

ADVANCED ENGINEERING MATHEMATICS

1	Course Title:	ADVANCED ENGINEERING MATHEMATICS	
2	Course Code:	MAK5001	
3	Type of Course:	Compulsory	
4	Level of Course:	Second Cycle	
5	Year of Study:	1	
6	Semester:	1	
7	ECTS Credits Allocated:	6.00	
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:	Doç. Dr. MURAT REİS	
15	Course Lecturers:	Prof. Dr. Osman Kopmaz	
16	Contact information of the Course Coordinator:	okopmaz@uludag.edu.tr +90 224 294 19 62 Uludağ Üniversitesi, Mühendislik Mimarlık Fakültesi, Makine Mühendisliği Bölümü, Görükle, 16059 Bursa	
17	Website:		
18	Objective of the Course:	Teach advanced mathematical methods which are used in solving engineering problems.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	Students who attend this course learn advanced topics and methods of mathematics.
		2	They can model engineering problems, and solve them using mathematical methods.
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21	Course Content:		
	Course Content:		
Week	Theoretical	Practice	
1	Review of ordinary differential equations. Series solutions of differential equations. Frobenius method.		
2	Special differential equations. Bessel and modified Bessel differential equations. Classical and modified Bessel functions of first and second kind. 1st take-home.		

3	Legendre differential equation and Legendre polynomials. General expansion theorem. Orthogonality and completeness. Orthogonal functions.			
4	Fourier series. Fourier integrals and transform. Laplace transforms. 2nd take-home.			
5	Partial differential equations. Deriving equations in engineering problems. One dimensional wave equation. D'Alembert solution.			
6	Method of separation of variables. Initial and boundary value problems. Eigenvalue problems. Eigenvalues and eigenfunctions. Examples from vibrations theory and heat transfer. 3rd take-home.			
7	Series solutions. Classification of second order partial differential equations. Elliptic, hyperbolic and parabolic equations. Characteristic curves.			
8	Repeating courses and midterm exam			
9	Calculus of variations. Variations. Variation problems in integral form. Euler-Lagrange equations.			
10	Application examples. Constrained variation problems.			
11	Variational principles of mechanics. Lagrange			
Activites		Number	Duration (hour)	Total Work Load (hour)
Theoretical		14	3.00	42.00
Practicals/Labs		0	0.00	0.00
13	Self-study and preparations	14	7.00	98.00
Homeworks		5	15.00	75.00
14	Projects	0	0.00	0.00
Field Studies		0	0.00	0.00
Midterm exams		1	2.50	2.50
Others		0	0.00	0.00
Final Exams		Materials: Mathematics, McGraw Hill Publ. Comp. E. Kreyszig Advanced Engineering Mathematics, J. Wiley		2.50
Total Work Load				220.00
Total work load/ 30 hr		B. Karaoglu, FİZİK ve Mühendislikte Matematik Yöntemler, Seckin Yavıncılık.		7.33
ECTS Credit of the Course				6.00
23	Assesment			
TERM LEARNING ACTIVITIES		NUMBER	WEIGHT	
Midterm Exam		1	25.00	
Quiz		0	0.00	
Home work-project		5	25.00	
Final Exam		1	50.00	
Total		7	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															
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
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	1 very low			2 low			3 Medium			4 High			5 Very High			