

# ALTERNATIVE FUEL VEHICLES APPLICATIONS

1	Course Title:	ALTERNATIVE FUEL VEHICLES APPLICATIONS
2	Course Code:	OTO4126
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:	None
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: +90 224 294 1978- 294 2602 Uludağ Üniversitesi Mühendislik Fakültesi Otomotiv Mühendisliği Bölümü Görükle Kampusu Bursa 16059
17	Website:	None
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:	Students participating in this course know alternative fuels used in vehicles and gain the ability to solve engineering problems that may be encountered in alternative fuel conversion.
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 gaining to written and verbal communication skills 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	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 conversion kits 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 Exams	Introduction of conversion kits used in	1	10.00	10.00
Total Work Load				106.00
Total work load/30 hrs				3.00
ECTS Credit of the Course				3.00
	vehicles running with CNG and the original engine			
13	Comparison of performance and pollutant emission values ??of ethanol-powered vehicles with those in the original engine Comparing the performance and pollutant emission values ??of the vehicles working with methanol with the values ??in the original engine			
14	Vehicles powered by sodium boron hydride Fuel cell driven vehicles			

<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	30.00
Quiz	0	0.00
Home work-project	1	10.00
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	Evaluation will be made according to the midterm exam, homework, and final exam to be held during the semester.	

<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	1	1	1	1	1	1	1	1	1	1	1	1	0	0
ÖK2	1	3	1	1	2	1	1	1	1	1	1	1	1	1	0	0
ÖK3	1	1	1	2	1	1	1	1	1	1	1	1	1	1	0	0
ÖK4	1	1	1	1	2	1	1	1	1	1	1	1	1	1	0	0
ÖK5	1	2	1	1	2	1	2	1	1	1	1	1	1	1	0	0
ÖK6	1	1	1	1	1	1	1	2	1	1	1	1	1	1	0	0
ÖK7	1	1	1	1	1	1	1	1	2	1	1	1	1	1	0	0
<b>LO: Learning Objectives    PQ: Program Qualifications</b>																
<b>Contribution Level:</b>	<b>1 very low</b>		<b>2 low</b>		<b>3 Medium</b>		<b>4 High</b>		<b>5 Very High</b>							