

POLYTECHNIC OF MEÐIMURJE IN ČAKOVEC

- ANN ALL																	
		C	OU	IRSE SYLLA	BU	S											
ACADEMIC YEAR: 2020/2021																	
1. GENERAL COURSE INFORMATION																	
1.1 Course name		hnology II															
1.2 Study program/s		•	e pr	ofessional stu	dy S	ustainable I	Deve	lopment									
1.3 Course status (O,E)	0	<u> </u>						tures	30								
1.4 Course code	404	14			ins	struction	Exe	rcises	30								
1.5 Course abbreviation	ΤII				(ni	umber of											
1.6 Semester	4				ho	urs)	E-le	arning									
1.7 ECTS	5			1.7	Pla	ce and	Pre	nises of th	ne Po	lytechnic of							
					tin	ne of	Me	đimurje in	Čako	vec,							
					ins	struction		ording to t									
							pub	lished on	the w	ebsite.							
2. TEACHING STAFF																	
2.1 Course leader/s-title	dr.s	sc. Mario Še	erce		ntac		mai	io.sercer@	@mev	v.hr							
					ntac												
2.2 Assistant/s- title	_				ntac												
	-				ntac												
2.3 Instruction held by-				CO	ntac	t											
title																	
3. COURSE DESCRIPTION	CL			· · · · ·						•							
3.1 Course goals			-	acquainted		-		••••	•								
		procedures, corrosion protection procedures and the basics of additive															
3.2 Prerequisites	-	production procedures. Passed the course Technology of Material Resources and attended the course															
5.2 Freiequisites		chnology I.	11 26	recimology (urce		nueu	the course							
3.3 Course outcomes			illv	completing th		nurse stude	ntsv	will be abl	e to:								
	/	After successfully completing the course, students will be able to:															
	I1 - understand melting, molding, casting and solidification;																
	12 - distinguish basic casting procedures and classification of casting																
	procedures;																
	13 - define the basic types of polymeric materials and their properties;																
	14 - distinguish basic polymer processing procedures;																
	I5 - identify corrosion processes and classify corrosion protection methods;																
	I6 - analyze the possibilities and needs of the application of additive																
	production procedures in the context of modern development and																
2.4.0	production. Through the course, students will be introduced to the basics of casting																
3.4 Course content		-								-							
			-	asting proces ration of the		•		•									
			-	of polymeric		-											
				ng. They will			-	-									
				-						forms of corrosion damage to mechanical structures and modern methods							
	used in corrosion protection technologies. Introduction to additive production																
			tion			logics. intre			aitive	production							
3.5 Types of coursework		l its applica Lectures	tion x			Blended e-		Individual		Laboratory							

Other 3.6 Language of instruction Other 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 Oral exam 2 Midterm exams Practical task Continuous knowledge check 2 Written exam Experimental work 1 Oral exam Research 1 3.8 Assessment and evaluation of students' work during classes and at the final exam Activity specification Percent % Points 3.9 Assessment criteria – analysis per learning outcomes Midterm exam 1 20% 20 Written exam 30% 30 100 3.9 Assessment criteria – analysis per learning outcomes Ways of evaluating learning outcomes Mid-term Outcome 1 15 15 15 Outcome 2 15 15 15 Outcome 4 15 15 15 Outcome 5 5 30 30 100		i N	Seminars and workshops	x	Distant learnin		x	Field classes	a	Multim and aetwor		Mentorship	
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must achieve at least 50% points for each learning outcome)													
		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	-									
0 - 49 fail (1)			•										
					d a nosi	tive gr	ade	if he / she r	egularl	v atte	nded cla	sses (10%)	
	3.10 Specific features	A student achieved a positive grade if he / she regularly attended classes (10%),											
	3.10 Specific features			passed the written part of the exam (60%) and the oral part of the exam (30%).									
where all learning outcomes are checked. Successfully solved three colloqui	related with taking	pass	ed the v										
during the semester are a substitute for the written part of the exam. The fina	•	pass Stud	ed the v lents wh	o did	not tak	e the c	collo	oquium acce	ess the		•		
grade is obtained in the oral part of the exam. All learning outcomes and	related with taking	pass Stud whe	ed the v lents wh re all lea	o did arning	not tak outco	e the c mes ar	collo re ch	oquium acce necked. Suc	ess the cessful	ly sol	ved thre	e colloquia	
checked in the oral part of the exam.	related with taking	pass Stud whe duri	ed the v lents wh re all lea ng the se	o did arning emest	not tak outco er are a	e the c mes ar a subst	collo e ch itute	oquium acce necked. Suc e for the wr	ess the cessful itten p	lly sol art of	ved thre the exar	e colloquia n. The final	

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							
3.13 Required reading	1.Bauer, B, Mihalic Pokopec, I: Osnove tehnologije lijevanja, FSB, Zagreb2017.						
	2. Čatić, I.: Uvod u proizvodnju polimernih tvorevina, Društvo plastičar, gumaraca, Zagreb, 1990.						
	3. Juraga, I., Alar, V., Stojanović, I.: Korozija i zaštita premazima, FSB, Zagreb, 2014.						
	4. Godec, D., Šercer, M.: Aditivna proizvodnja, FSB, Zagreb, 2015.						
3.14 Additional reading	1.Roberge, P.R.: Handbook of corrosion enginering, McGrow Hill, New York, 1999.						
	2. Diegel et al., A practical guide to design for additive manufacturing, Springer, 2020.						
4 ADDITIONAL COURSE IN 4.1 Quality control							
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 evaluatio						
	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						
		g the teacher's office hours.					
4.3 Information about the course	It is t All no poste	he obligation of each student to be regularly informed about the course. otifications about the classes or possible postponement of classes will be ed on the bulletin board and on the website of the Polytechnic at least 24					
	nours	s in advance.					

4.4 Course contribution	Use new technologies and techniques as part of the lifelong learning process
to the study	Critically evaluate arguments, assumptions and data in order to form an
program	opinion and contribute to the solution of the problem
	Apply the basics of thermoenergetics, thermodynamics and hydromechanics
	in the spatial design of thermodynamic systems
	Develop a technical plan in the field of design of mechanical thermotechnical systems
	Analyze the basic elements and networks in electrical engineering and justify the use of non-renewable and renewable energy sources, applicable to thermotechnical systems

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.	Foundry as a production process. Basic terms. Division of casting processes.	direct teaching	Explain the basic concepts in foundry. Distinguish divisions of casting procedures.	1, 2
2.	Casting in the sand. Shell casting, precision casting, casting in full molds.	direct teaching	Define the basic properties of an individual casting process in disposable molds.	12
3.	Casting into permanent molds.	direct teaching	Define the basic properties of an individual casting process in permanent molds.	12
4.	Melting. Solidification. Defects in castings.	direct teaching	Explain the melt preparation process. Define solidification of alloys. Distinguish defects on castings.	11, 12
5.	Introduction and historical development of polymer products production. Polymer division. Mechanical and thermal properties of polymers.	direct teaching	Distinguish polymeric materials, define their basic mechanical and thermal properties.	13

Hours	Topic and description	Method	Learning outcomes	outcome
	EXE	RCISES/ SEMINARS		Course
	technology process, economic effect of additive production.		application and economic effect of additive production.	16
14.	Additive production processes (3DP, FDM, SLA, SLS, DMLS). Selection of optimal additive	direct teaching direct teaching	Distinguish individual additive production technology. Explain the	16
13.	Introduction to additive technologies. Basic principles of additive technologies.	direct teaching	Define additive technology and basic principles.	16
12.	Electrical corrosion protection methods. Corrosion behavior of important construction materials.	direct teaching	Explain electrical methods of corrosion protection. Define the corrosion behavior of important construction materials.	15
11.	Coating protection. Metallic and non-metallic coatings. Basics, coating division, areas of application.	direct teaching	Distinguish between metallic and non-metallic coatings and their areas of application.	15
10.	Occurrences of corrosion damage.	direct teaching	Define the basic characteristics of the manifestations of corrosion damage.	15
9.	Chemical and electrochemical corrosion. Corrosive environments.	direct teaching	Explain chemical and electrochemical corrosion. Distinguish corrosive environments.	15
8.	Application of polymer formations.	direct teaching	Define and explain the field of application of polymer products.	13, 14
7.	Cyclic processes for processing polymer products.	direct teaching	Distinguish cyclic polymer processing procedures.	14
6.	Continuous processing of polymer products.	direct teaching	Distinguish continuous polymer processing procedures.	14

		 Direct teaching (lecture, instruction, pp presentation) Discovery learning (individual, lead, discussion) Group learning Case study Field classes 		
1.	Introduction to casting technology. Advantages and disadvantages. The main partners of the foundry industry.	direct teaching	Explain the importance of the foundry industry and the application of castings.	11
2.	Modeling and inflow system.	discovery learning	Explain the basic principles of model construction and inflow system.	11, 12
3.	Preparation of melt and melting furnace.	direct teaching	Define melt preparation for gray and ductile iron and Al alloys. Distinguish types of melting furnaces.	11
4.	Visit to the Ferro-preis foundry.	field work	Explain the principles of molding and casting.	11, 12
5.	Mid-term exam I	Checking c	outcomes I1 and I2.	
6.	Introduction to the types of polymeric materials.	direct teaching	Define the basic properties of polymeric materials and method of production.	13
7.	Plastomer injection molding.	direct teaching	Define plastomer injection molding.	14
8.	Additive processes for the production of polymer products.	direct teaching	List additive processes for the production of polymeric products.	14
9.	Visit to firm Plastometalik.	field work	Explain the production and application of polymers.	13, 14
10.	Mid-term exam II	Checking c	outcomes I1 and I2.	
11.	Occurrences of corrosion.	direct teaching	Distinguish the manifestations of corrosion.	15
12.	Methods of protection of mechanical structures.	direct teaching	Define corrosion protection methods.	15

13.	Work on Stratasys F900.	discovery learning Explain the FDM procedure.					
14.	Work on EOS M290.	discovery learning Explain the DMLS procedure.					
15.	Mid-term exam III	Checking outcomes I1 and I2.					