EUROAQUAE
Euro Hydro-Informatics and Water Management

Curricula presentation

Basic acquisitions: all partner universities and beyond

Semester 1	Content	Location	30 ECTS
Module 1.1	Mathematics & physics	All partners	6 ECTS
Module 1.2	Hydrology & Hydraulics	All partners	6 ECTS
Module 1.3	Introduction to water and aquatic environment management	All partners	6 ECTS
Module 1.4	Computer skills, databases & GIS – ICT	All partners	6 ECTS
Module 1.5	Web-based collaborative engineering	All partners	2 ECTS
Module 1.6	Language skills – Intensive course (UNUT)	UNUT	4 ECTS

Hydro-Informatics: UNUT

Semester 2	Content	Location	30 ECTS
Module 2.1	Hydro-Informatics & Integrated Water Resources Management (from global scale to local application)	UNUT	7 ECTS
Module 2.2	Numerical methods & computational hydraulics	UNUT	6 ECTS
Module 2.3	Introduction to software packages (commercial & industrial modelling systems)	UNUT	7 ECTS
Module 2.4	Software engineering	UNUT	4 ECTS
Module 2.5	Advanced ICT, databases & GIS - Communication	UNUT	6 ECTS

Thematic specialisation: Urban waters – UNSA

Semester 3	Content	Location	30 ECTS
Module 3.1	Modelling methods for urban waters (sewage network, floods and waste waters)	UNSA	5 ECTS
Module 3.2	Methods for water supply and waste waters treatment	UNSA	3 ECTS
Module 3.3	Economical and legal environments - Water industry & municipalities	UNSA	5 ECTS
Module 3.4	Project management & communication	UNSA	5 ECTS
Module 3.X	Hydro-Europe Working as virtual company/institute	UNSA	6 ECTS
Module 3.Y optional	Pre professional training (all partners sharing)	UNSA	6 ECTS
Module 3.Y optional	Research introduction (all partners sharing)	BTUC	6 ECTS

Thematic specialisation: Hydro-Informatics Systems – BTUC

Semester 3	Content	Location	30 ECTS
Module 3.1	Coupling free-surface and groundwater modelling	BTUC	4 ECTS
Module 3.2	Modelling business processes, workflow and information management	BTUC	6 ECTS
Module 3.3	Geometric modelling and presentation methods	BTUC	4 ECTS
Module 3.4	Monitoring, data acquisition and documentation	BTUC	4 ECTS
Module 3.X	Hydro-Europe Working as virtual company/institute	UNSA	6 ECTS
Module 3.Y	Pre professional training (all partners sharing)	UNSA	6 ECTS
Module 3.Y	Research introduction (all partners sharing)	BTUC	6 ECTS

Thematic specialisation: Inland waters management – BUTE

Semester 3	Content	Location	30 ECTS
Module 3.1	Modelling methods for inland surface waters (rivers with floodplains, lakes and reservoirs),	BUTE	6 ECTS
Module 3.2	Hydrological modelling and forecasting (rainfall-runoff, flood forecast, lake and wetland water balance)	BUTE	4 ECTS
Module 3.3	River basin management and planning (under the EU Water	BUTE	4 ETCS

	Framework Directive)		
Module 3.4	Advanced hydrometry and data analysis in surface waters (automated, various space-time resolution techniques)	BUTE	4 ETCS
Module 3.X	Hydro-Europe Working as virtual company/institute	UNSA	6 ECTS
Module 3.Y	Pre professional training (all partners sharing)	UNSA	6 ECTS
Module 3.Y	Research introduction (all partners sharing)	BTUC	6 ECTS

Thematic specialisation: Decision support systems – UPC

Semester 3	Content	Location	30 ECTS
Module 3.1	Artificial neural network for Decision Support Systems (DSS)	UPC	3 ECTS
Module 3.2	Flood risk concepts and application in river basin management	UPC	5 ECTS
Module 3.3	DSS for flood risk in urban areas	UPC	5 ECTS
Module 3.4	Real time control and operation of irrigation canals, rivers and reservoirs	UPC	5 ECTS
Module 3.X	Hydro-Europe Working as virtual company/institute	UNSA	6 ECTS
Module 3.Y	Pre professional training (all partners sharing)	UNSA	6 ECTS
Module 3.Y	Research introduction (all partners sharing)	BTUC	6 ECTS

Professional practice (UNSA coordinator) & Research (BTUC coordinator)

Semester 4	Content	Location	30 ECTS
Module 4.1 Option	Research & development project Following the 4 thematic specialisations developed in semester 3 or oriented trough fundamental topics	Coordination BTUC	30 ECTS
Module 4.1 Option	Professional practice Following the 4 thematic specialisations developed in semester 3 or oriented trough fundamental topics	Coordination UNSA	30 ECTS

Semester 1 - Basic acquisitions – All partners of the consortium

Module 1.1 – Mathematics & Physics
The participants receive a refresher course on mathematics and physics used in water engineering and Hydro-Informatics (numerical and computer methods). The mathematics covers statistics applied in hydrology (Cf. extreme values). Physics is focused on fluid mechanics.

Module 1.2 – Hydrology & Hydraulics
The module will give to the participants the basic principles of hydrology and free-surface hydraulics. The presentation covers concepts, methods and tools used in engineering activities. Subjects are hydrological cycle, precipitations measurement and analysis, evaporation analysis, rainfall-runoff analysis, physical properties of water, hydrostatics, basic hydrodynamics, uniform flow in channels and pipes, steady-state, non-uniform and unsteady flow concept.

Module 1.3 – Introduction to water and aquatic environment management
The module presents the water issues in the world (such as floods, draughts, sanitation, water supply, irrigation). Lectures are focused on the operational management of the aquatic environments and the key role of Hydro-Informatics. The module covers ecological, physical, chemical and biological aspects of aquatic environments and the related artificial infrastructure / constructions.

Module 1.4 – Computer skills, databases and GIS - ICT
The module will provide basic skills in operating computer resources in networks, databases management and Geographical Information Systems (GIS) Technology. The participants receive an introduction into modern ICT and the position of ICT in engineering activities related to the water field. In particular they will be introduced into theory and concepts of Web-based Collaborative Engineering serving as a link between the courses taught at the partner institutions, supporting generation of equivalent levels and preparing for E-Learning / Open Distance Learning and mobility within the course system. The module is technically coordinated by BTUC.

Module 1.5 - Web-based collaborative engineering
The course introduces the use and practice of Web-services and software for collaborating engineering and communicating over the Internet. Participants from all places have to collaborate over the net on a given engineering exercise within small mixed groups. The intention is to familiarise with the medium Internet and establish virtual contacts between the participants who will later meet in the 2nd semester face to face. Students are supposed to acquire skills of working in a heterogeneous multi-cultural environment.

Module 1.6 – Language skills
The module, given by UNUT, is defined as an intensive language training in English as main instruction language used in a majority of modules and in a second European language (French, German, Spanish and eventually Hungarian) used by the members of the consortium (especially used by host institution for the specialisation - semester 3). The module's validation is obtained in English with a TOEFL score of 575 or greater, or by an IELTS score of 6.5 or greater. The validation for the other European language is obtained in a similar way according to each specific language certification system.

Semester 2 – Hydro-Informatics - UNUT

Module 2.1 – Hydro-Informatics & Integrated Water Resources Management
The module presents the context of different environments such as urban areas, catchments, coastal zones. According to these specific situations, the course gives a methodology to identify the type of Hydro-Informatics methods and tools and provides a global vision of computer based decision support systems that are widely used into offices of engineers, water authorities, national bodies and international agencies. The module underlines the major issues on sustainable water management, the water policies and strategies of management.

Module 2.2 - Numerical methods and computational hydraulics
The module provides introduction, through theory and practice, to numerical methods applied generally to the water field and especially to computational hydraulics. The course is based on introduction to differential equations in fluid mechanics for free-surface flow and transport system used for unsteady flows simulation. The module presents in details and through exercises the most widely used approaches such as method of characteristics, finite differences and finite elements.

Module 2.3 – Introduction to software packages
The module offers to the participants to use and to apply through case studies the major modelling packages for hydrological catchments modelling, drinking network design and optimisation, sewage network design and management, 1D and 2D free surface flows in continental and marine environments. The proposed tools are issued and developed by the most advanced professional and scientific producers such as Danish Hydraulic Institute (DK), Electricité de France EDF (F), WL Delft Hydraulics (NL), Wallingford software (UK), WASY (DE). The purpose for the participants is to have an extensive knowledge and practice of the modelling procedures with the different packages.

Module 2.4 – Software engineering
The module presents the main concepts of software engineering based on modern ICT. Knowledge on Java programming and Web-technologies will be complemented. Introduction will be given to computational environments such as Internet, clusters, parallel computing etc. as well as the design, implementation and set-up of water related Web services.

Module 2.5 – Advanced ICT, databases & GIS - Communication
The module presents the growing position of ICT in hydro-engineering for both design and collaboration through virtual laboratories. The strong acquisition in this field constitutes a key component of the know-how of hydro-informatics and water management professionals. The databases and GIS are mainly covered in the integration of application and data management aspects. To support coherence of the program this module is run E-Learning activity sharing between all partners of the consortium. Exercises will be done on simple projects to be run in Web-based collaboration by students from all partner-universities to acquire, besides engineering, soft skills in team-working in a heterogeneous multicultural group. The exercises realized in the communication part (oral and written activities with multimedia devices and tools) are conducted both in English and in a second European

language. On completion of this module, the participant acquires essential skills which are compulsory into future professional activities and positions in multi-cultural environment.

NB: During the semester 2, each participant identifies and confirm a specialisation for semester 3.

Semester 3 – Thematic specialisation - Urban waters – UNSA

Module 3.1 – Modelling methods for urban waters (sewage network, floods and waste waters)
The module is focused on the context and the nature of modelling in the urban environment. The participant acquires the exhaustive knowledge about the hydro-informatics methods and the tools (variety of modelling systems: physically based, data driven, lumped models) available to cover the urban problems such as sewage network definition, optimization and management, urban flooding or waste water management.

Module 3.2 – Methods for water supply and waste waters treatment
The module presents the main methodologies and techniques applied for the water supply and the waste waters treatments. The participants acquire theoretical knowledge about the different technical solutions. Through case studies and examples, they are trained to define and manage operational solutions in various situations. The course includes a wide use of optimization methods for technical and economic purposes as well.

Module 3.3 – Economical and legal environments – Water industry & municipalities
The module covers legal frameworks for the development and the protection of water resources and water services, the development of policies, laws and standard (Cf. European Water Framework Directive), the socio-economic system components with major concepts as subsidiary principle, deregulation, free market and competition of interest. The relationships and strategies between water industry and municipality are developed and analysed according to the rules of the water market. The module could also be taught as e-learning activity for all partners

Module 3.4 – Project management & communication
The project management (PM) techniques as planning, task hierarchy, decision making and financial awareness are essential for the development of project in urban environment. The module is focused on the acquisition of the Project Management applied to generic projects as water supply, sewage network, waste water management and flood protection. The module includes the needs of communication related to such projects in relationship with social, professional, economic and cultural urban environments.

Semester 3 – Thematic specialisation - Hydro-Informatics Systems - BTUC

Module 3.1 – Coupling free-surface and groundwater modelling
Water resources depend on interaction of groundwater and free-surface flow. Description of groundwater and rock-flow processes will be given in term of differential equations and common numerical schemes. Attention will be given to transport phenomena of pollutants. Aspects of integration of small to large scale processes will be discussed and principles for coupling of software for interacting processes with free surface flows presented.

Module 3.2 – Modelling business processes, workflow and information management
Mapping the potential of ICT to support business processes (workflow) will be taught. Basic mathematics of theory of sets and graphs will be presented and ICT oriented model description formulation introduced (UML, unified modelling language). Examples will be modelled taken from crisis management for flood events. Small examples will be implemented in Java.

Module 3.3 – Geometric Modelling and Presentation Methods
Mathematical background for modelling geometry in the context of numerical grid generation and presentation of physics in Web environment will be taught. Small examples will be implemented and exercises with commercial software run. Attention will be given to impact of discretization to correct representation of physical processes.

Module 3.4 – Monitoring, data acquisition and documentation
Sustainable water resources management demands for monitoring by data acquisition in the field and laboratory as well as simulation by computer models. Concepts of monitoring and data acquisition will be presented and mathematical concepts (tensor analysis, set theory) for handling mass data from field measurement and numerical simulation introduced. Implementation into Hydro-Informatics Systems by object-oriented approaches to support information analysis, visualization, documentation and archiving will be shown. Approaches will be taught in the view of Web-based technology and coupling standard software tools by generalised information bases.

Semester 3 – Thematic specialisation - Inland waters management - BUTE

Module 3.1 – Modelling methods for inland surface waters (rivers with floodplains, lakes and reservoirs)
This module will give an overview on the problem oriented numerical modelling methods in surface waters the applicability of which will be presented by a number of case studies. Processes to model will include flow, mixing, sediment transport and bed morphology, and the focus will be on the multidimensional approach. Both grid-based models and Lagrangian particle tracking techniques will be described. Model implementation in complex conditions such as main channel with forested floodplains, or lakes with vegetated littoral zones will be also discussed. Planning and performing data acquisition for model calibration and verification, moreover, model simplifications vs. information loss will be highlighted, too. An introduction to numerical solvers with capability of static adaptation to input data fields or dynamic adaptation e.g. to the modelled flow (including both space and time refinement or coarsening) will give an impression on future developments. Selected river and lake case studies will show the merits and utility of 2- and 3D methods in surface water hydro- and sediment dynamics projects.

Module 3.2 – Hydrological modelling and forecasting (rainfall-runoff, flood forecast, lake and wetland water balance)
The general purpose of this module will be rainfall-runoff, channel flow and lake water balance modelling in system theory approach. Linear systems will be discussed in details including rainfall-runoff input-output models, various methods for determining the unit hydrograph, linear kinematic wave equation, various continuous and discrete cascade models, base-flow analysis, stochastic models and the Kalman-filtering. A brief introduction to non linear systems, including the implementation of non-linear processes in rainfall-runoff and channel flow models, effective rainfall and anticipant rainfall/infiltration will also be given. Geomorphic-based watershed models with non-linear storage, as well as GIS and remote control will serve as case studies in hydrological modelling.

Module – 3.3 River basin management and planning (under the EU Water Framework Directive)
This module will first give an introduction to river basin management and to the global understanding of integrated river basin management and planning. The focus will be on the EU Water Framework Directive (WFD) and the relevant EU directives, moreover, on the R&D challenges of and EU guidance documents for its implementation. Further topics include the identification of the environmental, social and economic objectives for water management, planning of programmes of measures to achieve the objectives, integration of the river basin management plans under the WFD and under the policies of the economic sectors. An overview of the best practices of informatics, GIS and mathematical modelling for river basin management and planning will be also given. Aspects such as participatory river basin management, the role and approaches for public participation and social learning will be also dealt with. The module will be completed by discussing the main principles of international river basin management and management of large river basins.

Module – 3.4 Advanced hydrometry and data analysis in surface waters (automated, various space-time resolution techniques)
In this module an overview will be given on the up-to-date techniques and instrumentation to collect river and lake bathymetry, flow velocity, sediment transport and bed material data with various space and time resolution. Special attention will be paid on automated techniques, optimising measurement sites and periods in order to maximise data information content. Methods and tools relevant to fluvial and lake conditions and scales (including e. g. the wind as external forcing factor) will be described. The teaching material will also contain computer

analysis, evaluation and displaying methods as well as the ways to utilise the data in numerical model calibration and verification.

Semester 3 – Thematic specialisation - Decision Support Systems - UPC

Module 3.1 - Artificial neural network for Decision Support Systems (DSS)
In this module the basis and the technology associated to the use of neural networks is presented. The module is oriented to the definition of Decision Support Systems (DSS) in terms of the minimum set of variables used to take the appropriated decisions in terms of risk/vulnerability derived from real conditions in hydraulic systems: floods in river basins, urban areas or others.

Module 3.2 - Flood risk concepts and application in river basin management
This module is oriented to define the risk criteria and application to determine in real scenarios a risk map associated to a flood event predicted or estimated. The module focuses in the use of DTM information, hydraulic tools (numerical models in 1D and 2D), and the definition of risk database criteria than can be customized or adapted to any specific situation, and the use of decision support systems trained with the hydraulic tools presented before.

Module 3.3 - DSS for flood risk in urban areas
The specificity of this small basins where the floods goes through a street networks, with a collecting system constituted by a set of street inlets and the risk associated to the pedestrians and urban components (houses, urban infrastructures, cars, shops, etc) is addressed. In this module the topics are concentrated in the runoff and flow process in urban area along the streets, the hydraulic analysis of sewer systems and the global risk problem associated to these concepts.

Module 3.4 - Real time control and operation of irrigation canals, rivers and reservoirs
This module is oriented to the global management of the irrigation infrastructures. The key problem is to manage all the control gates along the canal, rivers and reservoirs in order to supply the water volumes demanded by the farmers at the right instant and in the desired quantities. This can be done in terms of a real time control process, first defining the trajectories of the control gates according to the initially desired discharges, and finally in real time, in case of modifications/perturbations produced during the control process. Open Channel hydraulics, system dynamics and control theory will be used in this module.

Semester 3 – Common activities

Module 3.X – Hydro-Europe – Working as virtual company/institute – UNSA
Hydro-Europe is an intensive course focused on collaborative engineering and based on the successfully experiences running since more than 5 years between the partners (Cf. www.hydro-web.org). The main objective for the participants is to acquire and to validate collaboration and professional skills through a virtual environment. International teams composed with participants from each academic partners work collaboratively remotely through Internet on a case study where a variety of hydro-informatics tools can be applied and used. Study cases will be commonly defined according to specializations. Field activities will accompany this activity and final presentations take place at UNSA at the end of semester 3.

Module 3.Y optional – Pre professional training - UNSA
This interdisciplinary module is dedicated to an intensive course focused on acquisition of professional skills as professional organizations, international structures and organizations, legal environment of companies, communication, ICT for engineering activities, written and oral presentation, reporting and synthesis. The module will be offered to all partners of the consortium and concluded by an intensive course after Hydro-Europe.

Module 3.Y optional – Research Methodology - BTUC
The interdisciplinary module is dedicated to an intensive course focused on acquiring research methodologies as well to specific topics in hydro-informatics within Web-based seminars. The module will present how to approach research work, how to validate simulation models and how to document findings, presenting them and writing reports. Within seminars students will present current work from which master thesis will be identified. The

module will be shared by all partners of the consortium and support coherence within the program by face-to-face meetings.

Semester 4 – Professional practice & Research

Module 4.1 – Research & development project – 6 months – Coordination BTUC
The definition of the master work in research area is made in dialogue between the student, a mentor from the host institution of semester 4, a supervisor from the coordinating institution (BTUC) and eventually with an external partner of the water field (industrial, consulting company, public services …). The research project is carried out in the research environment of the consortium members. For the participants hosted by UNUT for semester 1, the institution for the module must be different from UNUT. The work is concluded by a thesis with defence. The operational organization of this module is made by BTUC, acting as the coordinating institution and with the full participation of all the consortium members. The validation (30 ECTS) of the module is made by BTUC.

Module 4.1 – Professional practice – 6 months – Coordination UNSA
The professional practice is carried out into a company or public service (external partner), on a specific project defined in cooperation between the student, a mentor from the home institution, a supervisor from the host institution (UNSA) and a mentor from the external partner (public service or private structure). The project carried out by the student takes part of the regular activities of the company or public service. This professional practice is considered for the student as a first professional experience as executive engineer in Hydro-informatics. The evaluation and the validation of the module is made mainly trough professional criteria. The work is concluded by a portfolio which presents a description of the work done in the project and an in-depth review of at least one associated topic and details of the lessons learned. The professional practice is achieved in a European company or a European public service. The operational organization of this module is made by UNSA, acting as the host institution and with the full participation of all the consortium members. The validation (30 ECTS) of the module is made by UNSA.

Acquired competencies and the learning outcomes of the Masters Course

The concept of the master is defined to answer the challenge of the water management anywhere in the world and for all situations with the methodologies and the tools which are the only ones able to provide efficient and sustainable solutions. The master of Water management and Hydro-Informatics is an innovative approach to strengthen young researchers, professionals and practitioners competencies both in the water management, the water-environment engineering as well as in the exploitation of potential of modern ICT.

Semester 1. The first semester is dedicated to provide to the participants the basics knowledge to be able to follow the Water management and Hydro-Informatics courses. The participants acquire collaborative skills to strengthen the community of the master and also of the professionals and practitioners.

Semester 2. The second semester is defined as a compulsory common platform on Hydro-Informatics and based on a set of techniques and tools applied in different situations. The acquired competencies provide to the participants the general capacities compulsory to develop and to enter a specialization in the following semester.
Semester 3 – Specialization Urban waters – The specialization on Urban waters develops specific capacities for analysis, design, modelling and management for all the aspects of water supply, waste water treatments and flash floods in urban areas.

Semester 3 – Specialization Hydro-Informatics Systems - The specialization on Hydro-Informatics Systems provides competencies about application in ICT potential for understanding and developing innovative solutions in the profession as well as in research.

Semester 3 – Specialization Inland waters management – The specialization focused on inland waters management develops specific capacities for analysis, design, modelling and management for the main aspects for river basin management and planning, hydrometry design and management and integrated resources management.

Semester 3 – Specialization Decision Support System (DSS) – The specialization on DSS develops capacities and competencies for the conception of systems for risk analysis, flood forecasting and warning, real time control.
Semester 3 – Common activities – The 3 modules allow to the participants to develop and to complete engineering, pre-professional, practical and scientific skills in a multicultural environment just before entering the final exercise and practice of the master course.

Semester 4 - Professional practice and research – The professional practice is defined as the first professional experience within a company or a public service on a real specific on-going project. The research orientation allows to the participants to obtain a capacity in a specific scientific or technical field in relationship with the most significant issues in Hydro-Informatics.

Semester 1	All partners of the consortium t	Competencies	Outcomes
Module 1.1	Mathematics & physics	Theoretical skills	Exercises
Module 1.2	Hydrology & Hydraulics	Theoretical skills	Exercises
Module 1.3	Introduction to water and aquatic environment management	Understanding & analysis capacities	Study case report
Module 1.4	Computer skills, databases & GIS – ICT	Practical skills	Software exercise
Module 1.5	Web-based collaborative engineering	Multi-cultural understanding & engineering skills	Short documented engineering project
Module 1.6	Language skills – Intensive course (UNUT)	Practical skills	TOEFL

Semester 2	UNUT	Competencies	Outcomes
Module 2.1	Hydro-Informatics & Integrated Water Resources Management (from global scale to local application)	Understanding & analysis capacities	Study case report Software exercise
Module 2.2	Numerical methods & computational hydraulics	Theoretical skills	Software exercise
Module 2.3	Introduction to software packages (commercial & industrial modelling systems)	Theoretical skills	Software exercise
Module 2.4	Software engineering	Understanding & analysis capacities	Software exercise
Module 2.5	Advanced ICT, databases & GIS - Communication	Practical skills	Study case report

Semester 3	Urban waters UNSA	Competencies	Outcomes
Module 3.1	Modelling methods for urban waters (sewage network, floods and waste waters)	Understanding and modelling capacities	Software exercise
Module 3.2	Methods for water supply and waste water treatment	Analysis, design and management capacities	Study case & software exercise
Module 3.3	Economical and legal environments - Water industry & municipalities	Situation analysis & Planning capacities	Study case report
Module 3.4	Project management & communication	Analysis, planning and management capacities	Study case report & presentation

Semester 3	Hydro-Informatics systems - BTUC	Competencies	Outcomes
Module 3.1	Coupling free-surface and groundwater modelling	Understanding and modelling capacities	Software exercise
Module 3.2	Modelling business processes, workflow and information management	Understanding and modelling capacities	Software exercise
Module 3.3	Geometric modelling and presentation methods	Understanding and modelling capacities	Software exercise
Module 3.4	Monitoring, data acquisition and documentation	Understanding and modelling capacities	Software exercise

Semester 3	Inland waters management - BUTE	Competencies	Outcomes
Module 3.1	Modelling methods for inland surface waters (rivers with floodplains, lakes and reservoirs),	Understanding and modelling capacities	Software exercise
Module 3.2	Hydrological modelling & forecasting (rainfall-runoff, flood forecast, lake & wetland water balance)	Understanding and modelling capacities	Study case & software exercise
Module 3.3	River basin management and planning (under the EU Water Framework Directive)	Situation analysis Planning capacities	Study case report
Module 3.4	Advanced hydrometry and data analysis in surface waters (automated, various space-time resolution techniques)	Design and management capacities	Study case & software exercise

Semester 3	Decision Support System - UPC	Competencies	Outcomes
Module 3.1	Artificial neural network for Decision Support Systems (DSS)	Understanding and modelling capacities	Software exercise
Module 3.2	Flood risk concepts and application in river basin management	Risk analysis ability	Study case report & software exercise
Module 3.3	DSS for flood risk in urban areas	Understanding and modelling capacities	Software exercise
Module 3.4	Real time control and operation of irrigation canals, rivers and reservoirs	Design and management capacities	Study case & software exercise

Semester 3	Common activities	Competencies	Outcomes
Module 3.X	Hydro-Europe Working as virtual company/institute	Multi-cultural understanding and engineering skills	Documented engineering project
Module 3.Y optional	Pre professional training (all partners sharing)	Professional environment knowledge	Identification of professional project
Module 3.Y optional	Research introduction (all partners sharing)	Preparedness to scientific work	Identification of master thesis

Semester 4		Competencies	Outcomes
Module 4.1 Option	Research & development project	Problem solving ability	Master thesis
Module 4.1 Option	Professional practice	Professional ability	Portfolio