

COURSE RECORD

Code	ME-424
Name	FUEL CELL SCIENCE AND ENGINEERING
Hour per week	3 (3 Theory + 0 Practice)
Credit	3
ECTS	5
Level/Year	Undergraduate/2022
Semester	Spring
Type	Elective
Prerequisites	-
Description	Fuel cells directly convert the chemical energy in hydrogen to electricity, with pure water and potentially useful heat as the only byproducts. Hydrogen-powered fuel cells are not only pollution-free, but they can also have more than two times the efficiency of traditional combustion technologies. The focus of the Fuel Cell Science and Engineering course is to introduce fuel cell systems, hydrogen economy, transport processes in fuel cell, and analysis of fuel cells.
Objectives	<i>In this course it is aimed to</i> - explain basics of thermodynamics, electrochemical and transport processes governing fuel cell technology -introduce the different types of fuel cells and their working principles -discuss the parameters affecting fuel cell performance -present hydrogen storage and reforming processes and hydrogen economy
Learning Outcomes	<i>By the end of the course, the student will be able to</i> L01. Become familiar of fuel cell thermodynamics, mass & heat transfer and electrochemical processes in fuel cells L02. Define the working principles of proton-exchange membrane (PEMFC) and solid oxide (SOFC) by their components. L03. To explain the properties of hydrogen as a fuel and its state-of-art storage technologies L04 Use the techniques, skills, and modern engineering tools for modelling and analysis of fuel cell systems. L05. State the impact of this technology in a global and societal context

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
L01	5	5	5	3	5	0	5	2	4	4
L02	5	4	5	3	5	0	5	2	4	4
L03	5	5	5	4	4	0	4	2	5	4
L04	5	5	5	4	4	0	4	2	5	4
L05	5	5	5	4	4	0	4	2	5	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
An Introduction to Fuel Cells	L01, L05
Fuel Cell Thermodynamics	L01
Fuel Cell Electrochemistry	L01
Fuel Cell Charge and Mass Transport	L01
Fuel Cell Heat Transfer	L01
PEMFC	L02
SOFC	L02
Fuels for Fuel Cell & Hydrogen Storage	L03
The Complete Fuel Cell System and Its Future	L04,L05

DERS BİLGİLERİ

Kodu	ME-424
İsmi	FUEL CELL SCIENCE AND ENGINEERING
Haftalık Saati	3(3 Teorik + 0 Pratik)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/2022
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Yakıt hücreleri, hidrojendeki kimyasal enerjiyi doğrudan elektriğe dönüştüren elektrokimyasal süreçlere dayalı çalışan sistemlerdir. Bu sistemlerde elde edilen elektrik enerjisinin yanısıra yan ürün olarak sadece saf su ve potansiyel olarak da faydalı ısı salarlar. Hidrojenle çalışan yakıt hücreleri hem doğaya herhangi bir kirletici salmazlar hem de geleneksel yakma teknolojilerinin iki katından daha fazla verimliliğe sahip olabilirler. Yakıt Pili Bilimi ve Mühendisliği dersinin odak noktası, yakıt pili sistemlerini, yakıt pilinde taşıma süreçlerini ve yakıt pillerinin analizini ve hidrojen ekonomisini tanıtmaktır.