

# ALTERNATIVE FUEL VEHICLES APPLICATIONS

1	Course Title:	ALTERNATIVE FUEL VEHICLES APPLICATIONS
2	Course Code:	MAK4422
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	4
6	Semester:	8
7	ECTS Credits Allocated:	3.00
8	Theoretical (hour/week):	2.00
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:	Prof. Dr. M.İHSAN KARAMANGİL
15	Course Lecturers:	-
16	Contact information of the Course Coordinator:	E-posta : ihsan@uludag.edu.tr T: +90 224 2941978 Uludağ Üniversitesi Mühendislik Mimarlık Fakültesi Otomotiv Mühendisliği Bölümü Görükle Kampusu Bursa 16059
17	Website:	
18	Objective of the Course:	The purpose of this course is to teach general properties of classic (gasoline and diesel) and alternative fuels (LPG, natural gas, hydrogen, methanol, ethanol and biodiesel) and is to inform about conversion kits used to alternative fuel vehicles. Moreover, comparisons are performed in terms of economic, conversion cost, running for a long time without breakdown, engine performance (power, torque, specific fuel consumption) and pollutant emissions.
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	Skill of comprehending vehicles using alternative fuel
	2	Skill of solving engineering problems related to vehicles using alternative fuel
	3	Skill of using information technologies effectively
	4	Skill of analyzing and commenting vehicles using alternative fuel
	5	Skill of gaining to conduct individual and team work
	6	Skill of communicating oral and written communication in Turkish
	7	Skill of gaining awareness of lifelong learning necessity
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21	Course Content:	
	<b>Course Content:</b>	

Week	Theoretical	Practice		
1	Introduction of energy resources. Information about renewable energy sources which are thought to use in vehicles (solar energy, wind energy)			
2	Classification of the fuels			
3	Obtaining methods of motor fuels (distillation, cracking and synthesis method) Classification of engine fuels			
4	General properties desired from spark ignition engine fuels (volatility, knock resistant...) Gasoline properties			
5	General properties desired from compression ignition engine fuels (cetane number, viscosity...) Diesel properties			
6	Problems occurring in engines because of illegal fuel usage			
7	General properties of other alternative fuel properties used engines (CNG, LPG, H <sub>2</sub> , methanol, ethanol, biodiesel)			
8	Fuel supply systems used in gasoline and diesel engines			
9	Repeating courses and midterm exam			
Activities		Number	Duration (hour)	Total Work Load (hour)
Theoretical	pollutant emissions of vehicles running with LPG and original fuel	14	2.00	28.00
Practicals/Labs		0	0.00	0.00
Self study	LPG and compression ignition engines used diesel and gasoline	2	11.00	22.00
Homeworks		1	14.00	14.00
Projects	pollutant emissions of vehicles running with CNG and original fuel	0	0.00	0.00
Field Studies		0	0.00	0.00
Midterm exams		1	16.00	16.00
Others		0	0.00	0.00
Final Exam	benzinli/kanarman adeganli kitarinin tanitimi 1100 cc benzinli motor ile calisan araclarin performans ve kirlotici emisyon degerlerinin orijinal motordaki degerlerle karstilarilmasi	1	10.00	10.00
Total Work Load				106.00
Total work load/ 30 hr				3.00
ECTS Credit of the Course				3.00
13	Etanol ile calisan araclarin performans ve kirlotici emisyon degerlerinin orijinal motordaki degerlerle karstilarilmasi Metanol ile calisan araclarin performans ve kirlotici emisyon degerlerinin orijinal motordaki degerlerle karstilarilmasi			
14	Sodyum bor hidrur ile calisan araclar Fuel cell ile tahrik edilen araclar			

<b>22</b>	Textbooks, References and/or Other Materials:	1. Ali Sürmen, İhsan Karamangil, Rıdvan Arslan “Motor Termodinamiği” Alfa Aktüel, 2004. 2. Oğuz Borat, Ali Sürmen, Mustafa Balcı “Motorlar” TEV Yay, 2006. 3. Richard van Basshuysen, Fred Schafer “Internal Combustion Engine Handbook” SAE, 2004. 4. SAE Papers
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<b>23</b>	Assesment
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TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	1	25.00
Quiz	0	0.00
Home work-project	1	15.00
Final Exam	1	60.00
Total	3	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		

<b>24</b>	<b>ECTS / WORK LOAD TABLE</b>
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<b>25</b>	<b>CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS</b>															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
ÖK5	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0
ÖK6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
ÖK7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<b>LO: Learning Objectives    PQ: Program Qualifications</b>																
Contribution Level:	1 very low			2 low			3 Medium			4 High			5 Very High			