with: electric, electronic, pneumatic and fluid components. Definition of signals and standard Sensors for signals. Engineering methods for design of control circuits. Peripherals and communications: man-machine (system)  11. Course content: Introduction and tasks of automation. Classification of systems for automati Fundamentals of number systems. Types of signals and processing. Boolean algebra. Logic functions. Fundamental laws and theorems of Boolean algebra. Genesis of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic function Pneumatic components. Pneumatic logic elements: with piston (3/2 valves), with ball, with the membranes. Fluidic components: Coanda effect, discrete effect. Components in modern consystems. Peripherals of control systems and communication man - machine (system). Sensifor signals. Finite automates. Combinational and sequential automates and their synthesis. Logic schemes and realization. Synthesis of automates with bi-stable memory elements. Engineering methods for design: Method of cascades, Step by step method. Introduction of Programmable logic control. Examples of modern control systems.  12. Study methods: Interactive teaching, laboratory and/or auditory exercises, standalone and/or team project work, standalone learning.  13. Total hours   6ECTSx30 classes = 180 hours	Add.	. 3 Course program for the first, second and third level (cycle) of studies									
Study group(s)   ACS, MecH   Faculty of Mechanical Engineering - Skopje,   Skopie,   Skopie   Skopie,   Sko		Course title			Control Systems in Mechatronics						
The organizer of the study program (unit, institute, department)   S. Cyril and Methodius University in Skopje											
(unit, institute, department)  5. Level (first, second, third)  6. Academic year / semester summer 7.   ECTS credits    6. Academic year / semester summer 7.   ECTS credits    7.   ECTS credits    8.   Instructor   prof. d-r Laze Trajkovski    8.   Derecugistres   No preconditions    8.   Instructor   prof. d-r Laze Trajkovski    9.   Prerequisites   No preconditions    10.   Course objectives (competences): Introduction with tasks and conditions for introduction of automation. Genesis: analysis and synthesis of logical functions and logical circuits. Classification and synthesis of finite automates. Technical construction of basic logic function with: electric, electronic, pneumatic and fluid components. Definition of signals and standard communications: man-machine (system)  11.   Course content: Introduction and tasks of automation. Classification of systems for automati Fundamentals of number systems. Types of signals and processing, Boolean algebra. Logic functions. Pundamental laws and theorems of Boolean algebra. Genesis of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic function Pneumatic components. Pneumatic logic elements: with piston (3/2 valves), with ball, with the membranes. Fluidic components: Coanda effect, discrete effect. Components in modern corn systems. Peripherals of control systems and communication man - machine (system). Sensi for signals. Finite automates. Combinational and sequential automates and their synthesis. Logic schemes and realization. Synthesis of automates with bi-stable memory elements. Engineering methods for design: Method of cascades, Step by step method. Introduction of Programmable logic control. Examples of modern control systems.  12.   Study methods: Interactive teaching, laboratory and/or auditory exercises, standalone and/or team project work, standalone learning.  13.   Total hours   15.1.   Lectures   30 h   15.2.   Lab (student work)   30 h   20 h   30 h   30 h   20 h   30 h   30 h   30 h   30 h   30 h					,						
<ul> <li>E. Level (first, second, third)</li> <li>First</li> <li>Academic year / semester</li> <li>Instructor</li> <li>prof. d-r Laze Trajkovski</li> <li>No preconditions</li> <li>Course objectives (competences): Introduction with tasks and conditions for introduction of automation. Genesis: analysis and synthesis of logical functions and logical circuits. Classification and synthesis of linite automates. Technical construction of basic logic function with: electric, electronic, pneumatic and fluid components. Definition of signals and standard Sensors for signals. Engineering methods for design of control circuits. Peripherals and communications: man-machine (system)</li> <li>Course content: Introduction and tasks of automation. Classification of systems for automati Fundamentals of number systems. Types of signals and processing. Boolean algebra. Logic functions. Fundamental laws and theorems of Boolean algebra. Genesis of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic function Pneumatic components. Pneumatic logic elements: with piston (3/2 valves), with ball, with the membranes. Fluidic components: Coanda effect, discrete effect. Components in modern consystems. Peripherals of control systems and communication man - machine (system). Sens for signals. Finite automates. Combinational and sequential automates and their synthesis. Logic schemes and realization. Synthesis of automates with bi-stable memory elements. Engineering methods for design: Method of cascades, Step by step method. Introduction of Programmable logic control. Examples of modern control systems.</li> <li>Study methods: Interactive teaching, laboratory and/or auditory exercises, standalone and/or team project work, standalone learning.</li> <li>Total hours</li> <li>Lectures/Lab</li> <li>15.1. Lectures</li> <li>16.2. Individual assignments</li> <li>25 h</li> <li>16.2. Individual assignments</li> <li>25 h</li> <li>17.</li></ul>	4.										
S.   Academic year / semester   summer   7.   ECTS credits	_					niversity	/ In Sкорје				
Instructor											
9. Prerequisites			year / semester								
10.   Course objectives (competences): Introduction with tasks and conditions for introduction of automation. Genesis: analysis and synthesis of logical functions and logical circuits. Classification and synthesis of finite automates. Technical construction of basic logic function with: electric, electronic, pneumatic and fluid components. Definition of signals and standard Sensors for signals. Engineering methods for design of control circuits. Peripherals and communications: man-machine (system)  11.   Course content: Introduction and tasks of automation. Classification of systems for automatic Fundamentals of number systems. Types of signals and processing. Boolean algebra. Logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic circuits. Minimization. Technical construction of logic functions. Analysis and synthesis of logic functions. Analysi			tas								
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team project work, standalone learning.   13.   Total hours   6ECTSx30 classes = 180 hours   30 + 30 + 20 + 25 + 75 = 180 hours   15.   Lectures/Lab   15.1   Lectures   30 h   15.2   Lab (student work)   30 h   16.1   Project Work/Assignments   16.1   Project assignments   25 h   16.2   Individual assignments   25 h   16.3   Self-study   75 h   17.1   Tests   80 p   17.2   Projects   10 p   17.3   Attendance   10 p   18.   Grading scale   Under 50   5 (five 6 in 70 points   6 (six 61 - 70 points   7 (seven 71 - 80 points   8 (eight 81 - 90 points   9 (nine 91 - 100 points   10 (ten											
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15.   Lectures   15.1   Lectures   30 h											
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17.2.   Projects   10 pm	17.										
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<ul> <li>19. Prerequisites for taking the final exam</li> <li>20. Language of Instruction</li> <li>Classes attendance (min. 25%) and finished sem assignments</li> <li>Macedonian</li> </ul>					9 (nine) (B)						
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20. Language of Instruction Macedonian	19.	Prerequisit	tes for taking the final exa	m							
	20	Languaga	of Instruction								
21.   Course evaluation   Student questionnaire											
	21.	Course ev	aluation		Student questionnaire						

22. Textbooks

	22.1.	Instruction materials							
		No.	Author	Title	Publisher	Year			
		1.	Laze Trajkovski	Control techniques (internal script)	Faculty of Mechanical Engineering - Skopje	2008			
		2.	T. Bundalevski, L. Trajkovski	Pneumatic sequential control, method of cascades (internal script)	Faculty of Mechanical Engineering - Skopje	1983			
		3.							
		Supplemental Instruction Materials							
	22.2.	No.	Author	Title	Publisher	Year			
		1.	S. Zaric	Production Automatization	Faculty of Mechanical Engineering, Belgrade	1981			