

# NUMERICAL ANALYSIS

1	Course Title:	NUMERICAL ANALYSIS
2	Course Code:	MAT3044
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	3
6	Semester:	6
7	ECTS Credits Allocated:	5.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	None
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Prof. Dr. MEHMET ÇAĞLIYAN
15	Course Lecturers:	Yrd.Doç.Dr. Sezayi HIZLIYEL
16	Contact information of the Course Coordinator:	caglayan@uludag.edu.tr, 0-224-2941752 Uludağ Üniv. Fen Ed. Fakültesi Matematik Bölümü Görükle Yerleşkesi 16059 Nilüfer/Bursa
17	Website:	
18	Objective of the Course:	The aim of the course is the design and analysis of techniques to give approximate but accurate solutions to hard problems
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	understand IEEE standard binary floating point format, machine precision and computer errors
	2	use Newton's method, Newton-Raphson's method, or the secant method to solve the equation $f(x)=0$ within the given tolerance
	3	use polynomial interpolations, including the Lagrange polynomial, the Hermit polynomial and cubic spline functions, for curve fitting, or data analysis; use, Newton's divided difference or cubic spline algorithms to evaluate the interpolations;
	4	difference formulas to calculate the approximate derivatives of functions and uses Lagrange polynomial approach to estimate errors
	5	external estimation method calculates numerical derivatives
	6	using the method of Romberg, Simson and Gauss calculates the numerical integration and determines the numerical error
	7	Solutions for non-linear systems of equations uses Newton Raphson method and fixed-point iteration
	8	write numerical programs, such as Matlab programs, to solve the above problems
	9	
	10	

21	Course Content:			
	Course Content:			
Week	Theoretical	Practice		
1	Error varieties, Arithmetic error analysis, some basic mathematical information			
2	operators and types (forward, backward, expansion, etc.)			
3	Approximate calculation of the roots of equations in one variable (Regula Falsi, Cutting, Newton-Raphson method)			
4	Approximate calculation of the roots of equations in one variable (Adjusted Regula Falsi, Corrected Newton Raphson, etc.).			
5	Interpolation and Lagrange interpolation polynomials			
6	Finite difference calculation, founded on the finite difference backward difference interpolation, advanced notice of Stirling, Everet, and Gaussian interpolasyon			
7	General problem-solving			
8	Repeating courses and midterm exam			
9	Numerical differentiation and error, analytical methods of substitution numerical differential calculus, exterior derivative estimation method			
Activites		Number	Duration (hour)	Total Work Load (hour)
11	Romberg, Simpson and Gauss numerical integral calculation method and the numerical	14	3.00	42.00
Practicals/Labs		0	0.00	0.00
12	Newton Raphson method for the solution of non-linear systems of equations	14	4.00	56.00
Homeworks		3	5.00	15.00
Projects	with fixed point iteration	0	0.00	0.00
Field Studies		0	0.00	0.00
Midterm exams				
22	Textbooks, References and/or Other	1	10.00	10.00
Others		2	8.00	16.00
Final Exams		2	10.00	10.00
Total Work Load				149.00
23	Assesment			
Total work load/ 30 hr				4.97
ECTS Credit of the Course				5.00
Midterm Exam		1	40.00	
Quiz		0	0.00	
Home work-project		0	0.00	
Final Exam		1	60.00	
Total		2	100.00	
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				
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	3	0	4	0	0	0	0	0	4	0	0	0	0	0	0	0
ÖK2	0	0	4	0	4	0	0	0	0	3	0	0	0	0	0	0
ÖK3	0	4	0	0	0	0	0	0	0	0	4	0	0	0	0	0
ÖK4	0	4	0	0	0	0	0	0	0	0	4	0	0	0	0	0
ÖK5	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
ÖK6	0	4	0	0	0	0	0	0	0	0	4	0	0	0	0	0
ÖK7	0	4	0	0	0	0	0	0	0	0	4	0	0	0	0	0
ÖK8	0	5	0	4	0	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				