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)

17 – 22 June 2013
Merinos Atatürk Congress Culture Center
Bursa, Turkey

BURSA TEKNİK ÜNİVERSİTESİ 2010

New Energy World JU
fuel cells & hydrogen for sustainability

Black Sea Universities Network
BSUN

ORGANISATION AND SCOPE

The Accredited International Summer School on “PEM Fuel Cell Fundamentals” is organized by the European Commission, Directorate General Joint Research Centre (JRC), Institute for Energy and Transport (IET), the Fuel Cell and Hydrogen Joint Undertaking FCH-JU, the Black Sea Universities Network, Bursa Technical University, and the University of Bucharest.

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

- helping Candidate Countries and Potential Candidate Countries to familiarize 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 but not restricted to:

- 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 within the MSc Program: “Renewable & Alternative Energy Sources” at the University of Bucharest, 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 – University of Bucharest, Romania

Prof. Ali Surmen – Bursa Technical University, Turkey

Dr. Mustafa Hatipoglu – ENVERDER, Turkey

REGISTRATION

Applicants should register with Black Sea Universities Network, www.bsun.org ;

Registration fee is 100 Euro. Payments will be made on-site in cash or by bank transfer.

VENUE, LOGISTICS AND ACCOMODATION

Venue: Bursa Technical University, Turkey.

Information on logistics and accommodation will be supplied by Bursa Technical University upon request

MONDAY	
08.30 – 09.00	Registration
Welcome and introduction	
09.00 – 09.15	Opening and EU Enlargement
09.15 – 09.30	Fuel Cell & Hydrogen Joint Undertaking
09.30 – 10:45	Introduction to fuel cells
10:45 – 11.15	Break
11.15 – 13.00	Introduction to fuel cell technologies
13.00 – 14.00	Lunch
Fundamentals	
13.30 – 15.30	Fuel Cell Thermodynamics
15.30 – 16.00	Break
16.00 – 18.00	Fuel Cell Thermodynamics

TUESDAY	
Fundamentals,	
08.30 – 10.45	Tutorials & Group assignments
10:45 – 11.00	Break
11.00 – 12.30	Tutorials & Group assignments
12.30 – 13.30	Lunch
Fundamentals	
13.30 – 17.00	Fuel Cell Electrochemistry
17.00 – 18:00	Poster session

WEDNESDAY	
Fundamentals	
08.30 – 10.45	Fuel Cell Electrochemistry
10:45 – 11.00	Break
11.00 – 12.30	Fuel Cell Electrochemistry
12.30 – 13.30	Lunch
Fundamentals	
13.30 – 14.30	Tutorials & Group assignments
14:30 – 14.45	Break
14.45 – 16.30	Tutorials & Group assignments
16:30 – 17:30	Poster session

THURSDAY	
Transport Phenomena	
09.30 - 10.45	Fuel cell charge transport
10:45 – 11.00	Break
11.00 – 12.30	Fuel cell mass transport
12.30 – 13.30	Lunch
Transport Phenomena	
13.30 – 16.00	Heat Transfer
16:00 – 16.30	Break
16.30 – 18.00	Tutorials & Group assignments
18:00 – 19:00	Poster session
FRIDAY	
08.30 – 09.30	ECTS session
Materials	
09.30 – 10.45	Fuel cell materials
10:45 – 11.00	Break
11.00 – 12.30	Stack components
12.30 – 13.30	Lunch
Components	
13.30 – 15.00	Stack and system design
15:00 – 15:30	Break
15.30 – 16.00	Stack and system design
16:00 – 17:00	Poster session

SATURDAY	
Fuel Cell in-situ Characterization	
09:30 – 10:45	Fuel cell testing
10:45 – 11.15	Break
11.00 – 12.30	Fuel cell testing
12.30 – 13.30	Lunch
Fuel Cell ex-situ Characterization	
13.30 – 15.30	Test methods and analysis
15:30 – 16:00	Presentations of individual & group works Course Assessment - Q&A
16:00- 16;30	Panel discussion & Evaluation Closing remarks