Teaching Guide				
Identifying Data				2019/20
Subject (*)	Experimental hydraulics I		Code	632844204
Study programme	Mestrado Universitario en Enxeñaría da Auga (plan 2012)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Optional	6
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Ciencias da Computación e Tecnoloxías da InformaciónComputaciónEnxeñaría Civil			
Coordinador	Rabuñal Dopico, Juan Ramon	E-mail	juan.rabunal@udc.es	
Lecturers	Rabuñal Dopico, Juan Ramon Rodríguez Tajes, Álvaro Vázquez González, Ana María	E-mail	juan.rabunal@udc.es a.tajes@udc.es ana.maria.vazquez@udc.es	
Web	http://caminos.udc.es/info/asignaturas/201/masterindex.html			
General description	Introduction to experimental hydraulics. Scale models. Hydrometry. Continuous of control crosssections. Experimental field techniques. Instrumentation and control of water treatment processes. Tests to obtain design parameters. Know and understand the design and construction of scale models of hydraulic structures. Understand the different techniques of measurements of physical parameters (pressure, temperature, speed, etc..). Knowledge and practices with computer systems, electronic devices and hydraulic data acquisition systems (monitoring and control of a river basin, hydraulic experiments...).			

Study programme competences / results	
Code	Study programme competences / results
A13	Knowledge of the experimental technics applied to the water engineering. Capacity to design experiments. Capacity to develop reduced models in the laboratory. Capacity to use different types of experimental instrumentation, including flowmeter, depth probes, three-dimensional speedometer, limnimeter, windlass..
A14	Knowledge and understanding for design and construction of scale-models of hydraulic structures. Understanding of different technics that exist in the measurement of physical conditions (pressure, temperature, speed?) in the field of hydraulic knowledge of computing systems and electronic control and the acquisition of hydraulic data (monitoring and control of the river basin, hydraulic circuit, etc)
A20	Use and management of measuring equipment in the field and in the laboratory. Knowledge of the methodology of control process and the determination of design parameters for water treatment processes
B1	To resolve problems effectively
B2	To apply critical thinking, logic and creativity
B3	To work individually with initiative
B4	To communicate effectively in work surroundings
B5	Continuous recycling of knowledge in a general perspective in a global situation of water engineering
B6	Understanding of the need to analyse history to understand the present
B7	Facility to integrate in multidiscipline teams
B8	Capacity to organize and plan
B9	Capacity for analysis, synthesis and structure of information and ideas
C1	To understand the importance of the enterprising culture and to know the means at the reach of the enterprising people
C2	To value knowledge critically, technology and available information to resolve problems that they will face
C3	To assume as a professional and citizen the importance of learning throughout life
C4	To value the importance of the investigation, innovation and technology development in the social ?economic advance and cultural in society
C5	To posses and understand knowledge that gives a base or oportunity to be original in the development and for applications of ideas, often in the context of investigation

C6	The students must be able to apply the acquired knowledge and their capacity to resolve problems in new surrandings or not well known within wider contexts (or multidiscipline) related with the study area
C7	The students must be able to integrate knowledge and to affront the complexity to formulate judgements from information that, been incomplete or limited, include reflexions about social responsabilities and ethics related to the application of the knowledge and judments
C8	The students must be able to comunicate their conclusions, knowledge and the last reasons that support them, to spezialated publics and not spezialated in a clear and unambiguous way.
C9	The student must possess the learning ability with permits them to continues to study in a manner wich will be in a great measure self directed and individual

Learning outcomes			
Learning outcomes	Study programme competences / results		
Be able to perform tests and experimentation in the field of hydraulics and water quality	AC13 AC14 AC20	BC1 BC2 BC3 BC4 BC5 BC6 BC7 BC8 BC9	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8 CC9

Contents	
Topic	Sub-topic
1. Introduction	1.1 Introduction to testing and experimentation in hydraulics
2. Continuous of control crosssections	2.1 Experimental field techniques.
3. Hydrometry. Techniques for measuring and recording water parameters (level, flow, speed, etc..).	3.1 Instrumentation Systems (sensors, actuators) 3.2 Control Modules (PLCs, data acquisition) 3.3 Data Transmission Systems

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A14 B1 B2 B4 B5 B6 B8 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	20	20	40
Laboratory practice	A13 A14 A20 B1 B2 B3 B4 B7 B8 B9 C2	20	20	40
Objective test	A13 A14 B1 B2 B5 B6 B9	2	8	10
Seminar	A13 A14 A20 B1 B2 B3 B5	15	15	30
Personalized attention		30	0	30
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Regular lectures where the main theoretical contents of the subjects are regarded

Laboratory practice	Practical experiments related to the theoretical aspects regarded at the magistral lectures
Objective test	Final Exam
Seminar	Personalized attention to be provided for the semminars

Personalized attention	
Methodologies	**Description**
Guest lecture / keynote speech Objective test Seminar Laboratory practice	Personalized attention to be provided for the semminars

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Guest lecture / keynote speech	A14 B1 B2 B4 B5 B6 B8 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	Attendance	10
Objective test	A13 A14 B1 B2 B5 B6 B9	The knowledge of the concepts developed at the magistral lectures will be assesed and considered for the final mark	30
Seminar	A13 A14 A20 B1 B2 B3 B5	Optional	10
Laboratory practice	A13 A14 A20 B1 B2 B3 B4 B7 B8 B9 C2	The attendance to the seminars and the work developed will be considered for the final mark	50

Assessment comments

Sources of information	
Basic	- Reginald W Herschy (1999). Hydrometry : principles and practices.. John Wiley &Sons - Jacob Millman, Arvin Grabel (1998). Microelectronics: Digital and Analog Circuits and Systems. McGraw Hill Higher Education - Puertas Agudo, Jerónimo, Sánchez Juny, Martí (2006). Hidráulica. Universidade da Coruña - Pallás, R. (1998). Sensores y acondicionadores de señal. Barcelona. Marcombo
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.