Aims and scope

The broad experience achieved by the Universities of A Coruña and Magdeburg in the training of Civil Engineering and Water Engineering professionals within the last decades, has culminated in the development of a Joint International Master Degree meeting the requirements of the European Space of Superior Education set by the Bologna Treaty.

At the moment there is an increasing need for qualified professionals in the field of Water and Environmental Engineering that posses not only high skills in this field of expertise but that also own qualifications that allow them to develop their professional activity within an international environment.

The Masters on Water Engineering being taught at the universities of A Coruña and Magdeburg are going to be merged into a joint programme that also counts with the collaboration of some other prestigious European higher education institutions. The programme will be based into three semesters one of which will be imparted at each of the institutions and a third one to take place at the university of the student´s choice (among A Coruña, Magdeburg and some other partner universities), where the students will develop their Master Thesis and their Internship or university practicum .

Some further information follows and can be found in the web-pages:

http://caminos.udc.es/info/asignaturas/201/masterindex.html
http://master.geama.org/es
https://www.hs-magdeburg.de/
http://www.udc.es/

Main Features

- Total length of the master programme: 90 ECTS
- Three terms structure
  - First term (30 ECTS), Winter-semester: Oct. to Feb. at A Coruña
  - Second term (30 ECTS): Spring-semester: April to July at Magdeburg
  - Third term (30 ECTS): Winter-semester: Oct. to Feb. (location to be chosen between A Coruña, Magdeburg or partner Universities
- Degree to be obtained: International Master Degree in Water Engineering, Meng. (Hydraulic and environmental engineering)
- Number of students to be admitted (total): 25
- Access: University degrees in engineering to be assessed by the Academic commission by July/September of each year
- Beginning of the programme 1st Oct 2012

Fachbereich Wasser und Kreislaufwirtschaft
Master in Water Engineering
Universidad de A Coruña
ETS de Ingenieros de Caminos, Canales y Puertos

FIRST SEMESTER (La Coruña)	ECTS	
1.1 HYDROLOGICAL PLANNING AND PROJECTS	6	
1.2 WATER SUPPLY AND DRAINAGE SYSTEMS	6	
1.3 PHYSICO-CHEMISTRY AND QUALITY OF WATER	6	
Options (Choose 2 out of 4)		
1.4 EXPERIMENTAL HYDRAULICS I	6	
1.5 COMPUTATIONAL FLUID DYNAMICS I	6	
1.6 WATER TREATMENT and ENERGY EFFICIENCY	6	
1.7 GROUNDWATER ENGINEERING I	6	
		30
SECOND SEMESTER (Magdeburg)		
2.1 HYDRAULIC PLANNINGS AND PROJECTS	6	
2.2 GIS AND HYDROLOGY	6	
2..3 RESTORATION ECOLOGY	6	
Options (Choose 2 out of 4)		
2.4 EXPERIMENTAL HYDRAULICS II	6	
2.5 COMPUTATIONAL FLUID DYNAMICS II	6	
2.6 RIVER MORPHOLOGY	6	
2.7 WATER BIOTECHNOLOGY	6	
		30
THIRD SEMESTER		
3.1 ENTERPRISE TRAINING OR UNIVERSITY PRACTICUM	15	
3.2 MASTER THESIS	15	30
		90

Master in Water Engineering

POLITECNICO DI MILANO · Universidad de Concepción · UNIVERSITY OF SURREY · Grenoble INP ENSE3 · UNIVERSITÀ DEGLI STUDI DI GENOVA · emalcsa · CÁMARA OFICIAL MINEIRA DE GALICIA

Syllabuses (in short):

First semester (A Coruña)

Compulsory modules

1.1 HYDROLOGICAL PLANNING AND PROJECTS
Assessment and analysis of water resource systems. Groundwater management. Surface water management. Water withdrawals and uses. Methods of analysis: identification, optimization, uncertainties, objectives and control of water management plans. Introduction to data management systems by GIS. Design of water resources systems and planning. Water economy and legislation.

1.2 WATER SUPPLY AND DRAINAGE SYSTEMS
Water supply and urban drainage systems design. Operation and maintenance. Theoretical development and practical examples.

1.3 PHYSICO-CHEMISTRY AND QUALITY OF WATER
Basic principles of water chemistry, sampling procedures, analytical techniques for the determination of major and trace constituents, description of the techniques generally used to assess the quality of water chemical analyses or to interpret series of water quality data. Although the course is focused on natural waters, the principles and techniques described can be broadly applied to water supply, water treatment and related areas.

Options (Choose 2 out of 4)

1.4 EXPERIMENTAL HYDRAULICS I
Introduction to experimental hydraulics. Scale models. Hydrometry. Continuous of control cross-sections. Experimental field techniques. Instrumentation and control of water treatment processes. Tests to obtain design parameters.

1.5 COMPUTATIONAL FLUID DYNAMICS I
Fundamentals of Computational Fluid Dynamics. Fundamental equations: Saint-Venant, Navier-Stokes, potential flow, stream-vorticity, Stokes flow, shallow water, convection-diffusion, Darcy,... Fundamentals of Matlab programming. Finite element programming of hydrodynamic, porous media and geochemical models.

1.6 WATER TREATMENT and ENERGY EFFICIENCY
Analysis of water treatment processes from the perspective of power consumption and resulting environmental implications

1.7 GROUNDWATER ENGINEERING I
Basis of flow in porous and fractured media (physical hydrogeology) in both saturated and unsaturated conditions. Interactions of surface water and groundwater. Hydrogeochemical principles and rock-water interaction (chemical hydrogeology, transport in porous media), hydrodynamics test of aquifers (slug tests, pumping tests,…), constructive aspects of wells, development and exploitation of aquifers.

Second semester (Magdeburg)

Compulsory modules

2.1 HYDRAULIC PLANNING AND PROJECTS
Dam hydraulics and design of spillways in international consulting projects, flood-control, flood management, hydraulics and design of channels, groundwater hydraulics, hydraulics and design of fish passes.

2.2 GIS AND HYDROLOGY
Advanced hydrology, analysis of extrema, PMP, PMF, climate change, numerical modelling, use of GIS in projects, hydrogeology.

2.3 RESTORATION ECOLOGY
River and lake ecology, design of experiments in ecology, river restoration basis, examples and field studies

Options (Choose 2 out of 4)

2.4 EXPERIMENTAL HYDRAULICS II
Hydraulic flume experiments and morphological flume experiments: scaling laws, measurement systems, data acquisition, data analysis. Sediment recirculation systems, sediment transport, scouring phenomena at hydraulic structures

2.5 COMPUTATIONAL FLUID DYNAMICS II
Using HEC-RAS in combination with HEC GEO RAS, advanced hydraulic projects, sediment transport and scour, two dimensional hydraulic models, advantages and disadvantages of 1D, 2D and 3D models, SSIM

2.6 RIVER MORPHOLOGY
Fundamentals of river morphology, use of Shields and Hjulström diagrams, sediment transport, bed load and suspension load, scour at hydraulic structures, sedimentation in reservoirs and remobilisation of sediments

2.7 WATER BIOTECNOLOGY
Biodiversity and species composition analysis, determination of aquatic organisms, Hydro-biological field trips and analysis, water chemistry, water pollution, protection of water, environmental microbiology

Third semester (location to be chosen by students)

3.1 Enterprise training period or University Practicum

Internships will involve the development of professional practice in various fields related to Water Engineering within one of the companies with which a partnership agreement has been signed. Internships may be developed in companies and institutions linked to the A Coruña or Magdeburg universities, or other universities with which these institutions have bilateral agreements. The assignment of placements will contemplate the priority of students and in case of conflict will strictly follow academic criteria. A tutor will be appointed for every student at the host university to supervise the work being carried out. At the end of the internships the student will submit a report and the tutor will assess its adequacy. The duration of these practices will be between one and three months, extendable by agreement between the parties. Similarly the development of these practices at the university facilities will be also allowed, collaborating on research projects in the different areas involved. This will be the so-called university practicum. The contractual relationship shall preferably be paid in either case.

3.2. Master Thesis

Students must write a final master thesis as a mandatory requirement for obtaining the Master Degree in Water Engineering. In order to do so, the coordinator of the host university will appoint a tutor being an expert on the subjects that students might choose as the object of their dissertations. The purpose of the dissertation is a research work in any field related to Water Engineering. The dissertation can be developed at the Universities of A Coruña or Magdeburg, or other universities with which they have bilateral agreements. The assignment of placements will contemplate the priority of students and in case of conflict will strictly follow academic criteria. Upon completion of the work the tutor will receive a report which will be assessed by a examination board to be established at the host university with at least three members, including the course coordinator at the host university, the tutor and another person appointed by her/him.

In case of conflict, the coordinators of the Universities of A Coruña and Magdeburg will sort out any problems trying to reach an agreed solution between the parties. A standardized writing format will be provided to students to meet with. The students will provide a thesis copy to each of the board members at least one week before the dissertation. The language for the writing and reading will be English.