



POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

COURSE SYLLABUS

ACADEMIC YEAR: 2020/2021

1. GENERAL COURSE INFORMATION

1.1 Course name	Sustainability of installations			
1.2 Study program/s	Undergraduate professional study Sustainable Development			
1.3 Course status (O,E)	Mandatory	1.6 Mode of instruction (number of hours)	Lectures	30
1.4 Course code			Exercises	30
1.5 Course abbreviation	OI		Seminars	
1.6 Semester	VI		E-learning	
1.7 ECTS	5	1.7 Place and time of instruction	The premises of the Polytechnic of Međimurje in Čakovec, according to the schedule published on the website	

2. TEACHING STAFF

2.1 Course leader/s-title	Ines Baksa, pred.	contact	ibaksa@mev.hr
		contact	
2.2 Assistant/s- title		contact	
		contact	
2.3 Instruction held by- title		contact	

3. COURSE DESCRIPTION

3.1 Course goals	The aim of the course is to get acquainted with the installations: water supply, sewerage, fire protection installations, and gas installation in buildings in terms of function, position in the building, the required space, and their integration into modern solutions and construction technologies. Introduction to thermotechnical (heating, cooling, ventilation and air conditioning), gas, electrical (lighting, EM drives, lightning rod, telephone, antenna systems) and vertical transport installations in buildings in terms of function, position in the building, required space and their integration into modern solutions and construction technologies.									
3.2 Prerequisites	Passed the course Sustainability of Construction									
3.3 Course outcomes	After successfully passing the course, the student will be able to: 1. Critically judge the utility system. 2. Recommend a heating and air conditioning system. 3. Self-assess the system of low voltage installations. 4. Apply the principles of sizing heating and air conditioning systems. 5. Evaluate the principles of sizing the utility system. 6. Select the principles of sizing the system of low voltage installations.									
3.4 Course content	The course presents contents related to the concept, possibilities and role of sustainability of technical installations within recent building systems.									
3.5 Types of coursework	x	Lectures	x	Exercises		Blended e-learning	x	Individual activities		Laboratory
	x	Seminars and workshops		Distant learning	x	Field classes	x	Multimedia and network	x	Mentorship

	Other																																																																																																		
3.6 Language of instruction	Croatian / English																																																																																																		
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)	2,0	Class attendance	0,3	Seminars		Essay																																																																																													
	0,3	Class activity	0,3	Project		Report/paper																																																																																													
		Midterm exams	0,3	Practical task	0,3	Continuous knowledge check																																																																																													
	1,0	Written exam		Experimental work																																																																																															
	0,5	Oral exam		Research																																																																																															
3.8 Assessment and evaluation of students' work during classes and at the final exam	<table border="1"> <thead> <tr> <th><i>Activity specification</i></th> <th><i>Percent %</i></th> <th><i>Points</i></th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;"><i>Assessment during instruction</i></td> </tr> <tr> <td><i>Attendance</i></td> <td>5%</td> <td>5</td> </tr> <tr> <td><i>Class activity</i></td> <td>5%</td> <td>5</td> </tr> <tr> <td><i>Seminar/ project/ essay</i></td> <td>20%</td> <td>20</td> </tr> <tr> <td><i>Midterm exam 1</i></td> <td>20%</td> <td>20</td> </tr> <tr> <td><i>Midterm exam 2</i></td> <td>20%</td> <td>20</td> </tr> <tr> <td><i>Oral exam</i></td> <td>30%</td> <td>30</td> </tr> <tr> <td colspan="3" style="text-align: center;"><i>Exam assessment for the students who failed to fulfil all the obligatory requirements during the semester</i></td> </tr> <tr> <td><i>Written exam</i></td> <td>60%</td> <td>60</td> </tr> <tr> <td>Total:</td> <td>100%</td> <td>100</td> </tr> </tbody> </table>						<i>Activity specification</i>	<i>Percent %</i>	<i>Points</i>	<i>Assessment during instruction</i>			<i>Attendance</i>	5%	5	<i>Class activity</i>	5%	5	<i>Seminar/ project/ essay</i>	20%	20	<i>Midterm exam 1</i>	20%	20	<i>Midterm exam 2</i>	20%	20	<i>Oral exam</i>	30%	30	<i>Exam assessment for the students who failed to fulfil all the obligatory requirements during the semester</i>			<i>Written exam</i>	60%	60	Total:	100%	100																																																												
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3.10 Specific features related with taking the course	<p>If the student collects 50% of the points of each outcome, he / she directly takes the exam, provided that he / she has done practical work (seminars / project). During the exam, it is possible to orally check the knowledge from practical work (seminars / project).</p> <p>Once earned points for each learning outcome are no longer deleted unless the student, with the express approval of the course leader, decides to correct the result for each learning outcome, whereby the points won are deleted and</p>																																																																																																		

	<p>newly earned points for that learning outcome. The final grade is obtained on the exam period and is the sum of points earned during classes.</p> <p>Students who did not take the colloquium access the written part of the exam where all learning outcomes are checked, and are required to have completed practical work (seminars / project) before taking the exam.</p>										
3.11 Students obligations	<p>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.</p> <p>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.</p>										
3.12 Written assignments	<p>In principle, two (2) seminar papers will be written in each semester. At the same time, within the topic of the Seminar, it will be visible to which learning outcomes the Seminar and its content (task) refer. In principle, Seminar I is written after the first seven (7) weeks of classes and covers the learning outcomes covered in the first seven (7) weeks. Seminar II is written after the second seven (7) weeks of teaching and covers the learning outcomes covered in the other seven (7) weeks of teaching.</p> <p>The type of seminar assignments is defined by the subject teacher, but all questions and tasks cover the course material, ie learning outcomes. Regardless of the number of points earned per learning outcome, the student can access all of the following knowledge tests. Once earned points for each learning outcome are no longer deleted, unless the student decides to correct the result for each learning outcome, whereby the points won until then are deleted and newly earned points for that learning outcome are entered.</p> <p>Points for seminar assignments are awarded in accordance with the quality of work and answers to questions related to assignments. Points earned through work, flashes and attendance are retained by the student throughout the academic year, and can only be corrected exceptionally, with the express approval of the subject teacher.</p>										
3.13 Required reading	<table border="1"> <tr> <td>1.</td> <td>Cetinić, I.: Vodovod, radni materijal- Skripte predavanja i vježbe</td> </tr> <tr> <td>2.</td> <td>Radonjić, M.: Vodovod i kanalizacija u zgradama, Croatiaknjiga, 2004.</td> </tr> <tr> <td>3.</td> <td>Tušar, B.: Ispuštanje i pročišćavanje otpadne vode, Croatiaknjiga, 2004.</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>	1.	Cetinić, I.: Vodovod, radni materijal- Skripte predavanja i vježbe	2.	Radonjić, M.: Vodovod i kanalizacija u zgradama, Croatiaknjiga, 2004.	3.	Tušar, B.: Ispuštanje i pročišćavanje otpadne vode, Croatiaknjiga, 2004.				
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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	<p>Course contribution to the study program in generic learning outcomes;</p> <p>I1 - Interpret information, ideas, problems and solutions to professional and General public,</p> <p>I2 - Use new technologies and techniques as part of a lifelong process Learning,</p> <p>I3 - Use foreign languages in professional communication and use of professional literature,</p> <p>I5 - Critically evaluate arguments, assumptions and data in order to create opinions and contributing to the solution of the problem.</p> <p>The contribution of the course to the study program in specific learning outcomes;</p> <p>I7 - Analyze collected data in the field of sustainable development,</p> <p>I8 - Interdisciplinary to solve engineering problems of sustainable development,</p> <p>I10 - Interpret European Union legislation in the field of sustainable development,</p> <p>I11 - Apply basics of thermoenergetics, thermodynamics and hydromechanics in spatial design of thermodynamic systems,</p> <p>I12 - Develop a technical plan in the field of design of Mechanical Thermotechnical System,</p> <p>I13 - Analyze the basic elements and networks in electrical engineering and justify use of non-renewable and renewable energy sources, applicable code thermotechnical systems,</p> <p>I14 - Apply and monitor conventional heating, cooling, and ventilation systems and devices,</p> <p>I15 - Maintain thermotechnical systems and thermal distribution networks</p> <p>I16 - Propose technical changes and upgrades to conventional ones thermotechnical systems in the direction of sustainable development,</p> <p>I22 - Plan facility management, and maintain buildings and Civil engineering,</p> <p>I23 - Manage water, air, soil, waste and energy in a sustainable way,</p> <p>I25 - Identify significant environmental aspects within the organization for the purpose management, and meeting standards and obligations,</p> <p>I26 - Formulate simple problems in the field of environmental protection works solving them with the application of the principles of sustainable development,</p> <p>I27 - Assess potential risks to the environment and cooperate in the preparation of studies environmental protection and studies on the impact of the project on the environment</p>

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	Learning outcomes	Course outcome
		<ul style="list-style-type: none"> • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes... 		
1.	Supply and possible sources of sanitary drinking water; consumption estimate.	Presentation, discovery learning, presentation	Use basic concepts and units of supply and possible sources of sanitary drinking water; consumption estimate	11
2.	Water supply schemes; function, materials and performance of individual elements and assemblies; measuring water consumption.	Presentation, discovery learning, presentation	Distinguish water supply schemes, assemblies and water consumption measurement	11
3.	Individual and central hot water preparation systems; types of energy; solar energy in hot water preparation.	Presentation, discovery learning, presentation	Distinguish models of hot water preparation system	12
4.	Basic schemes, sizes of devices and elements; space for accommodation in the building; installation of different types of solar collectors.	Presentation, discovery learning, presentation	Use a variety of device size shapes and installation elements	12
5.	Calculation of hot water preparation: dimensioning of the water supply pipe network; selection and types of booster systems.	Presentation, discovery learning, presentation	Distinguish the choice and types of pressure boosting systems in the dimensioning of the pipe network	12
6.	Fire protection of buildings with water; basic schemes, functions, materials and performance of individual elements and assemblies.	Presentation, discovery learning, presentation	Use knowledge of fire protection of buildings with water	11
7.	Automatic gas fire protection systems FM 200; fire alarm; burglar and surveillance systems.	Presentation, discovery learning, presentation	Apply and differentiate automatic gas fire protection systems	11
8.	Legislation; external and internal hydrant network; automatic sprinkler systems; extinguishing with gases and foam.	Presentation, discovery learning, presentation	Apply the principles of legislation	11

9.	Types of wastewater and sewage systems; schemes; function, materials and performance of individual elements and assemblies.	Presentation, discovery learning, presentation	Use scheme knowledge; function, materials and performance of wastewater and sewage systems	11
10.	Sanitary items and devices: ergonomic usable spaces; prefabricated elements; sanitary block rocks and cabins.	Presentation, discovery learning, presentation	Apply basic syntax of ergonomic use	11
11.	Types of wastewater treatment plants; grease, oil and petrol separators; collection and septic tanks; biodisk.	Presentation, discovery learning, presentation	Apply the concept of wastewater treatment plant	11
12.	Sizing of sewer installation; equivalent factor method (DIN1986); calculation method according to KÄlter	Presentation, discovery learning, presentation	Explain the laws on sizing sewer installations; by the method of equivalent factors (DIN1986); calculation method according to KÄlter	14
13.	Types and purpose of gas; gas installation schemes; function, materials and performance of individual elements and assemblies.	Presentation, discovery learning, presentation	Explain the types and purposes of gas; gas installation schemes; functions, materials and performance of individual elements and assemblies	11
14.	Types of consumers, installation conditions; types and sizing of gas chimneys.	Presentation, discovery learning, presentation	Apply the postulates of the installation conditions; type and dimensioning of gas chimneys	11, 12, 13
15.	Legislation; dimensioning of gas installations.	Presentation, discovery learning, presentation	Apply legislation in the sizing of gas installations	11, 12, 13
EXERCISES/ SEMINARS				
Hours	Topic and description	Method <ul style="list-style-type: none"> • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes... 	Learning outcomes	Course outcome

1.	Hygienic basis of thermotechnical installations; external climatic conditions: climate zones; outdoor temperatures; windiness.	Presentation, discovery learning, presentation	Application of basic concepts and units of basics of thermotechnical installations	11
2.	Methodology for calculation of heat inflows and losses; impact and possible ways to reduce them; approximate methods.	Presentation, discovery learning, presentation	Explain the methodology of calculation of heat inflow and loss	11
3.	Historical development of heating; division; heat sources; basic installation schemes; calculation of heating installation elements.	Presentation, discovery learning, presentation	Apply models and basic installation schemes	15
4.	Types of radiators, material, method of installation, required space; location determination, budget.	Presentation, discovery learning, presentation	Apply various types of radiators	12
5.	Natural ventilation, solutions and laws of natural ventilation; mechanical ventilation, basic schemes.	Presentation, discovery learning, presentation	Explain the solutions and laws of natural and mechanical ventilation	14, 15
6.	Elements of ventilation systems, their function, position, material, heat recovery; noise and solutions to reduce it.	Presentation, discovery learning, presentation	Apply knowledge of elements of ventilation systems	13
7.	Air conditioning: system division; basic schemes, elements, function, position, method and places of installation.	Presentation, discovery learning, presentation	Apply and differentiate the division of air conditioning systems	14. 15, 16
8.	Refrigeration plants, principles of operation, heat pumps and the possibility of using renewable energy sources.	Presentation, discovery learning, presentation	Apply the concept of refrigeration plant	14. 15, 16
9.	Cooling: historical development SPLIT systems their development and application; VRV systems their development and application.	Presentation, discovery learning, presentation	Make a model of SPLIT and VRV refrigeration plant	14. 15, 16
10.	Electrical installations: strong and weak current, basic schemes, connections, distribution and measurements, spare unit.	Presentation, discovery learning, presentation	Build the basic syntax of electrical installation	14. 15, 16
11.	Type of light source; artificial lighting: installation solutions calculation methodology.	Presentation, discovery learning, presentation	Apply the concept and solutions of light source installation	16
12.	Telephone installations: DTK network, basic schemes, connection with informatics; central monitoring system.	Presentation, discovery learning, presentation	Apply the concept and installation solutions of telephone installation	16

13.	Audio video installations: lightning protection installations: function, material, elements, position, performance.	Presentation, discovery learning, presentation	Apply the concept and solutions for the installation of audio video and lightning installation	15
14.	Types and sizing of elevators, solutions and location of elevator engine room, escalators and escalators.	Presentation, discovery learning, presentation	Apply postulates in the selection of elevator systems	14, 15, 16
15.	Information on special installations: medical gases, cutting and welding gases, pool technology.	Presentation, discovery learning, presentation	Apply postulates on special installations	11, 12, 13