

POLYTECHNIC OF MEÐIMURJE IN ČAKOVEC

COURSE SYLLABUS											
	ACADEMIC YEAR: 202				022/2023						
1. GENERAL COURSE INFORMATION											
1.1 Course name	Digital electronic circuits										
1.2 Study program/s	Undergraduate professional study of Computer Science										
1.3 Course status (O,E)	0			1.6 M	lode of	Lectures 30					
1.4 Course code	DE	S			i	nstruction	Exe	ercises	45		
1.5 Course abbreviation	50	07			(number of	Sen	ninars			
1.6 Semester	Ш				h	iours)	E-le	earning			
1.7 ECTS	6				1.7 Pl t ii	ace and ime of nstruction	The Pol ^y Čak sch wel	e premises ytechnic c covec, acco edule pub bsite	of the f Međ ording lished	e imurje in to the on the	
2. TEACHING STAFF		· -		·	1		I		-		
2.1 Course leader/s-title	Ju lec	rica Trst sturer	tenjak/ s	senior	conta	ict	jtrs	tenjak@n	nev.hr		
					conta	lct					
2.2 Assistant/s- title					conta	lct					
					conta	lct					
2.3 Instruction held by- title	Jurica Trstenjak/ senior lecturer				contact jtrstenjak@mev.hr						
3. COURSE DESCRIPTION											
3.1 Course goals	Student should acquire a functional overview of the basic components of modern digital electronic circuits, learn the basics of digital technique, logical algebra and the realization of more complex logical functions.										
3.2 Prerequisites	It is necessary to have passed the subject Basics of Electrical Engineering and Electronics							ering and			
3.3 Course outcomes	 After successfully completing the course, students will be able to: O1 - Use different number systems and codes O2 - Apply minimization of logic functions and basic logic circuits O3 - Explain the operation of basic types of bistables O4 - explain the operation of basic combinational and arithmetic circuits O5 - use combinational circuits, registers and counters in the design of synchronous sequential circuits O6 - explain AD and DA conversion 										
3.4 Course content	Number systems. Codes. Logic circuits. Integrated circuits. Multivibrators. Minimization. Registers. Counters. Sequential circuits. Memories. A/D and D/A conversion.										
3.5 Types of coursework	x	Lectur	x	Exercises		Blended e-	x	Individual		Laboratory	
		es Semin ars and works hops Other	x	Distant learning		Field classes	x	Multimed and network	ia	Mentorship	

3.6 Language of instruction	Croatian/English									
3.7 Monitoring students'	2,5	Class a	ttendar	nce	:	Seminars		Essay		
work (enter the	Class a		ss activity			Project		Report/paper		iper
credits for each	Exam (N		(Midterm		0.5	Practical task		Continuous		IS
activity so that the	exams)				Experimental work			knowledge check		e check
total number of	Written exam					experimer				
to the total ECTS	Oral exam					Research				
value of the course,										
1 ECTS = 30 hours)										
3.8 Assessment and			Activity	v specific:	ation	Pe	rcent %	Poi	nts	
evaluation of			Activit	A	ssessmen	t during ir	nstruction	101		
during classes and at		Atte	ndance				5%	5	,	
the final exam		Class	s activity	activity			5%		-	
		Midt	part of term ex	part of midterms			15%		5	
		Midt	term exa	am 2			20%	20	0	
		Midt	term exa	am 3			20%		D	
	Practical task			k			15%	15		
			Exam d	assessmen obligator	it for the s ry require	students v ments du	vho failed to ring the sem	fullfil all t ester	he	
		Writ	ten exa	m	yrequire		60%	6	60	
		Oral	exam				15%	1.	5	
		Tota	ıl:			:	100%	10	100	
3.9 Assessment criteria –										
analysis per learning				Ν	lačin pola	ganja ish	oda			
analysis per learning outcomes			Atte	N Class	lačin pola Midte	ganja isho Midte	oda Midter	Practi	Oral	
analysis per learning outcomes			Atte nda	Class activit	lačin pola Midte rm exam	ganja isho Midte rm exam	oda Midter m exam	Practi cal	Oral part of midter	Total
analysis per learning outcomes			Atte nda nce	Class activit y	lačin pola Midte rm exam 1	ganja isho Midte rm exam 2	oda Midter m exam 3	Practi cal task	Oral part of midter ms	Total
analysis per learning outcomes	Outo	come 1	Atte nda nce	Class activit y	lačin pola Midte rm exam 1	ganja isho Midte rm exam 2	Dida Midter m exam 3	Practi cal task 2	Oral part of midter ms 2	Total
analysis per learning outcomes	Outo	come 1 come 2	Atte nda nce	Class activit y	Actin pola Midte rm exam 1 10 10	ganja isho Midte rm exam 2	oda Midter m exam 3	Practi cal task 2 2	Oral part of midter ms 2 2	Total 14 14
analysis per learning outcomes	Outo Outo Outo	come 1 come 2 come 3	Atte nda nce	Class activit y	lačin pola Midte rm exam 1 10 10	ganja ish Midte rm exam 2 10	oda Midter m exam 3	Practi cal task 2 2 3 2	Oral part of midter ms 2 2 2 3 2	Total 14 14 16 14
analysis per learning outcomes	Outo Outo Outo Outo	come 1 come 2 come 3 come 4 come 5	Atte nda nce	Class activit y	lačin pola Midte rm exam 1 10 10	ganja isho Midte rm exam 2 10 10	Dida Midter m exam 3	Practi cal task 2 2 3 2 3 2 3	Oral part of midter ms 2 2 2 3 2 3 2 3	Total 14 14 16 14 16 14
analysis per learning outcomes	Outo Outo Outo Outo Outo	come 1 come 2 come 3 come 4 come 5 come 6	Atte nda nce	Class activit y	lačin pola Midte rm exam 1 10 10	ganja isho Midte rm exam 2 10 10	Dida Midter m exam 3 10 10	Practi cal task 2 2 2 3 2 3 3 3 3	Oral part of midter ms 2 2 2 3 2 3 3 3 3	Total 14 14 16 16 16 16
analysis per learning outcomes	Outo Outo Outo Outo Outo	come 1 come 2 come 3 come 4 come 5 come 6 come	Atte nda nce	Class activit y	lačin pola Midte rm exam 1 10 10	ganja isho Midte rm exam 2 10 10	Midter m exam 3 10 10	Practi cal task 2 2 3 2 3 3 3 3	Oral part of midter ms 2 2 2 3 2 3 3 3 3	Total 14 14 16 14 16 14
analysis per learning outcomes	Outo Outo Outo Outo Outo Outo Outo not- relat	come 1 come 2 come 3 come 4 come 5 come 6 come	Atte nda nce	Class activit y	lačin pola Midte rm exam 1 10 10	ganja isho Midte rm exam 2 10 10	Dida Midter m exam 3 10 10	Practi cal task 2 2 3 2 3 3 3	Oral part of midter ms 2 2 3 2 3 2 3 3 3	Total 14 14 16 14 16 14 16 10
analysis per learning outcomes	Outo Outo Outo Outo Outo Outo not- relat	come 1 come 2 come 3 come 4 come 5 come 6 come come ted	Atte nda nce	Class activit y 5	lačin pola Midte rm exam 1 10 10	ganja ishu Midte rm exam 2 10 10 10	And a midter m exam 3 midter m exam 10 midter m exam 20 midter m exam 20 midter m exam 10 m	Practi cal task 2 2 3 2 3 3 3 3 3	Oral part of midter ms 2 2 3 2 3 3 3 3	Total 14 14 16 14 16 10 100
analysis per learning outcomes	Outo Outo Outo Outo Outo not- relat T	come 1 come 2 come 3 come 4 come 5 come 6 come ted	Atte nda nce	Class activit y 5 5	lačin pola Midte rm exam 1 10 10 10	ganja isho Midte rm exam 2 10 10 10	And the second s	Practi cal task 2 2 3 3 2 3 3 3 15	Oral part of midter 2 2 3 2 3 3 3 3 3	Total 14 14 16 14 16 14 16 10 100
analysis per learning outcomes	Outo Outo Outo Outo Outo Outo not- relat T	come 1 come 2 come 3 come 4 come 5 come 6 come ted ted	Atte nda nce 5 5 5	Class activit y 5 5 5 nes (in o	Actin pola Midte rm exam 1 10 10 10 20 20	ganja isho Midte rm exam 2 10 10 10 10 20 20	oda Midter m exam 3 10 10 10 20 20	Practi cal task 2 2 3 2 3 3 3 3 15	Oral part of midter ms 2 2 3 2 3 3 3 3 15	Total 14 14 16 14 16 10 100 student
analysis per learning outcomes	Outo Outo Outo Outo Outo not- relat T	come 1 come 2 come 3 come 4 come 5 come 6 come ted ted total	Atte nda nce 5 5 5 5 0utcon ve at le	Class activit y 5 5 5 5 5 s east 50%	Action pola Midte rm exam 1 10 10 10 10 20 rder to points	ganja isho Midte rm exam 2 10 10 10 10 20 pass the for each	oda Midter m exam 3 10 10 10 20 e mid-term learning o	Practi cal task 2 2 3 2 3 3 3 3 15 n exam/e outcome	Oral part of midter ms 2 2 3 2 3 3 3 3 3 15	Total 14 14 14 16 14 16 10 100 student
analysis per learning outcomes	Outo Outo Outo Outo Outo Outo not- relat T Grad must Point	come 1 come 2 come 3 come 4 come 5 come 6 come ted ted ted ted ted ted ted ted ted te	Atte nda nce 5 5 5 5 5 5 0 0 0 0 0 0 0 0 0 0 0 0 0	Class activit y 5 5 5 5 nes (in o east 50%	Actin pola Midte rm exam 1 10 10 10 10 20 rder to points f	ganja isho Midte rm exam 2 10 10 10 10 20 pass the for each	e mid-term learning of	Practi cal task 2 2 3 2 3 3 3 15 n exam/e putcome	Oral part of midter ms 2 2 3 2 3 3 3 3 15	Total 14 14 16 14 16 10 100 student
analysis per learning outcomes	Outo Outo Outo Outo Outo Outo not- relat T Grad must Point 89 –	come 1 come 2 come 3 come 4 come 5 come 6 come ted ted ted table t	Atte nda nce 5 5 5 5 5 5 5 0utcon 2 6 at le 6 6 rade excelle	Class activit y 5 5 5 5 5 6 5 5 0% cast 50%	ačin pola Midte rm exam 1 10 10 10 20 vrder to points f	ganja isho Midte rm exam 2 10 10 10 10 20 20 pass the for each	e mid-term learning o	Practi cal task 2 2 3 2 3 3 3 3 15 n exam/e putcome	Oral part of midter ms 2 2 3 2 3 3 3 3 15 exam the	Total 14 14 16 14 16 10 100 student
analysis per learning outcomes	Outo Outo Outo Outo Outo Outo Outo Outo	come 1 come 2 come 3 come 4 come 5 come 6 come ted ted ted ted ted ted ted ted ted te	Atte nda nce 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Class activit y 5 5 5 5 5 nes (in o east 50% nt (5) od (4)	Action pola Midte rm exam 1 10 10 10 20 20 order to points to	ganja isho Midte rm exam 2 10 10 10 10 20 pass the for each	oda Midter m exam 3 10 10 10 20 e mid-term learning o	Practi cal task 2 2 3 2 3 3 3 15	Oral part of midter 2 2 3 2 3 3 3 3 15	Total 14 14 16 14 16 10 100 student
analysis per learning outcomes	Outo Outo Outo Outo Outo Outo Outo not- relat T Grad must Point 89 – 76 – 63 –	come 1 come 2 come 3 come 4 come 5 come 6 come ted ted ted tal ting of c c achiev ts C 100 e 88 v 75 g	Atte nda nce 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Class activit y 5 5 5 5 5 5 5 5 5 5 1 5 1 5 1 5 1 5 1	Action pola Midte rm exam 1 10 10 10 20 Prder to points f	ganja isho Midte rm exam 2 10 10 10 20 pass the for each	e mid-term learning of	Practi cal task 2 2 3 2 3 3 3 3 15	Oral part of midter ms 2 2 3 2 3 3 3 3 15	Total 14 14 16 14 16 10 100 student
analysis per learning outcomes	Outa Outa Outa Outa Outa Outa Outa Outa	come 1 come 2 come 3 come 4 come 5 come 6 come ted otal otal otal ts 6 100 e 88 v 75 g 62 p	Atte nda nce 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Class activit y 5 5 5 5 5 5 1 5 1 5 1 5 1 5 1 5 1 5 1	Actin pola Midte rm exam 1 10 10 10 20 rder to points t	ganja isho Midte rm exam 2 10 10 10 10 50 20	oda Midter m exam 3 10 10 10 20 e mid-term learning o	Practi cal task 2 2 3 2 3 3 3 3 15	Oral part of midter ms 2 2 3 3 2 3 3 3 3 15	Total 14 14 16 14 16 10 100 student
analysis per learning outcomes	Outo Outo Outo Outo Outo Outo Outo not- relat T Grad must Point 89 – 76 – 63 – 50 – 0 –	come 1 come 2 come 3 come 4 come 5 come 6 come ted ted ted ted ted ted ted ted ted te	Atte nda nce 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Class activit y 5 5 5 5 nes (in o ast 50% nt (5) od (4) 3)	Action pola Midte rm exam 1 10 10 10 20 20 order to points f	ganja isho Midte rm exam 2 10 10 10 10 0 0 0 0 0 0 0 0 0 0 0 0 0	oda Midter m exam 3 10 10 10 20 e mid-term learning o	Practi cal task 2 2 3 2 3 3 3 15	Oral part of midter 2 2 3 2 3 3 3 3 15	Total 14 14 16 14 16 10 100 student
analysis per learning outcomes 3.10 Specific features	Outo Outo Outo Outo Outo Outo Outo Outo	come 1 come 2 come 3 come 4 come 5 come 6 come ted ted ted tal tachiev ts 6 100 e 88 v 75 g 62 p 49 fa der for	Atte nda nce 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Class activit y 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 5 0 6 2 3 1 5 0 6 2 5 5 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5	ass the o	ganja isho Midte rm exam 2 10 10 10 10 20 pass the for each	oda Midter m exam 3 10 10 10 20 e mid-term learning o	Practi cal task 2 2 3 2 3 3 3 15 n exam/e outcome	Oral part of midter ms 2 2 3 2 3 3 3 3 15 exam the	Total 14 14 16 14 16 16 10 100 student
analysis per learning outcomes 3.10 Specific features related with taking	$\begin{array}{c} \text{Outta}\\ \text{Outta}\\$	come 1 come 2 come 3 come 4 come 5 come 6 come ted otal otal otal otal otal otal otal otal	Atte nda nce 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Class activit y 5 5 5 5 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5	ass the of that lead	ganja isho Midte rm exam 2 10 10 10 20 pass the for each	ne / she m	Practi cal task 2 2 3 3 2 3 3 3 15 n exam/e outcome	Oral part of midter ms 2 2 3 3 2 3 3 3 3 15 exam the b)	Total 14 14 16 14 16 10 100 student um of 50% utcome. If
analysis per learning outcomes 3.10 Specific features related with taking the course	Outo Outo Outo Outo Outo Outo Outo Outo	come 1 come 2 come 3 come 4 come 5 come 6 come ted otal ing of c cachiev ts 6 100 e 88 v 75 g 62 p 49 fa der for e point ident d	Atte nda nce 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Class activit y 5 5 5 5 5 5 1 5 1 5 1 5 1 5 1 5 1 5 1	ass the of that lead we a suf	ganja isho Midte rm exam 2 10 10 10 20 pass the for each for each	e mid-term learning of humber of	Practi cal task 2 2 3 2 3 3 3 15 n exam/e outcome	Oral part of midter ms 2 2 3 2 3 3 3 15 exam the exam the earning o in the 1si	Total 14 14 16 16 16 10 100 student um of 50% utcome. If t midterm

	she c	annot take the next midterm exam. Once achieved points in intermediate						
	exam	s 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 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							
	take the written and oral part of the exam, where all learning outcomes are							
	checked, and are required to submit all homework before taking the exam.							
3.11 Students obligations	Full-time students are required to attend at least 70% of the total number of							
	hour	s 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						
	oblig	ed to attend the lectures again and meet the conditions for taking the						
	exam	l.						
	Atter	ndance can be offset by online tuition, organised webinars and added						
	assig	nments given by teachers. One lesson lasts 45 minutes, and several hours						
	form	a teaching unit. Absence from one teaching unit is counted as one						
	abse	nce. Delays and apologies are recorded separately. In that case, if the						
	stude	ent missed more than 50% of classes, and has a justifiable						
	reaso	on/apology, the request should be submitted to the Department Council,						
	whic	h then decides on the justification of student absences with the						
	oblig	atory opinion of the course leader.						
3.12 Written								
assignments								
3.13 Required reading	1	Anil K. Maini: Digital Electronics: Principles, Devices and						
	1.	Applications 1st Edition, Wiley, West Sussex, 2007.						
	2.							
3.14 Additional reading	1.							
	2.							
4 ADDITIONAL COURSE INI	ORM/	ATION						
4.1 Quality control	The o	quality of the program, teaching process, teaching skills and level of						
	mast	ery of the material will be established by conducting a written evaluation						
	base	d 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	Stude	ents 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	lt is t	he obligation of each student to be regularly informed about the course.						
the course	All no	otifications about the classes or possible postponement of classes will be						
	poste	ed on the bulletin board and on the website of the Polytechnic at least 24						
	hour	s in advance.						
4.4 Course contribution	Apply	y the acquired learning skills, basic knowledge of the profession and						
to the study	problem solving necessary for continuing studies at a higher level.							
program	Analyze the basic elements of electrical engineering and digital circuits and							
	ident	ify the structure of the computer.						