NUMERICAL ANALYSIS

1	Course Title:	NUMERICAL ANALYSIS
2	Course Code:	MAT3044
3	Type of Course:	Compulsory
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):	1
11	Prerequisites:	None
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Prof. Dr. NURSEL ÖZTÜRK
15	Course Lecturers:	Doç. Dr. ASLI AKSOY
16	Contact information of the Course Coordinator:	nursel@uludag.edu.tr Tel: 0224 294 2083 Bursa Uludağ Üniversitesi Endüstri Mühendisliği Bölümü
17	Website:	
18	Objective of the Course:	The objective of the course is to learn the numerical analysis methods.
19	Contribution of the Course to Professional Development:	The contribution of the course to the professional development is to introduce the basic knowledge and methods about numerical analysis, and to provide ability to apply the learned methods.
20	Learning Outcomes:	

	1	Will be able to understand the solutions for non-linear and linear systems, regression, interpolation, numerical integration, numerical differentiation methods
	2	Will be able to solve the engineering problems using numerical methods and to use numerical analysis software
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21	Course Content:	

	Course Content:	
Week	Theoretical	Practice
1	Introduction to Numerical Analysis, Error Analysis	MATLAB

#	Topic	Tools
2	The solution of nonlinear equations - Bracketing Methods (Graphical methods, The Bisection Method, The False-Position Method)	MATLAB and Numerical Methods Toolkit
3	The solution of nonlinear equations -Open Methods (Simple fixed point iteration, The Newton-Raphson Method)	MATLAB and Numerical Methods Toolkit
4	The solution of nonlinear equations (The Secant Method, Multiple roots)	MATLAB
5	Linear algebraic equations (Motivation, Gauss Elimination, Pitfalls of elimination methods, Techniques for improving solutions, Determinant with Gauss elimination)	MATLAB
6	Linear algebraic equations (Gauss-Jordan, The matrix inverse, The solution vector with Gauss-Jordan and matrix inverse)	MATLAB
7	Linear algebraic equations (LU Decomposition, LU Decomposition version of Gauss elimination-Doolittle, Crout decomposition, The matrix inverse with the LU decomposition)	MATLAB

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	14	1.00	14.00
Self study and preperation	14	4.00	56.00
Homeworks	3	8.00	24.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	2.00	2.00
Others	0	0.00	0.00
Final Exams	1	2.00	2.00
Total Work Load			126.00
Total work load/30hr			4.20
ECTS Credit of the Course			4.00

(overlapping week rows)

#	Topic	Tools
11	Interpolation (Newton's divided-difference interpolating polynomials)	MATLAB
13	Numerical Integration (The Trapezoidal Rule, Simpson's Rules, Integration with unequal ...)	MATLAB
14	Numerical Differentiation, High-Accuracy Differentiation Formulas	MATLAB

22	Textbooks, References and/or Other Materials:	• S.C. Chapra and R.P. Canale, "Numerical Methods for Engineers", McGraw Hill. • S.C. Chapra and R.P. Canale, Çev. H. Heperkan, U. Kesgin, "Yazılım ve Programlama Uygulamalarıyla Mühendisler İçin Sayısal Yöntemler", Literatür Yay.
23	Assesment	

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
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	Midterm Exam, Final Exam	

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	4	0	0	3	0	0	0	0	0	0	0	0	0	0	0
ÖK2	5	5	0	0	4	0	0	0	0	0	0	0	4	0	0	0

LO: Learning Objectives PQ: Program Qualifications					
Contribution Level:	1 very low	2 low	3 Medium	4 High	5 Very High