European Commission

JOINT RESEARCH CENTRE

Institute for Energy and Transport (IET)

INTERNATIONAL SUMMER SCHOOL

ON

PEM FUEL CELLS

ACCREDITED

according to the

European Credit Transfer System (ECTS)

16 – 20 July 2012

Nevsehir, Turkey

INTERNATIONAL CENTRE FOR HYDROGEN ENERGY TECHNOLOGIES

A project of the United Nations Industrial Development Organization supported by the Turkish Ministry of Energy and Natural Resources

ICHET

UNIDO

VNIVERSITAS OVIDIANA TOMIS

ORGANISATION AND SCOPE

The Accredited International Summer School on "PEM Fuel Cell Fundamentals" is organised by the European Commission, Directorate General Joint Research Centre (JRC), Institute for Energy and Transport (IET), United Nations Industrial Development Organization (UNIDO), International Centre for Hydrogen Energy Technologies (ICHET) and the Ovidius University of Constanta.

The Accredited International Summer School on "PEM Fuel Cell Fundamentals", as part of the JRC's Enlargement and Integration Action, has strategic objectives of:

- helping Candidate Countries and Potential Candidate Countries to familiarise with the "EU Acquis" in areas of the JRC
- contributing to the development of the European Research Area (ERA).

TECHNICAL OBJECTIVES

The technical objectives of the Accredited International Summer School are:

- to provide general knowledge of the design, modeling and optimization of PEM fuel cell systems
- to enable the comprehension of the detailed operation, functionality and interaction between the various components used in PEM fuel cell systems
- to develop analytic skills in system integration with respect to system efficiency and control engineering aspects of PEM fuel cell energy systems
- to obtain the knowledge needed to construct and operate PEM fuel cell based technologies in the laboratory and in real applications
- to share knowledge related to the practical realization and implementation of fuel cell systems, especially pertaining to innovative aspects, business planning and financial considerations.

TARGETED AUDIENCE

The Accredited International Summer School is aimed at:

- Master students (with a BSc in Physics, Chemistry, Thermodynamics or Material Sciences)
- Young professionals and junior researchers including PhD students from academia and industry

In order to receive ECTS points, participants should take part in all lectures and successfully complete the examinations of the Summer School.

EUROPEAN CREDIT TRANSFER SYSTEM (ECTS)

The Accredited International Summer School on "PEM Fuel Cell Fundamentals" is part of a faculty course, offered at the MSc Programme: "Engineering of Systems with Renewable Energy Sources" of the Ovidius University of Constanta, Romania. The Summer School allows students to receive 3 ECTS points upon successful completion of examinations.

TOPICS AND ACHIEVEMENTS

At the end of the Summer School, the participants will have gained:

- Knowledge: Detailed PEMFC electrochemistry, thermodynamics, thermo-fluidics, heat transfer, water management. Structural characteristics and properties of catalysts, electrodes, membranes. Influence of the fuel properties. Mechanisms of degradation in PEMFC. System integration solutions. Testing methodologies and procedures.
- Skills: Problem solving. PEM fuel cell modeling. Analysis of I-V curves. Techno-economical analysis of PEMFC applications.
- Problem solving Multi-physics and multi-scale structure of PEMFC systems, Efficiency of cell, stack and systems.

SCIENTIFIC AND ORGANISING COMMITTEE

Dr. Georgios Tsotridis - European Commission, Joint Research Centre

Prof. Eden Mamut – Ovidius University of Constanta

Dr. Mustafa Fazil Serincan – United Nations Industrial Development Organization

Dr. Suha Yazici – United Nations Industrial Development Organization

REGISTRATION

Applicants should register with International Centre for Hydrogen Energy Technologies (ICHET);
Dr. Mustafa Fazil Serincan ; fserincan@unido-ichet.org
Dr. Suha Yazici ; syazici@unido-ichet.org

Registration fee is 100 Euro. Payments will be made on-site in cash

VENUE, LOGISTICS AND ACCOMODATION

Venue: Nevsehir University, Turkey.

Information on logistics and accommodation will be supplied by International Centre for Hydrogen Energy Technologies (ICHET)
Dr. Osman Atanur; oatanur@unido-ichet.org
Dr. Suha Yazici ; syazici@unido-ichet.org

PROGRAM

MONDAY	
08.30 – 09.00	**Registration and coffee**
Welcome and introduction	
09.00 – 09.30	**Opening and EU Enlargement** G.Tsotridis – European Commission (JRC) - Confirmed
09.30 – 10:45	**Introduction to fuel cells** L. Jőrissen – Zentrum für Sonnenenergie- und Wasserstoff-Forschung (ZSW) - Confirmed
	Break
11.15 – 12.30	**Introduction to fuel cell technologies** L. Jőrissen – Zentrum für Sonnenenergie- und Wasserstoff-Forschung (ZSW) - Confirmed
12.30 – 13.30	**Lunch**
Fundamentals	
13.30 – 15.00	**Fuel Cell Thermodynamics** D. Baker - Middle East Technical University (METU) - Confirmed
	Break
15.30 – 16.30	**Fuel Cell Thermodynamics** D. Baker - Middle East Technical University (METU) - Confirmed
16:30 – 17:30	**Tutorials & Group assignments** **Poster session**

TUESDAY	
08.30 – 09.20	**ECTS session**
Fundamentals, Structures & Materials	
09.30 – 10.45	**Fuel Cell Electrochemistry** C. Lamy - University of Montpellier II - Confirmed
	Break
11.00 – 12.30	**Fuel Cell Electrochemistry** C. Lamy - University of Montpellier II - Confirmed
12.30 – 13.30	**Lunch**
Fundamentals, Structures & Materials	
13.30 – 14.20	**Transport phenomena in PEM Fuel Cells** E. Mamut - Ovidius University of Constanta - Confirmed
14.20 – 14.30	**Break**
14.30 – 15.20	**Transport phenomena in PEM Fuel Cells** E. Mamut - Ovidius University of Constanta - Confirmed

15.20 – 15.30	**Break**
15.30 – 16.20	**Heat & Water management** E. Mamut - Ovidius University of Constanta - Confirmed
16:30 – 17:30	**Tutorials & Group assignments** **Poster session**

WEDNESDAY	
08.30 – 09.20	**ECTS session**
Components, Modeling and Design	
09.30 – 10.45	**Fuel cell modeling** M.F. Serican – United Nations - International Centre for Hydrogen Energy Technologies (UNIDO-ICHET) - Confirmed
	Break
11.00 – 12.30	**Fuel cell components** L. Jőrissen – Zentrum für Sonnenenergie- und Wasserstoff-Forschung (ZSW) - Confirmed
12.30 – 13.30	**Lunch**
Components, Modeling and Design	
13.30 – 14.30	**Fuel cell stack components and materials** L. Jőrissen – Zentrum für Sonnenenergie- und Wasserstoff-Forschung (ZSW) - Confirmed
	Break
14.45 – 16.30	**Fuel cell stack and system design** L. Jőrissen – Zentrum für Sonnenenergie- und Wasserstoff-Forschung (ZSW) - Confirmed
16:30 – 17:30	**Tutorials & Group assignments** **Poster session**

THURSDAY	
08.30 – 09.20	**ECTS session**
Operation conditions and testing	
09.30 - 10.45	**Fuel cell operating conditions** L. Antoni – Commissariat à l'énergie atomique et aux énergies alternatives (CEA) - Confirmed
	Break
11.00 – 12.30	**Fuel cell testing** L. Antoni – Commissariat à l'énergie atomique et aux énergies alternatives (CEA) - Confirmed
12.30 – 13.30	**Lunch**
Applications	

13.30 – 14.45	**Stationary and mobile applications** A. Friedrich – Deutsches Zentrum für Luft- und Raumfahrt (DLR) - Confirmed
	Break
15.00 – 16.30	**Characterisation of fuel cell components** R. Hiesgen – Deutsches Zentrum für Luft- und Raumfahrt (DLR) - Confirmed
16:30 – 17:30	**Tutorials & Group assignments** **Poster session**

FRIDAY	
08.30 – 09.20	ECTS session
Economics and business	
09.30 – 10.45	Early Markets TBD
	Break
11.00 – 12.30	Early Markets TBD
12.30 – 13.30	Lunch
Presentations, Course Assessment and evolutions	
13.30 – 16:30	Presentations of individual & group works Panel discussion - Course Assessment - Q&A
16.30 – 17.30	Evaluation and closing remarks
15.30 – 16.00	Closing remarks