

<b>Course Description Form</b>	
<b>Course Code and Name</b>	CENG206 NUMERICAL ANALYSIS
<b>Course Semester</b>	4
<b>Catalog Content</b>	Number systems, Interpolation by polynomial, The solution of non-linear equations, Matrices and Systems of Linear Equations
<b>Textbook</b>	Numerical Methods for Scientists and Engineers (Dover Books on Mathematics) 2nd Revised ed. Edition, R. W. Hamming, 1987.
<b>Supplementary Textbooks</b>	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.
<b>Credit</b>	4
<b>Prerequisites of the Course</b> ( Attendance Requirements)	There is no prerequisite or co-requisite for this course.
<b>Type of the Course</b>	Compulsory
<b>Instruction Language</b>	English
<b>Course Objectives</b>	Teaching 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.
<b>Course Learning Outcomes</b>	1 Introducing numerical analysis issues 2 Introducing the basic concepts of finite differences 3 Introducing numerical methods for root finding 4 Introducing the methods of solution of nonlinear equations 5 Introducing the methods of interpolation 6 Introducing the methods to get the derivative 7 Introducing the methods of integration 8 Introducing numerical solutions of double integrals 9 Introducing the methods of curve fitting 10 Introducing the methods for solving differential equations
<b>Instruction Methods</b>	The mode of delivery of this course is Face to face

<p><b>Weekly Schedule</b></p>	<ol style="list-style-type: none"> <li>1. Week Numerical analysis in engineering, errors</li> <li>2. Week Computer representations of integers, floating point numbers (IEEE notation)</li> <li>3. Week Notation related errors, solution methods for multivariate equations</li> <li>4. Week Finite difference procedures</li> <li>5. Week Forward difference, backward difference, central difference tables and their use in finding errors</li> <li>6. Week The concept of interpolation</li> <li>7. Week Forward/backward difference interpolation formulas</li> <li>8. Week Curve fitting, least squares method</li> <li>9. Week Numerical integration methods</li> <li>10. Week Ordinary differential equations approximate solution methods</li> <li>11. Week Iteration methods, Newton-Raphson, Secant, Two Partitions methods</li> <li>12. Week Runge-Kutta, Euler-Secant methods</li> <li>13. Week Solving differential equations using Taylor series expansion method</li> <li>14. Week Application Examples, Assignments</li> </ol>																															
<p><b>Teaching and Learning Methods</b></p> <p><i>(These are examples. Please fill which activities you use in the course)</i></p>	<p>Weekly theoretical course hours: 3  Reading Activities  Preparation of Midterm and Midterm Exam  Final Exam and Preparation for Final Exam</p>																															
<p><b>Assessment Criteria</b></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">Numbers</th> <th style="width: 20%; text-align: center;">Total Weighting (%)</th> </tr> </thead> <tbody> <tr> <td>Midterm Exams</td> <td style="text-align: center;">1</td> <td style="text-align: center;">40</td> </tr> <tr> <td>Assignment</td> <td style="text-align: center;">4</td> <td style="text-align: center;">20</td> </tr> <tr> <td>Application</td> <td></td> <td></td> </tr> <tr> <td>Projects</td> <td></td> <td></td> </tr> <tr> <td>Practice</td> <td></td> <td></td> </tr> <tr> <td>Quiz</td> <td></td> <td></td> </tr> <tr> <td>Percent of In-term Studies (%)</td> <td></td> <td style="text-align: center;">60</td> </tr> <tr> <td>Percentage of Final Exam to Total Score (%)</td> <td></td> <td style="text-align: center;">40</td> </tr> <tr> <td>Attendance</td> <td></td> <td></td> </tr> </tbody> </table>		Numbers	Total Weighting (%)	Midterm Exams	1	40	Assignment	4	20	Application			Projects			Practice			Quiz			Percent of In-term Studies (%)		60	Percentage of Final Exam to Total Score (%)		40	Attendance			
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<b>Workload</b>	<b>Activity</b>	<b>Total Number of Weeks</b>	<b>Duration (weekly hour)</b>	<b>Total Period Work Load</b>			
	Weekly Theoretical Course Hours	14	3	42			
	Weekly Tutorial Hours						
	Reading Tasks	14	2	28			
	Studies						
	Material Design and Implementation						
	Report Preparing						
	Preparing a Presentation						
	Presentations						
	Midterm Exam and Preparation for Midterm Exam	1	14	14			
	Final Exam and Preparation for Final Exam	1	14	14			
	Other ( should be emphasized)			0			
	Total Workload			98			
	Total Workload / 25			3.92			
Course Credit (ECTS)			4				
<b>Contribution Level Between Course Learning Outcomes and Program Outcomes</b>	No	Program Outcomes	1	2	3	4	5
	1	Sufficient knowledge on mathematics, science and computer engineering; ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems					X
	2	Ability to identify, define, formulate and solve complex engineering problems; ability to choose and apply appropriate analysis and modelling methods for these purposes					X
	3	Ability to design a complex system, process, device, software, algorithm, or product under realistic constraints and circumstances to meet certain requirements; ability to apply modern design techniques for this purpose				X	
	4	Ability to choose, develop and use modern techniques and tools necessary for engineering applications; ability to effectively use computing technologies			X		
	5	Ability to design and implement systems or experiments to solve engineering problems, collect and interpret data to evaluate and analyze the results of solutions			X		
	6	Ability to work effectively in intradisciplinary and interdisciplinary teams or individually					X
	7	Ability to efficiently prepare, evaluate and interpret reports				X	
	8	Ability to make presentations and conduct effective verbal and written communication in Turkish and English	X				
	9	Awareness of the necessity of lifelong learning; ability to access information, follow scientific and technological developments; ability to perpetually renew oneself			X		
	10	Awareness of professional and ethical responsibility, ability to act in accordance with ethical principles		X			

	11	Ability to apply knowledge on project management, risk management and change management	X				
	12	Awareness of entrepreneurship and innovation, ability to design and build sustainable systems	X				
	13	Ability to devise local and global solutions to contemporary issues considering the effects of engineering applications on health, environment and security	X				
	14	Awareness of the legal consequences of engineering solutions	X				
	15	Ability to apply knowledge on software development process and documentation rules	X				
	16	Knowledge on standards used in engineering applications	X				
	17	Awareness of occupational health and security, information security and privacy	X				
<b>The Course's Lecturer(s) and Contact Information</b>		Computer Engineering Department Chair bmbb@gazi.edu.tr					