

NAME OF THE COURSE		INTEGRATED WATER RESOURCES MANAGEMENT				
Code		Year of study	2., III. semester			
Course teacher	Roko Andričević, PhD, Full professor, tenure	Credits (ECTS)	4.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30		15	
Status of the course	Mandatory	Percentage of application of e-learning	/			
COURSE DESCRIPTION						
Course objectives	According to the labor market needs, the objective of the course is to introduce the methodology for implementing integrated water resources management with particular attention to the implementation of Water Framework Directive and European Flood Directive.					
Course enrolment requirements and entry competences required for the course	Undergraduate qualification (6th level of EQF or CROQF) in the technical or natural sciences.					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	The student is expected to master the basics of water resources management in river basins, to get acquainted with all the characteristics and mode of operation of water resources systems, and to master the basic issues related to integrated management. The student should get acquainted with the key principles of the Water Framework Directive (WFD) as well as with the methodology of its application to river basins. Furthermore, the student is expected to master the basic elements of water resources modelling and to acquire basic experience in the practical application of modelling for the purpose of water resources management. The student should be able to define the problem of management at the river basin level and to master all the necessary elements of the management plan development, which is the final stage of the application of WFD..					
Course content broken down in detail by weekly class schedule (syllabus)	<p>Part one: Concepts and goals of sustainable development, global environmental problems, the basics of integrated management, an introduction to EU water legislation. An introduction to Water Framework Directive, the legislative and institutional framework.</p> <p>Part two: Water status, water quality classes, reference conditions, typology and concept of water bodies. Integrated water quality measurement, typology of watercourse, reference conditions of different types of watercourses, surface and ground water bodies, heavily modified water bodies, artificial water bodies and risk analysis of water body quality.</p> <p>Part three: Analysis of pressures and impacts on water bodies, the goals and basic concepts of pressure and impact analysis. Risk assessment of not satisfying the goals of WFD. The basics of hydrologic and hydrodynamic modelling, and surface waters quality modelling.</p> <p>Part four: River/estuary/lake water quality modelling. Groundwater modelling with water balance analysis. Identification, delineation and description of groundwater bodies. The impact of human activity on groundwater and groundwater management modelling.</p> <p>Part five: Economic analysis of water use, the principles and economic mechanisms of water resources of water supply and water treatment systems.</p> <p>Part six: Presentation and analysis of the development of a river basin management</p>					

	<p>plan with all its principles and characteristics.</p> <p>Part seven: Monitoring as part of the environmental protection information system. System goals and functions. Evaluation of initial indicators of environmental conditions. Implementation of integrated soil/water/air quality monitoring. Levels of monitoring – global level, the basin level. Determining locations for data acquisition. Installation of measuring instruments. Water/soil/air quality indicators. Information system development. Integrated management based on integrated monitoring. The role of indicators in monitoring optimization.</p>					
Format of instruction	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> exercises <input type="checkbox"/> <i>on line</i> in entirety <input type="checkbox"/> partial e-learning <input type="checkbox"/> field work			<input type="checkbox"/> independent assignments <input type="checkbox"/> multimedia <input type="checkbox"/> laboratory <input type="checkbox"/> work with mentor		
Student responsibilities	Regular attendance of classes, tests, written and oral exam,					
Screening student work (<i>name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course</i>)	Class attendance	1.0	Research		Practical training	
	Experimental work		Report			
	Essay		Seminar essay	1.0		
	Tests		Oral exam	1.0		
	Written exam	1.0	Project			
Grading and evaluating student work in class and at the final exam	Homework assignments (25%), seminar paper (25%), final examination – written and oral (50%).					
Required literature (available in the library and via other media)	Title				Number of copies in the library	Availability via other media
	Andričević, R., Integralno upravljanje vodnim resursima, autorizirana predavanja (in English), University of Split, 2004.					
	Chapra S. C., Surface Water-Quality Modeling, The McGraw-Hill Companies, 1997					
	Castelletti A. and Soncini-Sessa R. (2006). Topics on system analysis and integrated water resources management, 304 pages, Elsevier, ISBN-13: 978-0-08-044967-8					
	The EU Water Framework Directive - integrated river basin management for Europe, http://ec.europa.eu/environment/water/waterframework/index_en.html , http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri =					

	OJ:L:2000:327:0001:0072:EN:PDF.		
Optional literature (at the time of submission of study programme proposal)	<p>1. • WFD and Hydromorphological Pressures – Technical Report – Case Studies – Potentially relevant to the improvement of ecological status/potential by restoration/mitigation measures; Separate Document of the Technical Report, November 2006.</p> <p>2. • Proceedings of the International Conference on Aspects of Conflicts in Reservoir Development & Management”, City University , London , 3-5 September, 1996.</p> <p>3. • River Basin Management Planning, http://www.sepa.org.uk/wfd/rbmp/index.htm</p> <p>4. • Guidance on public participation in relation to the water framework directive active involvement, consultation, and public access to information. http://www.eau2015-rhin-meuse.fr/fr/ressources/documents/guide_participationpublic.pdf</p> <p>5. • Water Framework Directive and monitoring, http://www.eea.europa.eu/themes/water/status-and-monitoring/water-frameworkdirective-and-monitoring</p>		
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University level, through questionnaires; (2) Faculty level by Quality Control Committee; (3) Lecturer’s level.		
Other (as the proposer wishes to add)			