ENGINEERING MATHEMATICS

1	Course Title:	ENGINEERING MATHEMATICS	
2	Course Code:	TEK2002	
3	Type of Course:	Compulsory	
4	Level of Course:	First Cycle	
5	Year of Study:	2	
6	Semester:	4	
7	ECTS Credits Allocated:	5.00	
8	Theoretical (hour/week):	4.00	
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:	Dr. Ögr. Üyesi FATİH SÜVARİ	
15	Course Lecturers:	Yrd. Doç. Dr. Sevda Telli, Yrd. Doç. Dr. Gürsel Şefkat	
16	Contact information of the Course Coordinator:	E-Posta: okopmaz@uludag.edu.tr Tel: +90 224 294 19 62 Posta Adresi: U.Ü., Müh. Mim. Fak., Makine Müh. Bölümü, Görükle, 16059 Bursa	
17	Website:	http://www20.uludag.edu.tr/~mtd/	
18	Objective of the Course:	To transmit to students the applications of linear algebra and higher calculus encountered in various engineering courses along with examples from those courses simultaneously teaching the basic theory knowledge to them To get student have the ability of correct reasoning, and the skill of implementing the results in these branches of mathematics as a tool in engineering problems.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	The students who attend this course can establish and solve engineering problems which can be defined in form of linear algebraic equations,
		2	They can study and solve matrix eigenvalue problems that emerge in vibrations, strength of materials, and similar engineering fields,
		3	They can analyze the general 3-dimensional motion of a particle or body point through vector functions,
		4	They can calculate multiple or line integrals in some engineering sciences such as dynamics, strength of materials, fluid mechanics etc.
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21	Course Content:	
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Week	Theoretical	Practice
1	Introduction to linear algebra. Matrices and matrix algebra. Special matrices. Set of linear equations. Matrix representation of a set of linear equations.	
2	Method of Gauss elimination in solving linear equations. Existence and uniqueness of solution. Rank of matrices. Relation between the concept of rank and the existence and uniqueness of solution of a set of linear equations.	
3	Determinants. Cramer's method. Inverse matrix. Singular matrix. Solving a set of linear algebraic equations using inverse matrix method, and Gauss-Jordan method.	
4	Matrix eigenvalue problems. Orthogonal matrices. Orthogonality of eigenvectors. Examples from strength of materials, and vibrations.	
5	Vector algebra. Scalar, vector, and mixed product in vectors. 1. quiz.	
6	Vector functions. Serret-Frenet formulas. Osculator plane. Curvature and torsion of curves. Applied problems from Dynamics. Derivation of the equations of straightlines and planes in space.	
7	Introduction to multi-variable functions. Two-variable functions. Limit, continuity, and derivatives in two-variable functions. Partial derivatives. Isohips. Tangent plane.	
8	Stationary points. Partial and perfect differentials, and their implementation in error estimation. Definition of gradient.	
9	Direction derivative. Parametric differentiation. Constrained extremum problems. Method of Lagrange multipliers.	
10	Midterm exam + Course review	
11	Double integrals in Cartesian and polar coordinates. Jacobian. Transition to different coordinate systems.	
12	Finding of the area of a surface patch. Triple integrals and their application in engineering.	
13	Line integrals. Path independence. Vector fields. Potential functions. Conservative fields. Green's theorem.	
14	Divergence and curl. Integral theorems in vector analysis. Stokes' and Gauss-Ostrogradski theorems. 2. quiz	
22	Textbooks, References and/or Other Materials:	MAK2002/TEK2002 Engineering Mathematics Lecture Notes, O. Kopmaz-S. Telli, Bursa, 2008.
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	25.00
Quiz	2	25.00
Home work-project	0	0.00

Final Exam	1	50.00
Total	4	100.00
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

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	13	3.00	39.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	24.00	24.00
Others	2	12.00	24.00
Final Exams	1	24.00	24.00
Total Work Load			153.00
Total work load/ 30 hr			5.10
ECTS Credit of the Course			5.00

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	4	4	0	0	0	4	0	0	0	0	0	0	0	0	0
ÖK2	4	4	4	0	0	0	4	0	0	0	0	0	0	0	0	0
ÖK3	4	4	4	0	0	0	4	0	0	0	0	0	0	0	0	0
ÖK4	4	4	4	0	0	0	4	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