Università degli Studi di Roma Tor Vergata

Scheda Insegnamento

Docente responsabile dell'insegnamento/attività formativa

Nome	Vesselin Krassimirov
Cognome	Krastev

Denominazione insegnamento/attività formativa

Italiano	
Inglese	Clean Hydrogen Technologies

Informazioni insegnamento/attività formativa

A.A.	2025/2026	○ L	⊗ LM	○ LM CU
CdS	Ingegneria Gestionale			
Codice				
Canale				
CFU	6			
Lingua	Inglese			

Docente del modulo didattico (compilare solo per attività formative articolate in moduli)

Nome	
Cognome	

Denominazione modulo didattico (compilare solo per attività formative articolate in moduli)

Italiano	
Inglese	

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Obiettivi formativi e risultati di apprendimento attesi

Italiano	
Inglese	LEARNING OUTCOMES: The course is expected to provide students with fundamentals of clean hydrogen production, transportation and utilization, including the related challenges and opportunities. KNOWLEDGE AND UNDERSTANDING: At the end of the course, students are expected to identify the most relevant technical and economic performance parameters of end-use hydrogen-based plants. Furthermore, they are expected to have acquired a basic knowledge of design principles of hydrogen conversion and storage systems. APPLYING KNOWLEDGE AND UNDERSTANDING: Students should be able to successfully apply engineering-grade calculations on the overall energetic performances of hydrogen-based systems as well as on the efficiency of single hydrogen conversion and storage devices. MAKING JUDGEMENTS: At the end of the course, students should be able to independently assess plant-scale performances of hydrogen systems, based on thermodynamic arguments as well as on return of investment estimation. COMMUNICATION SKILLS: The final oral exam is expected to motivate the students in developing their communication skills, in terms of both technical language notions as well as their critical thinking ability. LEARNING ABILITY: The assignment of sample projects throughout the course is expected to boost the students' learning abilities, through self-development of specific technical analysis and solution methodologies.

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Prerequisiti

Italiano	
Inglese	Thermodynamics and heat transfer principles. Renewable energy production technologies.

Programma

Italiano	
Inglese	• Introduction: Hydrogen Properties, Hydrogen as an Energy Carrier (challenges and opportunities); • Overview of National and EU Clean Hydrogen policies; • Clean Hydrogen Production: current status and potential solutions; • Hydrogen Storage: current status and potential solutions; • Hydrogen Utilization I (transport applications); • Hydrogen Utilization II (stationary energy systems); • LTPEM and HTPEM Fuel Cell design principles; • Solid-state Hydrogen Storage design principles; • Costs evaluation: Impacts of Production, Transport and Storage on the LCOH

Modalità di valutazione

- [ ] Prova scritta
- [x] Prova orale
- [ ] Valutazione in itinere
- [x] Valutazione di progetto
- [ ] Valutazione di tirocinio
- [ ] Prova pratica
- [ ] Prova di laboratorio

Descrizione delle modalità e dei criteri di verifica dell'apprendimento

Italiano	
Inglese	Students will be evaluated through the development of sample projects and final oral exam at the end of the course. The successful development of the assigned project is a prerequisite to access the oral exam. Projects will be based on basic technical and return of investment evaluations on hydrogen end use plants (e. g. refueling stations). The oral exam includes a variable number of questions, usually between 1 aand 3. In some cases, more questions should be required to effectively assess the students's abilities and preparation. In the following, an approximate description of the evaluation criteria for the final oral exam: - score below 18 (insufficient): severe deficiencies in the course knowledge, lack of connection between the different topics; - 18-21: limited knowledge of the course topics, limited reasoning and connection abilities; - 22-25: good knowledge of the course topics, good reasoning and connection abilities; - 26-28: very good knowledge of the course topics, very good reasoning and connection abilities; - 29-30: excellent knowledge of the course topics, excellent reasoning and connection abilities; - 30L: outstanding knowledge of the course topics, development of original lines of thinking.

Testi adottati

Italiano	
Inglese	A selection of supporting exam prep materials will be provided through the Teams platform (slides, exercises, etc.).

Bibliografia di riferimento

Italiano	
Inglese	

Modalità di svolgimento

☒ Modalità in presenza
☐ Modalità a distanza

Descrizione della modalità di svolgimento e metodi didattici adottati

Italiano	
Inglese	Lecture (classroom-taught only).

Modalità di frequenza

◯ Frequenza facoltativa
⊗ Frequenza obbligatoria

Descrizione della modalità di frequenza

Italiano	
Inglese	Classroom-taught lessons.