

# NUMERICAL ANALYSIS

<b>1</b>	Course Title:	NUMERICAL ANALYSIS	
<b>2</b>	Course Code:	TEK3081SİL	
<b>3</b>	Type of Course:	Optional	
<b>4</b>	Level of Course:	First Cycle	
<b>5</b>	Year of Study:	3	
<b>6</b>	Semester:	5	
<b>7</b>	ECTS Credits Allocated:	4.00	
<b>8</b>	Theoretical (hour/week):	2.00	
<b>9</b>	Practice (hour/week):	0.00	
<b>10</b>	Laboratory (hour/week):	0	
<b>11</b>	Prerequisites:		
<b>12</b>	Language:	Turkish	
<b>13</b>	Mode of Delivery:	Face to face	
<b>14</b>	Course Coordinator:	Prof. Dr. İRFAN KARAGÖZ	
<b>15</b>	Course Lecturers:		
<b>16</b>	Contact information of the Course Coordinator:	karagoz@uludag.edu.tr	
<b>17</b>	Website:		
<b>18</b>	Objective of the Course:	This course is designed to introduce engineering students to the numerical solutions of mathematical problems occurring in engineering and to improve their computer skills.	
<b>19</b>	Contribution of the Course to Professional Development:	It provides the ability to create a mathematical model of the problems that will be encountered in professional work, and to solve these model equations effectively using a calculator. It also contributes to the ability to estimate or reduce errors that may occur during the solution.	
<b>20</b>	Learning Outcomes:		
		<b>1</b>	Be familiar with matrix operations.
		<b>2</b>	Be able to use numerical methods to solve linear and nonlinear algebraic equations.
		<b>3</b>	Ability to interpolate any data.
		<b>4</b>	Ability to differentiate and integrate any data, numerically
		<b>5</b>	Ability to solve numerically ordinary differential equations.
		<b>6</b>	Ability to explain the advantages and disadvantages of alternative numerical methods.
		<b>7</b>	Be able to make the computer implementation of these numerical methods to solve fundamental and practical engineering problems and to develop programming skills.
		<b>8</b>	Ability to recognize the importance of errors and be able to estimate the errors in numerical solution.
		<b>9</b>	
		<b>10</b>	
<b>21</b>	Course Content:		
		<b>Course Content:</b>	
<b>Week</b>	<b>Theoretical</b>	<b>Practice</b>	
<b>1</b>	Overview of numerical methods, their potential and limitations Approximations and errors.		

<b>2</b>	Solution of the systems of linear equations, Direct methods: Gaussian elimination, Gauss Jordan elimination,	
<b>3</b>	Iterative methods for linear systems, simple iteration, Gauss-Seidel , relaxation.	
<b>4</b>	Linear Independence, system condition, ill-conditioned equations, matrix inversion, Roots of Equations, linear interpolation.	
<b>5</b>	Simple iteration and Newton-Raphson methods, Quiz 1	
<b>6</b>	Systems of nonlinear equations, Newton method,	
<b>7</b>	Finite differences and Interpolating polynomials	
<b>8</b>	Lagrange interpolation, spline interpolation,	
<b>9</b>	Numerical differentiation.	
<b>10</b>	Repeating courses and midterm exam	
<b>11</b>	Numerical integration. Newton-Cotes integration of equations. Multi variable integration, Improper integrals.	
<b>12</b>	Numerical solution of ordinary and partial differential equations. Taylor's expansion method,	
<b>13</b>	Euler's method, Runge-Kutta methods, Quiz 2	

Activites		Number	Duration (hour)	Total Work Load (hour)
Theoretical	Materials: İrfan Karagöz, 3.baskı, Nobel yay., 2011	2	2.00	28.00
Practicals/Labs	2. Numerical Methods for Engineers	0	0.00	0.00
Self study and preperation	3. Numerical Methods for Engineers and Scientists, J. Hoffman: McGraw-Hill 1993	3	3.00	36.00
Homeworks		4	5.00	20.00
Projects	Assesment	0	0.00	0.00
Field Studies		0	0.00	0.00
Midterm exams	1	1	15.00	15.00
Midterm Exam		1	40.00	
Others		0	0.00	0.00
Final Exams		1	21.00	21.00
Home work-project	0	0	0.00	
Total Work Load				120.00
Final Exam	1	1	39.00	
Total work load/ 30 hr	2	2	100.00	4.00
ECTS Credit of the Course				4.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00		
Contribution of Final Exam to Success Grade		60.00		
Total		100.00		
Measurement and Evaluation Techniques Used in the Course		Exams are conducted in a classical style. Easy, medium and difficult questions are asked to cover every subject.		

24	ECTS / WORK LOAD TABLE
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ÖK2	3	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	2	3	0	2	4	0	0	0	0	0	0	0	0	0	0	0
ÖK4	3	3	0	3	4	0	0	0	0	0	0	0	0	0	0	0
ÖK5	3	4	0	1	2	0	0	0	0	0	0	0	0	0	0	0
ÖK6	1	4	0	1	1	0	0	0	0	0	0	0	0	0	0	0
ÖK7	1	3	0	4	1	0	0	0	0	0	0	0	0	0	0	0
ÖK8	1	1	0	2	4	0	0	0	0	0	0	0	0	0	0	0
LO: Learning Objectives    PQ: Program Qualifications																
Contribution Level:	1 very low		2 low		3 Medium		4 High		5 Very High							