POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

COURSE SYLLABUS

ACADEMIC YEAR:	2020/2021

1. GENERAL COURSE INFORMATION

1.1 Course name	Computers for monitoring and managing technical processes				
1.2 Study program/s	Undergraduate professional study of Computer Science				
1.3 Course status (O,E)	E		**1.6 Mode of instruction (number of hours)**	**Lectures**	30
1.4 Course code	RNUTP			**Exercises**	30
1.5 Course abbreviation				**Seminars**	
1.6 Semester	IV			**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	Jurica Trstenjak/ senior lecturer	**contact**	jtrstenjak@mev.hr
		contact	
2.2 Assistant/s- title		**contact**	
		contact	
2.3 Instruction held by- title	Jurica Trstenjak/ senior lecturer	**contact**	jtrstenjak@mev.hr

3. COURSE DESCRIPTION

3.1 Course goals	The student should learn to solve problems of implementation of computer systems for automation of technical processes.
3.2 Prerequisites	No conditions
3.3 Course outcomes	After successfully completing the course, students will be able to: O1 - Distinguish the basic elements of the process measurement system O2 - Explain the elements of an automatic control system O3 - Describe process sensors, transducers and actuators for measuring and controlling temperature, flow, pressure, level and displacement O4 - Describe and perform different ways of process control, from basic control schemes (ON-OFF, P, PI, PD, PID control, program control) to advanced control schemes (time - optimal, proportional, cascade, advanced, optimal, adaptive and intelligent control)). O5 - Select the Arduino system configuration and write a driver / user program for simpler and more complex tasks
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	Lectures	x	Exercises		Blended e-learning	x	Individual activities	x	Laboratory
		Seminars and workshops	x	Distant learning		Field classes		Multimedia and network		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	Class attendance		Seminars		Essay
	Class activity		Project		Report/paper
2	Exam (Midterm exams)	1	Practical task		Continuous knowledge check
	Written exam		Experimental work		
	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	5%	5
Class activity	5%	5
Oral part of midterms	15%	15
Midterm exam 1	30%	30
Midterm exam 2	30%	30
Practical task	15%	15
Exam assessment for the students who failed to fullfil all the obligatory requirements during the semester		
Written exam	*60%*	*60*
Oral exam	15%	15
Total:	**100%**	**100**

3.9 Assessment criteria – analysis per learning outcomes

	Attendance	Class activity	Midterm exam 1	Midterm exam 2	Practical task	Oral part of midterms	Total
Outcome 1			10			3	13
Outcome 2			10			4	14
Outcome 3			10			4	14
Outcome 4				10		4	14
Outcome 5				20	15		35
Outcome not-related	5	5					10
Total	**5**	**5**	**20**	**20**	**15**	**15**	**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

In order for a student to pass the course, he / she must earn a minimum of 50% of the points available for that learning outcome for EACH learning outcome. If a student does not achieve a sufficient number of points in the 1st midterm exam (minimum 50% of the total number of points) or the 2nd midterm exam, 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 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 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.	Carlos A. Smith: Principles and Practice of Automatic Process Control, 2nd Edition 2nd Edition
	2.	
3.14 Additional reading	1.	
	2.	

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	Analyze the basic elements of electrical engineering and digital circuits and identify the structure of computers

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**

		• Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes…		
1. & 2.	Introduction. Processes and objects. A systematic approach to process management. Reverse control (regulation), advanced control and management. Input - output sizes.	Discussion, lecture, PP presentation, case study	Distinguish regulation from management	O1
3. & 4.	Processes and process devices. Operations and technological operations. Division of technological operations: Transmission, transition and conversion operations.	Discussion, lecture, PP presentation, case study	Explain the processes and process devices used in a real system	O1, O2
5. & 6.	Process modeling. Electrical, mechanical, fluid and thermal systems. Energy, work, power	Discussion, lecture, PP presentation, case study	Explain electrical, mechanical, fluid and thermal systems, and their modeling	O1,O2
7. & 8.	Measuring sensors (sensors) and actuators (actuators) - input, output and transmission features. Temperature and flow measurement.	Discussion, lecture, PP presentation, case study	Use the correct sensor depending on the process and argue the decision	O3
9. & 10.	Measuring sensors (sensors) and actuators (actuators) - input, output and transmission features. Displacement and force measurement.	Discussion, lecture, PP presentation, case study	Use the correct sensor depending on the process and argue the decision	O3

11. & 12.	Preparation for taking the 1st intermediate exam	Discussion	Outcome check OO1-O3	O1-O3
13. & 14.	1. midterm exam	On its own	Outcome check O1, O2 and O3	O1-O3
15. & 16.	Basic process management schemes: "on-off" and P management.	Discussion, lecture, PP presentation, case study	Distinguish and apply "on-off" and P guidance	O4
17. & 18.	Basic guidance schemes: PD, PI and PID guidance	Discussion, lecture, PP presentation, case study	Distinguish and apply PD, PI and PID guidance	O4
19. & 20.	Basic guidance schemes: PD, PI and PID guidance	Discussion, lecture, PP presentation, case study	Distinguish and apply PD, PI and PID guidance	O4
21. & 22.	Keeping the basic scheme: optionally conducting, conducting in ratio, forward guiding	Discussion, lecture, PP presentation, case study	Explain election leadership, proportional leadership and advance leadership	O4
23. & 24.	Complex guidance schemes: Optimal guidance, adaptive guidance, intelligent guidance	Discussion, lecture, PP presentation, case study	Explain optimal leadership, adaptive leadership, and intelligent leadership	O4
25. & 26.	Process industry and automatic control, examples	Discussion, lecture, PP presentation, case study	Explain with an example the process industry and automatic control	O4
27. & 28.	Preparation for taking the 2nd intermediate exam	Discussion	Outcome check O4, O5	O4-O5
29. & 30.	2. midterm exam	On its own	Outcome check O4- O5	O4-O5
EXERCISES/ SEMINARS				
Hours	**Topic and description**	**Method** • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study	**Learning outcomes**	**Course outcome**
1. & 2.	Introduction: introduction to the Arduino kit	Presentation, discussion	Explain the parts and use of the Arduino kit	O5
3. & 4.	Lab. exercise 1	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
5. & 6.	Lab. exercise 2	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5

7. & 8.	Lab. exercise 3	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
9. & 10.	Lab. exercise 4	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
11. & 12.	Lab. exercise 5	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
13. & 14.	Lab. exercise 6	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
15. & 16.	Lab. exercise 7	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
17. & 18.	Lab. exercise 8	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
19. & 20.	Lab. exercise 9	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
21. & 22.	Lab. exercise 10	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
23. & 24.	Lab. exercise 11	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
25. & 26.	Lab. exercise 12	Presentation, independent work, discussion	Realize projects using the Arduino kit	O5
27. & 28.	Lab. exercise: Independent task	Independent work	Realize projects using the Arduino kit	O5
29. & 30.	Intermediate exam from exercises	Independent work	Outcome check O5	O5