numerical Analysis, Brooks/Cole, 2011.					
Course Objectives		The objective of this course is to introduce basic numerical methods and their applications in engineering. Students who complete the course will have gained the knowledge and skills to analyze the engineering problems they face and apply numerical methods in an effective way.							
Course Content		Introduction to MATLAB programming. Floating point arithmetic. Solving nonlinear equations with a single unknown. Solution of systems of linear equations. Introduction to optimization. Regression and interpolation. Curve fitting. Numerical differentiation and integration. Solution of differential equations using numerical methods.							
Learning Outcomes		LO1		Use the MATLAB programming language and toolboxes to implement numerical algorithms.					
		LO2		Solve nonlinear equations with a single unknown using numerical methods.					
		LO3		Solve systems of linear equations using numerical methods.					
		LO4		Apply basic optimization concepts using numerical methods.					
		LO5		Apply regression and interpolation methods to fit curves to data in engineering applications.					
		LO6		Apply numerical methods for differentiation, integration and differential equations.					
Program Outcomes				LO1	LO2	LO3	LO4	LO5	LO6
PO1		Adequate knowledge in mathematics, science (a) and computer engineering subjects (b) pertaining to the relevant discipline (1); ability to use theoretical and applied information in these areas to model and solve engineering problems (2).			1.a		1.a	1.a	
PO4		Ability to devise (a), select, and use (b) modern techniques and tools needed for engineering practice (1); ability to employ information technologies effectively (2).		1.b 2					
PO12		Knowledge of advanced mathematics subjects including differential equations, integral calculus (a), linear algebra (b), statistics and probability (c), and discrete mathematics (d).				b			a
Subjects (Knowledge, Skills and Behaviours), Contributions of Subjects to Learning Outcomes, Assessment Methods	No	Week	Subjects	LO1	LO2	LO3	LO4	LO5	LO6
	S1	1	Introduction to numerical methods						
	S2	2-3	MATLAB programming	MF, H, Q					
	S3	4-5	Floating point arithmetic: Computer representation; error analysis	MF, Q					
	S4	6-7	Solution of nonlinear equations with a single unknown: Bisection and Regula Falsi Methods; Fixed Point Methods; Newton, Secant Methods; Convergence analysis.		MF, H, Q				
	S5	8	Solving linear systems of equations: Gaussian elimination;pivoting; LU Decomposition			MF, H, Q			
	S6	9	Introduction to optimization: one dimensional optimization: multi variable				MF,H,Q		

[illegible]