NUMERICAL ANALYSIS

1	Course Title:	NUMERICAL ANALYSIS	
2	Course Code:	TEK3081	
3	Type of Course:	Optional	
4	Level of Course:	First Cycle	
5	Year of Study:	3	
6	Semester:	5	
7	ECTS Credits Allocated:	4.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	No	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Dr. Ögr. Üyesi EROL SOLMAZ	
15	Course Lecturers:	Prof.Dr. İrfan Karagöz Yrd.Doç.Dr. Erol Solmaz	
16	Contact information of the Course Coordinator:	karagoz@uludag.edu.tr 40018	
17	Website:		
18	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.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	Be familiar with matrix operations.
		2	Be able to use numerical methods to solve linear and nonlinear algebraic equations.
		3	Ability to interpolate any data.
		4	Ability to differentiate and integrate any data, numerically
		5	Ability to solve numerically ordinary differential equations.
		6	Ability to explain the advantages and disadvantages of alternative numerical methods.
		7	Be able to make the computer implementation of these numerical methods to solve fundamental and practical engineering problems and to develop programming skills.
		8	Ability to recognize the importance of errors and be able to estimate the errors in numerical solution.
		9	
		10	
21	Course Content:		

Course Content:

Week	Theoretical	Practice
1	Overview of numerical methods, their potential and limitations Approximations and errors.	

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

23	Materials:	İrfan Karagöz, 3.baskı, Nobel yay., 2011 2. Numerical Methods for Engineers 3. Numerical Methods for Engineers and Scientists, J. Hoffman; McGraw-Hill 1993

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	12	1.00	12.00
Homeworks	5	4.00	20.00
Projects Assesment	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	10.00	10.00
Midterm Exam	1	30.00	
Others	3	5.00	15.00
Final Exams	1	12.00	12.00
Home work-project	0	0.00	
Total Work Load			97.00
Total work load/ 30 hr			3.23
Total	100.00		
ECTS Credit of the Course			4.00

Contribution of Term (Year) Learning Activities to Success Grade	50.00
Contribution of Final Exam to Success Grade	50.00
Total	100.00
Measurement and Evaluation Techniques Used in the Course	

24	**ECTS / WORK LOAD TABLE**

25	**CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS**															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	4	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0

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**