ADVANCED TOPICS IN MACHINE DYNAMICS

1	Course Title:	ADVANCED TOPICS IN MACHINE DYNAMICS	
2	Course Code:	MAK6218	
3	Type of Course:	Optional	
4	Level of Course:	Third Cycle	
5	Year of Study:	2	
6	Semester:	4	
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:	Prof. Dr. OSMAN KOPMAZ	
15	Course Lecturers:	Yok.	
16	Contact information of the Course Coordinator:	Dersi veren: Prof. Dr. Osman Kopmaz Tel:0224 294 1962 eposta: okopmaz@uludag.edu.tr	
17	Website:		
18	Objective of the Course:	Dynamic analysis is one of the most important stages in machine design. First step in this is the derivation of equations of motion. In this course, various formulations used to obtain equations of motion. Besides, the dynamics of some mechanisms and machines encountered in mechanical engineering field.	
19	Contribution of the Course to Professional Development:	Today, thee exist some softwares for the dynamic analysis of mechanical systems. Fort he efficient use of these softwares, it is necessary to govern the fundamental principles and issues of mechanics and machine dynamics. This course provides the students the opportunity of extention of knowledge in the field of machine dynamics, and learning how to implement in the practice.	
20	Learning Outcomes:		
		1	Students who attend this course can analyse, discuus and develop the general performance of a mechanism which exists or in the stage of design.
		2	Fundamentals principles of Dynamics apply to mechanisms and machines.
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21	Course Content:		
	Course Content:		
Week	Theoretical	Practice	

1	Review of principles of Dynamics and basic topics of Machine Dynamics.	
2	Methods for obtaining equations of motion. The Euler-Newton equations of motion. Homework 1.	
3	The principle of virtual work. The principle of virtual power (Jourdain).	
4	Generalized coordinates. D'Alembert's principle. The Lagrange equations of motion. Homework 2.	
5	Hamilton's principle. Generalized velocities. Kane's equations of motion.	
6	Gibbs-Appel's equations of motion. Homework 3.	
7	Applications in special mechanical systems. Holonom ve nonholonom Systems.	
8	Deriving and solving the equations of motion of systems with rigid and/or flexible links.	
9	Dynamics of reciprocating machines. Kinematics and dynamics of crank-slider mechanism.	
10	First and Second order crank stars. Mass and energy balancing in single and multi-cylinder internal combustion engines. Homework 4.	
11	Dynamics of coupler mechanisms.	
12	Mass and energy balancing in coupler	
13	General review.	
14		

Materials:	Çetin. -Makine Teorisi.İL. Eres Söylemez -H.Dressig. F. Holzweissig. Dynamics of Machinery. Springer Verlag.

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	14	4.00	56.00
Homeworks	4	13.00	52.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	15.00	15.00
Others	0	0.00	0.00
Final Exams	1	15.00	15.00
Total Work Load			195.00
Total work load/ 30 hr			6.00
ECTS Credit of the Course			6.00

23	Assessment	
Midterm Exam	1	8.00
Home work-project	4	32.00
Final Exam	1	60.00
Total	6	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		Studens are given four take-homes. Mid-term and final exams are also given as take-homes.
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	3	4	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	4	4	3	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**				