



Jordan University of Science and Technology
Faculty of Engineering
Mechanical Engineering Department

ME759 Special Topics Renewable Energy

First Semester 2025-2026

Course Catalog

3 Credit Hours. The course will comprehensively cover all the aspects of the Green hydrogen energy value chain including production methods from hydrocarbons & renewables, separation & purification, storage, transportation & distribution, refueling, utilization in various sectors, associated energy conversion devices, sensing and safety. Technical comparisons of various processes and technologies, economic aspects & cost analysis, regulations, codes and standards, global status and future directions will be discussed. The course will provide a broad knowledge of hydrogen as an energy carrier, the way it will play an important role in various sectors towards decarbonization, current limitations, and future scenarios.

Teaching Method: On Campus

Text Book

Title	Principles and Applications of Hydrogen Energy Technology
Author(s)	CATHAL. O'DONNELL, DAVID O'ROURKE MENG, REUBEN NOYCE
Edition	1st Edition
Short Name	Ref #1
Other Information	

Instructor

Name	Prof. Ghassan Tashtoush
Office Location	M5 L2
Office Hours	Sun : 11:00 - 13:00 Mon : 12:00 - 14:00 Tue : 13:00 - 14:00 Wed : 12:00 - 14:00
Email	gtash@just.edu.jo

Class Schedule & Room

Section 1:

Lecture Time: Mon, Wed : 10:30 - 12:00

Room: U

Tentative List of Topics Covered

Weeks	Topic	References
Weeks 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	COURSE PLAN: Week 1: Properties of hydrogen, global status of supply and demand, methods of hydrogen production, steam reforming, tutorial Week 2: Advanced methods of steam reforming, partial oxidation, autothermal reforming, combined reforming, reforming using alternate energy sources, tutorial Week 3: Hydrogen production from methane decomposition, from coal and biomass, tutorial Week 4: Hydrogen separation and purification, thermochemical cycles for hydrogen production, fundamentals for electrolysis of water Week 5: Green Hydrogen Technology, Components of electrolytic cells, configuration of electrolyzer stack, different electrolyzer technologies, photoelectrochemical hydrogen production, technical and economic comparison of different production methods and global status, cost analysis, tutorial Week 6: Introduction to hydrogen storage, underground hydrogen storage, fundamentals of hydrogen compression and expansion Week 7: Mechanical and non-mechanical hydrogen compressors; compressed hydrogen tank type	From Ref #1

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
1. To identify the potential of H ₂ as a renewable and green fuel, and also to suitable production systems.	20%	
To understand the basics of the techniques of Hydrogen Production To understand the Techniques for Hydrogen separation and purification.	20%	
To analyze various storage methods available for hydrogen fuel to act as a feedstock for energy conversion.	20%	
4. To understand Green Hydrogen and its importance..	20%	
To understand the thermodynamics and working principles of a fuel cell.	20%	

Policy

Evaluation	Evaluation: MT Exam 20% Project 30% Final Exam 50%
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