

**MSc EuroAqueae HydroInformatics and Water Management  
EuroAqueae**

Year 1 Semester 1 (Basic Skills Aquisition)

Location: UNSA / BTUC / UPC

UNSA/BTUC.UPC

Study Period: Mid-Sep to End-Jan

| Year 1<br>Sem 1 | Module Title   | Brief Description   | ECTS |
|-----------------|--|---|------|
| Module 1.1      | Mathematics & Physics &                                  | The participants receive a refresher course on mathematics and physics used in water engineering and Hydroinformatics (numerical and computer methods). Mathematics covers statistics applied in hydrology (Cf. extreme values). Physics is focused on fluid mechanics.   | 6    |
| Module 1.2      | Hydrology & Hydraulics &                                 | The module gives 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.   | 6    |
| 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 Hydroinformatics. The module covers ecological, physical, chemical and biological aspects of aquatic environments and the related artificial infrastructure/constructions.  | 6    |
| Module 1.4      | Computer skills, databases & GIS - ICT &                 | The module provides basic skills in operating computer resources in networks, in one programming language, in databases management and in 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. Exercises are mainly focusing on simple programming examples and GIS application for water related problems.  | 6    |
| 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 an heterogeneous multi-cultural environment. The module is technically coordinated by our partner the Technical University of Cottbus (Germany). | 4    |
| Module 1.6      | European Language I skills (French)                      | Basic/Intermediate French language training (depending on student level). The validation is obtained through oral and written assessment.   | 2    |

**MSc EuroAqueae HydroInformatics and Water Management  
EuroAqueae**

Year 1 Semester 2 (Hydroinformatics )

Location: NU

NU

Study Period: Beginning Feb to End-May

| Year 1<br>Sem 2 | Module Title  | Brief Description   | ECTS |
|-----------------|---|---|------|
| Module 2.1      | Hydroinformatics & Integrated River Basin 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 Hydroinformatics methods and tools. The course 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.   | 5    |
| Module 2.2      | Numerical methods & 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.  | 5    |
| Module 2.3      | Introduction to software packages / Modelling of Floods /     | The module offers to the participants to use and to apply through case studies the major modelling packages for hydrological catchments modelling, 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), Deltares (NL), Wallingford Software (UK), Halcrow (UK) DHI-WASY (DE). The purpose for the participants is to have an extensive knowledge and practice of the modelling procedures with the different packages for the modelling of floods.<br><br>Danish Hydraulic Institute (DK), Electricité de France EDF (F), Deltares (NL), Wallingford Software (UK), Halcrow (UK) DHI-WASY (DE) | 5    |
| Module 2.4      | Software engineering / Hydroinformatics Systems Development / | The module presents the main concepts of software engineering based on modern ICT. Knowledge on programming and Web-technologies are complemented. Introduction is 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.  | 5    |
| Module 2.5      | Climate Change: vulnerability, impacts and adaptation         | This module addresses the risks and likely impacts of climate change in the human, natural and built environments, covering key aspects such as water resources, flooding, sea level rise and coasts, health, transport, infrastructure and cities. Engineering strategies for adaptation are described in detail, so the participant can learn not just how climate change will impact society, but also how society can respond. Participants are well equipped to assess, propose and apply sustainable strategies in a range of key infrastructures and environmental settings.   | 5    |
| Module 2.6      | European Language skills (English) - Thesis writing -         | The module is focused on thesis writing (MSc thesis) in English and includes also a communication part (oral and written activities with multimedia devices and tools) focused on thesis defence. On completion of this module, the participant acquires essential skills which are compulsory into future professional activities and positions in multi-cultural environment.   | 5    |

Remark: During Semester 2, each participant identifies and confirms a specialisation for Semester 3.

UNSA

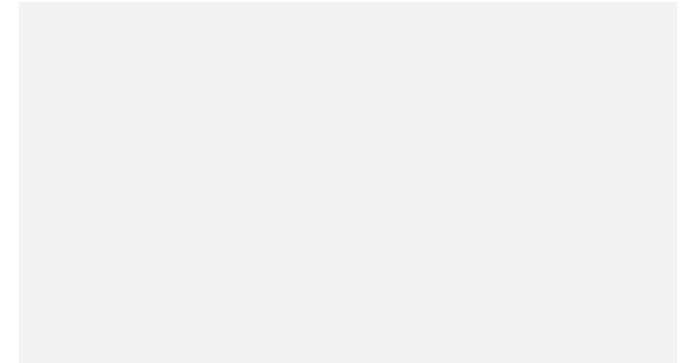
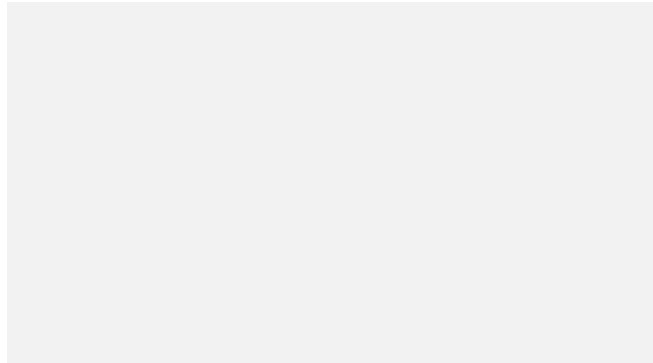
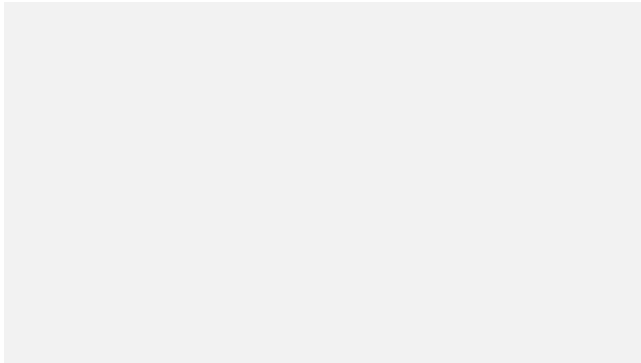
BTUC

UPC

| Year 2<br>Sem 1 | Content | Brief Description | ECTS |
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| <p>Module 4.1<br/>(Option 1)</p> | <p>Research &amp; development project<br/>&amp;<br/>(Coordination by BTUC)</p> | <p>The definition of the master work in the research area is made in dialogue between the student, a mentor from the host institution of semester 4 - and possibly with an academic tutor from a third country - and an external partner of the water field (industrial, consulting company, public services...).</p> <p>The research project is carried out in the research environment of the consortium members.</p> <p>For the participants hosted by NU for semester 1, the institution for the module must be different from NU. The work is concluded by a thesis dissertation with defence involving at least representatives from 2 European institutions. The operational organization of this module is ensured by BTUC and with the full participation of all the consortium members. The validation of the module provides 30 ECTS.</p> <p style="text-align: center;">NU<br/>BTUC<br/>30ECTS</p>   | <p>30</p> |
| <p>Module 4.1<br/>(Option 2)</p> | <p>Professional practice<br/>(Coordination by UNSA)</p>                        | <p>Following the 4 thematic specialisations developed in semester 3 or oriented through fundamental topics</p> <p>The professional practice is carried out into a company or public service (external partner / associated 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 internship is considered for the student as a first professional experience as executive or project engineer in Hydroinformatics. The evaluation and the validation of the module are carried out mainly through 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 UNS and with the full participation of all the consortium members. The validation of the module provides 30 ECTS.</p> <p style="text-align: center;">UNSA<br/>UNSA<br/>30 ECTS</p> | <p>30</p> |