

MSc EuroAqua HydroInformatics and Water Management
EuroAqua水信息及水资源管理硕士

Year 1 Semester 1 (Basic Skills Aquisition)

Location: UNSA / BTUC / UPC

Study Period: Mid-Sep to End-Jan

第一学年第一学期课程（基础知识技能培训）

地点: UNSA/BTUC.UPC

学期起止: 九月中旬至次年一月底

Year 1 Sem 1	Module Title	Brief Description	ECTS
Module 1.1	Mathematics & Physics 数学&物理	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. 项目参与者将接受与水利工程和水信息学（数字计算方法方面）相关的数学、物理知识的课程培训。数学课程的培训将涵盖水文统计的基本知识。而物理学的课程将着重于流体力学的讲解。	6
Module 1.2	Hydrology & Hydraulics 水文学&水力学	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. 本模块将对课程参与者进行水文学基础知识与水力学中自由表面流理论的讲解。课程讲义涵盖的概念，理论与方法介绍与实际的水利工程、研究紧密相关。课程主题涉及水文循环，降雨测量与分析，蒸散发分析，降雨径流分析，水文学中物理概念的介绍，水文统计学，水动力学，明渠均匀流与管流，非均匀流与非稳定流。	6
Module 1.3	Introduction to water and aquatic environment management 水资源环境规划	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. 本模块将对于世界范围内的水问题进行介绍分析，例如：洪水问题，干旱问题，土地盐碱化问题以及供水与灌溉问题。课程将重点围绕水资源环境的最优化规划方法以及实习问题中水信息学发挥的关键作用来展开。课程内容将从环境、物理、化学、生态等多个方面对水环境的影响展开并讨论水工建筑物的功效。	6
Module 1.4	Computer skills, databases & GIS - ICT 计算机技术, 数据库 & 地理信息系统-信息和通信技术	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. 本模块将对于课程参与者进行计算机资源网络化的基本技术培训。内容包括至少一种计算机语言的学习以及数据库管理和地理信息技术技能的培训。学生不但能接受关于信息和通信技术的知识介绍而且将了解信息和通信技术在解决水资源问题上的应用。课程中的练习将侧重于简单的编程训练已达到熟练运用地理信息系统技术解决水利问题目的。	6
Module 1.5	Web-based collaborative engineering 基于网络的课程实习	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). 本课程将对学生团队进行团队合作的训练，包含基于网络信息技术的小组交流讨论与模型软件操作。分散在各地的学生将被分成小组利用网络进行课程实习。其目的在于让学生熟悉新时代的网络工作模式，并提供一个平台令本项目的参与者们彼此熟悉以便更好的开展第二学期的集中培训。在与拥有不同文化背景的同学一起完成课程实习的过程中，课程参与者将获得宝贵的经验以适应未来的工作。本模块的技术支持来自本项目的合作伙伴科特布斯技术大学（德国）。	4
Module 1.6	European Language I skills (French) 语言技巧（法语）	Basic/Intermediate French language training (depending on student level). The validation is obtained through oral and written assessment. 初级、中级法语技能培训（取决于学生的个人情况）。课程最终评定将基于学生的口语与书写测试。	2

MSc EuroAquae HydroInformatics and Water Management
EuroAquae水信息及水资源管理硕士

Year 1 Semester 2 (Hydroinformatics)
Location: NU
Study Period: Beginning Feb to End-May

第一学年第二学期课程（水信息学）
地点: NU
学期起止: 二月初至五月底

Year 1 Sem 2	Module Title	Brief Description	ECTS
Module 2.1	Hydroinformatics & Integrated River Basin Management 水信息学 & 综合流域规划	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. 本模块将向学生讲述不同环境背景下的水问题处理办法, 例如: 在城市环境下, 大流域范围内及沿海地区。对于不同情景下的水问题, 课程讲师将给学生讲述并介绍针对不同问题的水信息学解决方案与应用工具。课程将从全球化的角度对广泛应用于水利工程单位, 水利研究所, 国家机构, 国际组织之间的水资源规划决策支持系统进行详细论述。着重探讨水资源可持续发展以及相关政策法规制定中出现的热点问题。	5
Module 2.2	Numerical methods & computational hydraulics 数字模型 & 计算水力学	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. 本着理论与实际相结合的原则, 本模块将对在水文、水利研究中引用的数值计算理论公式进行详细介绍。计算水力学是本课程的主要侧重点。课程将从对非稳定流与自由表面流的应用公式的简介展开, 结合课上练习, 对广泛应用于水力计算的特征值法, 有限差分法以及有限元法进行详细讲解。	5
Module 2.3	Introduction to software packages / Modelling of Floods 模型简介/洪水模型	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. 本课程主要通过指导学生利用水文模型对于实习问题进行一维、二维模拟, 以加深对自由表面流模型在大陆、海洋环境下应用的理解。Danish Hydraulic Institute (DK), Electricité de France EDF (F), Deltares (NL), Wallingford Software (UK), Halcrow (UK) DHI-WASY (DE)等世界著名的水利模型开发机构所开发的模型软件将作为本课程的主要实习工具供学生选用。目的在于培养学生利用不同模型从不同角度分析洪水问题的能力。	5
Module 2.4	Software engineering / Hydroinformatics Systems Development 软件工程/水信息学系统开发	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. 本课程将向学生讲述在新的信息通信技术背景下的软件工程理论。通过结合计算机编程与网络技术应用学习实践练习, 学生将在因特网技术, 集群处理, 平行计算, 以及水资源网站设计与实施方面有长足进步。	5
Module 2.5	Climate Change: vulnerability, impacts and adaptation 气候变化: 危害性, 影响性与适应性	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. 本课程将着重讨论由于气候变化给人类, 自然及环境带来的影响与危害。例如: 水资源短缺, 洪涝灾害, 海平面上涨对于人类健康, 城市交通, 及市政规划的影响。通过从工程技术的角度详细讲述人类为适应气候变化所采取的措施, 学生不仅能对气候变化对社会的影响有更加直观的认识, 而且对如何降低气候影响的危害有愈加深刻的理解。在课程结束后, 学生将能够自主地对一系列环境规划与工程设计问题提出可持续发展的建议。	5
Module 2.6	European Language skills (English) - Thesis writing 语言技巧(英语) - 论文写作	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. 本课程不仅将向学生讲授英文写作的技巧(硕士论文写作), 而且还将指点学生在论文答辩交流过程中所要注意的事项(基于多媒体工具的交流与写作技巧)。通过完成本课程, 学生将可以自如地在今后多文化语境中流利的表述自己的学术观点。	5

Remark: During Semester 2, each participant identifies and confirms a specialisation for Semester 3.
备注: 在第二学期中, 每个项目参与者都将有机会选择自己第三学期的专业方向。

MSc EuroAque Hydroinformatics and Water Management
EuroAque水信息与水资源管理硕士

Year 2 Semester 1
(Thematic specialisation: Urban waters)
Location: UNSA
Study Period: Mid-Sep to End-Feb

第二年第一学期 (专业方向: 城市水文)
地点: UNSA
学期起止: 九月中旬至次年二月

Year 2 Sem 1	Content	Brief Description	ECTS
Module 3.1	Modelling methods for urban waters (sewage network, floods and water quality) 城市水文模型 (污水管网、洪水和水质)	The module is focused on the context and the nature of modelling in the urban environment. The participant acquires the exhaustive knowledge about hydroinformatics methods and tools (variety of modelling systems: physically based, data driven) needed to be available to cover the urban problems such as sewerage network, definition, optimization and management, urban flooding and water quality management. 本课程旨在全面掌握城市水文建模的背景和性质。参与者将获得有关水信息学方法和工具（各种建模系统：物理基、数据驱动）的详尽知识，以便能够解决城市问题，如污水管网、定义、优化和管理、城市洪水和水质管理。 学生将学习关于利用水信息学方法来解决城市水文问题的详细知识，并通过对一些具体问题的分析，例如：污水管网建模、水质数据最佳化管理、城市洪水建模及污水处理建模系统建模等，展示其能力。 课程结束时，学生将能够： 1. 理解城市水文建模的背景和性质。 2. 掌握城市水文建模的方法和工具。 3. 能够应用水信息学方法解决城市水文问题。	5
Module 3.2	Methods for water supply and waste waters treatment 供水和污水处理方法	The module presents the main methodologies and techniques applied for the water supply and the waste waters treatment. 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. 本课程将介绍供水和污水处理的主要方法和技巧。参与者将获得有关不同技术解决方案的理论知识。通过案例研究和示例，他们将接受训练以定义和管理各种情况下的运营解决方案。课程将广泛使用技术优化方法，用于技术和经济目的。 此外，本课程还将介绍供水和污水处理的优化方法。通过案例研究和示例，参与者将学习如何定义和管理各种情况下的运营解决方案。课程将广泛使用技术优化方法，用于技术和经济目的。 课程结束时，学生将能够： 1. 理解供水和污水处理的主要方法和技巧。 2. 能够应用优化方法解决供水和污水处理问题。 3. 能够定义和管理各种情况下的运营解决方案。	3
Module 3.3	Economical and legal environments - Water industry & municipalities 经济和法律法规环境 - 水务行业与市政机构	The module covers legal frameworks for the development and the protection of water resources and water services, the development of policies, laws and standard (CE, 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 municipalities are developed and analysed according to the role of the water market. The module could also be taught as an evening activity for all partners. 本课程涵盖水资源开发和保护的法律法规框架，政策的制定、法律和标准（CE、欧洲水框架指令），以及社会经济系统组件的主要概念，如辅助原则、 deregulation、自由市场和利益竞争。水务行业与市政机构之间的关系和策略将根据水市场的角色进行开发和分析。该模块也可以作为所有合作伙伴的晚间活动进行教学。 课程结束时，学生将能够： 1. 理解水资源开发和保护的法律法规框架。 2. 能够制定政策、法律和标准。 3. 能够分析水务行业与市政机构之间的关系和策略。 4. 能够应用水市场的主要概念。	5
Module 3.4	Project Management & Communication 项目管理与沟通	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 relation with social, professional, economic and cultural urban environments. 项目管理技术，如规划、任务层次、决策制定和财务意识，对于城市环境中的项目发展至关重要。该模块侧重于获取应用于通用项目的水供应、污水管网、废水管理和防洪保护的项目管理。该模块包括与城市环境中的社会、专业、经济和文化环境相关的沟通需求。 课程结束时，学生将能够： 1. 理解项目管理技术。 2. 能够制定项目计划。 3. 能够进行决策制定。 4. 能够进行财务意识。 5. 能够进行沟通。	5
Module 3.5	European Language II skills (French) 欧洲语言 II 技能 (法语)	Basic/intermediate French language training (depending on student level). The validation is obtained through oral and written assessment. 初级/中级法语语言培训（根据学生水平）。验证是通过口头和书面评估获得的。 课程结束时，学生将能够： 1. 理解法语的基本语法和词汇。 2. 能够进行口头和书面交流。	3
Module 3.3	Hydro-Europe Working as virtual company/institute 欧洲水文虚拟公司/研究所工作	HydroEurope is an intensive course focused on collaborative engineering and based on the successfully experiences running since 2002 between the partners (CE, www.hydroeurope.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 hydroinformatics tools can be applied and used. Study cases are commonly defined according to specializations. Field activities accompany this activity and final presentations take place at University of Nice at the end of the semester. 欧洲水文虚拟公司/研究所工作是一个专注于协作工程并基于合作伙伴自 2002 年以来成功运行的经验。参与者的主要目标是获取并验证通过虚拟环境中的协作和专业技能。由来自各个学术合作伙伴的参与者组成的国际团队通过互联网远程协作，在一个案例研究中应用和使用各种水信息学工具。研究案例通常根据专业领域定义。现场活动将伴随此活动，并在学期末在尼斯大学进行最终展示。 课程结束时，学生将能够： 1. 理解协作工程的概念。 2. 能够进行远程协作。 3. 能够应用水信息学工具。 4. 能够进行最终展示。	6
Module 3.Y	Pre professional training 专业技能训练	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 is offered to all partners of the consortium and concluded by an intensive course after HydroEurope. 本课程，作为“欧洲水文虚拟公司/研究所工作”项目的一部分，旨在为学生提供专业技能训练。该模块是专门为联盟的所有合作伙伴设计的，并在完成欧洲水文虚拟公司/研究所工作后通过密集课程结束。 课程结束时，学生将能够： 1. 理解专业组织的概念。 2. 能够进行国际沟通。 3. 能够进行法律环境分析。 4. 能够进行工程活动的 ICT 应用。 5. 能够进行书面和口头展示。 6. 能够进行报告和综合。	3
Module 3.Y	Research methodology 研究理论	The interdisciplinary module is dedicated to an intensive course focused on acquiring research methodologies as well to specific topics in Hydroinformatics within Web-based seminars. The module presents how to approach research work, how to validate simulation models and how to document findings, presenting them and writing reports. Within seminars, the students present their current work from which master thesis are identified. The module is shared by all partners of the consortium and support coherence within the program by face-to-face meetings. 跨学科模块是专注于获取研究方法论以及 Web 研讨会中水信息学特定主题的课程。该模块介绍了如何接近研究工作，如何验证仿真模型以及如何记录发现，展示它们并撰写报告。在研讨会中，学生展示他们当前的工作，从中识别出硕士论文主题。该模块由联盟的所有合作伙伴共享，并通过面对面会议支持项目内的连贯性。 课程结束时，学生将能够： 1. 理解研究方法论。 2. 能够验证仿真模型。 3. 能够记录发现和撰写报告。 4. 能够在研讨会中展示工作。 5. 能够识别硕士论文主题。	3

MSc EuroAque Hydroinformatics and Water Management
EuroAque水信息与水资源管理硕士

Year 2 Semester 1
(Thematic specialisation: Hydroinformatics system)
Location: IFUG
Study Period: Mid-Sep to End-Feb

第二年第一学期 (专业方向: 水信息系统)
地点: IFUG
学期起止: 九月中旬至次年二月

Year 2 Sem 1	Content	Brief Description	ECTS
Module 3.1	Numerical simulation free-surface and groundwater modelling 数值模拟自由表面和地下水建模	Water resources depend on groundwater and free-surface flow. Description of free-surface and groundwater flow processes are given in terms of differential equations and common numerical schemes. Aspects of integration of small to large scale processes are discussed and principles for coupling of software for interacting processes presented. 水资源的获取依赖于地下水和自由表面流。自由表面和地下水流动过程的描述以偏微分方程和常见的数值方案给出。从小尺度到大规模过程集成的方面进行了讨论，并介绍了耦合软件以处理相互作用的流程。 课程结束时，学生将能够： 1. 理解自由表面和地下水流动过程的描述。 2. 能够应用数值方案。 3. 能够耦合软件。	6
Module 3.2	Information and process modelling in hydroinformatics projects. 水信息学项目中的信息和过程建模	Information modelling for Hydroinformatics systems in water related projects based on the object oriented modelling technique (field, ILM, and implementation techniques) is introduced. Meta Data and information management strategies are presented. Basic mathematics of theory of sets and graphs are presented and applied for process modelling in projects. Examples are modelled taken from flood management and coastal engineering projects. 本课程将介绍基于面向对象建模技术（领域、ILM 和实现技术）的水信息学系统中的信息建模。元数据和信息管理策略将得到展示。集合和图论的基本数学理论将得到介绍，并应用于项目中的过程建模。示例将来自洪水管理和沿海工程项目的建模。 课程结束时，学生将能够： 1. 理解信息建模和过程建模。 2. 能够应用面向对象建模技术。 3. 能够应用集合和图论。	3
Module 3.3	Geometric modeling and presentation methods 几何建模与呈现方法	Mathematical background for modeling geometry in the context of numerical grid generation and presentation of physics in Web environment are taught. Small examples are implemented and exercises with commercial software run. Attention is given to impact of discretization to correct representation of physical processes. 本课程将教授在数值网格生成和 Web 环境中物理呈现的几何建模的数学背景。将教授小型示例并实施练习，并运行商业软件。将特别关注离散化对物理过程正确表示的影响。 课程结束时，学生将能够： 1. 理解几何建模的数学背景。 2. 能够实施小型示例。 3. 能够运行商业软件。 4. 能够理解离散化的影响。	3
Module 3.4	Monitoring, data acquisition and documentation 实时监控、数据获取和记录	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 are presented and mathematical concepts (linear analysis, etc theory) for handling mass data from field measurement and numerical simulation introduced. Implementation into Hydroinformatics systems by object-oriented approaches to support information analysis, visualization, documentation and archiving are shown. Approaches are taught in the view of Web-based technology and coupling standard software tools by generalised information bases. 可持续发展的水资源管理要求通过现场和实验室的数据获取以及计算机模型中的模拟进行监控。将介绍监控和数据获取的概念，并展示在面向对象方法的支持下支持信息分析、可视化、文档记录和存档的方法。将在 Web 技术观点和耦合标准软件工具通过通用信息库的观点进行教学。 课程结束时，学生将能够： 1. 理解监控和数据获取的概念。 2. 能够实施面向对象方法。 3. 能够应用 Web 技术。 4. 能够耦合标准软件工具。	6
Module 3.5	European Language II skills (German) 欧洲语言 II 技能 (德语)	Basic/intermediate German language training (depending on student level). The validation is obtained through oral and written assessment. 初级/中级德语语言培训（根据学生水平）。验证是通过口头和书面评估获得的。 课程结束时，学生将能够： 1. 理解德语的基本语法和词汇。 2. 能够进行口头和书面交流。	3
Module 3.X	Hydro-Europe Working as virtual company/institute 欧洲水文虚拟公司/研究所工作	HydroEurope is an intensive course focused on collaborative engineering and based on the successfully experiences running since 2002 between the partners (CE, www.hydroeurope.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 hydroinformatics tools can be applied and used. Study cases are commonly defined according to specializations. Field activities accompany this activity and final presentations take place at University of Nice at the end of the semester. 欧洲水文虚拟公司/研究所工作是一个专注于协作工程并基于合作伙伴自 2002 年以来成功运行的经验。参与者的主要目标是获取并验证通过虚拟环境中的协作和专业技能。由来自各个学术合作伙伴的参与者组成的国际团队通过互联网远程协作，在一个案例研究中应用和使用各种水信息学工具。研究案例通常根据专业领域定义。现场活动将伴随此活动，并在学期末在尼斯大学进行最终展示。 课程结束时，学生将能够： 1. 理解协作工程的概念。 2. 能够进行远程协作。 3. 能够应用水信息学工具。 4. 能够进行最终展示。	6
Module 3.Y	Pre professional training 专业技能训练	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 is offered to all partners of the consortium and concluded by an intensive course after HydroEurope. 本课程，作为“欧洲水文虚拟公司/研究所工作”项目的一部分，旨在为学生提供专业技能训练。该模块是专门为联盟的所有合作伙伴设计的，并在完成欧洲水文虚拟公司/研究所工作后通过密集课程结束。 课程结束时，学生将能够： 1. 理解专业组织的概念。 2. 能够进行国际沟通。 3. 能够进行法律环境分析。 4. 能够进行工程活动的 ICT 应用。 5. 能够进行书面和口头展示。 6. 能够进行报告和综合。	3
Module 3.Y	Research methodology 研究理论	The interdisciplinary module is dedicated to an intensive course focused on acquiring research methodologies as well to specific topics in Hydroinformatics within Web-based seminars. The module presents how to approach research work, how to validate simulation models and how to document findings, presenting them and writing reports. Within seminars, the students present their current work from which master thesis are identified. The module is shared by all partners of the consortium and support coherence within the program by face-to-face meetings. 跨学科模块是专注于获取研究方法论以及 Web 研讨会中水信息学特定主题的课程。该模块介绍了如何接近研究工作，如何验证仿真模型以及如何记录发现，展示它们并撰写报告。在研讨会中，学生展示他们当前的工作，从中识别出硕士论文主题。该模块由联盟的所有合作伙伴共享，并通过面对面会议支持项目内的连贯性。 课程结束时，学生将能够： 1. 理解研究方法论。 2. 能够验证仿真模型。 3. 能够记录发现和撰写报告。 4. 能够在研讨会中展示工作。 5. 能够识别硕士论文主题。	3

MSc EuroAque Hydroinformatics and Water Management
EuroAque水信息与水资源管理硕士

Year 2 Semester 1
(Thematic specialisation: Decision Support System)
Location: IFUG
Study Period: Mid-Sep to End-Feb

第二年第一学期 (专业方向: 决策支持系统)
地点: IFUG
学期起止: 九月中旬至次年二月

Year 2 Sem 1	Content	Brief Description	ECTS
Module 3.1	Artificial neural network for Decision Support Systems (DSS) 人工神经网络用于决策支持系统	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 decision in terms of risk/vulnerability derived from real conditions in hydrologic systems: floods in river basins, urban areas or others. 本课程将介绍神经网络用于决策支持系统 (DSS) 的基础和相关技术。该模块旨在介绍在最小变量集下，从现实水文系统中的洪水、城市地区或其他情况中做出适当决策的定义。 课程结束时，学生将能够： 1. 理解神经网络的基础。 2. 能够定义 DSS。 3. 能够应用神经网络。	3
Module 3.2	Flood risk concepts and application in river basin management 洪水风险概念及其在流域管理中的应用	The 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 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 below. 本课程旨在定义风险标准并将其应用于确定现实场景中与洪水事件预测或估计相关的风险图。该模块侧重于使用 DTM 信息工具（1D 和 2D 中的数值模型），以及定义可定制或适应任何特定情况的风险数据库标准，并使用以下呈现的水力工具训练的决策支持系统。 课程结束时，学生将能够： 1. 理解洪水风险概念。 2. 能够应用 DTM 信息工具。 3. 能够定义风险数据库标准。 4. 能够使用决策支持系统。	5
Module 3.3	DSS for flood risk in urban areas 城市洪水风险决策支持系统	The specificity of this small basins where the floods goes through a street network, with a collecting system constituted by a set of street inlets and the risk associated to the pedestrians and urban components (houses, urban infrastructure, cars, shops, etc) is addressed. In this module the topics are presented in the rural and flow process in urban area along the streets, the hydraulic analysis of sewer systems and the global risk problem associated to those concepts. 这种小流域的特殊性在于洪水通过街道网络，收集系统由一系列街道入口组成，以及与行人和城市组件（房屋、城市基础设施、汽车、商店等）相关的风险。在本模块中，将介绍农村和沿街道的城市区域中的流过程，污水系统的液压分析以及与这些概念相关的全球风险问题。 课程结束时，学生将能够： 1. 理解小流域的特殊性。 2. 能够分析城市区域中的流过程。 3. 能够进行液压分析。 4. 能够解决全球风险问题。	5
Module 3.4	Real time control and operation of irrigation canals, rivers and reservoirs 灌溉渠道、河流和水库的实时监控和运营	This module is oriented to the global management of the irrigation infrastructure. The key problem is the control of the control gates along the canal, rivers and reservoirs in order to supply the water volume 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 modification/perturbation produced during the control process. Open Channel Hydraulics, system dynamics and control theory are used in this module. 本课程旨在介绍灌溉基础设施的全球管理。关键问题是沿渠道、河流和水库的控制闸门的控制，以便在正确的时间和所需的数量下为农民提供所需的水量。这可以通过实时监控过程来实现，首先根据最初所需的流量定义控制门的轨迹，然后在控制过程中发生修改/扰动时在实时中进行控制。本课程将使用明渠水力学、系统动力学和控制理论。 课程结束时，学生将能够： 1. 理解灌溉基础设施的全球管理。 2. 能够进行实时监控。 3. 能够进行系统动力学分析。 4. 能够应用控制理论。	5
Module 3.5	European Language II skills (Spanish) 欧洲语言 II 技能 (西班牙语)	Basic/intermediate Spanish language training (depending on student level). The validation is obtained through oral and written assessment. 初级/中级西班牙语语言培训（根据学生水平）。验证是通过口头和书面评估获得的。 课程结束时，学生将能够： 1. 理解西班牙语的基本语法和词汇。 2. 能够进行口头和书面交流。	3
Module 3.X	Hydro-Europe Working as virtual company/institute 欧洲水文虚拟公司/研究所工作	HydroEurope is an intensive course focused on collaborative engineering and based on the successfully experiences running since 2002 between the partners (CE, www.hydroeurope.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 hydroinformatics tools can be applied and used. Study cases are commonly defined according to specializations. Field activities accompany this activity and final presentations take place at University of Nice at the end of the semester. 欧洲水文虚拟公司/研究所工作是一个专注于协作工程并基于合作伙伴自 2002 年以来成功运行的经验。参与者的主要目标是获取并验证通过虚拟环境中的协作和专业技能。由来自各个学术合作伙伴的参与者组成的国际团队通过互联网远程协作，在一个案例研究中应用和使用各种水信息学工具。研究案例通常根据专业领域定义。现场活动将伴随此活动，并在学期末在尼斯大学进行最终展示。 课程结束时，学生将能够： 1. 理解协作工程的概念。 2. 能够进行远程协作。 3. 能够应用水信息学工具。 4. 能够进行最终展示。	6
Module 3.Y	Pre professional training 专业技能训练	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 is offered to all partners of the consortium and concluded by an intensive course after HydroEurope. 本课程，作为“欧洲水文虚拟公司/研究所工作”项目的一部分，旨在为学生提供专业技能训练。该模块是专门为联盟的所有合作伙伴设计的，并在完成欧洲水文虚拟公司/研究所工作后通过密集课程结束。 课程结束时，学生将能够： 1. 理解专业组织的概念。 2. 能够进行国际沟通。 3. 能够进行法律环境分析。 4. 能够进行工程活动的 ICT 应用。 5. 能够进行书面和口头展示。 6. 能够进行报告和综合。	3
Module 3.Y	Research methodology 研究理论	The interdisciplinary module is dedicated to an intensive course focused on acquiring research methodologies as well to specific topics in Hydroinformatics within Web-based seminars. The module presents how to approach research work, how to validate simulation models and how to document findings, presenting them and writing reports. Within seminars, the students present their current work from which master thesis are identified. The module is shared by all partners of the consortium and support coherence within the program by face-to-face meetings. 跨学科模块是专注于获取研究方法论以及 Web 研讨会中水信息学特定主题的课程。该模块介绍了如何接近研究工作，如何验证仿真模型以及如何记录发现，展示它们并撰写报告。在研讨会中，学生展示他们当前的工作，从中识别出硕士论文主题。该模块由联盟的所有合作伙伴共享，并通过面对面会议支持项目内的连贯性。 课程结束时，学生将能够： 1. 理解研究方法论。 2. 能够验证仿真模型。 3. 能够记录发现和撰写报告。 4. 能够在研讨会中展示工作。 5. 能够识别硕士论文主题。	3

MSc EuroAqueae HydroInformatics and Water Management
EuroAqueae水信息及水资源管理硕士

Year 2 Semester 2
(Thematic specialisation: Urban waters)
Location: Private/Public Institution
Study Period: Beginning Mar to Mid-Aug

第二学年第一学期
地点: 公司/研究所
学期起止: 三月初至八月底

Year 2 Sem 1	Content	Brief Description	ECTS
Module 4.1 (Option 1)	Research & development project 科研 & 项目开发 (Coordination by BTUC)	<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. 学生第四学期的硕士研究方向将由第四学期负责人, 学生本人, 第三方指导教师或额外合作伙伴(来自工程单位, 研究机构或政府部门)共同协商确定。研究课题应在本项目内的合作机构老师或相关负责人指导下进行。如果是第一学期在NU的学生, 其指导机构负责人不可为来自NU的教师。本次硕士论文研究的最终评定应基于至少有两个欧洲水利相关机构负责人参与的硕士论文答辩。本次研究项目由BTUC及全程参与水信息及水资源管理硕士项目的合作单位监督实施。本次论文研究所占学分30ECTS。</p>	30
Module 4.1 (Option 2)	Professional practice 专业实习 (Coordination by UNSA)	<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. 遵循在第三学期或之前选定的四个理论专业方向, 第四学期的专业实习将在公司或者公共服务机构(额外或相关的合作伙伴)之中进行。实习项目将由学生本人, 实习单位, 主管单位(UNSA)指导老师以及相关合作伙伴中的负责人共同协商决定。实习项目将包含于所在公司或单位的日常工作之中。本次实习将作为学生第一次在水信息专业领域的工作经历。本次实习的评定将基于一定的专业标准。实习结束后, 学生应提交一份包含描述所在单位进行实习工作的实习报告。报告中应详细描述至少一项所学知识在实习工作中的应用。实习工作将开展欧洲的公司或服务机构。本次专业实习由UNSA及全程参与水信息及水资源管理硕士项目的合作单位监督实施。本次实习所占学分30 ECTS。</p>	30