COURSE DESCRIPTION FORM			
Course Code and Name	CENG206 NUMERICAL ANALYSIS		
Course Semester	4		
Catalogue Data of the Course (*Course Content*)	Number systems, Interpolation by polynomial, The solution of non-linear equations, Matrices and Systems of Linear Equations		
Course Textbooks	Numerical Methods for Scientists and Engineers (Dover Books on Mathematics) 2nd Revised ed. Edition, R. W. Hamming, 1987.		
Supplementary Textbooks	Introduction to Numerical Analysis: Second Edition (Dover Books on Mathematics), F. B. Hildebrand, 1987. Numerical Mathematics and Computing 7th Edition by E. Ward Cheney, David R. Kincaid, 2012.		
Credit (*ECTS*)	5		
Prerequisites for the Course (*Attendance Requirements*)	There is no prerequisite or co-requisite for this course.		
Course Type	Compulsory		
Language of Instruction	English		
Course Objectives	To teach the error concepts and numerical programming techniques concerning the basic mathematical operations (interpolation, derivative, integral solution of linear algebraic equations and non linear equations) computation of which are performed by means of computer.		
Course Learning Outcomes	1. Explains the basic concepts of Finite Differences. 2. Numerical methods in cases where it is difficult to find roots analytically It finds roots with its help. 3. Explains the solution methods of sets of nonlinear equations. 4. Uses interpolation methods. 5. Uses the given methods to take derivatives. 6. Uses the given methods to take integrals. 7. Explains numerical solutions of double integrals. 8. Explain curve fitting methods. 9. Explain the methods given to solve differential equations.		
Instruction Method *(Face-to-face, Distance education etc.)*	The mode of delivery of this course is Face to face		
Weekly Schedule of the Course	1. Week Numerical analysis in engineering, errors 2. Week Computer representations of integers, floating point numbers (IEEE notation) 3. Week Notation related errors, solution methods for multivariate equations 4. Week Finite difference procedures 5. Week Forward difference, backward difference, central difference tables and their use in finding errors 6. Week The concept of interpolation 7. Week Forward/backward difference interpolation formulas 8. Week Curve fitting, least squares method 9. Week Numerical integration methods 10. Week Ordinary differential equations approximate solution methods 11. Week Iteration methods, Newton-Raphson, Secant, Two Partitions methods 12. Week Runge-Kutta, Euler-Secant methods 13. Week Solving differential equations using Taylor series expansion method 14. Week Application Examples		
Teaching Activities *(The time spent for the activities listed here will determine the amount of credit required)*	Weekly theoretical course hours: 3 Internet search and library work Midterm and revision for midterm Final exam and revision for final exam		
Assessment Criteria		**Number(s)**	**Weight (%)**

Midterm exam	1	40
Assignment	1	20
Application		
Project		
Practice		
Quiz		
Final exam	1	40
Total	3	100

Workload of the Course

Activity	Number of Weeks	Duration (Weekly Hour)	End of Semester Total Workload
Weekly theoretical course hours	14	3	42
Weekly practical course hours			
Reading activities			
Internet search and library work	14	3	42
Designing and implementing materials			
Making a report			
Preparing and making presentations			
Midterm and revision for midterm	1	14	14
Final exam and revision for final exam	2	14	28
Total workload			126
Total workload/ 25			5.04
Course Credit (ECTS)			5

Contribution Level between Course Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Knowledge of mathematics, science, basic engineering, computing, and computer engineering; ability to use this knowledge in solving complex engineering problems.					X
2	Ability to define, formulate and analyze complex engineering problems using basic science, mathematics and engineering knowledge and considering the UN Sustainable Development Goals relevant to the problems addressed.					X
3	Ability to design creative solutions to complex engineering problems; ability to design complex systems, processes, devices, software, algorithms or products to meet current and future requirements, considering realistic constraints and conditions.				X	
4	Ability to select, use and develop appropriate techniques, resources and modern engineering and informatics tools, including estimation and modeling, for the analysis and solution of complex engineering problems while being aware of their limitations.					X
5	Ability to use research methods to examine complex engineering problems or research topics in computer engineering, including reviewing the literature, designing experiments, conducting experiments, collecting data, analyzing and interpreting results.			X		
6	Knowledge of the effects of engineering practices and the standards used in these practices on society, health and safety, economy, sustainability and environment					

	within the scope of the UN Sustainable Development Goals; awareness of the consequences of engineering solutions in the fields of information security and law.						
7	Acting in accordance with engineering professional principles and knowledge on ethical responsibility; awareness of acting impartially, without discrimination on any issue, and being inclusive of diversity.		X				
8	Ability to work effectively individually and as a team member or leader in intradisciplinary and multidisciplinary teams (face-to-face, remote, or hybrid).						
9	Ability to conduct effective verbal and written communication on technical issues in Turkish or English, prepare reports, make effective presentations and prepare software documentation, considering the various differences of the target audience (such as education, language, profession).		X				
10	Knowledge of business practices such as project, risk and change management and economic feasibility analysis; awareness of entrepreneurship and innovation.						
11	Lifelong learning skill that includes the ability to learn independently and continuously, to adapt to new and developing scientific practices and technologies, and to think inquisitively about technological changes.						

Lecturer(s) and Contact Information	Computer Engineering Department Chair bmbb@gazi.edu.tr