COMPUTER AIDED ANALYSIS OF MECHANICAL SYSTEM

1	Course Title:	COMPUTER AIDED ANALYSIS OF MECHANICAL SYSTEM	
2	Course Code:	OTO5161	
3	Type of Course:	Optional	
4	Level of Course:	Third 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. Ahmet YILDIZ	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	Dr. Öğr. Üyesi Ahmet YILDIZ ahmetyildiz@uludag.edu.tr Bursa Uludağ Üniversite, Mühendislik Fakültesi, Otomotiv Mühendisliği Bölümü	
17	Website:		
18	Objective of the Course:	The aim of the course is to provide the student with the mathematical modeling of mechanical systems, the ability to simulate with Matlab / Simulink / ADAMS programs, the modeling and control of vehicle active suspension systems, the best parameter selection with modern optimization techniques of mechanical systems.	
19	Contribution of the Course to Professional Development:	At the end of this course, students will have professional knowledge about simulation of mechanical systems for mechanism and vibration analysis in Matlab / Simulink and ADAMS programs.	
20	Learning Outcomes:		
		1	To be able to mathematically modeling and simulating single, double and multi-degree of freedom mechanical systems
		2	To be able to gain the skills in simulation, analysis and optimization of specified systems in computer environment with the help of Matlab, Simulink and ADAMS package programs
		3	To gain the ability to compare the results obtained with the help of equations with the simulation results found with the package program and to report them
		4	To gain the ability of the parametric optimization of mechanical systems with modern optimization techniques
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21	Course Content:		

	Course Content:	
Week	Theoretical	Practice
1	Introduction to Mechanical System and Modeling	
2	Basic Principles of MATLAB program and solution of differential equations	
3	Basic Principles of Simulink program and solution of differential equations	
4	Introduction of the ADAMS Program and modeling of vehicle systems	
5	Mathematical model of single degree of freedom vehicle systems: Crank-rocker and four-bar mechanisms and mass-spring system	
6	Simulation of single degree of freedom vehicle systems with Matlab and Simulink	
7	Simulation of single degree of freedom vehicle systems in ADAMS environment	
8	Comparison and reporting of simulation outputs of single degree of freedom vehicle systems	
9	Mathematical modeling of two or more degrees of freedom vehicle systems: Half Vehicle-Full Vehicle Models	
10	Simulation of vehicle systems with two or more degrees of freedom in Matlab and Simullink	
11	Simulation of vehicle systems with two or more degrees of freedom in ADAMS environment	
12	Development of PID based model of active suspension system in Simulink environment	
13	Introduction to Parameter Optimization of Mechanical Systems	
14	Optimization of mechanical systems with Genetic Algorithm in Matlab environment	

22	Textbooks, References and/or Other Materials:	1.Vehicle Dynamics, Reza N. Jazar, Springer-Verlag New York,2014 2.Sayısal Yöntemler ve Matlab Uygulamaları Nurhan Karaboğa, Nobel Yayıncılık, 2017 3.Machine Theory I, Eres Söylemez, METU
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		Students are evaluated in the form of a test and / or a written exam.

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	14	9.00	126.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	4.00	4.00
Others	0	0.00	0.00
Final Exams	1	8.00	8.00
Total Work Load			180.00
Total work load/ 30 hr			6.00
ECTS Credit of the Course			6.00

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