Course guide
205258 - HF - Hydrogen's Future: Technologies and Applications

Last modified: 02/04/2024

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 758 - EPC - Department of Project and Construction Engineering.

Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2024 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Lopez Grimau, Victor

Others: Cuesta I Mota, Dídac

TEACHING METHODOLOGY

Course divided in theory classes (2h/week) and practical sessions (3h/week).
Theory sessions introduce the students to the concepts, technologies and challenges of introducing hydrogen, especially green hydrogen, into our society based on fossil resources.
Practical sessions aim developing students' critical thinking over hydrogen technology implementation, via discussions on specific case studies and working on a team project.
The team project is intended to conceptualize the implementation of hydrogen at a productive environment, or services offered at a city or building, and analyzing its implications. Students will work on their team project during practical sessions, after case study has been discussed and its involved activities are done.
Atenea questionnaires for both, theory and case studies, answers will evaluate the degree of comprehension after each session.

LEARNING OBJECTIVES OF THE SUBJECT

Introduce students to the technologies surrounding hydrogen production, management and uses, and the challenges and the opportunities this element represents for world's post-fossil era development.
Develop students' analytical skills to evaluate hydrogen implementation projects for diverse applications (energy, transport, industry).

STUDY LOAD

Type	Hours	Percentage
Self study	45,0	60.00
Hours large group	30,0	40.00

Total learning time: 75 h

CONTENTS

Introduction to hydrogen

Description:
- Hydrogen proprieties
- World H2 strategies

Full-or-part-time: 7h
Theory classes: 2h
Self study : 5h

Producing hydrogen

Description:
- Colors of hydrogen
- Production processes
- Quality of produced hydrogen

Full-or-part-time: 12h
Theory classes: 4h
Self study : 8h

Manipulating hydrogen

Description:
- Storage
- Transport
- Safety

Full-or-part-time: 14h
Theory classes: 6h
Self study : 8h

Applications at mobility and trasport

Description:
- Fuel cell
- Hydrogen based fuels
- Examples present and future: terrestrial, naval, aerial

Full-or-part-time: 14h
Theory classes: 6h
Self study : 8h

Industrial applications

Description:
- Chemical
- Metallurgy
- Other sectors

Full-or-part-time: 14h
Theory classes: 6h
Self study : 8h

Energy applications

Description:
- Energy vector: electricity vs H2
- Hydrogen as battery
- Hydrogen at home
- Particular case: Nuclear Fusion

Full-or-part-time: 14h
Theory classes: 6h
Self study : 8h

GRADING SYSTEM

Theory questionnaires 15%
Case studies questionnaires 15%
Theory exam 20%
Team work 50%
Midterm presentation (10%)
Final presentation (15%)
Report (25%)

BIBLIOGRAPHY

Complementary:
- Llorca, Jordi. El hidrógeno y nuestro futuro energético [on line]. Barcelona: Universitat Politècnica de Catalunya, 2010 [Consultation: 23/04/2024]. Available on: http://hdl.handle.net/2099.3/36579. ISBN 9788498804188.
- Zohuri, Bahman. Hydrogen energy: challenges and solutions for a cleaner future [on line]. Cham: Springer International Publishing, 2019 [Consultation: 23/04/2024]. Available on: https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-319-93461-7. ISBN 9783319934617.
- Silveira, José Luz. Sustainable hydrogen production processes: energy, economic and ecological issues [on line]. Cham: Springer International Publishing, 2017 [Consultation: 23/04/2024]. Available on: https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-319-41616-8. ISBN 9783319416168.

RESOURCES

Hyperlink:
- Hidrógeno: vector energético de una economía descarbonizada. https://www.fundacionnaturgy.org/publicacion/hidrogeno-vector-energetico-de-una-economia-descarbonizada/