VEHICLE DYNAMICS

1	Course Title:	VEHICLE DYNAMICS	
2	Course Code:	OTO3006	
3	Type of Course:	Compulsory	
4	Level of Course:	First Cycle	
5	Year of Study:	3	
6	Semester:	6	
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:	-	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Dr. Ögr. Üyesi ZELİHA KAMIŞ KOCABIÇAK	
15	Course Lecturers:	-	
16	Contact information of the Course Coordinator:	Uludağ Üniversitesi, Mühendislik-Mimarlık Fakültesi, Otomotiv Mühendisliği Bölümü 16059 Görükle/BURSA zkamis@uludag.edu.tr; Tel: 0224 2941992	
17	Website:		
18	Objective of the Course:	The aim of the course is to provide knowledge relating to vehicle dynamics, ride and handling	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	To be able to evaluate the loads applied to the vehicle system, which is a dynamic structure, as a principle design criteria.
		2	To be able to apprehend the importance of the effects of crash mechanics, as much as the dynamic effects caused by the road and environment, on structural design.
		3	To be able to understand the relation on the road-tyre interface. Therefore, to have a perception on the difference between the classical system and the vehicle system dynamics.
		4	To be able to apprehend the opposition between handling and ride dynamics as a design criteria.
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21	Course Content:		

Course Content:

Week	Theoretical	Practice
1	Introduction to vehicle dynamics, vehicle ride and handling	

2	Main loads on the car body, basic principles in designing a vehicle chassis.
3	Chassis frame torsional and bending stiffnesses, specifications definition. Engine and transmission main loads.
4	Crashworthiness: energy absorption and restraint systems
5	Crashworthiness: crash tests.
6	Braking system, ideal and real braking, circuits layout, disc and drum brakes.
7	Ideal steering, power steering. Steering system, kinematic steering, steering systems layout, subsystem elements.
8	Handling Dynamics, Axis Systems, Basic Concepts, Tyre-Road Interaction, Forces and Moments.
9	Cornering Stiffness, Camber Angle and Self Aligning Torque Effects, Tyre Modelling, Dugoff Model, Allen Model,
10	Pacejka's Magic Formula Tyre Model, Driver-Vehicle System, Handling Dynamics Models
11	Bicycle Model, Slip Angles, Equations of Motion.
12	Stability Analysis, Handling Characteristics, Case studies in Matlab
13	Suspension System design considering the
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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	6.00	84.00
Homeworks	2	15.00	30.00
Projects	2	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	10.00	10.00
Others	0	0.00	0.00
Final Exams	1	10.00	10.00
Total Work Load			176.00
Total work load/ 30 hr			5.87
ECTS Credit of the Course			6.00

23 Assesment		
TERM LEARNING ACTIVITIES	**NUMBE**	**WEIGHT**
Midterm Exam	1	25.00
Home work-project	2	10.00
Final Exam	1	50.00
Total	5	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**

Vehicle Dynamics & Control, R. Rajamani, Springer,
M. Blundell, Butterworth-Heinemann, 2004.

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