Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Unit Title:	INTRODUCTION TO HYDROGEN TECHNOLOGY
Unit ID:	ENGIN5305
Credit Points:	15.00
Prerequisite(s):	Nil
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	030701

Description of the Unit:

This course will provide students with an introduction to hydrogen and related technologies which are used for hydrogen production and utilisation. It will cover topics like colour spectrum of hydrogen (brown, blue, green etc) and the technologies associated with these, the relevance of hydrogen in the energy transition and mix. Safety aspects associated with the use of hydrogen will also be delved into. The course will also provide an overview of the water electrolysis and hydrogen fuel cell technologies, including the introduction to the components and materials used in there. Advantages and limitations of these technologies and their applications (existing and potential) will be discussed. Theoretical knowledge will also be complemented with modelling and simulation studies

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Does Recognition of Prior Learning apply to this Unit? No

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

CourseLevel:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory					✔	
Intermediate						
Advanced						

Learning Outcomes:

Knowledge:

K1. Demonstrate an advanced understanding of the hydrogen colour spectrum and carbon footprint.

K2. Explain the principles for production and storage techniques used for different types of hydrogen

K3. Demonstrate an advanced understanding of the various applications of hydrogen and associated challenges.

K4. Demonstrate an understanding of the types of fuel cells and electrolysers.

K5. Demonstrate an understanding of the components used in PEM fuel cells.

Skills:

S1. Critically analyse the requirements, materials and methods for storage of hydrogen for end-use applications

S2. Evaluate the challenges associated with hydrogen technologies adoption in specific settings

S3. Technically evaluate component materials and design requirements in PEM fuel cells and electrolysers

Application of knowledge and skills:

A1. Design and model flow field designs for use in low-temperature and PEM fuel cells

A2. Perform system level analysis of fuel cell incorporated systems in targeted applications

Unit Content:

- Introduction to hydrogen storage, transport and safety considerations
- Overview of applications of hydrogen and hydrogen technologies
- Overview of types of Fuel cells and electrolysers
- Overview of challenges in hydrogen economy
- Introduction to polymer electrolyte membrane (PEM) fuel cell systems, components and materials
- Introduction to Fuel cell bipolar plates and flow dynamics (microfluidics)
- Flow patterns and pressure drop analysis
- CFD of hydrodynamics, heat and mass transfer in bipolar plates

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1 - K4	Demonstrating knowledge and application of basic hydrogen tech related concepts covered in the course, industry applications, and material requirements	Assignments / quizzes	10-20%
S1 - S3	Report /project on industry relevant existing and potential problems related to adoption of hydrogen technologies	Reports / presentations	10-20%

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
S3, A1, A2	Simulation and data analysis tasks related to course material	Simulation / laboratory experiments	20-30%
K1-K5, S1-S3	Course related questions and problems	Exam / Tests	40-60%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit No

Date: mmm dd, yyyy

Adopted Reference Style:

APA

Refer to the library website for more information

Fed Cite - referencing tool