

MEĐIMURJE POLYTECHNIC IN ČAKOVAC



POLYTECHNIC OF MEĐIMURJE AND ČAKOVEC

SYLLABUS COURSE

ACADEMIC YEAR: 2020/2021

1. GENERAL INFORMATION ABOUT THE COURSE

1.1. Course title	Sizing of wooden and metal structures			
1.2. Study program (s)	Undergraduate professional study Sustainable Development			
1.3. Course status (O, I)	Mandatory	1.6. Teaching methods (number of hours)	Lectures	30
1.4. Course code			Exercises	30
1.5. Course abbreviation	DDiMK		Seminar	
1.6. Semester	IV		E-learning	
1.7. Credit value (ECTS)	5	1.7. Place and time of classes	Premises of the Polytechnic of Međimurje in Čakovec, according to the schedule published on the website	

2. TEACHING STAFF

2.1. Carrier	mr. sc. Vladimir Križaić	2.4. Assistant (s)	mr. sc. Vladimir Križaić, Dražan Hranj	
2.2. Calling	s. lecturer	2.5. Title (s)	s. lecturer lecturer	
2.3. Contact	vkrizaic@mev.hr	2.9. Contact / s	vkrizaic@mev.hr dhranj@mev.hr	

3. COURSE DESCRIPTION

3.1. Course objectives	Acquisition of basic design knowledge required for the design of smaller buildings. To enable students to dimension simple rod structures made of steel or wood, with a thorough acquaintance with the specifications of materials, performance, resistance and design situations. Include durability and fire resistance of steel and wooden structures. Basics of calculation of elements, joints, connections and details on the roof system of your own architectural project from architectural structures. Fundamentals of spatial stability of steel and wooden structures of roof systems. To train students to participate in the supervision and construction of wooden structures (monolithic and laminated glued wood) and steel structures of roof systems .
3.2. Requirements for enrollment and taking the course	Passed course Load-bearing capacity of structures and Mechanics and resistance of structures.
3.3. Learning outcomes	After successfully completing the course, students will be able to: 1. Use, determine and apply statics and basics of spatial stability in the classification of steel and wooden building structures in the design methodology and method of construction, especially roof structures

	<ol style="list-style-type: none"> 2. Use and apply the resistance of materials in wooden and steel roof structures to the geometric and constructive system in 3. Know the production and select the characteristics and properties of wood and steel in construction according to EC 5 and EC3, ie the applicable regulations with fire safety 4. Evaluate and select the mechanical properties or mechanical strength of wood and steel for simple structures 5. Analyze , assemble and select load analysis on roof structures 6. Calculate and use the calculation of the method of limit states of bearing capacity and usability (EC3 and EC5) on simple roof structures made of wood or metal 7. Calculate and use the calculation of the load-bearing capacity limit method on simple roof joints and details of wood or metal 8. Use and present the basics of spatial stability of roof structures 																																																			
3.4. Course content	The course presents contents related to classical and modern technology of construction projects																																																			
3.5. Types of teaching	x	Lectures	x	Exercises		Blended e-learning	x	Independent tasks		Laboratory																																										
		Seminars and workshops		Distance education		Field work	x	Multimedia and network		Mentoring work																																										
		Other:																																																		
Performance language	Croatian																																																			
3.7. Monitoring student work (enter the number of ECTS credits for each activity so that the total number of ECTS credits corresponds to the credit value of the course, 1 ECTS = 30 hours)	2,0	Class attendance	0,5	Seminar paper		Essay																																														
	0,5	Teaching activity		Project		Report																																														
	1.0	Colloquia		Practical work		Continuous assessment																																														
	1.0	Written exam		Experimental work																																																
	1.0	Oral exam		Research																																																
3.8. Assessment and evaluation of student work during classes and at the final exam	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Activity specification</th> <th style="width: 25%;">Percentage%</th> <th style="width: 25%;">points</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;">Evaluation during classes</td> </tr> <tr> <td>Class attendance</td> <td style="text-align: center;">8%</td> <td style="text-align: center;">8</td> </tr> <tr> <td>Teaching activity</td> <td style="text-align: center;">2%</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Seminar paper</td> <td style="text-align: center;">18</td> <td style="text-align: center;">18</td> </tr> <tr> <td>Colloquium 1</td> <td style="text-align: center;">36 %</td> <td style="text-align: center;">36</td> </tr> <tr> <td>Colloquium 2</td> <td style="text-align: center;">36 %</td> <td style="text-align: center;">36</td> </tr> <tr> <td colspan="3" style="text-align: center;"><i>Evaluation of exam work for students who did not take the colloquium</i></td> </tr> <tr> <td>Written exam</td> <td style="text-align: center;">90 %</td> <td style="text-align: center;">90</td> </tr> <tr> <td>In total:</td> <td style="text-align: center;">100%</td> <td style="text-align: center;">100</td> </tr> </tbody> </table>										Activity specification	Percentage%	points	Evaluation during classes			Class attendance	8%	8	Teaching activity	2%	2	Seminar paper	18	18	Colloquium 1	36 %	36	Colloquium 2	36 %	36	<i>Evaluation of exam work for students who did not take the colloquium</i>			Written exam	90 %	90	In total:	100%	100												
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3.9. Evaluation criteria – elaboration by outcomes	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="7" style="text-align: center;">Method of passing the outcome</th> </tr> <tr> <th></th> <th style="text-align: center;">Class attendance</th> <th style="text-align: center;">Teaching activity</th> <th style="text-align: center;">Colloquium 1</th> <th style="text-align: center;">Colloquium 2</th> <th style="text-align: center;">Practical work</th> <th style="text-align: center;">In total</th> </tr> </thead> <tbody> <tr> <td>Outcome 1</td> <td></td> <td></td> <td style="text-align: center;">10</td> <td style="text-align: center;">2.5</td> <td></td> <td style="text-align: center;">12.5</td> </tr> <tr> <td>Outcome 2</td> <td></td> <td></td> <td style="text-align: center;">10</td> <td style="text-align: center;">2.5</td> <td></td> <td style="text-align: center;">12.5</td> </tr> <tr> <td>Outcome 3</td> <td></td> <td></td> <td style="text-align: center;">10</td> <td style="text-align: center;">2.5</td> <td></td> <td style="text-align: center;">12.5</td> </tr> <tr> <td>Outcome 4</td> <td></td> <td></td> <td style="text-align: center;">10</td> <td style="text-align: center;">2.5</td> <td></td> <td style="text-align: center;">12.5</td> </tr> </tbody> </table>										Method of passing the outcome								Class attendance	Teaching activity	Colloquium 1	Colloquium 2	Practical work	In total	Outcome 1			10	2.5		12.5	Outcome 2			10	2.5		12.5	Outcome 3			10	2.5		12.5	Outcome 4			10	2.5		12.5
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	Outcome 5				10		10
	Outcome 6				10		10
	Outcome 7				10		10
	Outcome 8				10		10
	Outside the outcome	8	2				10
	In total	8	2	40	50	0	100
	<p>Scoring outcomes (in order to pass the colloquium / exam the student must achieve at least 50% points for each learning outcome)</p> <p>Rating Points</p> <p>89 - 100 Excellent (5)</p> <p>76 - 88 Very good (4)</p> <p>63 - 75 Good (3)</p> <p>51 - 62 Sufficient (2)</p> <p>0 - 49 Insufficient (1)</p>						
3.10. Specifics related to taking the course	<p>If a student collects 50% of the points of each outcome, he / she directly takes the exam .</p> <p>If a student does not achieve a sufficient number of points on the midterm exam, he / she cannot take the next midterm exam. A student who does not do a seminar paper-house sizing program cannot colloquize .</p> <p>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.</p> <p>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 and the program are checked .</p>						
3.11. Student 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.</p> <p>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.</p> <p>If the student has not fulfilled all the obligations provided 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 consultations, organized 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, a 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 works							
3.13. Required reading	1.	B. Androić, D. Džeba I. Dujmović: METAL STRUCTURES I, Textbook of the University of Zagreb, Faculty of Civil Engineering, Publisher: IGH Zagreb 1994.					
	2.	A. Vukov: INTRODUCTION TO METAL STRUCTURES, Publisher: Faculty of Civil Engineering, University of Split, 1988					
	3.	A. Bjelanović, V.Rajčić: WOODEN STRUCTURES ACCORDING TO EUROPEAN STANDARDS, Publisher: Hrvatska sveučilišna naklada, Faculty of Civil Engineering, University of Zagreb, Zagreb 2005					

	4.	Damir Markulak, Ivan Bajkovec , Construction of steel structures according to European standards: an overview of the group of standards HRN EN 1090: peculiarities of fabrication and assembly of steel structures , Osijek, Josip Juraj Strossmayer University, Faculty of Civil Engineering, 2011.
	5.	Marta Sulyok-Selimbegović , Wooden constructions in architecture: a textbook for the study of architecture Zagreb, Golden marketing - Technical book , Faculty of Architecture, 2008.
3.14. Supplementary literature	1.	TECHNICAL ENCYCLOPEDIA: Steel, Steel structures, aluminum structures, HLZ, Zagreb.
	2.	B. Androić, D. Džeba, I. Dujmović: METAL STRUCTURES 2,3,4, Textbook of the University of Zagreb, Faculty of Civil Engineering, Publisher: IA PROJEKTIRANJE, Zagreb 2003.
	3.	Helmut C. Schulitz, Werner Sobek, Karl J. Habermann: STEEL CONSTRUCTION MANUAL, Publisher: Birkhauser Verlag Detail edition, Basel, 1999, English or German, www: detail.de
	4.	LV Leech: STRUCTURAL STEELWORK FOR STUDENTS. Publisher: Butterworth & co., London 1988

4. ADDITIONAL INFORMATION ABOUT THE COURSE

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 standardized ways and in accordance with the acts of the Polytechnic of Međimurje in Čakovec.
4.2. Contacting the teacher	Students can contact the teacher during the consultation period and during classes, while for short questions and explanations they can contact 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 that students come to the consultation as often as possible for any ambiguities.
4.3. Informing about the course	It is the obligation of each student to be regularly informed about the course. All notifications about the holding 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. The contribution of the course to the study program	Apply the basics of construction through the creation and design of the roof of the house

5. DEVELOPMENT OF THEMATIC UNITS (the number of elaborated hours is identical to the number of lectures and exercises of the course)

LECTURES				
Hours	Topic and description of the lecture	Method of work	Lecture learning outcomes	Course learning outcome
		<ul style="list-style-type: none"> • direct teaching (presentation, instruction, pp presentation) • Discovery learning (independent, guided, discussion, debate) • Group / collaborative learning • case study • field teaching... 		

1.	Introduction to the course content, basics of construction	Presentation, pp presentation	Distinguish construction systems	I1
2.	General overview of wooden and steel structures: historical development and modern static systems, special reference to roofs.	Presentation, pp presentation	Distinguish between wooden and steel constructions	I1
3.	Classification of steel and wooden building structures and resistance to geometric system, structural system, construction method and methodology of roof structure design	Presentation, pp presentation	Distinguish the properties of constructive resources	I2
4.	Steel characteristics: production and properties. Types of construction steels, rolling products.	Presentation, pp presentation	Use the structural steel	I3
5.	Wood characteristics: production and properties. Wood as a material: properties, types and classification of wood and laminated timber.	Presentation, pp presentation	Distinguish tree species	I4
6.	Fundamentals of fire safety, protection and durability of steel and wooden structures.	Presentation, pp presentation	Apply fire fighting	I4
7.	Loads of roof structures with combinations for the load-bearing capacity limit method - GSN according to common (European) standards (EC3 and EC5)	Presentation, pp presentation	Distinguish loads on systems	I5
8.	Sizing - calculation of simple roof elements of the structure according to the methods of load-bearing capacity limits - GSN and GSU (usability) according to common (European) standards (EC3 and EC5)	Presentation, pp presentation	Apply sizing of simple constructions	I6
9.	Calculation of horns and branches (wood - steel) - GSN and GSU deflection control	Presentation, pp presentation	Apply sizing of simple constructions	I6
10.	Calculation of columns (wood - steel)	Presentation, pp presentation	Apply sizing of simple constructions	I6

11.	Fasteners in wooden and steel constructions. Design and basics of joint design.	Presentation, pp presentation	Apply sizing of simple constructions	17
12.	Sizing - calculation of simple details of roof elements of the structure according to the methods of limit load-bearing states - GNS according to common (European) standards (EC3 and EC5)	Presentation, pp presentation	Apply sizing of simple constructions	17
13.	Calculation of pressure and tension rod connections (wood - steel)	Presentation, pp presentation	Apply sizing of simple constructions	17
14.	Execution drawings of a simpler roof wooden - steel construction with specifications	Presentation, pp presentation	Explain and read the design project	18
15.	Fundamentals of spatial stability of steel and wooden roof structures and structural connections, static connections and extensions.	Presentation, pp presentation	Explain and read the design project	18
EXERCISES / SEMINARS				
Hours	Topic and description of the lecture	Method of work <ul style="list-style-type: none"> • direct teaching (presentation, instruction, pp presentation) • Discovery learning (independent, guided, discussion, debate) • Group / collaborative learning • case study • field teaching... 	Lecture learning outcomes	Course learning outcome
1.	Introduction to the course content, basics of construction	Presentation, pp presentation	Distinguish construction systems	11
2.	General overview of wooden and steel structures: historical development and modern static systems, special reference to roofs.	Guided task, examples of systematic and structural modeling	Distinguish between wooden and steel constructions	11
3.	Classification of steel and wooden building structures and resistance to geometric system, structural system, construction method and methodology of roof structure design	Guided task - the roof of the family house	Distinguish the properties of constructive resources	12

4.	Steel characteristics: production and properties. Types of construction steels, rolling products.	Guided task - the roof of the family house	Use construction steel	13
5.	Wood characteristics: production and properties. Wood as a material: properties, types and classification of wood and laminated timber.	Guided task - the roof of the family house	Distinguish tree species	14
6.	Fundamentals of fire safety, protection and durability of steel and wooden structures.	Guided task - the roof of the family house	Apply fire fighting	14
7.	Loads of roof structures with combinations for the load-bearing capacity limit method - GSN according to common (European) standards (EC3 and EC5)	Guided task - the roof of the family house	Distinguish loads on systems	15
8.	Sizing - calculation of simple roof elements of the structure according to the methods of load-bearing capacity limits - GSN and GSU (usability) according to common (European) standards (EC3 and EC5)	Guided task - the roof of the family house	Apply sizing of simple constructions	16
9.	Calculation of horns and branches (wood - steel) - GSN and GSU deflection control	Guided task, examples of sizing	Apply sizing of simple constructions	16
10.	Calculation of columns (wood - steel)	Guided task, examples of sizing	Apply sizing of simple constructions	16
11.	Fasteners in wooden and steel constructions. Design and basics of joint design.	Guided task, examples of sizing	Apply sizing of simple constructions	17
12.	Sizing - calculation of simple details of roof elements of the structure according to the methods of limit load-bearing states - GNS according to common (European) standards (EC3 and EC5)	Guided task, examples of sizing	Apply sizing of simple constructions	17
13.	Calculation of pressure and tension rod connections (wood - steel)	Guided task, examples of sizing	Apply sizing of simple constructions	17
14.	Execution drawings of a simpler roof wooden - steel	Guided task, examples of sizing	Explain and read the design project	18

	construction with specifications Fundamentals of spatial stability of steel and wooden roof structures and structural connections, static connections and extensions.			
15.	Submission of papers	Independent production	To rate	