

Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering  
 Mechanical Engineering Department  
 2022-2023 Spring Semester  
**SYLLABUS**

<b>Code/Name</b>	MEC 208 / Numerical Methods
<b>Type</b>	Required
<b>Credit/ECTS</b>	4/4
<b>Hour per Week</b>	3 (3+0+0)
<b>Level/Year</b>	Undergraduate/2
<b>Semester</b>	Spring
<b>Classroom</b>	A403
<b>Content</b>	Basic concepts of computational methods. Error analysis. Numerical solutions of linear and nonlinear algebraic equations. Numerical approximations: regression and interpolation. Numerical differentiation and integration. Numerical solution of ordinary differential equations: initial and boundary value problems, eigenvalue problems. Introduction to the numerical solution of partial differential equations. Applications using appropriate software.

**Prerequisites**

<b>Textbooks</b>	<p><b>Primary</b>                  Chapra SC, Canale RP, <i>Numerical Methods for Engineers</i>, 8<sup>th</sup> edition, McGraw-Hill, 2021.</p> <p><b>Supplementary</b>                  Hoffman JD, Frankel S, <i>Numerical Methods for Engineers and Scientists</i>, 2<sup>nd</sup> edition, CRC Press, 2001.</p>
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<b>Objectives</b>	<ul style="list-style-type: none"> <li>To analyze the numerical methods in engineering applications and give knowledge about numerical approaches.</li> <li>To analyze how numerical analyses can be applied to a wide range of problems of importance in engineering and industry.</li> </ul>
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<b>Course Outcomes</b>	In this course students will be able to: CO1 Develop stable and accurate solution algorithms for a given problem and perform error analysis of the found results CO2 Solution of the linear and non-linear equation and equation systems with various methods CO3 Application of various interpolation and curve fitting methods in the solution of engineering problems CO4 Application of numerical differentiation and integration methods in the solution of various engineering problems CO5 Understand engineering problems expressed by ODEs and solutions to these problems using numerical solution methods
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**Weekly Schedule of Topics**

W	Topic
1	Introduction to numerical methods, approximation and round-off errors
2	Taylor Series, Algorithms, Numerical Errors
3	Roots of equation:, Graphical Methods, Bisection Method, False-Position Method
4	Simple Fixed-Point Iteration, Newton- Rampson Method, Secant Model
5	Linear Algebraic Equations: Gauss Elimination, Gauss-Jordan
6	LU Decompositon, The Matrix inverse, Gauss-Seidel
7	Curve Fitting: Least- Squares Regression (Linear Regression, Polynomial regression etc.)
8	Interpolation, Newton's Divided- Differences Intepolating Polynomials
9	Numerical Differantiation and Integration: Trapezoidal rule, Simpson's Rules

10	Ordinary Differeation Equations :Euler’s Method, Runge-Kutta Methods
11	Ordinary Differeation Equations :Euler’s Method, Runge-Kutta Methods
12	Boundary-Value Problems, General Methods
13	Eigenvalue Problems
14	Introduction to the numerical solution of partial differential equations

<b>Professional Contribution</b>	Ability to understand, apply, and use the numerical methods and tools in engineering
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**Contribution to Program Outcomes\***

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	5	1	5	5	0	2	1	3	1	5	2
CO2	5	1	5	5	0	2	1	3	1	5	2
CO3	5	1	5	5	0	2	1	3	1	5	2
CO4	5	1	5	5	0	2	1	3	1	5	2
CO5	5	1	5	5	0	2	1	3	1	5	2

\* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

<b>Special Conditions</b>	The consequence of violation of the attendance rule is to receive a grade of <b>NA</b> .
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**Requirements**

<b>Evaluation</b>	Midterm Exam	40%
	Quizzes	20%
	Final Exam	40%
	Total	100%

<b>Course Policy</b>	<ol style="list-style-type: none"> <li>1. You must attend at least 70% of the sessions including add-drop period. Otherwise, you will receive a grade of DZ.</li> <li>2. Be in the class on time.</li> <li>3. English should always be used to communicate with one another.</li> <li>4. Mobile phone should be switched off and put away during the class.</li> <li>5. Illegal copies of the textbooks and other course materials cannot be used for the classwork and exams.</li> </ol>
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<b>Cheating &amp; Plagiarism</b>	<ul style="list-style-type: none"> <li>• Copying or letting someone to copy your work on exams, assignments, or reports is cheating.</li> <li>• Cutting and pasting text, figures and tables from the web sources or any other electronic source is plagiarism.</li> <li>• A consequence of academic dishonesty is to receive a grade of FF for the course.</li> </ul>
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**Instructor**

Name/Surname	Dr. Gökhan CANBOLAT	Email	gokhan.canbolat@alanya.edu.tr
Room	411	Office Hours	Tuesday : 11:30 – 12:30 Wednesday : 11:30 – 12:30