NAME OF THE COURSE	Modeling Software Systems					
Code	PMID54	Year of study	GU-1			
Course teacher	doc.dr. sc. Branko Žitko dr. sc. Tonći Dadić	Credits (ECTS)	5,0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30		30	
Status of the course	obligatoty	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Adopt formal models of basic concept of computing Model finite state automata Model formal grammars					
Course enrolment requirements and entry competences required for the course						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Formalize language by using automata and grammars Design automata for language recognition Design automata for language generation Design grammar based on automata Normalize grammar					
Course content broken down in detail by weekly class schedule (syllabus)	Week 1: Lecture: Course introduction, teacher, obligations, exam Formal language, symbols and notations, grammar and automata, regular languages Exercise: Defining formal language and operations on language Week 2: Lecture: Deterministic Finite State Automaton (DFS), formal definition, minimization of DFS Exercise: Construction of DFS given by language, DFS minimization Week 3: Lecture: Non-deterministic Finite State Automaton (NFS), formal definition, conversion of NFS to DFS Exercise: Construction of NFS given by language, conversion of NFS to DFS Week 4: Lecture: Non-deterministic Finite State Automaton with empty transitions (eNFS), formal definition, conversion of eNFS to NFS Exercise: Construction of eNFS given by language, conversion of eNFS to NFS Week 5: Lecture: Colloquium Exercise: Exercise tasks for colloquium Week 6: Lecture: Moore and Mealy automaton, formal definition, conversion of Moore to Mealy automaton, conversion of Mealy to Moore automaton Exercise: Construction of Moore and Mealy automaton given by language, conversion of Moore to Mealy automaton, conversion of Mealy to Moore automaton Week 7:					

	Lecture: Regular expressions, conversion of regular expression into eNFS, regular definitions	
	Exercise: Construction of eNFS given by regular expressions, regular definitions	
	Week 8:	
	Lecture: Formal grammar, context free grammar, generative tree, languages and grammars, left and right linear grammars, construction of NFS from right linear grammar, construction of eNFS from left linear grammar	
	Exercise: Construction of regular grammar for DFS, construction of NFS for regular grammar, construction of NFS for right linear grammar, construction of eNFS for left linear grammar, construction of left linear grammar from NFS	
	Week 9:	
	Lecture: Context free language, ambiguity of grammar, language and sequence, generating sequence, grammar alternations and simplifications	
	Exercise: construction of context free grammar	
	Week 10:	
	Lecture: Chomsky normal form, Greibach normal form, swap of the last non-terminal, solving left recursion	
	Exercise: conversion of grammar into Chomsky normal form, conversion of grammar into Greibach normal form	
	Week 11:	
	Lecture: Colloquium	
	Exercise: Exercise tasks for colloquium	
	Week 12:	
	Lecture: Push down automata (PA), formal definition, construction of PA that accepts by empty stack from context free grammar	
	Exercise: construction of PA from context free grammar	
	Week 13:	
	Lecture: Recursive countable languages, Turing automata (TA), extended model of TA, simplified model of TA, generating language by TA	
	Exercise: Construction of TA for recursive countable language	
	Week 14:	
	Lectures: Construction of TA for language whose grammar has unlimited productions, construction of grammar for a language given by TA	
	Exercise: Construction of grammar for a language given by TA	
	Week 15:	
	Lectures: Colloquium	
	Exercise: Exercise tasks for colloquium	

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ on line in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ homework assignments
Student responsibilities	lecture attendance active learning colloquium written exam	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Name	Ects	Name	Ects	Name	Ects
	Class attendance	2	Research		Experimental work	
	Oral exam		Report		Homework assignments	
	Seminar essay		Essay			
	Tests	1	Practical training	1		
	Written exam	1	Project			

Grading and evaluating student work in class and at the final exam	Colloquium (75%) Written exam (25%)

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. Srbljić: Jezični procesori 1: Uvod u teoriju formalnih jezika, automata i gramatika, Element, Zagreb 2004.	0	

Optional literature (at the time of submission of study programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	conversation with students student evaluation using the anonymous survey student achievement on exam self-analysis
Other (as the proposer wishes to add)	