POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

COURSE SYLLABUS

ACADEMIC YEAR: 2020./2021.

1. GENERAL COURSE INFORMATION				
1.1 Course name	**Water Quality Management**			
1.2 Study program/s	SUSTAINABLE DEVELOPMENT - Ecoengineering			
1.3 Course status (O,E)	O	**1.6 Mode of instruction (number of hours)**	**Lectures**	30Merlin
1.4 Course code	4063		**Exercises**	30
1.5 Course abbreviation	UKV		**Seminars**	
1.6 Semester	IV		**E-learning**	
1.7 ECTS	5	**1.7 Place and time of instruction**	Classrooms Polytechnic of Međimurje in Čakovec	

2. TEACHING STAFF			
2.1 Course leader/s-title	Ivančica Somođi, mag. biol. mol., lectures	**contact**	isomodji@mev.hr
		contact	
2.2 Assistant/s- title		**contact**	
		contact	
2.3 Instruction held by- title		**contact**	

3. COURSE DESCRIPTION	
3.1 Course goals	An interdisciplinary approach links water quality to water management and use as a naturel resource. The ecological principles in the interventions on water bodies are emphasized on the basis of the legal regulations of the Republic of Croatia and the EU, resolving the conflict between ecology and the purpose of water bodies. Knowledge of water quality according to Croatian and EU legislation is acquired through acquisition knowledg of concepts: water quality parameters; drinking water, process water, water quality changes, rainwater, wastewater (communal, industrial, technological) of natural water systems, water self-purification, water eutrophication, groundwater pollution, pollution sources. Emphasis is placed on finding a balance between water use and protection, respected the specific role and purpose of water bodies. Students acquire basic knowledge of the meaning of the terms: good ecological status of natural waters, ecological potential of HMWB and MWB, biological diversity, monitoring.
3.2 Prerequisites	/
3.3 Course outcomes	After successfully completing the course, students will be able to: I1 - Describe the physical, chemical, biological, ecological, hydromorphological parameters of water quality; types of water bodies; integrated management of water bodies and basins, emissions into water, protection of water bodies. I2 - Identify, describe and explain water types, impacts on water bodies and management and use; predict the impacts of water emissions, compare the impacts of interventions with the purpose of water bodies. I3 - Interpret and apply the basics of protection and integrated water management and elements of water quality, protection of water source. I4 - Assess, review emissions to water from industrial facilities and provide

proposed solutions for reduced impact.
I5 - Anticipate possible consequences of the intervention on water bodies; independently apply legal regulations in the use of water, apply data from Management Plans and other water acts.
I6 - Connect and present the acquired knowledge and legislation in integrated water quality management.

3.4 Course content

The course addresses the basic management of aquatic ecosystems in a sustainable way. Students get acquainted with major pressures: water pollution, water abstractions, droughts and floods. Major physical modifications to land (drainage, soil erosion and floodplain changes) and to water bodies (channelisation and barriers) also affect morphology and water flow. The contents are processed descriptively and from the aspect of case studys, focusing on the sustainability of the use of aquatic ecosystems. The following contents are presented in the teaching units:
Croatian and European legislation, basic parameters of water quality according to WFD; drinking water, process water, rainwater, wastewater (municipal, industrial), changes in water quality, eutrophication of water, sources of pollution, types of pollution. Students get acquainted with the basic planning documents on the basis of which waters and river basin are managed. The challenges of managing and using aquatic ecosystems with an emphasis on sustainability are discussed.

3.5 Types of coursework

x	Lectures	x	Exercises		Blended e-learning		Individual activities		Laboratory
x	Seminars and workshops		Distant learning		Field classes		Multimedia and network		Mentorship
	Other								

3.6 Language of instruction

3.7 Monitoring students' work (enter the number of ECTS credits for each activity so that the total number of ECTS credits is equal to the total ECTS value of the course, 1 ECTS = 30 hours)

2	Class attendance	0,5	Seminars		Essay
0,5	Class activity		Project		Report/paper
1,0	Midterm exams		Practical task		Continuous knowledge check
	Written exam		Experimental work		
1,0	Oral exam		Research		

3.8 Assessment and evaluation of students' work during classes and at the final exam

Activity specification	Percent %	Points
Assessment during instruction		
Attendance	10%	10
Class activity	10%	10
Seminar/ project/ essay	20%	20
Midterm exam 1	12,5%	12,5
Midterm exam 2	12,5%	12,5
Exam assessment for the students who failed to fullfil all the obligatory requirements during the semester		
Written exam	*25%*	*25*
Oral exam	*35%*	*35*
Total:	**100%**	**100**

3.9 Assessment criteria – analysis per learning outcomes

Ways of evaluating learning outcomes						
	Attendance	**Activity**	**Mid-term**	**Mid-term**	**Practical**	**Total**

			exam 1	**exam 2**	**work**	
Outcome 1			5	5		10
Outcome 2			5	5		10
Outcome 3			5	5		10
Outcome 4			5	5	10	20
Outcome 5		5	5	5	10	25
Outcome 6		5	5	5	10	25
Outcome not-related						
Total		10	30	30	30	100

Grading of outcomes (in order to pass the mid-term exam/exam the student must achieve at least 50% points for each learning outcome)

Points	Grade
89 – 100	excellent (5)
76 – 88	very good (4)
63 – 75	good (3)
50 – 62	pass (2)
0 – 49	fail (1)

3.10 Specific features related with taking the course

If a student collects 50% of the points of each outcome, he / she directly takes the exam, provided that he / she has submitted a seminar paper. A student cannot access the exam period if he / she has not submitted and presented a seminar paper. The seminar paper is taught and presented according to the schedule of the lecture, and at the latest at the final lecture when it must be presented. During the exam, it is possible to orally check the knowledge during the preparation of the seminar paper.

If a student does not achieve a sufficient number of points on the midterm exam, he / she cannot take the next midterm exam.

Once achieved points in intermediate exams for each learning outcome are no longer deleted unless the student decides to correct the result for a particular learning outcome, whereby the points won until then are deleted and newly achieved points for that learning outcome are entered.

The final grade is obtained on the exam period and is the sum of points earned during classes.

Students who did not take the colloquium access the written part of the exam where all learning outcomes are checked.

3.11 Students obligations

Full-time students are required to attend at least 70% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. Part-time students are required to attend at least 30% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. If the student has not fulfilled all the obligations set by the course, he is obliged to attend the lectures again and meet the conditions for taking the exam.

Attendance can be offset by online tuition, organised webinars and added assignments given by teachers. One lesson lasts 45 minutes, and several hours form a teaching unit. Absence from one teaching unit is counted as one absence. Delays and apologies are recorded separately. In that case, if the student missed more than 50% of classes, and has a justifiable reason/apology, the request should be submitted to the Department Council, which then decides on the justification of student absences with the obligatory opinion of the course leader.

3.12 Written assignments

Seminar papers must be computer written and may have a maximum of 10 to 12 text cards (Times New Roman, font 12) from introduction to conclusion, together with pictures, appendices to tables according to the "Regulations on the final work,..."; MEV, 2015. Seminar papers must have an adequate title page, content, marked pages and literature. The seminar paper should be

	divided into chapters and contain a list of references and a list of figures and tables and graphs and finally a summary / conclusion in the size of 250 words. The student guarantees the authenticity of the work with his signature.	
3.13 Required reading	1.	Tedeschi: Zaštita voda, HDGI, Zagreb, 1997.
	2.	Mayer D.: Voda od nastanka do upotrebe, Prosvjeta, 2004.
	3.	Tušar B.: Ispuštanje i pročišćavanje otpadne vode, Croatia knjiga, 2004
	4.	Filipović I., Lipanović S., Opća i anorganska kemija, Školska knjiga, Zagreb
3.14 Additional reading	1.	Valić F.,i sur.: Zdravstvena ekologija, Medicinska naklada, Zagreb, 2001.
	2.	Ondrašek G i sur.:Voda u agroekosustavima, Agronomski fakultet, Sveučilište u Zagrebu, Zagreb, 2015
	3.	Oliver S. Owen, Daniel D. Chiras, John P, Reganold, Prentice Hall: Natural Resoursce Conservation, Prentice Hall, 1998

4 ADDITIONAL COURSE INFORMATION	
4.1 Quality control	The quality of the program, teaching process, teaching skills and level of mastery of the material will be established by conducting a written evaluation based on questionnaires, and in other standardised ways and in accordance with the by-laws of the Polytechnic of Međimurje in Čakovec.
4.2 Contact the teacher	Students can contact the teacher during the office hours and during classes, while for short questions and explanations they can contact him/her any day during working hours by coming in person or by landline. It is also possible to ask questions by e-mail, which will be answered in 48 hours at the latest. It is desirable for students to come as often as possible for any possible questions during the teacher's office hours.
4.3 Information about the course	It is the obligation of each student to be regularly informed about the course. All notifications about the classes or possible postponement of classes will be posted on the bulletin board and on the website of the Polytechnic at least 24 hours in advance.
4.4 Course contribution to the study program	I6 Solve engineering problems in sustainable development by applaying mathematics, chemistry, physics and biology. I8 Interdisciplinary solving of engineering problems in sustainable development. I27 Assess potential environmental risks and cooperate in the preparation of environment impact studies and EIA.

5. ANALYSIS OF COURSE TOPICS (the number of hours is equal to the number of lectures and exercises of the course)

LECTURES

Hours	**Topic and description**	**Method** • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes…	**Learning outcomes**	**Course outcome**
1.	Introduction: concept, content, career	Direct teaching, conversation	Explain the content of the course and basic obligations	I1
2.	Water quality management	Presentation, pp presentation, conversation	Explain the global role of water	I2

3.	Water quality in Croatian regulations; water information system	Presentation, pp presentation	Recognition of legal documents	I2
4.	Water quality in EU regulations;	Presentation, pp presentation	Recognition of legal documents of EU	I2
5.	Water resources management, hydrological cycle	Presentation, pp presentation	Explain the global role of water	I2
6.	Water protection objectives	Presentation, pp presentation	Describe the goals	I1
7.	Water: molecule, bonds, dipole	Presentation, pp presentation	Explain the water molecule (structure, connections)	I2
8.				
9.	Water: basic physical properties	Presentation, pp presentation	Distinguish the basic physical properties of water	I3
10.	Basic physical quality elements	Presentation, pp presentation	Explain the basic physical quality elements	I2
11.	Basic chemical quality elements	Presentation, pp presentation	Distinguish the basic chemical quality elements of water	I3
12.				
13.	Basic biological quality elements	Presentation, pp presentation, conversation	Distinguish the basic biological quality elements of water	I3
14.				
15.	Water resources management, hydrological cycle	Presentation, pp presentation, conversation	Explain the global role of water and the basics of integral water management	I2
16.	Midterm exam 1	Written work	Present the acquired knowledge	I6
17.	Basic hydromorphological elements	Presentation, pp presentation	Describe the basic hydromorphological quality elements of water	I3
18.	Groundwater	Presentation, pp presentation	Describe groundwater, relate to soil structure	I3
19.	Groundwater exploitation and protection	Presentation, pp presentation	Compare groundwater exploitation and protection	I4
20.	Water pollution, sources of pollution, type of pollution	Presentation, pp presentation	Analyze anthropogenic influences	I5
21.				
22.	Bioaccumulation: heavy metals, pesticides	Presentation, pp presentation	Explain the methods of intake	I2

			of heavy metals and pesticides, consequences	
23.	Eutrophication	Presentation, pp presentation	Assess euthophication in water bodies	I5
24.	Precipitation, wastewater (municipal, industrial, cooling)	Presentation, pp presentation	Distinguish wastewater	I2
25.	Elements and standards for assessing water status and potential	Presentation, pp presentation	Describe the elements of water assessment	I1
26.	Artificial and significantly modified water bodies	Presentation, pp presentation	Distinguish the elements of HMWB water assessment	I3
27.	Aquatic environment	Presentation, pp presentation	Describe aquatic ecosystems	I1
28.	Quality of the water suitable for the cultivation of economically significant aquatic organisms	Presentation, pp presentation	Apply quality elements	I3
29.	Drinking water protection measures, health safety of drinking water	Presentation, pp presentation	Apply protection measures	I3
30.	Midterm exam 2	Written work	Present the acquired knowledge	I6
EXERCISES/ SEMINARS				
Hours	**Topic and description**	**Method** • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes…	**Learning outcomes**	**Course outcome**
1.	Water resources - conservation and management: past, present and future; division	Presentation, pp presentation, example, discussion	Explain the sustainability of water use as a resource	I2
2.	Water quality in EU legislation	Presentation, pp presentation	Recognition of EU legislation	I2
3.	Hydrogen bonds, dissociation	Presentation, pp presentation, exercise	Understand dissociation	I2
4.	Water as a solvent	Presentation, pp presentation, exercise	Distinguish basic physical properties	I3
5.	Introduction to laboratory work and safety measures at work	Presentation, pp presentation, example, discussion	Be able to apply the rules of work in the laboratory	I3
6.				
7.	Basic physico-chemical, biological	Exercise	Analyze quality	I4

8.	parameters of surface water quality according to WFD and USKV		parameters in USKV and WFD	
9.	Basic hydromorphological parameters of water quality in USKV	Presentation, pp presentation, example, discussion	Identificirati hidromorfološke parametre kakvoće	I5
10.	Seminars: harmful effects of water	pp presentation problem solving by example (case analysis), discussion	Identify the harmfull effects of water	I2
11.	Case study: flood defense Japan, Venice		Recognize and resolve the antagonism of protection against the harmful effects of water and ecology	I6
12.	Seminars: multipurpose hydrotechnical facilities, impact		Integrate acquired knowledge with examples	I6
13.	Seminars: impact of TPP / HPP		Think critically and recognize impacts through case analysis.	I6
14.	Case study: Irrigation, California Water Project	Presentation, pp presentation, example, discussion	Interpret the example: the relationship between the purpose of construction and the impact	I4
15.	Water pollution (global): main pollutants and their control, types of wastewater, ballast water, global water pollution problem	Presentation, pp presentation, example, discussion	Interpret global water pollution problems	I3
16.	Groundwater quality elements according to USKV	Presentation, pp presentation, discussion	Analyze quality elements in USKV	I4
17.	Groundwater quality elements	Presentation, pp presentation	Explain quality elements	I2
18.	Nitrates Directive	Presentation, pp presentation	Explain Nitrates Directive	I2
19.	Sanitary protection zones in spatial planning documentation	Problem solving by example (case analysis), discussion	Think critically, protection through the analysis of spatial plans	I5
20.	Water pollution by micro-pollutants: pharmaceuticals, parabens in water	Presentation, pp presentation, discussion	Explain the role of pesticides, division and identify the consequences of application.	I2
21.	Case study: bioaccumulation	Problem solving by example (case analysis), discussion	Think critically and recognize the accumulation of	I4

			pesticides and heavy metals in the food pyramid.	
22.	Seminars: water pollution	Problem solving by example (case analysis), discussion	Interpret water pollution	I2
23.	Wastewater limit values	Presentation, pp presentation, discussion	Apply the GVEOV Ordinance	I3
24.	Seminars: basin management plan	Problem solving by example (case analysis), discussion	Present management plans	I6
25.	Water pollution (global): types, main pollutants and their control, types of wastewater, ballast water, global water pollution problem	Presentation, pp presentation, discussion	Interpret global water pollution problems	I3
26.	Aquaculture, legislation	Presentation, pp presentation, discussion	Present the types of aquaculture, explain sustainable aquaculture, recognize the impact of environmental factors on ichthyofauna	I3
27.	Analiza slučaja: navodnjavanje, California Water Project	Problem solving by example (case analysis), discussion	Interpret the example and the relationship of purpose and influence	I4
28.	Seminars: the impact of aquaculture on water		Think critically and recognize impacts through case analysis	I6
29.	Seminar: hydromorphological changes of water bodies	Problem solving by example (case analysis), discussion	Interpret the example and the relationship of purpose and influence	I6
30.	Alien species in the aquatic environment (IAS)	Presentation, pp presentation, discussion	Identify IAS impacts on examples (case analysis)	I6