IAHR AIRH

International Association for Hydraulic Engineering and Research

European Engineering Graduate School Environment Water

Short Course

Environmental Fluid Mechanics

Theory, Experiments, Applications

7-16 June 2004

Department of Hydraulic and Water Resources Engineering

Budapest University of Technology and Economics

MŰEGYETEM 1782

Course description

Environmental fluid mechanics is concerned with the fluid motions and associated mass and heat transport processes that occur in the Earth's hydrosphere and atmosphere on local or regional scales. A particular emphasis within these scales is the influence of these flows on (and their interaction with) man-made facilities and structures and their responses to anthropogenic releases of mass and heat. The special aim of the course is to concentrate on this latter aspect, by linking fundamental fluid mechanical concepts to engineering applications and practice.

The course will follow closely the aims and objectives established successfully at the predecessor events held at the Institute for Hydromechanics at the University of Karlsruhe in 1999 and at the Department of Civil Engineering at the University of Dundee in 2001. Specifically, it will cover the basic theoretical principles underlying a range of important environmental flows and their mathematical description. Laboratory experiments will be used to illustrate the physical mechanisms. Selected computational simulation models and examples of engineering design and environmental applications will be demonstrated.

Fundamental topics that will be addressed

Turbulent diffusion and shear flow dispersion in riverine and coastal flows and the lower atmosphere

Turbulent jets and plumes: entrainment and mixing processes, boundary effects

Chaotic advection and its consequences to pollutant mixing and bio-chemical processes in the environment

Rotation effects in environmental fluid mechanics: Coriolis acceleration, Kelvin waves, Ekman layers, geostrophic flow, coastal boundary current dynamics, coastal fronts

Stratified flow phenomena, including waves and intrusions, gravity currents, instabilities and mixing

Wave-current interaction and its impact on coastal mixing and morphology

Material transport processes and mechanisms

Architectural fluid mechanics

Specific applications and case studies

Fluid mechanics of wastewater disposal systems; design and performance characteristics of sea outfalls

PBL airflow, diffusion and dispersion problems

Wetland and vegetation hydrodynamics, transport and fate of contaminants and nutrients

Dynamics of deep and shallow lakes and reservoirs, computational models of circulation dynamics and water quality in lakes

Flow, mixing and transport models in coastal zone

Laboratory demonstration of a range of environmental flow phenomena

Course Programme

In addition to lectures, seminars, demonstrations and field trip, the course will have a Student Forum at which students can present informally their current research projects.

Full details of the course programme and schedule are available on the website **www.vit.bme.hu/EFMEGW** .

Who should attend?

The course is intended to masters or doctoral level students as well as for engineers and scientists in private industry, government or research institutions involved in hydraulic and environmental engineering, planning and impact assessment.

A prerequisite for attendance is first degree or diploma in either civil, environmental, mechanical, or chemical engineering, engineering science or an equivalent qualification in a cognate discipline.

The course is open to participants from all countries.

Lectures

All lectures will be given in English. Full notes will be distributed to all participants at the start of the course.

The European Engineering Graduate School Environment Water (EGW)

The European Engineering Graduate School Environment Water of IAHR is a network of European institutions offering courses at a high academic level on hydraulics and related fields. The courses are dedicated to graduate students, post-graduates and professionals. For academic recognition a common credit system and an appropriate quality control is introduced.

The scope and objectives of IAHR-EGW, together with the complete course calendar may be found on www.iws.uni-stuttgart.de/IAHR .

Course Fee

The course fee of 600 euro (450 euro for students) ***for participants registering before 15 April 2004*** covers lecture notes, snacks and coffee breaks. The course fee is increased by 10% for participants registering after 15 April 2004. One third reduction in the fee is available to participants from EGW network partner institutions.

Payment should be made to "*Budapest University of Technology and Economics*" by personal cheque (Hungarian participants only), money draft or money order (no credit cards). Bank transfer is recommended, for which details can be found on the course website. Unfortunately, any bank transfer charges have to be borne by the sender. Payment must be received by 15 May 2004.

Time and Location

The course will be held at the Budapest University of Technology and Economics, Hungary. A range of accommodation options is available to participants and details on these options will be sent to all registrants.

The course will begin on Monday 7 June 2004 at 9:00 and will finish at around 13:00 on Wednesday 16 June.

The weekend days will be devoted to an organised field trip to the countryside combining tourist attractions and professional sites.

Budapest the capital of Hungary offers a number of attractions all along the course. The weather in June is usually fine both for classes and for sightseeing.

Course Faculty

Prof János Józsa (Course Co-ordinator)
Department of Hydraulic and Water Resources Engineering, Budapest University of Technology and Economics, Hungary

Prof Gerhard H Jirka
Institute for Hydromechanics, University of Karlsruhe, Germany

Prof Peter A Davies
Department of Civil Engineering, University of Dundee, UK

Prof Alistair G L Borthwick
Department of Engineering Science, University of Oxford, UK

Prof Dieter Etling
Institute of Meteorology and Climatology, University of Hannover, Germany

Prof Paul Linden
Department of Mechanical and Aerospace Engineering, University of California, San Diego, USA

Prof Heidi M Nepf
Department of Civil and Environmental Engineering, Massachusetts Institute of Technology (MIT), USA

Prof Scott A Socolofsky
Department of Civil Engineering, Texas A&M University, USA

Prof Tamás Tél
Department of Theoretical Physics, Eötvös Lóránd University, Hungary

Prof Alfred J Wüest
Swiss Federal Institute for Environmental Science and Technology, Switzerland

For further information:

www.vit.bme.hu/EFMEGW
E-mail: jozsa@vit.bme.hu
Phone: +36 1 463 1164
Fax: +36 1 463 1879

Environmental Fluid Mechanics Theory, Experiments, Applications

7-16 June 2004
Budapest University of Technology and Economics

Registration Form:

Name
Organisation
Address

City
Postcode/zip
Country

Phone
Fax
E-mail

Academic degrees (degree, year, institution)

Name and address of academic supervisor (students only)

Course Fee (please indicate)

Full fee (600 euro)
Reduced fee (registered students) (450 euro)
EGW Network Partner reduction (400 euro)

Registration must be received by 15 May 2004

Mail to: Prof János Józsa
Department of Hydraulic and Water Resources Engineering
Budapest University of Technology and Economics
Muegyetem rkp. 3. Kmf. 4.
H-1111 Budapest, Hungary