COURSE INFORMATION FORM

Course Name	Course Code
Numerical Analysis I	821613006

Semester	Number of Course Hours per Week		Credit	ECTS
	Theory	**Practice**		
3	3	0		5

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

Course Language	Course Level	Course Type
Turkish	Undergraduate	Elective

Prerequisite(s) if any	
Objectives of the Course	The aim of this course is to teach students the fundamental principles and applications of numerical analysis methods. The course aims to equip students with the ability to solve mathematical problems using numerical methods. Students will gain knowledge in topics such as root finding, interpolation, numerical integration and differentiation, and numerical solutions of linear equation systems. By applying numerical methods through computer programs, students will develop the ability to solve real-world problems in engineering, physics, economics, and other fields.
Short Course Content	This course covers the fundamentals and applications of numerical methods. The content includes the solution of linear equation systems, root-finding methods, interpolation techniques, and numerical integration and differentiation.

	Learning Outcomes of the Course	Contributed PO(s)	Teaching Methods *	Measuring Methods **
1	Understand the fundamentals of numerical methods and comprehend their advantages and disadvantages compared to analytical methods.	1	1,2,5	A
2	Apply root-finding methods to approximate the roots of functions.	2,3	1,2,5	A
3	Use interpolation techniques to estimate values between data points.	3,4,5	1,2,5	A
4	Solve basic mathematical problems such as integration and differentiation using numerical methods.	1,4,6	1,2,5	A
5	Apply various numerical methods to solve linear equation systems.	2,3,4	1,2,5	A
6	Analyze errors in numerical methods and evaluate the accuracy of the results.	5,6,7	1,2,5	A
7	Implement numerical methods in computer programs and develop numerical algorithms using programming languages such as Python, MATLAB, or similar.	7,8,9,10	14,15	A
8	Recognize the application areas of numerical methods and understand their importance in engineering, physics,	11,12,13,14,15	14,15	A

*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

	economics, and other fields. Develop solutions to real-world problems through numerical analysis.			

Main Textbook	Burden, R. L. & Faires J. D, Numerical Analysis, Fifth Ed., PWS Publishing Company, Boston, 1993.
Supporting References	Ward Cheney & David Kincaid, Numerical Mathematics and Computing, Second Ed., Cole Publishing Company, California, 1985.
Necessary Course Material	

Course Schedule	
1	Taylor theorem and Taylor series
2	Approximations and error analysis
3	Numerical solutions of one variable equations
4	Bisection method, Regula Falsi method and Newton Raphson method
5	Secant method, fixed point iteration
6	Interpolation and polinomial approximatin, Curve fitting
7	Lagrange interpolation and Newton interpolation
8	Mid-Term Exam
9	Numerical derivative, forward, backward and centeral difference formulas
10	Numerical integration, Rectangular rule and trapez rule
11	Simpson method
12	Analytical solutions of linear equations system, Gauss elimination, Crammer rule
13	Numerical solutions of linear equations system, Jacobi method, Gauss Seidel method
14	Least squares method
15	Computer algorithms for numerical methods
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	42
Classroom Studying Time (review, reinforcing, prestudy,….)	14	3	42
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)	1	5	5
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	20	20
Final Exam	1	2	2
Studying for Final Exam	1	30	30
	Total workload		143
	Total workload / 30		4,76
	Course ECTS Credit		5

*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

Evaluation	
Activity Type	**%**
Mid-term	50
Quiz	
Homework	
Bir öğe seçin.	
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	The ability to apply knowledges of Mathematics and Computer Sciences,	5
2	To have sufficient theoretical and practical knowledge of Mathematics at international level,	3
3	The ability of describing, modelling and solving of mathematical problems at Mathematics and related subjects,	5
4	The skill to solve and design a problem process in accordance with a defined target,	5
5	Skills to analyze data, interpret and apply to other datum and using these data on computer,	4
6	The skill to use the modern techniques and computational tools needed for mathematical applications,	5
7	The skill to make team work within the discipline and interdisciplinary,	3
8	The ability to improve oneself by following the developments on other modern, scientific and technological subjects as well as Mathematics and Computer Sciences,	4
9	The skill to communicate orally and in written way, in a clear and concise manner by having individual work skills and ability to independently decide and analytical thinking,	2
10	The skill to have professional and ethical responsibility,	2
11	The skill to have consciousness for quality issues and scientific research,	2
12	The skill to be sensitive to environmental issues related with problems and development of living area and consistent in the social relations,	1
13	Ability to solve problems in the working life faced to find an appropriate algoritms via mathematical modeling and to write computer programs,	5
14	The skill to developed design of software systems at different complex levels,	4
15	The credence of necessity of life-long learning and ability to apply the formation long-life learning.	2

LECTUTER(S)				
Prepared by	Assoc. Dr. Özlem ERSOY HEPSON			
Signature(s)				

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