CORE MODULE MATRIX

Doctoral Training Centre in Fuel Cells and their Fuels

Fig. 4:

Module	Credits	Institution (Code)	Contact hours (Semester)	Optional (O) Compulsory (C)	Learning Objectives	Assessment Methods
Compulsory						
Business Methods, Economics and Strategy *Stuart Blackburn* W/C 23 Feb 2015 Mon-Wed Chem-Eng 112	**10**	**UoB** **(04 20706)**	**21 (2)**	**C**	To understand and use basic ratio analysis. Analyse a company's strategic position using tools including PEST, SWOT, and Porter's Forces. To demonstrate an understanding of the basics of macro economics including international trade, inflation, pricing. To demonstrate common theories for firms' economic behaviour, supply and demand. To demonstrate the understanding of human relations in the firm, including perception, communication, conflict, management and leadership styles and motivators for the workforce.	100% assessment by exam Reassessment: 100 % exam
Effective Project Management *Neil Rowson* W/C 16 Feb 2015 Chem-Eng 112	**10**	**UoB** **(04 19682)**	**21 (1)**	**C**	By the end of the module the student should be able to: 1. Demonstrate knowledge of timing and planning/preparation in project management; 2. Demonstrate knowledge of the critical path of a process; 3. Be able to solve critical path problems and manage timelines; 4. Calculate and plan Net Present Value of a project; 5. Demonstrate an awareness of the importance of the team; 6. Demonstrate an ability to communicate with peers through effective presentations.	Post course project (80%) and oral presentation (20%). Reassessment: 100% coursework.
The Energy System *Maria Jesus Herrerias, Nicholas Horsewood, Emma Steadman* 6th - 9th Oct 2014 10am-4pm Chem-Eng G3	**10**	**UoB** **(08 22831)**	**24 (1)**	**C**	1. Explain the main demands for energy, how they are currently met, and how this is likely to change in future. 2. Analyse the main economic, environmental and political forces affecting the energy industries, particularly in the UK.	This module will be assessed by a project report of 4,000 words Reassessment: 100% coursework
FCH Safety I & II *Vladimir Molkov* TBC (may not run until 2015-16)	**20**	**Ulster** **Delivered at UoB**		**C**		

Fuel Cell and Hydrogen Technology (FCHT) *Robert Steinberger-Wilckens* W/C 24th Nov 2014 Mon Learning Centre-UG06 Tue Chem-Eng 112 Wed Learning Centre-UG05 Thur & Fri Chem-Eng 112	**10**	**UoB** **(04 26222)**	**28 (1)**	**C**	The module will cover the Fuel Cell & Hydrogen technologies and their science. • electrochemistry/thermodynamics/energy analysis tools • applications of fuel cells and hydrogen • hydrogen generation, processing & storage • hydrogen as energy storage vector • low temperature fuel cells, materials, designs, fuels, and systems • high temperature fuel cells, materials, designs, fuels, and systems • hydrogen and fuel cell safety issues • environmental analysis, market introduction, economy, and policy framework	study report 25%, exam 75% Reassessment:100% exam
Materials for Hydrogen and Fuel Cell Technologies *David Book* W/C 17 Nov 2014 Met & Mat GC17	**10**	**UoB** **(04 19688)**	**30 (1)**	**C**	By the end of the module the student should be able to: 1. Appreciate and describe the use of functional materials in a range of hydrogen production, hydrogen storage and fuel cell technologies; 2. Understand the key materials challenges that need to be overcome, in order for the viable introduction of hyd rogen and fuel technologies into the market; 3. Understand and describe the materials fabrication, characterization techniques that are required for the development of hydrogen production, hydrogen storage and fuel cell technology components; 4. Understand how the hydrogen and fuel cell technologies studied, might fit into a number of possible hydrogen energy-based economies.	60% open book examination at the end of the teaching week; 20% presentation during the teaching week; 20% essay submitted after the teaching week. Reassessment: 100 % coursework
TOTAL CORE MODULES	**70**					

Fig. 5:

Optional Modules

University of Birmingham	University of Nottingham	Loughborough University
JESS Summer School, Greece: Intro to battery technologies (04 27444); Intro to high-temp fuel cells and electrolysers (04 27445) or Intro to low-temp fuel cells and electrolysers (04 27446) Introduction to Electrochemistry (pre-requisite to other electrochemistry modules) – (04 26223) 10 credits W/C 20 October 2014, Venue TBC Materials for Energy Generation and Storage (04 19689) – 10 credits (Dave Book) W/C 1 June 2015, Venue TBC Advanced Electrochemical Applications (04 26226) – 10 credits (Surbhi Sharma) W/C 26 June 2015, Learning Centre-UG06 Chemical NanoEngineering (04 26512) – 10 credits (Alex Robinson) W/C 19 January 2015, Chem Eng-G35 Techniques for Fuel Cell Characterisation (04 26219) – 10 (Neil Rees & Surbhi Sharma) W/C 9 February 2015, Chem-Eng G35 Materials for Low Temperature Fuel Cells – 10 credits (Neil Rees & Surbhi Sharma) (04 27442) TBC - (may not run until 2015-16) **Materials for High Temperature Fuel Cells – 10 credits (D. Brett & N. Brandon + Peter Slater) TBC (will not run before 2015-16)** **Fuel Cell Engineering – 10 credits (D. Brett & N. Brandon)** ***TBC* (will not run before 2015-16)** **Fuel Cell Modelling – 10 credits** **(D. Brett & N. Brandon) TBC (will not run before 2015-16** Marketing and TQM (18003) – 10 credits (Neil Rowson) W/C 17 November 2014, Chem-Eng 124 Public Engagement & Awareness in Energy (04 23637) – 10 credits (Aman Dhir) January 2016 Postgraduate Enterprise Summer School (04 24423) 13-17 July 2015	Advanced Materials Characterization (04 23677 / MM4AMC) – 10 credits Autumn, Monday 3pm-5.30pm (practical). Friday 9am-10.30am Automotive Materials (04 23679 / MM4AUM) – 10 credits **Not running 2014/15** Combined Heat & Power Systems (04 23674 / K14CHP) – 10 credits Conservation and Recycling Materials (04 23670 / MM4CRM) – 10 credits Autumn, Thursday 2pm-4pm Energy Conservation & Utilization (04 23671 / K14ECU) – 10 credits Renewable Energy Technology 1 (04 23672 / K1DRE1) – 10 credits Renewable Energy Technology 2 (04 23673 / K1DRE2) – 10 credits Surface Engineering Technology (04 23678 / MM4SET) – 10 credits Technologies for the Hydrogen Economy (04 23669 / H54HYE) - 10 credits Spring, Tuesday 11am-1pm Further Dates and times available on request Autumn Term: Monday 22 September 2014 – Friday 12 December 2014 Spring Term: Monday 12 January 2015 – Friday 27 March 2015 Summer Term: Monday 27 April 2015 – Friday 19 June 2015	Sustainable Vehicle Powertrains (TTP401) – 20 credits 9-13 March, Prof. Rui Chen Vehicle Functional Performance (04 23682 / 08TTP301) – 20 credits 13-17 October, Dr Anoma Malalasekera Vehicle Systems Analysis (04 23683 / 08TTP302) – 20 credits 1-5 December, Dr Stephen Walsh Developing the Enterprising Researcher – 10 credits **Not currently accredited** Impact and Innovation Management – 10 credits TBC – Julie Holland, Anne Courtenay-Smith **May not run 2014/15** Commercialisation of Research – 10 credits TBC – Julie Holland, Anne Courtenay-Smith **May not run 2014/15**

Optional modules

The programme requires students complete 50

credits of optional modules.

Module Format

Modules at University of Birmingham and Loughborough are taught full-time for the duration of one week per module.

Modules at University of Nottingham are taught weekly for the duration of one term per module.