EUROAQUAE
Euro Hydro-Informatics and Water Management

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

Year 1 Semester 1 (Basic Skills Aquisition) **第一学年第一学期课程（基础知识技能培训）**
Location: UNSA / BTUC / UPC **地点：UNSA/BTUC.UPC**
Study Period: Mid-Sep to End-Jan **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，土体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。课程中的练习将偏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 Techinical University of Cottbus (Germany). 本课程将对学生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

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

Year 1 Sem 2	Module Title	Brief Description	ECTS
Module 2.1	Hydroinformatics & Integrated River Basin Management "d Ÿ – & 5, 8#q ?ô B	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. \ Q ‡ 6 A –+OAâF = <)ß ³6ü Ÿ ;,´"dL NÈ 4*6 Î# È » ² Ö X þ 2)ß ³ ; È W#q 93 $ µ ú"ï#§ ` j Ä) ¾ = < õ Ÿ ;,´"dL NÈ ÈB.0;Aâ 8 65 > –+OAâF J, ¦ û4ýJ,) = <L NÈ,´"d Ÿ –@ ã é x > Ä+X § ÁB.0; 6 þ ˜ *3 F,´@ Ö) ¯# Ä+X ¾"d Y 0; … } È"d Y.D0¦ p È - æ j ´ È -Lu4ô4÷ {L$,´"dCt$À?ô B ã1† _ 13+5 F >|B 4öAêF Ä-pGý ÒAØ"dCt$À 15 … ú-(£ o1†# ?ô f Ê] *)à,´ &éL NÈ Ä	5
Module 2.2	Numerical methods & computational hydraulics ‡ Q » & AÑ1Ç"d Ë –	The module provides introduction, through theory and practice, to numerical methods applied generally to the water field and especially to computational hydraulics. The course is based on introduction to differential equations in fluid mechanics for free-surface flow and transport system used for unsteady flows simulation. The module presents in details and through exercises the most widely used approaches such as method of characteristics, finite differences and finite elements. \-p*6Aê > ÎLu-(5 8,´ Î I È \ Q ‡ 6) X"d · Ã"d Y.D 0¦] E+X,´ IAÑ1Ç*6Aê œ ?F >|B 4ö û4ý ÄAÑ1Ç"d Ë – _ \B.0;,´ k?± ×Gý&é Á B.0; 6 þ)MŽ0c Ê#q >8 +a>˜M' #q,´ Ä+X œ ?,´1° û … 0 È5 8B. :4ó • Ë) ¯# Ä+X ¾"d ËAÑ1Ç,´(© ± I# È 9L€ 6# ú 9L€ s# F >|B 4ö Aâ@ Ä	5
Module 2.3	Introduction to software packages / Modelling of Floods Q »1° û / #Z"d Q »	The module offers to the participants to use and to apply through case studies the major modelling packages for hydrological catchments modelling, 1D and 2D free surface flows in continental and marine environments. The proposed tools are issued and developed by the most advanced professional and scientific producers such as Danish Hydraulic Institute (DK), Electricitéde France EDF (F), Deltares (NL), Wallingford Software (UK), Halcrow (UK) DHI-WASY (DE). The purpose for the participants is to have an extensive knowledge and practice of the modelling procedures with the different packages for the modelling of floods. \B.0; k?±FJE÷ 7 , –+O Y+X "d · Q ») ¾ Î •L NÈF >| 05$ Ã ¼5$ Q È Ð$!)8 +a>˜M'#q Q » X WLv Ã#§#;)ß ³ ; Ä+X,´*6@ Ä Danish Hydraulic Institute (DK), Electricitéde France EDF (F), Deltares (NL), Wallingford Software (UK), Halcrow (UK) DHI-WASY (DE) 1y F+|:‡ =,´"d Y Q » 0 j ´ p 0 ,´ Q »EŸ & 6 Œ j \B.0;,´ k?± Î • § Ë –+OF9+X Ä-,´ X ¾) « –+O Y+X = < Q » þ = <@ Ö 6 À#Z"dL NÈ,´7- Ë Ä	5
Module 2.4	Software engineering / Hydroinformatics Systems Development EŸ & 0; / "d Ÿ3+5 0	The module presents the main concepts of software engineering based on modern ICT. Knowledge on programming and Web-technologies are complemented. Introduction is given to computational environments such as Internet, clusters, parallel computing etc. as well as the design, implementation and set-up of water related Web services. \B.0; 6 A –+OAâF X à,´ ŸFJ ° _6ü Ÿ ;,´EŸ & 0;*6Aê ÂFJE÷5 8AÑ1Ç j5F0; >5• 5 ° _ Ä+X ° _ – • ÎD%4ó • È –+O 6 X (©5• ° _ ÈLö5Ô 4*6 È £>|AÑ1Ç È ú"dCt$Â5•1 AÎAÑ > Î í éM' 9K¯ CãF !• Ä	5
Module 2.5	Climate Change: vulnerability, impacts and adaptation "D I F Ö ¡ ã W Ë ¡ ý W >F2 Ä W	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. \B.0; 6-pGýAØAê+a ¾"D I F5 ê2« È8 'f ú)ß ³ V •,´ ¡ ý > ¡ ã Ä » ² Ö"dCt$Â. 5j È#Z#Í&® ã È#§ £M' : #Ø) ¾ ê2« • ç Ë þ 2 ÔFJ È ú 2 o?ô B,´ ¡ ý ÄFJE÷ þ 0; ° _,´@ ÖB 4öAâF ê2« jF2 Ä"D I F pG÷ ,´ Ú í È –+O = õ7-)"D I F)/n J,´ ¡ ý 9 $ Ð-$?ò,´AÔAö È6< D) ² …L} ~"D I ¡ ý,´ ¡ ã 9 8 Ð$! k,´*6@ Ä XB.0;5 • > È –+O 67- O8 k `) 03+ G)ß ³?ô B > 0;ÀîAÑL NÈ * 15 …,´ *AÞ Ä	5
Module 2.6	writing B @0 ° Ä9!B Å - Aê · É Œ	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. \B.0; = õ 6 A –+OAâ ¸9! · É Œ,´ ° Á…. Aê · É Œ Å Ë6< DF 6 7&é –+O XAê ·1„EÙ Ô#qE÷0;] p?±# ?,´ »N© Ä * ¾ J Â ƒ §,´ Ô#q > É Œ ° Å ÂFJE÷ ¼ @ \B.0; È –+O 6 8 ² ` X ú > J · FB ³]#q Y,´>˜F 8 !,´ – _?ò&é Ä	5

Remark: During Semester 2, each participant identifies and confirms a specialisation for Semester 3.
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Year 2 Semester 2
(Thematic specialisation: Urban waters) **第二学年第一学期**
Location: Private/Public Institution **地点：公司/研究所**
Study Period: Beginning Mar to Mid-Aug **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)	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…). The research project is carried out in the research environment of the consortium members. 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经由第四学期负责人，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位30ECTS。	30
Module 4.1 (Option 2)	Professional practice 专业实习 (Coordination by UNSA)	Following the 4 thematic specialisations developed in semester 3 or oriented trough fundamental topics 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 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 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。 实习项目将经由学生本人，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UNS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。本次实习所占学分位 30 ECTS。	30