STRUCTURE OF FIRST CYCLE FOUR YEARS STUDY PROGRAMME IN COMPUTER ENGINEERING AND TECHNOLOGIES

Courses, 1 year - 1 semester

No.	Code	Courses	ECTS	Hours	Total
1.	2FI100121	Mathematics 1	8	3+2+2	240
2.	2FI100221	Fundamentals of computer programming	6	2+2+1	180
3.	2FI100421	Introduction to Informatics	6	2+2+1	180
4.	2FI100321	Fundamentals of Electrical Engineering	6	2+2+1	180
5.		Elected subject from list No.1	4	2+1+1	120
		Total ECTS	30	11+9+6	900

List No. 1 of elective subjects (choose one of the offered subjects)

<u> </u>	To ciedate subjects (choose one of the office subjects)					
No.	Code	Courses	ECTS	Hours	Total	
1.	4FF100721	Macedonian language 1	4	2+1+1	120	
2.	4FF100621	English language level A2.1	4	2+1+1	120	
3.	4FF100221	German language level A1.1	4	2+1+1	120	
4.	4FF100421	Italian language level A1.1	4	2+1+1	120	
5.	4FF100121	Spanish language level A1.1	4	2+1+1	120	
6.	4FF100521	French language level A1.1	4	2+1+1	120	
7.	4FF100321	Russian language level A1.1	4	2+1+1	120	

Courses, 1 year - 2 semester

No.	Code	Courses	ECTS	Hours	Total
1.	2FI101121	Mathematics 2	6	2+2+1	180
2.	2FI101221	Object-oriented Programming	6	2+2+1	180
3.	2FI101321	Computer Electronic Components	6	2+2+1	180
4.	2FI101421	Discrete Mathematics	6	2+2+1	180
5.		Elected subject from list No.2	6	2+2+1	180
6.	2SC100121	Sport and recreation			
		Total ECTS	30	10+9+7	900

List No. 2 of elective subjects (choose one of the offered subjects)

No.	Code	Courses	ECTS	Hours	Total
1.	4FF101423	Macedonian language 2	6	2+2+1	180
2.	4FF101123	English language level A2.2	6	2+2+1	180
3.	4FF101223	German language level A1.2	6	2+2+1	180
4.	4FF100923	Italian language level A1.2	6	2+2+1	180
5.	4FF100823	Spanish language level A1.2	6	2+2+1	180
6.	4FF101023	French language level A1.2	6	2+2+1	180
7.	4FF101323	Russian language level A1.2	6	2+2+1	180

Courses, 2 year - 3 semester

No.	Code	Courses	ECTS	Hours	Total
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		Total ECTS	30	12+8+7	900
5.		Elected subject from list No.4	4	2+1+1	120
4.		Elected subject from list No.3	4	2+1+1	120
3.	2FI102121	Digital Logic	6	2+2+1	180
2.	2FI102021	Software Engineering	8	3+2+2	240
1.	2FI101921	Data Structures and Algorithms	8	3+2+2	240

List No. 3 of elective subjects (choose one of the offered subjects)

No.	Code	Courses	ECTS	Hours	Total
1.	2FI130121	Theory of Probability	4	2+1+1	120
2.	2FI130221	Probability and Statistics	4	2+1+1	120

List No. 4 of elective subjects (choose one of the offered subjects)

No.	Code	Courses	ECTS	Hours	Total
1.	2FI131221	Algebraic Structures	4	2+1+1	120
2.	2FI130421	Professional Skills	4	2+1+1	120

Courses, 2 year - 4 semester

No.	Code	Courses	ECTS	Hours	Total
1.	2FI102421	Operating Systems	6	2+2+1	180
2.	2FI102521	Database Systems	6	2+2+1	180
3.	2FI102621	Visual Programming	6	2+2+1	180
4.	2FI102721	Computer Networks	6	2+2+1	180
5.		Elected subject from list No.5	6	2+2+1	180
		Total ECTS	30	10+9+7	900

List No. 5 of elective subjects (choose one of the offered subjects)

No.	Code	Courses	ECTS	Hours	Total
1.	2FI102023	Computational Tools in Engineering	6	2+2+1	180
2.	2FI102123	Operational Research	6	2+2+1	180

Courses, 3 year - 5 semester

No.	Code	Courses	ECTS	Hours	Total
1.	2FI103321	Computer Architecture	8	3+2+2	240
2.	2FI103421	Internet Programming	8	3+2+2	240
3.	2FI103521	Computer Graphics and Visualization	6	2+2+1	180
4.		Elected subject from list No.6	4	2+1+1	120
5.		Elected subject from list No.6	4	2+1+1	120
		Total ECTS	30	12+8+7	900

List No. 6 of elective subjects (choose two of the offered subjects)

No.	Code	Courses	ECTS	Hours	Total
1.	2FI131721	Advanced Algorithms	4	2+1+1	120
2.	2FI131821	Parallel Programming	4	2+1+1	120
3.	2FI131921	Mobile and Wireless Networks	4	2+1+1	120

4.	2FI132021	Network Protocols	4	2+1+1	120

Courses, 3 year - 6 semester

No.	Code	Courses	ECTS	Hours	Total
1.	2FI103921	Microcomputer Systems	6	2+2+1	180
2.	2FI104021	ICT Project Management	6	2+2+1	180
3.	2FI104121	Information Theory	6	2+2+1	180
4.	2FI104221	Numerical Methods	6	2+2+1	180
5.		Elected subject from list No.7	6	2+2+1	180
		Total ECTS	30	10+9+7	900

List No. 7 of elective subjects (choose one of the offered subjects)

	No.	Code	Courses	ECTS	Hours	Total
Ī	1.	2FI103323	Modern Computer Architectures	6	2+2+1	180
	2.	2FI103423	Introduction to Statistical Analysis	6	2+2+1	180

Courses, 4 year - 7 semester

No.	Code	Courses	ECTS	Hours	Total
1.	2FI104821	Computer System Security	8	3+2+2	240
2.	2FI104921	Artificial Intelligence	8	3+2+2	240
3.	2FI105021	Digital Signal Processing	6	2+2+1	180
4.		Elected subject from list No.8	4	2+1+1	120
5.		Elected subject from list No.8	4	2+1+1	120
		Total ECTS	30	12+8+7	900

List No. 8 of elective subjects (choose two of the offered subjects)

No.	Code	Courses	ECTS	Hours	Total
1.	2FI133921	JavaScript-based Technologies	4	2+1+1	120
2.	2FI134021	Basics of Robotics	4	2+1+1	120
3.	2FI134121	Software Testing and Analysis	4	2+1+1	120
4.	2FI134221	Data Storage and Management	4	2+1+1	120

Courses, 4 year - 8 semester

No.	Code	Courses	ECTS	Hours	Total
1.	2FI105621	Introduction to Data Science	4	2+1+1	120
2.	2FI104421	Distributed Computer Systems	4	2+1+1	120
3.	2FI105721	Cloud Infrastructure and Services	4	2+1+1	120
4.		Elected subject from list No.9	4	2+1+1	120
5.		Elected subject from list No.9	4	2+1+1	120
6.		Practical work – interdisciplinary project	4	0+0+4	120
7.		Graduate Thesis	6	0+0+8	180
		Total ECTS	30	10+5+17	900

List No. 9 of elective subjects (choose two of the offered subjects)

No.	Code	Courses	ECTS	Hours	Total
1.	2FI135221	Embedded Computer Systems	4	2+1+1	120
2.	2FI135321	Mobile Applications Development	4	2+1+1	120
3.	2FI135421	Human-Computer Interaction	4	2+1+1	120
4.	2FI135521	Differential Equations	4	2+1+1	120

Legend: In the field weekly fund of hours, the expression (a+b+c) denotes: a-lectures; b-auditory exercises; c) laboratory exercises

Append	ix 3.	Program	of the C	ourse for First cyc	le s	tudies			
1.	Title of C	ourse		Fundamentals of	f co	mputer programming)		
2.	Code			2FI100221					
3.	Study pro	ogram		Computer Engineering and Technologies					
4.	Organize program	er of the	Study	Goce Delchev University – Stip Faculty of computer science					
5.		st, second (or third	First cycle					
6.		c year/ sem	ester	1/1	1/1 7. Number of ECTS 6				
1.	Professo	r (s)		Prof. Vlado Gice	٧				
2.	Requirer	nents for e	nrolling	none					
3.	Gain the programi	ming langua	practica age. Acq	al knowledge in th		ld of structural progr or solving problems,			
4.	Contents of the course (per 15 weeks per semester): Introduction in computation. What is computer programming? Data types in programming languages. Instructions for dealing and formatting input and output. Interactive and noninteractive I-O. Programming structures selection, loop, recursion. Functions and function types. User defined data types. Structural vs simple data types. Records. Arrays. Multidimensional arrays.								
5.	Methods					eam project: Devel	oping	C++ progr	am on specific
6.			ilable tim	ne: 6 EKTS x 30 h	ours	s = 180 hours			
7.	Distributi	on of availa	ble time	: 30+30+30+30+6	60 = °	180 hours (2+2+1)			
8.	Forms of	teaching/	15.1	Lectures / theoretical, contact teaching, e-learning			30 h	ours	
	learning		15.2		prac	tical, laboratory,		30 h	ours
			16.1	Projects				30 h	ours
9.	Other activities	forms of	16.2	Individual wor	<			30 h	ours
			16.3	Home learning)			60 h	ours
	Method assessm	of ent							
10.	17.1	Tests / Ora	al Exam		7	0 scores			
	17.2	Individual projects, p	work ractical)	(presentation	' 1	0 scores			
	17.3	Activity an	d partici	oation	2	0 scores			
Ţ					u	p to 50 points	5	(five)	(F)
11.	Δςςρςς	nent Criteria	(scorec	/ nointe)	5	1 to 60 points	6	(six)	(E)
	~30C3311	on Chiena	(300165	points)	6	1 to 70 points	7	(seven)	(D)
					7	1 to 80 points	8	(eight)	(C)

				04 / 00 / /		(D)	
				81 to 90 points	9 (nine)	(B)	
				91 to 100 points	10 (ten)	(A)	
12.	Signature applexam/ or transi		d entrance to the final ne next year	Gaining at least 42 out of 70 points from activities during the semester from which: 40 points from midterm exams, 10 points from project and 20 points from presence on lectures and discussions.			
13.	Language of te	eaching /	[/] study	English			
14.	Methods of me of teaching	easuring	/ monitoring the quality	Self evaluation			
	Literature						
		Basic I	sic literature				
4.5	22.1	No	Author	Title	Publisher	Year	
15.		1.	Dale, N., Weems, C., Headington, M	Programming and Problem Solving with C++	Jones and Bartlett Publishers	2000	
		2.					
		3.					
	22.2	Additio	nal literature				
		No	Author	Title	Publisher	Year	
		1.					

Append	lix 3.	Program of the Co	urse for First cycl	e stu	dies		
1.	Title of Co	ourse	Mathemetics 1				
2.	Code		2FI100121				
3.	Study pro	gram	Computer Engin	eerir	ng and Technologies		
4.	Organizer program	of the Study	Goce Delchev University – Stip Faculty of computer science				
5.	Level (first	et, second or third rudies)	First cycle				
6.	Academic	year/ semester	First year/ first semester	7.	Number of ECTS	8	
8.	Professor	(s)	Prof. Tatjana Atanasova Pachemska, full professor				
9.	Requirem the course	ents for enrolling	Enrolment in the first cycle of studies of the study program				
10.	Aims of the course (competences): To adopt the basic concepts and tools of matrix calculus and applications, vector algebra, sequences and functions, differential calculus of a real function of one real variable that are necessary for mathematical						
11.	Contents	of the course (per 1	5 weeks per seme	ester):		

- 1. Matrices and determinants. Application solving systems of n -linear equations with n variables;
- 2. Vector algebra definition of a vector, coordinate representation, operations with vectors, linear dependence and independence, scalar, vector and mixed product, matrix representation and applications;
- 3. Analytical geometry in real 3-D space point, line, plane, basic equations, mutual position and applications;
- 4. Numerical sets natural, whole, rational numbers, mathematical induction;
- 5. Real numbers definition, absolute value of a real number, distance, intervals, open and closed sets, environments equations and inequalities in the set of real numbers;
- 6. Real sequence definition, construction, notion of convergence of a real sequence, criteria for convergence:
- 7. Real sequence Properties of convergent sequences, operations with convergent sequences, divergent sequences:
- 8. Special sequences arithmetic and geometric progression, the number e, subsequence;
- 9. Real functions of one variable definition, properties, graph of a function, classes of elementary functions and graphs
- 10. Real functions concept of limit value of a function; procedures for determining the limit value of a function, continuity and breakpoints. Asymptotes of a function. Application
- 11. Fundamentals of differential calculus definition of the derivative of a function with one real variable, geometric and physical interpretation, differentiable functions and rules of differentiation, application intervals of monotonicity
- 12. Basic theorems of differential calculus theorem of Lopital, Lagrange, Rolle, Mean value theorem, Taylor's polynomial, approximation of functions with polynomials
- 13. Derivatives and higher order differentials. Application of derivatives definition and types of extrema of a function with one real variable, way of determining extrema using derivatives. Other characteristic points (folds) of a function. Geometric interpretation
- 14. Examining flow and drawing a graph of a function with one real variable;
- 15. Applications drawing graphs using computer program packages

12.	Methods using IC		Lectures,	exercises, prepara	ation of a seminar pape	r and p	presentation	s, teaching with
13.	Total am	ount of avail	able time:	8 ECTS x 30 hou	rs = 240 hours			
14.	Distributi	on of availal	ole time: 4	5+30+30+60+75 =	= 240 hours (3+2+2)			
15.	Forms of teaching / learning activities		15.1	Lectures / theore e-learning	etical, contact teaching,	45		
15.			15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)		30		
	Other forms of activities		16.1	Projects		30		
16.			16.2	Individual work			60	
			16.3	Home learning				
	Method of assessment			1		•		
47	17.1	Tests / Ora	al Exam		70 scores			
17.	17.2	Individual projects, p	work ractical)	(presentation,	10 scores			
	17.3	Activity and	d participa	tion	20 scores			
					up to 50 points	5	(five)	(F)
10	A 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ant Critaria	/000r00/ =	ointo)	51 to 60 points	6	(six)	(E)
18.	Assessm	Assessment Criteria (scores/ points)			61 to 70 points	7	(seven)	(D)
					71 to 80 points	8	(eight)	(C)

				04 to 00 mainta	0 (nin s)	(D)			
				81 to 90 points	9 (nine)	(B)			
				91 to 100 points	10 (ten)	(A)			
19.	Signature app exam/ or transi		nd entrance to the final ne next year	Apart from 42 points from partial exams, completed homework and regularity of lectures, classroom exercises and laboratory exercises					
20.	Language of te	aching /	study	English					
21.	Methods of me teaching	asuring /	monitoring the quality of	Self-evaluation, period	lic tests, debates				
	Literature								
	22.1	Basic I	Basic literature						
		No	Author	Title	Publisher	Year			
22.		1.	Т. А. Пачемска, Л. Лазарова	Математика (the book will be translated in English)	Универзитет "Гоце Делчев" - Штип	2013			
		2.	М. Меркле	Математичка анализа	Рачунарски факултет- Београд	2006			
		3.	Глин Џејмс	Математика на модерен инженеринг	преводи од Влада на РМ	2009;			
	22.2	Additio	onal literature						
		No	Author	Title	Publisher	Year			
		1.							

Annex	c 3.	Program of the C	Course for First o	ourse for First cycle studies				
1.	1. Title of Course		Introduction to	Introduction to informatics				
2.	Code		2FI100421	2FI100421				
3.	3. Study program		Computer engir	Computer engineering and technologies				
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of informatics					
5.	Level (first, cycle of stu	second or third dies)	First cycle					
6.	Academic y	/ear/ semester	1 year / I semester	7.	Number of ECTS	6		
7.	7. Professor (s)		Prof. Natasha Koceska					
8.	Requirement the course	nts for enrolling	None	None				

	Aims of the course (competences):							
9.	Understan	ding the bas	sics of ICT	, history, current	situation and future; th			
0.					n; defining computer n et protocols, addressin			
					pages, basics of HTML			E
	Contents	of the course	e (per 15 w	eeks per semes				
		e covers the						
		History of computers and programming languages Hardware: peripheral devices, memory						
10	- Software	: operating s	systems, s	oftware types				
10	- Compute				SI model, TCP/IP mode	el, protoco	ols	
	- Internet: - Compute		tne interne	et, internet proto	cols and services.			
	- Multimed							
	- VoIP							
	- HTML, C Methods of							
11	Lectures,		, Labs, Nu	merical exercise	s, e-learning, individua	I and tea	m projects, o	ffice
12	hours							
	i otai amo	unt of availa	ble time: 6	ECTS x 30 hou	rs = 180 hours			
13	Distributio	n of availabl	e time: 30-		= 180 hours (2+2+1)			
1.1	1 15 1				retical, contact	30 hou	rs	
14	learning a			teaching, e-learning Exercises (practical, laboratory,		30 hours		
	J		15.2		minars, team work)			
			16.1	Projects		30 hou		
15	Other form activities	ns of	16.2	Individual work		30 hou		
			16.3	Home learning	60 hours			
16	Method of assessme							
	17.1	Tests / Ora	al Exam				70) points
17	17.2	Individual projects, p		entation,			10) points
	17.3	Activity an		tion			20) points
					up to 50 points	5	(five)	(F)
					51 to 60 points	6	(six)	(E)
18	Assessme	ent Criteria (s	scores/ noi	nts)	61 to 70 points	7	(seven)	(D)
	ASSESSINE	ini Ontona (c	scores/ por	1113)	71 to 80 points	8	(eight)	(C)
					81 to 90 points	9	(nine)	(B)
					91 to 100 points	10	(ten)	(A)
19		approval an ransition in t			60% active participation at the course			
20		of teaching			English			
21	Methods of teaching		/ monitori	ng the quality	Standardized tests, of Self-evaluation	bservation	on, survey	
	Literature							

		Basic	cliterature			
		No	Author	Title	Publisher	Year
		Natasha Koceska 1.		Интернет технологии	Универзитет ,,Гоце Делчев" - Штип.	2013
22	22.1	2.	Natasha Koceska Vlatko Jovanovski	Практикум по Интернет технологии	Универзитет ,,Гоце Делчев" - Штип.	2013
		3.	Douglas Comer	Internetworking with TCP/IP- Principles, Protocols and Architectures	Prentice Hall,	2000.
	22.2	Addit	ional literature			
		No	Author	Title	Publisher	Year
		1.	Timothy J. O'Leary, Linda I. O'Leary, Daniel A. O'Leary	Computing Essentials 2015, Complete Edition	McGraw-Hill Education	2003
		2.	Peter J. Denning, Craig H. Martell	Great Principles of Computing	MIT Press	2015
		3.				

Append	lix 3.	Program of the C	ourse for First cy	/cle s	studies		
1.	Title of Co	ourse	Fundamentals of Electrical Engineering				
2.	Code		2FI100321				
3.	Study pro	gram	Computer Engi	neer	ing and Technologies		
4.	Organizei program	r of the Study	Goce Delchev Faculty of comp				
5.	Level (first	st, second or third tudies)	First cycle				
6.	Academic year/ semester		First year / I semester	7.	Number of ECTS	6	
1.	Professor	· (s)	Ass. Professor Mirjana Kocaleva Vitanova				
2.	Requirem	ents for enrolling	None				
3.	Aims of the course (competences): Familiarity with basic terms and phenomena from electrostatics, theorems in the theory of electric circuits and methods for the analysis of electric networks with time-constant currents and voltages						
4.	Contents of the course (per 15 weeks per semester): Electrostatics. Electric field. Coulomb's law. Electric voltage. Capacitors and their connection in series and parallel. Direct currents. Kirchhoff's Laws for Complex Electric Circuits. Methods for solving electric circuits. Electromagnetism. Magnetic circuit. Alternating currents. Solving electrical circuits connected to alternating voltage in series, parallel and series-parallel connection of resistors, capacitors, and coils. Tesla multiphase electric circuits. Three-						

		phase winding systems connected in star and triangle. Electric power in a three-phase system. Creation of a three-phase rotating magnetic field.						
5.				es, theoretical a	and practical exercise	s, consultations;	creation of an	
6.	Total am	Total amount of available time: 6 ECTS x 30 hours = 180 hours						
7.	Distributi	ion of availa	able time:	30+30+30+30+60	0 = 180 hours (2+2+1)			
8.		f teaching	15.1	Lectures / teaching, e-lear	theoretical, contact	30 hours		
	/ learning	gactivities	15.2	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ractical, laboratory, ninars, teamwork)	30 hours		
			16.1	Projects		30 hours		
9.	Other activities	forms of	16.2	Individual work		30 hours		
			16.3	Home learning		60 hours		
	Method assessm	of nent						
10.	17.1	Tests / Or	al Exam		70 scores			
	17.2	Individual projects, p	work ractical)	(presentation,	10 scores			
ī	17.3	Activity an	d participa	ation	20 scores			
					up to 50 points	5 (five)	(F)	
					51 to 60 points	6 (six)	(E)	
11.	Assessm	nent Criteria	a (scores/	noints)	61 to 70 points	7 (seven)	(D)	
	710000011	ioni onione	(300103/	pointo	71 to 80 points	8 (eight)	(C)	
					81 to 90 points	9 (nine)	(B)	
1 1	l				91 to 100 points	10 (ten)	(A)	
12.		e approval transition i		nce to the final year	60% active participation at the course			
13.	Languag	e of teachir	ng / study		English			
14.	Methods of teachi		ng / monit	oring the quality	Self-evaluation			
	Literature	е						
		Bas	ic literatur	е				
		No	Autho	r	Title	Publisher	Year	
15.	22.1	Charles A. Gross Thaddeus A. Roppel			Fundamentals of Electrical Engineering	CRC Press	2012	
		2.	Giorgi	o Rizzoni	Fundamentals of Electrical Engineering	McGraw-Hill	2009	
i 1								
	22.2	Add	itional liter	ature				

	No	Author	Title	Publisher	Year
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Appendix 3. Program of the Course for First cycle studies						
1. Title of Course		English language level A2.1				
2.	Code	4FF100621				
3.	Study program	Computer Engineering and Technologies				
4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of computer science				
5.	Level (first, second or third cycle of studies)	First cycle				
6.	Academic year/ semester	First year / 7. Number of ECTS 4				
8.	Professor (s)	Dragan Donev				
9.	Requirements for enrolling the course None					
10.	I ' INONA					
11.	Contents of the course (per 15 weeks per semester): Vocabulary: Basic vocabulary including: numbers, colours, classroom objects, family-related words, appearance, character adjectives, everyday activities, jobs, rooms, things in the house, buildings,					

star signs, foods, containers, weather, seasons, months, feelings, clothes, parts of the body, animals, sports, sport equipment, travelling, natural features. Grammar: Basic grammar: verb to be, articles - a/an, this/that, question words, have got, possessive case/pronouns/adjectives, present simple, love/like + ing, prepositions of time, adverbs of frequency, there is/are, plurals, prepositions of place, imperative, countable/uncountable nouns, some/any/much/many/a lot of, present continuous, comparisons, ordinals, past simple (regular verbs), used to, had, past simple (irregular verbs), future simple, be going to, present continuous for future arrangements, modal verbs (can, could, must, mustn't should, shouldn't), present perfect, superlatives. All communicative skills are equally included in the course including basic communication: spelling names, exchanging phones, talking about counties and nationalities, greetings and introductions, describing physical appearances and character, talking about abilities, asking for and offering help, talking about daily routines, preferences, jobs, telling time, talking about houses and locations, giving directions, talking about food preferences and preparing food, giving advice, , making predictions about the future, talking about plans and intentions, talking about travelling and personal experiences, etc. The students will acquire basic knowledge of English culture. Methods of learning: Interactive method: group work, reports, homework, seminar papers, discussion, debate, cooperative 12. studying techniques, individual tasks, simulation of extra-curricular educational activities, individual studying. 13. Total amount of available time: 120 14. Distribution of available time: 2+1+1 Lectures / theoretical, contact 15.1 30 hours Forms of teaching / teaching, e-learning 15. learning activities Exercises (practical, laboratory, 15. ours 15.2 theoretical, seminars, team work) 16.1 15 hours **Projects** Other forms of 16.2 Individual work 30 hours 16. activities 30. ours 16.3 Home learning Method of assessment Tests / Oral Exam 70 scores 17.1 17. Individual work (presentation, 17.2 10 scores projects, practical) 17.3 Activity and participation 20 scores up to 50 points 5 (five) (F) 51 to 60 points 6 (six) (E) 7 61 to 70 points (D) (seven) 18. Assessment Criteria (scores/ points) 71 to 80 points 8 (eight) (C) 81 to 90 points 9 (nine) (B) (A) 91 to 100 points 10 (ten) Signature approval and entrance to the final 19. 60% active participation at the course exam/ or transition in the next year

20.	Language of tea	ching / s	tudy	English			
21.	Methods of mea teaching	Methods of measuring / monitoring the quality of teaching			Standardized motor tests, observation, survey Self-evaluation		
	Literature						
		Basic I	iterature				
		No	Author	Title	Publisher	Year	
22.	22.1	1.	VIRGINIA EVANS - JENNY DOOLEY	Upstream Elementary A2	Express Publishing	2006	
		2.	Clive Oxenden and Christina Latham- Koenig	New English File Beginner	Oxford University Press	2011	
		3.					
	22.2	Additio	onal literature				
		No	Author	Title	Publisher	Year	
		1.	Zoze Murgoski	English Grammar: With Contrastive Notes on Macedonian	National and University Library Kliment Ohridski	1997	
		2.					
		3.					

Apper	ndix 3.	Program of the C	ourse for First cy	cle st	tudies			
1.	Title of Cou	irse	French language level A1.1					
2.	· Code		4FF100521					
3.	3. Study program		Computer Engi	Computer Engineering and Technologies				
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of computer science					
5.	Level (first, second or third cycle of studies)		First cycle					
6.	Academic y	ear/ semester	First year / First semester	7.	Number of ECTS	4		
8.	Professor (s	s)	Svetlana Jakimovska					
9.	Requirement the course	nts for enrolling	None					
10.	At the end o	course (competen of the course the st derstand and use fa isfaction of needs o	rudent is expected amiliar everyday e	expre	essions and very basic phra	ases aimed at the		

- introduce him/herself and others and can ask and answer questions about personal details such as where they live, people they know and things they have;
- interact in a simple way provided the other person talks slowly and clearly and is prepared to help;
- identify himself and answer questions concerning, for example, his nationality, his age, his place of residence, his date of birth, his school and possibly, to ask himself questions of this type to somebody;
- recognize names, the most common words or expressions in simple situations of the everyday life: signs, handwritten indications doubled by icons, prices, schedules;
- spot and understand quantified data, proper nouns and other very simple information in a short text;
- identify globally (in their aspect, their typography, their localization) the function of certain common texts of the daily environment or the school environment;
- write a very simple message concerning the activities of the daily life containing some personal details.

Contents of the course (per 15 weeks per semester):

Vocabulary: Basic vocabulary including: numbers, colours, classroom objects, family-related words, appearance, character adjectives, everyday activities, jobs, rooms, things in the house, buildings, foods, containers, months, parts of the body.

Basic grammar structures: correct pronunciation of French, verbs être/avoir, articles, question words, pronouns, adjectives, present simple, prepositions of time, adverbs of frequency, plurals, prepositions of place.

All communicative skills are equally included in the course including basic communication: communicate, in a very simple way; talking about counties and nationalities, greetings and introductions, describing physical appearances and character, talking about abilities, asking for and offering help, talking about daily routines, preferences, telling time, talking about houses and locations, etc.

The students will acquire basic knowledge of French culture.

Methods of learning:

11.

- Interactive method: group work, reports, homework, seminar papers, discussion, debate, cooperative studying techniques, individual tasks, simulation of extra-curricular educational activities, individual studying.
- 13. Total amount of available time: 120
- 14. Distribution of available time: 2+1+1

15	15. Forms of teaching / learning activities 15.1 teaching, e-learning activities Exercises (pra		Lectures / theoretical, contact teaching, e-learning	30 hours
13.			Exercises (practical, laboratory,	15. hours
			theoretical, seminars, team work)	
	Other forms of activities	16.1	Projects	15 hours
16.		16.2	Individual work	30 hours
	donnad	16.3	Home learning	30. hours

	Method of assessme							
17.	17.1	Tests / Oral	Exam	70 scores				
	17.2	Individual wo	ork (presentation, octical)	10 scores	10 scores			
	17.3	Activity and	participation	20. scores				
		•		up to 50 points	5 (five)) (F)		
				51 to 60 points	6 (six)	(E)		
18.	Accessmen	ent Critoria (aa	oros/points)	61 to 70 points	7 (seve	n) (D)		
10.	Assessment Criteria (scores/ points)			71 to 80 points	8 (eigh	t) (C)		
				81 to 90 points	9 (nine) (B)		
				91 to 100 points	10 (ten)	(A)		
19.	_	approval and ransition in the	entrance to the final e next year	60% active participation at the course				
20.	Language of teaching / study			English and French				
21.	Methods of teaching	_	monitoring the quality	Standardized motor tests, observation, survey Self-evaluation				
	Literature							
		Basic	literature	•				
		No	Author	Title	Publisher	Year		
22.	22.1	1.	CAPELLE, G. & MENAND,R.	Taxi 1 (Méthode de français)	Edilingua	2003		
		2.	CAPELLE, G. & MENAND,R.	Taxi 1 (Cahier des exercices)	Edilingua	2003		
		3.						
	22.2 Additional literature							
		No	Author	Title	Publisher	Year		
		1.						
		2.						
		3.						

Appei	ndix 3.	Program of the Course for First cycle studies		
1.	1. Title of Course		German language level A1.1	
2.	2. Code		4FF100221	
3.	3. Study program		Computer Engineering and Technologies	

4.		dy	Goce Delchev I		•			
5.	program Level (first, second o	r third	Faculty of comp	outer	science			
5.	cycle of studies)	Tunia	First cycle					
6.	Academic year/ sem		First year / First semester	7.	Number of ECTS		4	
8.	Professor (s)		Lecturer MA M	arica	Tasevska			
9.	Requirements for entitle course		None					
10.	Aims of the course (of Students to be able to everyday topics, to fit countries, to shop in opinions, to get acquetc.	o conduc nd an unl Germany	et short dialogue known city, to co v, to make recor	omm nmei	unicate with people ndations, to describe	from Ge and ex	erman-speaking opress specific	
11.	etc. Contents of the course (per 15 weeks per semester): <i>Grammar:</i> verbs and conjugation of verbs (haben, sein, kommen, sprechen, fahren, schlafen, sehen) question words (wer, wo, woher, wie,) personal pronouns (accusative and dative), possesive pronouns (nominative and accusative), definite / indefinite article, separable verbs, adverbs in time (accusative and dative), question sentences, modal verbs (mögen, können, wollen, dürfen, sollen, müssen), perfect (past tense), imperative (ordering, adverbs of place, modality (könnten, würden + infinitiv), comparative and conjugative adjectives (viel, gern, gut), verbs with dative, conjunctions for independent sentences (und, oder, aber, de nn), ordinal numbers. Vocabulary: words from the field: greeting, presentation, eating and drinking, weight measures.							
12.	Methods of learning: Interactive method: g cooperative studying activities, individual s	techniqu						
13.	Total amount of avail	lable time	e: 120					
14.	Distribution of availal	ole time:	2+1+1					
15.	Forms of teaching /	15.1	Lectures / the teaching, e-le		·		30 hours	
10.	learning activities	15.2	Exercises (pra theoretical, se		al, laboratory, ars, team work)	15	i. hours	
10	Other forms of	16.1	Projects				15 hours	
16.	activities	16.2	Individual wor	·k			30 hours	

		Γ	16.3	Home learning		30. hours				
	Method of assessme									
17.	17.1	Tests / Ora	al Exam		70 scores					
	17.2	Individual projects, p		esentation,	10 scores					
	17.3	Activity an	d particip	oation	20. scores					
					up to 50 points	5 (five)	(F)			
					51 to 60 points	6 (six)	(E)			
4.0			,		61 to 70 points	7 (seven)	(D)			
18.	Assessme	ent Criteria (scores/ p	ooints)	71 to 80 points	8 (eight)	(C)			
					81 to 90 points	9 (nine)	(B)			
					91 to 100 points	10 (ten)	(A)			
19.	_	approval ar		nce to the final year	60% active participat	ion at the course				
20.	Language	of teaching	/ study		English and German					
21.	Methods of measuring / monitoring the quality of teaching				Standardized motor t Self-evaluation	ests, observation	, survey			
	Literature									
		Basic	c literatu	terature						
		No		or	Title Publisher		Year			
22		1.	Hilper Reima	n Kerner, Silke rt, Monika ann,Andreas aszewski	Schritte International 1 Kusrbuch + Arbeitsbuch	Hueber Verlag	2006			
22.	22.1	2.	Friede Voß	erike Jin, Ute	Grammatik aktiv Üben, Hören, Sprechen	Cornelsen	2018			
		3.	Ранка Пете	а Грчева р Рау	Голем Магор македонско-германски и германско-македонски речник		2006			
	22.2	Addi	tional lite	erature						
		No								
		1.	Дими	трија Гацов	Германска Граматика	НУБ "Климент Охридски" - Скопје	1995			
	2.		Pude	s Sandra, Angela, cht Franz	Меnschen A1.2 Hueber Verlag		2012			

3.	Olga Swerlowa	Grammatik & Konversation Arbeitsblätter für den Deutschunterricht	Langenscheid	2013
		A1-A2-B1		

Apper	ndix 3.	Program of the C	ourse for First cy	cle s	tudies			
1.	Title of Cou	Title of Course		Italian language level A1.1				
2.	Code		4FF100421	4FF100421				
3.	Study program		Computer Eng	ineer	ing and Technologies			
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of computer science					
5.	Level (first, cycle of stu	second or third idies)	First cycle					
6.	Academic y	/ear/ semester	First year / First semester	7.	Number of ECTS	4		
8.	Professor (s)	Nadica Negrievska					
9.	Requireme the course	nts for enrolling	None					

Aims of the course (competences):

At the end of the course the student is expected to:

- understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type;
- introduce him/herself and others and can ask and answer questions about personal details such as where they live, people they know and things they have;
- interact in a simple way provided the other person talks slowly and clearly and is prepared to help;
- identify himself and answer questions concerning, for example, his nationality, his age, his place of residence, his date of birth, his school and possibly, to ask himself questions of this type to somebody;
- recognize names, the most common words or expressions in simple situations of the everyday life: signs, handwritten indications doubled by icons, prices, schedules;
- spot and understand quantified data, proper nouns and other very simple information in a short text;
- identify globally (in their aspect, their typography, their localization) the function of certain common texts of the daily environment or the school environment;
- write a very simple message concerning the activities of the daily life containing some personal details.

10.

11.	All communicative skills are equally included in the course including basic communication: communicate, in a very simple way; talking about counties and nationalities, greetings and introductions, describing physical appearances and character, talking about abilities, asking for and offering help, talking about daily routines, preferences, telling time, talking about houses and locations, etc. The students will acquire basic knowledge of Italian culture. Methods of learning:								
12.	Interactive method: group work, reports, homework, seminar papers, discussion, debate, cooperative studying techniques, individual tasks, simulation of extra-curricular educational activities, individual studying.								
13.	Total amo	unt of availa	able time:	120					
14.	Distribution of available time: 2+1+1								
15	Forms of teaching /	teaching /	15.1	Lectures / theoretical, contact teaching, e-learning			ours		
15.	learning activities		15.2		(practical, laboratory, seminars, team work)	1	5. hours		
			16.1	Projects		15 h	ours		
16.	Other forn activities	Other forms of		Individual v	vork	30 h	ours		
	activities		16.3	Home lear	ning	30. hours			
	Method of assessme					•			
17.	17.1	Tests / Or	al Exam		70 scores				
	17.2	Individual projects, p	\ 1	sentation,	10 scores				
	17.3	Activity an	d participa	ation	20. scores				
					up to 50 points	5	(five)	(F)	
					51 to 60 points	6	(six)	(E)	
18.	Assassme	ent Criteria (scoros/ n	ointe)	61 to 70 points	7	(seven)	(D)	
10.	Assessine	eni Cinteria (scores/ p	Jii iiS)	71 to 80 points	8	(eight)	(C)	
					81 to 90 points	9	(nine)	(B)	
					91 to 100 points	10	(ten)	(A)	
19.	_	approval ar			60% active participation at the course				
20.	Language	of teaching	/ study		English and Italian				

21.	Methods of mea		monitoring the	Standardized motor tests, Self-evaluation	observation, sur	vey		
	Literature							
		Basic	literature					
		No	Author	Title	Publisher	Year		
22.	22.1	1.	Marin,T. & Magnelli,S.	Progetto italiano 1, nuovo (Libro dello studente)	Edilingua	2006		
		Marin,T. & Magnelli,S.		Progetto italiano 1, nuovo (Quaderno degli esercizi)	Edilingua	2006		
		3.						
	22.2	Additio	onal literature					
		No	Author	Title	Publisher	Year		
		1.	Marin,T.	La prova orale 1 (Manuale di conversazione, livello elementare - intermedio)	Edilingua	2000		
	2.		L. Toffolo & N. Nuti,	Allegro 1, Corso di italiano per stranieri, Livello elementare	Edilingua	2003		
		Cozzi, N., 3. Federico F. & Tancorre, A.		Caffè Italia, Corso di italiano 1	ELI s.r.l.	2005		

Appen	ndix 3.	Program of the Co	ourse for First cyc	le st	udies			
1.	Title of Cou	ırse	Spanish langua	ge le	vel A1.1			
2.	Code		4FF100121	4FF100121				
3.	Study program		Computer Engineering and Technologies					
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of computer science					
5.	Level (first, cycle of stu	second or third idies)	First cycle					
6.	Academic y	year/ semester	First year / First semester	7.	Number of ECTS		4	
8.	Professor (s)	Marija Todorova	à				
9.	Requireme the course	nts for enrolling	None					
10.	Aims of the course (competences): At the end of the course the student is expected to: - understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type;							

- introduce him/herself and others and can ask and answer questions about personal details such as where they live, people they know and things they have;
- interact in a simple way provided the other person talks slowly and clearly and is prepared to help;
- identify himself and answer questions concerning, for example, his nationality, his age, his
 place of residence, his date of birth, his school and possibly, to ask himself questions of
 this type to somebody;
- recognize names, the most common words or expressions in simple situations of the everyday life: signs, handwritten indications doubled by icons, prices, schedules;
- spot and understand quantified data, proper nouns and other very simple information in a short text;
- identify globally (in their aspect, their typography, their localization) the function of certain common texts of the daily environment or the school environment;
- write a very simple message concerning the activities of the daily life containing some personal details.

Contents of the course (per 15 weeks per semester):

Vocabulary: Basic vocabulary including: numbers, colours, classroom objects, family-related words, appearance, character adjectives, everyday activities, jobs, rooms, things in the house, buildings, foods, containers, months, parts of the body.

Basic grammar structures: correct pronunciation of Spanish, verbs ser/estar, articles, gender and number, question words, pronouns, adjectives, present simple, prepositions, adverbs of frequency, prepositions of place.

All communicative skills are equally included in the course including basic communication: communicate, in a very simple way; talking about countries and nationalities, greetings and introductions, describing physical appearances and character, talking about abilities, asking for and offering help, talking about daily routines, preferences, telling time, talking about houses and locations, etc.

The students will acquire basic knowledge of Spanish culture.

Methods of learning:

11.

- Interactive method: group work, reports, homework, seminar papers, discussion, debate, cooperative studying techniques, individual tasks, simulation of extra-curricular educational activities, individual studying.
- 13. Total amount of available time: 120
- 14. Distribution of available time: 2+1+1

15.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours
13.		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15. hours
		16.1	Projects	15 hours
16.	Other forms of activities	16.2 Individual work		30 hours
	donvinos	16.3	Home learning	30. hours

	Method of assessme						
17.	17.1	Tests / Oral I	Exam	70 scores			
	17.2	Individual wo	ork (presentation, ctical)	10 scores			
	17.3	Activity and p	participation	20. scores			
				up to 50 points	5 (five)	(F)	
				51 to 60 points	6 (six)	(E)	
40	^	at Ositavia (a.a.	/	61 to 70 points	7 (seven)	(D)	
18.	Assessme	ent Criteria (sco	ores/ points)	71 to 80 points	8 (eight)	(C)	
				81 to 90 points	9 (nine)	(B)	
				91 to 100 points	10 (ten)	(A)	
19.	_	approval and cransition in the	entrance to the final e next year	60% active participation	on at the course		
20.	Language	of teaching / s	study	English and Spanish			
21.	Methods of teaching	of measuring /	monitoring the quality of	Standardized motor te Self-evaluation	ests, observation,	survey	
	Literature						
		Basic I	iterature				
		No	Author	Title	Publisher	Year	
22.	22.1	1.	Dr. Marianne Barceló,Juana Sánchez Benito, Verónica Beucker, P.M. Luengo,Bibiana Wiener	¡Vamos! - 1	Mundo Español ediciones	2007	
		2.	A. Jarvis, R. Lebredo, F. Mena-Ayllón	"Basic Spanish Grammar"	Houghton Mifflin Company - USA	2000	
		3.					
	22.2		onal literature	Γ			
		No	Author	Title	Publisher	Year	
	1.		A. Gonzales Hermoso, J. R. Cuenot, M. Sanchez Alfaro	"Gramatica de español lengua extranjera"	Мадрид, Шпанија	1999	
		2.	Cristina Karpacheva	"Manual de español"	Софија	1998	
		3.	Ramon Sarmiento	"Gramatica progresiva de español para extranjeros"	"Colibri", Софија	1998	

Apper	ndix 3.	Program	of the Co	urse for First cy	cle s	tudies		
1.	Title of Cou	ırse		Russian Langua	age I	_evel A1.1		
2.	Code			4FF100321				
3.	Study prog	ram		Computer Eng	ineei	ing and Technologie	s	
4.	· ·	of the Stud	ly	Goce Delchev l		•		
5.	program Level (first,	second o	r third	Faculty of comp	outer	science		
J.	cycle of stu			First cycle				
6.	Academic y	year/ seme	ester	First year / First 7. Number of ECTS 4 semester				4
8.	Professor ((s)		Igor Stanojoski				
9.	Requirements for enrolling the course None							
10.	monologue and dialogue, developed habits for using colloquial spoken language, as well as developed reading and writing habits.							
11.	Contents of the course (per 15 weeks per semester): During the course, the main emphasis shall be placed on mastering the Russian alphabet and grammatical categories in the Russian language: Nouns, Genus and Number in Nouns, Personal pronouns, Determinative pronouns, Nominative case, Verbs, Present tense, Accusative case, Adjectives. The training shall be based upon non-specialized (essential) themes of a cultural character: Greetings, Introduction, Asking questions like "Who is this?" And "What is this?", Family, Expressing gratitude, "My, mine", Asking questions like "Who are you?", Pets, Using "How much?", Asking questions "How old are you?", Occupation / Work, Country and Language, Whquestions.							
12.		method: g e studying	technique	•		, seminar papers, dis imulation of extra-cu		
13.	Total amou	ınt of avail	able time:	120				
14.	Distribution	of availab	ole time: 2	+1+1				
15.	Forms of te	-	15.1	Lectures / the teaching, e-le	arnir	ng	30 ho	ours
	learning ac	tivities	15.2	Exercises (pratheoretical, se		al, laboratory, ars, team work)	1	5. hours
			16.1	Projects			15 ho	ours
16.	Other form activities	s of	16.2	Individual wor	·k		30 ho	ours
	20111100		16.3	Home learnin	g		3	30. hours

	Method of								
17.	17.1	Tests / Oral	Exam	70 scores					
	17.2	Individual wo	ork (presentation, actical)	10 scores					
	17.3	Activity and	participation	20. scores					
				up to 50 points	5 (five)	(F)			
				51 to 60 points	6 (six)	(E)			
18.	Assessme	ent Criteria (so	cores/ points)	61 to 70 points	7 (seven)	(D)			
		(1)	, , , , , , , , , , , , , , , , , , , ,	71 to 80 points	8 (eight)	(C)			
				81 to 90 points	9 (nine)	(B)			
				91 to 100 points	10 (ten)	(A)			
19.	_	approval and transition in th	entrance to the final e next year	60% active participati	on at the course	•			
20.	Language	e of teaching /	study	English and Russian					
21.	Methods of teaching	_	monitoring the quality	Standardized motor to Self-evaluation	ests, observatio	n, survey			
	Literature								
		Basic	Basic literature						
		No	Author	Title	Publisher	Year			
22.	22.1	1.	Ирина Осипова	«Ключ» - Учебник русского языка для начинающих.	Corvina, Москва	2005			
		2.							
		3.							
	22.2	Additi	onal literature	•					
		No	Author	Title	Publisher	Year			
		1.	S. A. Khavronina, A. I. Shirochenskaya	Русский язык в упражнениях. (Russian in exercises)	Русский язык. Курсы 2017 г.	2017			
			Л.В.Московкин, Л.В.Сильвина	Русский язык. Учебник для иностранных студентов подготовительных факультетов	СМИО Пресс, Санкт- Петербург	2006			
		3.							

Apper	ndix 3.	Program of the C	ourse for First cy	cle s	tudies			
1.	Title of Co	urse	Macedonian lar	ngua	ge 1			
2.	Code		4FF100721					
3.	Study prog	ıram	Computer Eng	ineei	ing and Technologies			
4.		of the Study		Goce Delchev University – Stip Faculty of computer science				
5.	program Level (first	, second or third	First cycle	Julei	Science			
6.	cycle of stu	i	First year /			1		
0.	Academic	year/ semester	First semester	7.	Number of ECTS	4		
8.	Professor ((s)	Ana Vitanova-R	linga	ceva			
9.	Requirements the course	ents for enrolling	None					
10.	Aims of the course (competences): At the end of the course the student is expected to: - understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type; - introduce him/herself and others and can ask and answer questions about personal details such as where they live, people they know and things they have; - interact in a simple way provided the other person talks slowly and clearly and is prepared to help; - identify himself and answer questions concerning, for example, his nationality, his age, his place of residence, his date of birth, his school and possibly, to ask himself questions of this type to somebody; - recognize names, the most common words or expressions in simple situations of the everyday life: signs, handwritten indications doubled by icons, prices, schedules; - spot and understand quantified data, proper nouns and other very simple information in a short text; - identify globally (in their aspect, their typography, their localization) the function of certain common texts of the daily environment or the school environment;					about personal re; early and is ationality, his age, k himself questions situations of the schedules; aple information in		
11.	Contents of the course (per 15 weeks per semester): Vocabulary: Basic vocabulary including: Alphabet, international words, names, greetings, countries and cities, objects, professions, countries and languages, family, food and drinks, meals, days, months, clothes, colors, parts of the head and the body, free time, abilities; Grammar: Basic grammar: personal pronouns and the auxiliary verb "cym" – "to be" (affirmative, negative and interrogative form), present tense (a-, e- and i-verb groups), nouns (gender, number and determination), adjectives and possessive pronouns-adjectives. All communicative skills are equally included in the course including basic communication: spelling names, exchanging phones, talking about counties and nationalities, greetings and introductions, describing physical appearances and character, talking about abilities, talking							

		•	•	. •	ouses and locations, ts will acquire basic	•		donian
12.	Interactive cooperation	•	technique		ork, seminar papers, s, simulation of extra			
13.	Total amo	ount of avail	able time:	120				
14.	Distribution	on of availab	ole time: 2-	+1+1				
15.		teaching /	15.1	Lectures / theoreteaching, e-lear	ning	30 hour	s	
	learning a	activities	15.2		tical, laboratory, ninars, team work)	15.	ours	
			16.1	Projects		15 hour	s	
16.	Other forr activities	ms of	16.2	Individual work		30 hour	s	
	donvinos		16.3	Home learning		30.	ours	
	Method o							
17.	17.1	Tests / Or	al Exam		70 scores			
	17.2	Individual projects, p		sentation,	10 scores			
	17.3	Activity ar	nd participa	ation	20 scores			
					up to 50 points	5	(five)	(F)
					51 to 60 points	6	(six)	(E)
18.	Assassm	ant Critoria	(acoroa) no	ointo)	61 to 70 points	7	(seven)	(D)
10.	Assessin	ent Criteria	(SCOIES/ PC	oirits)	71 to 80 points	8	(eight)	(C)
					81 to 90 points	9	(nine)	(B)
					91 to 100 points	10	(ten)	(A)
19.	1 -	approval a		e to the final ear	60% active particip	oation at t	he course	
20.	Language	e of teaching	g / study		English			
21.	Methods of teaching		g / monito	ring the quality	Standardized moto Self-evaluation	or tests, o	bservation	, survey
	Literature							
		Bas	ic literatur	е				
		No	Autho		Title	Publishe	er	Year
22.	22.1	1.		ја Кусевска, на Митковска	Зборувате ли македонски? (учебник)	МЕДИС информ		1995/ 2016
	2.		Татјан	и Бужаровска, на Гочкова- новска	Зборувате ли македонски?	МЕДИС информ		1995

			(работна тетратка)							
	3.	Татјана Гочкова- Стојановска, Искра Пановска Димкова	Божилак	Универзитет "Св. Кирил и Методиј"	2012					
22.2	Additio	Additional literature								
	No	Author	Title	Publisher	Year					
	1.									
	2.									
	3.									

		T							
Appen	dix 3.	Program of the Co	urse for First cycl	e stu	dies				
7.	Title of Co	ourse	Mathematics 2	Mathematics 2					
8.	Code		2FI101121						
9.	Study pro	gram	Computer Engin	eerir	ng and Technologies				
10.	Organizer program	of the Study	Goce Delchev L Faculty of comp						
11.	Level (first	st, second or third tudies)	First cycle						
12.	Academic year/ semester		First year/ second semester	7.	Number of ECTS	6			
23.	Professor	(s)	Prof. Tatjana Ata	anas	ova Pachemska, full profess	or			
24.	Requirem the course	ents for enrolling		Enrolment in the first cycle of studies of the study program and taken course in Mathematics 1					
25.	To adopt a of genera adopt the the conce Developm of learning The stude	lization of the notion basic concepts of diept of analogy and nent of analytical oping is also expected.	al calculus for a fund of an infinite number of an infinite number of an infinite number of an infinite of an i	merio gral o lea ies,	on of one variable, to understical sequence, functional sequence alculus of functions of several to solve first-order ordinability to generalize and anal athematical concepts and the flexible use of knowledge in	nuence and applications, to al variables, to understand hary differential equations. alogies as the highest level neories, should use ICT to			
26.	Content of the subject program: 1. Definite integral – definition according to Riemann, properties of a definite integral; 2. Relationship between a definite integral and a derivative - fundamental (Newton-Leibniz) theorem of integral calculus. Introduction of the notion of primitive function;								

27.	7. Numerical sequence – generalization of the term sequence and definition of sequence, convergence of sequence, properties, general criteria for convergence; 8. Number series - types of series and criteria for convergence - series with positive members, alternative series, absolute and conditional convergence; 9. Functional sequences and functional series – definition, pointwise convergence and uniform convergence, differentiation and integration of a functional series. Degree order and admissions; 10. Functions of multiple variables – definition, properties, graph of a function of two variables, continuity and types of breakpoints; 11. Functions with two variables – concept of differentiability, partial derivatives, extrema and application; 12. Multiple integrals – generalization of the notion of integral, change of variables in integral; 13. Multiple integrals – application 14. Differential equations of the first order – concept, general and particular solution of a differential equation, Cauchy's problem; 15. Solving some basic types of differential equations Methods of learning: Lectures, exercises, preparation of a seminar paper and presentations, teaching with using ICT									
28.	Total amount of available time: 6 ECTS x 30 hours = 180 hours									
29.	Distribution of available time: 30+30+15+60+45 = 240 hours (2+2+2)									
30.	Forms of learning	teachi	ing / _	15.1	Lectures / theore e-learning	etical, contact teaching, ractical, laboratory,	30			
				16.1	Projects	,	15			
31.	Other forms of activities		of	16.2	Individual work		60			
	donvinos			16.3	Home learning		45			
	Method assessm	ent	of		1					
	17.1		/ Oral	Exam		70 scores				
32.	17.2	Indivi proje	dual cts, pra	work ctical)	(presentation,	10 scores				
	17.3	Activi	ty and	participa	tion	20 scores				
						up to 50 points	5 (five)	(F)		
						51 to 60 points	6 (six)	(E)		
33.	Assessm	ent Cri	itaria (s	cores/ n	oints)	61 to 70 points	7 (seven)	(D)		
33.	A33633III		iteria (s	согез/ р	onno,	71 to 80 points	8 (eight)	(C)		
						81 to 90 points	9 (nine)	(B)		
						91 to 100 points	10 (ten)	(A)		
34.	Signature exam/ or				ance to the final year	Apart from 42 points homework and reg exercises and laborate	ularity of lectu			
35.	Languag	e of tea	aching	study/		English				
36.	Methods of measuring / monitoring the quality of teaching					Self-evaluation, periodic tests, debates				
	Literature									
37.	22.1		Basic	literature	Э					
	ZZ. I		No	Autho	r	Title	Publisher	Year		

	1.	Т. А. Пачемска, Л. Лазарова	Математика (the book will be translated in English)	Универзитет "Гоце Делчев" - Штип	2013				
	2.	Т.А.Пачемска	Математика 2	Book in progress, will be translate in English	2023				
	3.	Т. А. Пачемска, Л. Лазарова, М. Митева	Збирка задачи по Математика 2	GDU (Will be translate in English)	2022				
22.2	Additio	Additional literature							
	No	Author	Title	Publisher	Year				
	1.								

Anne	ex 3.	Program	of the c	ourse for First c	ycle	studies			
1.	Title of Cou	rse		Discrete mathematics					
2.	Code			2FI101421					
3.	Study progr	Study program		Computer Engir	eerir	g and Technologies			
4.	Organizer o	of the Study	,	Goce Delchev L Faculty of Comp					
5.	Level (first, cycle of stu		third	First cycle					
6.	Academic year/ semester			First year / Second semester	7.	Number of ECTS		6	
7.	Professor (s)			prof. Limonka K	ocev	a Lazarova			
8.	Requirement the course	nts for enro	lling	None					
9.	Aims of the course (competences): In this course, basic mathematical concepts for computer engineering will be studied. Students will get knowledge from the basics of set theory, relations, mappings, propositional logic and its application in logic circuits, predicate logic, proof techniques, counting principles and graph theory.								
10.	construction conclusions concepts of	n of logic s. Theory graph theo	circuits. of sets. ory. Grap	Minimization. Pro Relations. Mapp h representation,	edica ings. matr	ions. Application of te logic and quanti Principles of count x of adjacency, adjac Recurrent equations	fiers. Ding. Co cency lis	perivation of logical ombinatorics. Basic st, incidence matrix.	
11.	Methods of consultation		ectures,	theoretical and pi	actic	al exercises, e-learni	ng, tea	mwork,	
12.	Total amou	nt of availa	ble time:	6 ECTS x 30 hou	ırs =	180 hours			
13.	Distribution	of availabl	e time: 3	0 + 30 + 30 + 30	+ 60	= 180 hours (2 + 2 +	1)		
14.	Forms of te		15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)					

				15.2	exams, p seminar	cal and practical exercises, e- preparation of independent work ks x 1 hours = 15 hours)	30 hc	ours		
				16.1	Projects	,	30 hc	ours		
15.	Other f		of	16.2	Individual work			ours		
				16.3	Home lea	arning	60 hc	ours		
16.	Method of assessment									
	17.1 Tests / Oral Exam					70 scores				
17.	17.2 Individual v			work (pres	entation,	10 scores				
	17.3 Activity and participation				tion	20 scores				
						up to 50 points	5	(five)	(F)	
						51 to 60 points	6	(six)	(E)	
40	A = = = = =		Oritorio (s		nto\	61 to 70 points	7	(seven)	(D)	
18.	Assess	sment	Criteria (s	scores/ poi	nts)	71 to 80 points	8	(eight)	(C)	
						81 to 90 points	9	(nine)	(B)	
						91 to 100 points	10	(ten)	(A)	
19.	Signat final ex	ure ap	proval an r transitio	d entrance n in the ne	to the xt year	60% active participation at the course				
20.			teaching			English				
21.	Method quality			/ monitorii	ng the	Standardized motor tests, observation, survey Self-evaluation				
	Literati	ure								
		Basi	c literatur	е						
		No	Autho	or		Title	Publis	sher	Year	
22.	22.1	1.	Kenn	eth H. Ros	en	Discrete Mathematics and Its Applications Seventh Edition	Mc G	raw Hill	2007	
		2.	Susai	nna S. Epp)	Discrete Mathematics with Applications Fourth Edition	Brooks/Cole 201		2010	
	22.2	Addi	itional lite	rature			•		•	
		No	Autho	or		Title	Publis	sher	Year	

Annex 3. Pro	rogram of the Course for Integrated Second cycle studies

1.	Title of Co	ourse		Object Oriented F	Programming					
2.	Code			2FI101221						
3.	Study pro	gram		Computer Enginee	ering and Technologies					
4.	Organizei program	r of the Stu	dy	Goce Delchev Uni Computer Science						
5.		t, second o	or third	First cycle	, <u></u>					
6.		year/ sem	ester	First year / II semester	7. Number of ECTS		6			
7.	Professor	· (s)		Full Professor Cve	eta Martinovska Bande		•			
8.	Requirem	ents for en	rolling	None						
9.	This course through C Contents	++ prograr of the cour	the fund mming la se (per 1	amental concepts b nguage. 5 weeks per semes	,					
10	code. Fu classes, p functions	Basic object-oriented concepts: attributes, methods, class and subclass in the context of writing C++ code. Fundamental object-oriented ideas: inheritance hierarchies, overriding methods, abstract classes, polymorphism and virtual functions. Pointers to members, functions and classes. Overloading functions and operators. Constant and static members and functions. Templates, exceptions and exception handler. Runtime type identification. Input and output streams, working with files.								
11	Methods	Methods of learning: Lectures, Discussions, Labs, Practical exercises, e-learning, individual and team projects, office hours.								
12										
13					+ 60 = 180 hours (2 + 2	2 +1)				
14	Forms of		15.1	Lectures / theoretical, contact teaching, e-learning			ours			
	/ learning	activities	15.2	Exercises (practical, laboratory, theoretical, seminars, team work)			30 hours			
			16.1	Projects		30 hours				
15	Other forr activities	ns of	16.2	Individual work		30 hc	ours			
			16.3	Home learning		60 hc	ours			
16	Method of assessme									
	17.1	Tests / O	ral Exam		70 scores					
17	17.2	Individual projects, p		resentation,	10 scores					
	17.3	Activity ar	-		20 scores					
					up to 50 points	5	(five)	(F)		
					51 to 60 points	6	(six)	(E)		
18	Assessme	ent Criteria	(scores/	points)	61 to 70 points	7	(seven)	(D)		
					71 to 80 points	8	(eight)	(C)		
					81 to 90 points	9	(nine)	(B)		

				91 to 100 points	10 (ten)	(A)		
19	Signature apprexam/ or trans		d entrance to the final ne next year	60% active participation at the course				
20	Language of te	eaching	/ study	English				
21	Methods of me of teaching	asuring	/ monitoring the quality	Standardized motor te Self-evaluation	sts, observation,	survey		
	Literature							
,		Basic	literature	•				
22	22.1	No	Author	Title	Publisher	Year		
22		1.	Bruce Eckel	Thinking in C++	Prentice Hall	2000		
		2.	Stanley Lippman	Essential C++	Addison Wesley	1999		
		3.	Herbert Schildt	C++: The Complete Reference	McGraw Hill	2002		
	22.2	Additi	onal literature					
		No	Author	Title	Publisher	Year		
		1.	Stanley Lippman	C++ Primer	Addison Wesley	2005		
	2.		Nicolai Josuttis	The C++ Standard Library: A Tutorial and Reference	Addison Wesley	1999		
		3.	Ulla Kirch-Prinz and Peter Prinz	A Complete Guide to Programming in C++	Jones and Bartlett Publishers	2002		

Append	dix 3.	Program of the C	ourse for First cy	cle s	tudies			
1.	Title of Co	ourse	Computer Elec	ctror	nic Components			
2.	Code		2FI101321					
3.	Study pro	gram	Computer Engi	neer	ing and Technologies			
4.	Organizer of the Study program		Goce Delchev I Faculty of comp					
5.		st, second or third tudies)	First cycle					
6.	Academic	c year/ semester	First / 2	7.	Number of ECTS	6		
8.	Professor	r	Prof. Done Stojanov					
9.	Requirem the cours	nents for enrolling e	/					
10.	Aims of the course (competences): The course aims to provide comprehensive knowledge and understanding of the most important aspects of microelectronic circuits design. Upon successful completion of the course, students will be able to design/implement analog and digital circuits for basic and advanced data computing.							
11.	Contents of the course (per 15 weeks per semester):							

- Voltage and Current
- Resistor in DC circuit
- Current and Voltage generator (DC and AC)
- Ohm's law
- Kirchhoff first and second law
- Resistors in parallel and serial connection
- Capacitor and connection of multiple capacitors
- Thevenin's theorem
- RC low-frequency filter and high-frequency filters
- Semiconductors (p-n junction)
- Ideal model of diode
- Circuits with diodes
- Implementing AND, OR and Not circuit with diodes
- NPN and PNP junction
- The model of BJT transistor
- BJT transistor input and output characteristics
- BJT transistor acting as off switch, saturation mode, active mode
- BJT transistor as signal amplifier
- Circuits with BJT
- Implementing AND, OR, NOT, NAND and NOR circuits with BJT
- 12. Methods of learning: Lectures, practice in laboratory, home learning
- 13. Total amount of available time: 6 ECTS x 30 h = 180 h

14.	Distribut	ion of availa	able time:	30+30+30+30+60)=180 h (2+2+1)	
15.	Forms of teaching		15.1	Lectures / teaching, e-lear	theoretical, contact ning	30
15.	/ learning	g activities	15.2	\1	ractical, laboratory, inars, teamwork)	30
			16.1	Projects		30
16.	16. Other forms activities		16.2	Individual work		30
				Home learning		60
	Method of assessment					
17.	17. Tests / Ora 17.1 Individual projects, p		al Exam		70 scores	
			work ractical)	(presentation,	10 scores	

	17.3	Activity and	participation	20 cores				
	Assessment Criteria (scores/ points)			up to 50 points	5 (five)	(F)		
18.				51 to 60 points	6 (six)	(E)		
				61 to 70 points	7 (seven)	(D)		
				71 to 80 points	8 (eight)	(C)		
				81 to 90 points	9 (nine)	(B)		
				91 to 100 points	10 (ten)	(A)		
19.		e approval ar	nd entrance to the final the next year	/				
20.	Language of teaching / study			English				
21.	Methods of measuring / monitoring the quality of teaching			Self-evaluation				
	Literature							
	22.1	Basic	literature					
		No	Author	Title	Publisher	Year		
22.		Sedra, A.S., Smith K.C., Carusone, T.C. and Gaudet, V.		Microelectronic circuits (Vol. 4).	New York: Oxford university press.	2004		
		2.						
		3.						
	22.2	Additional literature						
		No	Author	Title	Publisher	Year		
		1.						

Appendix 3. Program of t		Program of the Co	Course for First cycle studies				
1.	Title of Course		English language level A2.2				
2.	Code		4FF101123				
3.	Study program		Computer Engineering and Technologies				
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of computer science				
5.	Level (first, second or third cycle of studies)		First cycle				
6.	Academic year/ semester		First year / second semester	7.	Number of ECTS	4	
8.	Professor ((s)	Dragan Donev				

9.	Requirements for enrolling the course None						
10.	Aims of the course (competences): At the end of the course the student is expected to: - understand phrases and the highest frequency vocabulary related to areas of most immediate personal relevance (e.g. very basic personal and family information, shopping, local area, employment). - catch the main point in short, clear, simple messages and announcements. - read very short, simple texts and find specific, predictable information in simple everyday material such as advertisements, prospectuses, menus and timetables and understand short simple personal letters. - communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar topics and activities and handle very short social exchanges. - use a series of phrases and sentences to describe in simple terms family and other people, living conditions, educational background and present or most recent job. - write short, simple notes and messages, write a very simple personal letter, for example thanking someone for something.						
11.	Contents of the course (per 15 weeks per semester): Vocabulary: types of disasters, parts of the body, types of accidents; illnesses and cures, medical professions and workplaces, emergency services; dishes, places to eat, ways to cook, types of shops, products, clothes, shopping habits and money; hobbies and personalities, sports and equipment, places for sports, films, types of entertainment; inventions, computers, space, solar system, UFOs, supernatural and environmental issues. Grammar: present perfect vs past simple; comparatives/superlatives; the definite article "the", plurals; past continuous vs past simple; reflexive pronouns; conditionals type 0 & 1; countable/uncountable nouns; quantifiers; infinitive; - ing form, - ing/ed participles; order of adjectives; the passive; question tags; relatives; reported speech (statements, questions, commands). All communicative skills are equally included in the course including communication: asking/giving/refusing permission; giving advice; narrating past experiences; discussing a bad day, giving news and reacting; talking about health problems and asking for medicine; ordering food at a takeaway, making a shopping list, buying things; expressing agreement/disagreement, talking about evenings out; describing objects, offering/accepting/refusing help.						
12.	Methods of learning: Interactive method: group work, reports, homework, seminar papers, discussion, debate, cooperative studying techniques, individual tasks, simulation of extra-curricular educational activities, individual studying.						
13.	Total amount of available time: 120						
14.	Distribution of available	e time: 2+	-1+1				
15.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning Exercises (practical, laboratory,	30 hours			
	Carring activities	15.2	theoretical, seminars, teamwork)	15. hours			
40	Other forms of	16.1	Projects	15 hours			
16.	activities	16.2	Individual work	30 hours			

			16.3	Home learning		30 hours				
	Method of assessme									
	17.1	Tests / Ora	al Exam		70 scores					
17.	17.2	Individual projects, p		sentation,	10 scores					
	17.3	Activity an	d participa	ation	20 scores					
		•			up to 50 points	5 (five)	(F)			
					51 to 60 points	6 (six)	(E)			
40	A				61 to 70 points	7 (seven)	(D)			
18.	Assessme	ent Criteria (scores/ po	oints)	71 to 80 points	8 (eight)	(C)			
					81 to 90 points	9 (nine)	(B)			
					91 to 100 points	10 (ten)	(A)			
19.		approval an		e to the final ear	60% active participation at the course					
20.	Language of teaching / study				English					
21.	Methods of measuring / monitoring the quality of teaching				Standardized motor to Self-evaluation	ests, observation	, survey			
	Literature									
		Bas	Basic literature							
		No	Autho	r	Title	Publisher	Year			
22.	22.1	1.	JENN	INIA EVANS - Y DOOLEY	Upstream Elementary A2	Express Publishing	2006			
		2.		Oxenden and ina Latham- g	New English File Beginner	Oxford University Press	2011			
		3.								
	22.2	Add	itional liter	rature						
		No	Autho	r	Title	Publisher	Year			
		1.	Zoze	Murgoski	English Grammar: With Contrastive Notes on Macedonian	National and University Library Kliment Ohridski	1997			
		2.								
		3.								

Appendix 3. Program of the Co			Program of the Co	urse for First cycle studies
	1. Title of Course		rse	Italian language level A1.2
	2.	Code		4FF100923

3.	Study program	Computer Engir	neeri	ng and Technologies			
4.	Organizer of the Study program	Goce Delchev U Faculty of comp		•			
5.	Level (first, second or third cycle of studies)	First cycle					
6.	Academic year/ semester	First year / second semester	7.	Number of ECTS	4		
8.	Professor (s)	Nadica Negrievska					
9.	Requirements for enrolling the course	None					
10.	 Aims of the course (competences): can interact in a simple way, ask and answer simple questions about themselves, where they live, people they know, and things they have, initiate and respond to simple statements in areas of immediate need or on very familiar topics, rather than relying purely on a very finite rehearsed, lexically organised repertoire of situation-specific phrases. can use simple phrases and sentences to describe or to ask for some things; can write a postcard or brief messages and read very short and simple texts.						
11.	contents of the course (per 15 vocabulary: holidays and vaca meals, food and beverages, typ routines, accessories; modes of grammar structures: demonstrated ending in -ista; the polite form; prepositions in, da, a, al; adversarticulated prepositions; locative members; prepositions of location prossimo); past participles of reperfect: essere or avere?; exprepresent perfect. all communicative skills are equinvitations, accept or decline an activities; express uncertainty acceptings; ask about and described addresses; talk about family; tarestaurant; talk about clothing stransportation in cities; expression occurred; describe the location disagreement, and disagree with	ations, weather; nations, weather; nations of restaurants of transportation, stative pronouns quarthe present indicates and expression recipies of possessive ation; reflexive verbagular verbs; expressions of place; it wally included in the invitation, talk about dishes arise the weather; of alk about dishes arise surprise; talk about of places in a city	mes, setth hops esto tive of as of djects with ession rregular trip; lescrand marticult particult particul	ing the table; articles of clo, places in a city; sporting a and quello; possessive adjust andare, venire, fare, sapfrequency; numbers from 1 ives, possessive adjectives a modal verbs; present perns of time; auxiliary verbs in ular past participles; adverbustes including basic commeisure activities, talk about rofessions; ask for and tell talk about prices; exchangibe personality; ask for and eals; express preferences; cle of clothing; talk about mast events; describe when a	thing, shoes, daily activities. ectives; nouns ere; the 01 to 10000; s with family fect (passato n the present is of time with the unication: extend the frequency of time; ask for and e holiday provide order at a odes of a past event		
12.	Methods of learning: Interactive method: group work, reports, homework, seminar papers, discussion, debate, cooperative studying techniques, individual tasks, simulation of extra-curricular educational activities, individual studying.						
13.	Total amount of available time:	120					
14.	Distribution of available time: 2	+1+1					

15.	Forms of t	eaching /	15.1	Lectures / teaching, e	heoretical, contact -learning	30 hours			
15.	learning a	ctivities	15.2		practical, laboratory, seminars, team work)	15 hours			
			16.1	Projects		15 hours			
16.	Other form	is of	16.2	Individual v	vork	30 hours			
	activities		16.3	Home learr	ning	30 hours			
	Method of assessme	nt							
17.	17.1	Tests / Ora	al Exam		70 scores				
	17.2	Individual projects, p		sentation,	10 scores				
	17.3	Activity an	d participa	ation	20. scores				
					up to 50 points	5 (five)	(F)		
					51 to 60 points	6 (six)	(E)		
4.0			,		61 to 70 points	7 (seven)	(D)		
18.	Assessme	nt Criteria (s	scores/ po	ints)	71 to 80 points	8 (eight)	(C)		
					81 to 90 points	9 (nine)	(B)		
					91 to 100 points	10 (ten)	(A)		
19.	_	approval an		e to the final ear	60% active participation at t	the course	'		
20.	Language	of teaching	/ study		English and Italian				
21.	Methods of quality of t	f measuring eaching	/ monitor	ing the	Standardized motor tests, o Self-evaluation	bservation, surv	ey ey		
	Literature								
		Bas	ic literatur	е					
		No	Autho	or	Title	Publisher	Year		
22.	22.1	1.		ielli,S.	Progetto italiano 1, nuovo (Libro dello studente)	Edilingua	2006		
		2.	Marin Magn	ı,T. & ıelli,S.	Progetto italiano 1, nuovo (Quaderno degli esercizi)	Edilingua	2006		
		3.							
	22.2	Add	itional lite	rature					
		No	Autho	or	Title	Publisher	Year		
		1.	Marin	ı,T.	La prova orale 1 (Manuale di conversazione, livello elementare - intermedio)	Edilingua	2000		
		2.	L. Tot Nuti,	ffolo & N.	Allegro 1, Corso di italiano per stranieri, Livello elementare	Edilingua	2003		

		3.	Cozzi, N., Federico F. & Tancorre, A.	Caffè Italia, Corso di italiano 1	ELI s.r.l.	2005
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Apper	ndix 3.	Program	of the C	ourse for First cy	cle s	tudies				
	Title of Cou	ırse		German langua	ige le	vel A1.2				
	Code			4FF101223						
	Study prog	ram		Computer Eng	ineer	ing and Technologie	es			
	Organizer o	of the Stud	ly		Goce Delchev University – Stip					
	program Level (first,	second o	r third	,	Faculty of computer science					
	cycle of stu		· uma		First cycle					
	Academic year/ semester		ester	First year / second semester	7.	Number of ECTS		4		
8.	Professor (s)		Marica Tasevs	ka					
9.	Requireme	nts for enr	olling	None						
10.	Aims of the course (competences): Students to be able to conduct short dialogues when meeting, greeting, to express opinions on everyday topics, to find an unknown city, to communicate with people from German-speaking countries, to shop in Germany, to make recommendations, to describe and express specific opinions, to get acquainted with the culture and civilization in the German-speaking countries, etc. Contents of the course (per 15 weeks per semester): Grammar: temporal prepositions (vor,seit, für, bei, nach, in, bis, ab), preposition "als", modal verbs (müssen, dürfen_sollen_), Indefinite pronoun "man" with modal verb, Possessive articles (Nominativ und Akkusativ), preposition mit,, lokal preposition (Lokale Präpositionen auf die Frage "Wo?" und "Wohin?", (Konjunktiv II), demonstrative pronouns, personal pronoun (Akkusativ / Dativ), dative verbs, conjunktion "denn"									
12.		method: g e studying	techniqu			, seminar papers, di imulation of extra-cu				
13.	Total amou	ınt of avail	able time	e: 120						
14.	Distribution	of availab	ole time:	2+1+1						
15.	Forms of te		15.1	Lectures / the teaching, e-le	arnin	g	30 ho	urs		
	learning ac	uvities	15.2	Exercises (practical, laboratory, theoretical, seminars, team work)			hours			
16.	Other forms	s of	16.1	Projects			15 ho	urs		
10.	activities		16.2	Individual wor	·k		30 ho	urs		

			16.3	Home learning		hours			
	Method of assessme								
	17.1	Tests / Oral	Exam		70 scores				
17.	17.2	Individual w		sentation,	10 scores				
	17.3	Activity and		ation	scores				
					up to 50 points	5 (five)	(F)		
					51 to 60 points	6 (six)	(E)		
4.0		. 6 !!	,		61 to 70 points	7 (seven)	(D)		
18.	Assessme	ent Criteria (s	cores/ po	oints)	71 to 80 points	8 (eight)	(C)		
					81 to 90 points	9 (nine)	(B)		
					91 to 100 points	10 (ten)	(A)		
19.		approval and ransition in the		e to the final	60% active participation	on at the course	•		
20.	Language of teaching / study				English and German				
21.	Methods of measuring / monitoring the quality of teaching				Standardized motor tests, observation, survey Self-evaluation				
	Literature								
		Basic	literatur	e					
		No	Autho	r	Title	Publisher	Year		
22.	22.1	1.	Sylvet Hiems Sprec	la Niebisch, te Penning- stra, Franz ht, Monika mann, Monika	Schritte International 2 Kusrbuch + Arbeitsbuch	Hueber Verlag	2006		
		2.		erike Jin, Ute	Grammatik aktiv Üben, Hören, Sprechen	Cornelsen	2018		
		3.	Ранка Петер	Грчева Рау	Голем македонско- германски и германско- македонски речник	Магор	2006		
	22.2	Additi	onal lite	rature					
		No							
		1.	Дими	грија Гацов	Германска Граматика	НУБ "Климент Охридски" - Скопје	1995		
		2.	Pude	Sandra, Angela, ht Franz	Menschen A1.2	Hueber Verlag	2012		
		3.	_	Swerlowa	Grammatik & Konversation Arbeitsblätter für den Deutschunterricht	Langenscheid	2013		

		A1-A2-B1	

Append	dix 3.	Program of the C	Course for First cy	ycle s	studies		
1.	Title of Co	ourse	Spanish langua	ge le	evel A1.2		
2.	Code		4FF100823				
3.	Study pro	gram	Computer Eng	ineer	ing and Technologies		
4.	program	of the Study	Goce Delchev I Faculty of comp				
5.	Level (firs	t, second or third tudies)	First cycle				
6.	Academic	; year/ semester	First year / second semester	7.	Number of ECTS	4	
8.	Professor	(s)	Marija Todorova	а			
9.	Requirem the course	ents for enrolling	None				
10.	Aims of the course (competences): - can interact in a simple way, ask and answer simple questions about themselves, where they live, people they know, and things they have, initiate and respond to simple statements in areas of immediate need or on very familiar topics, rather than relying purely on a very finite rehearsed, lexically organised repertoire of situation-specific phrases. - can use simple phrases and sentences to describe or to ask for some things; can write a postcard or brief messages and read very short and simple texts.						
11.	vocabular and meals shoes, da activities. grammar present in of frequer reflexive v expressio simple ter all commu extend inv frequency time; ask exchange and provide	s, food and bevera illy routines, access structures: adverbe idicative of irregula ncy; numbers from verbs, present performs of place; irregulanse, future tense. unicative skills are vitations, accept or of activities; expression and express the holiday greetings; de addresses; talk	acations, weather ges, types of rest sories; modes of sof time, demons ar verbs, the preparticiple ar past participle ar past participles decline an invitates uncertainty are date; talk about ask about and dabout family; talk	; nandaura trans strative osition possores of es of in the tion, and do holid escril	er): nes of relatives; dishes, onts, setting the table; articiportation, shops, places we pronouns, possessive ans en, de, a, con; advertessive adjectives, prepose regular verbs; expression verbs of time with the presentation of the course including basic of talk about leisure activities out; talk about profession days; organize a trip; talk about dishes and meals; expressribe an article of clothics.	icles of clothing, in a city; sporting adjectives; the os and expressions sitions of location; ons of time, esent perfect, past communication: es, talk about the ns; ask for and tell about prices; e personality; ask for oress preferences;	

	past ever	modes of transportation in cities; express surprise; talk about past events; describe when a past event occurred; describe the location of places in a city; talk about sports; express agreement, disagreement, and disagree with others.							
12.	Interactiv cooperati		group wor g techniqu	•	work, seminar papers, ks, simulation of extra		-	-	
13.	Total am	ount of ava	ilable time	e: 120					
14.	Distribution	on of availa	able time:	2+1+1					
15.		Forms of teaching 15.1 teaching, e-lea				30 hc	ours		
	/ learning	earning activities		,,	tical, laboratory, ninars, team work)	15 ho	ours		
	011 (Projects		15 ho	ours		
16.	Other forms of activities		16.2	Individual work		30 ho	ours		
			16.3	Home learning		30 hc	ours		
	Method of assessment								
17.	17.1	Tests / O	ral Exam		70 scores				
17.	17.2	Individual projects,		esentation,	10 scores				
	17.3 Activity and participation			20 scores					
					up to 50 points	5	(five)	(F)	
					51 to 60 points	6	(six)	(E)	
18.	A 00000m	ant Critaria	, (agarag)	nainta)	61 to 70 points	7	(seven)	(D)	
10.	Assessin	ent Criteria	i (Scores/	poirits)	71 to 80 points	8	(eight)	(C)	
					81 to 90 points	9	(nine)	(B)	
					91 to 100 points	10	(ten)	(A)	
19.	"	approval transition i		nce to the final year	60% active participa	tion at t	the course	•	
20.	Language	e of teachir	ng / study		English and Spanish	1			
21.	Methods of teachir		ng / monit	oring the quality	Standardized motor Self-evaluation	tests, c	bservation	ı, survey	
	Literature)							
		Bas	sic literatu	re					
		No	Autho	or	Title	Publi	sher	Year	
22.	22.1	22.1		arianne eló,Juana hez Benito, nica Beucker, Luengo,Bibiana er	¡Vamos! - 1	Muno Espa edicio	ñol	2007	

	2.	A. Jarvis, R. Lebredo, F. Mena-Ayllón	"Basic Spanish Grammar"	Houghton Mifflin Company - USA	2000	
	3.					
22.2	Additi	Additional literature				
	No	Author	Title	Publisher	Year	
	1.	A. Gonzales Hermoso, J. R. Cuenot, M. Sanchez Alfaro	"Gramatica de español lengua extranjera"	Мадрид, Шпанија	1999	
	2.	Cristina Karpacheva	"Manual de español"	Софија	1998	
	3.	Ramon Sarmiento	"Gramatica progresiva de español para extranjeros"	"Colibri", Софија	1998	

Apper	ndix 3.	Program of the C	ourse for First cy	cle s	tudies			
1.	Title of Co	urse	French languag	French language level A1.2				
2.	Code		4FF101023	4FF101023				
3.	Study program		Computer Eng	Computer Engineering and Technologies				
4.	Organizer program	of the Study	Goce Delchev I Faculty of comp					
5.	Level (first cycle of stu	, second or third udies)	First cycle	First cycle				
6.	Academic year/ semester		First year / second semester	7.	Number of ECTS	4		
8.	Professor	(s)	Svetlana Jakimovska					
9.	Requirements the course	ents for enrolling	None					
10.	Aims of the course (competences): - can interact in a simple way, ask and answer simple questions about themselves, where they live, people they know, and things they have, initiate and respond to simple statements in areas of immediate need or on very familiar topics, rather than relying purely on a very finite rehearsed, lexically organised repertoire of situation-specific phrases. - can use simple phrases and sentences to describe or to ask for some things; - can write a postcard or brief messages and read very short and simple texts.							

11.	wocabular meals, foo daily routing grammar expression possessivity verbs; preauxiliary verbs; all communextend invertibles and provide and provide and provide order at a of transpoon occurred; disagreem	y: holidays od and bevenes, access structures: on sof frequenes adjectives sent perfections in the citations, according activities for and expende addressed restaurant; rtation in citation in citation in citation in citation and diment, and diment, and diment, and diments.	and vacate rages, type sories; moodemonstrate ency; numbers with familit (passé compresent performent of time with alls are equipped to determine the determines; as les; talk about talk about ties; exprese location	des of restaur des of transp tive pronoun pers from 10 ly members; omposé); par erfect: être or the present ally included cline an invit uncertainty a ate; talk about k about and out family; ta t clothing styl ss surprise; of places in	er; names of relatives; dishes rants, setting the table; article ortation, shops, places in a sis; possessive adjectives; the 1 to 10000 prepositions; posprepositions of location; reflect participles of regular verbs avoir?; expressions of places.	es of control of city; speed present sessive exive es; exprese; irrections; alk aborders per exprese express e	clothing, sho corting active ent of basic re adjectives verbs with r ressions of t gular past amunication: talk about th ask for and out prices; rsonality; as s preference talk about r hen a past of	pes, rities. verbs; s, modal rime; tell sk for es; modes
12.	Methods of learning: Interactive method: group work, reports, homework, seminar papers, discussion, debate, cooperative studying techniques, individual tasks, simulation of extra-curricular educational activities, individual studying.							
13.	Total amo	unt of availa	able time:	120				
14.	Distributio	n of availab	le time: 2+	+1+1				
15.	Forms of t	eaching /	15.1	Lectures / teaching, e	theoretical, contact -learning	30 h	ours	
15.	learning a	ctivities	15.2		practical, laboratory, seminars, team work)	15. hours		
			16.1	Projects		15 hours		
16.	Other forn activities	ns of	16.2	Individual v	vork	30 hours		
	activitles		16.3	Home learn	ning	30. hours		
	Method of assessme							
	17.1	Tests / Or	al Exam		70 scores			
17.	17.2	Individual projects, p	\ 1	sentation,	10 scores			
	17.3	Activity ar	nd participa	ation	20. scores			
					up to 50 points	5	(five)	(F)
					51 to 60 points	6	(six)	(E)
18.	Assessme	ent Criteria ((scores/ po	oints)	61 to 70 points	7	(seven)	(D)
					71 to 80 points	8	(eight)	(C)
					81 to 90 points	9	(nine)	(B)

				91 to 100 points	10 (ten)	(A)			
19.			l entrance to the in the next year	60% active participation at the course					
20.	Language of te	eaching /	study	English and French					
21.	Methods of me quality of teach	_	/ monitoring the	Standardized motor tests, observation, survey Self-evaluation					
	Literature								
		Basic	literature						
	22.1	No	Author	Title	Publisher	Year			
22.		1.	CAPELLE, G. & MENAND,R.	Taxi 1 (Méthode de français)	Edilingua	2003			
		2.	CAPELLE, G. & MENAND,R.	Taxi 1 (Cahier des exercices)	Edilingua	2003			
		3.							
	22.2	Additi	onal literature	•					
		No	Author	Title	Publisher	Year			
		1.							
		2.							

Apper	Appendix 3. Progra		ourse for First cyc	cle st	udies				
1.	1. Title of Course		Russian language level A1.2						
2.	Code		4FF101323						
3.	Study prog	ram	Computer Eng	neer	ing and Technologies				
4.	Organizer of program	Goce Delchev University – Stip Faculty of computer science							
5.	Level (first, cycle of stu	second or third idies)	First cycle						
6.	Academic y	year/ semester	First year / Second semester	7.	Number of ECTS	4			
8.	Professor ((s)	Igor Stanojoski						
9.	Requireme the course	nts for enrolling	None						
10.	Aims of the course (competences): The main objective of the course is to train students in practical Russian language proficiency typical of basic level of Russian language skills, through which they will acquire a vocabulary of								

				•	ed habits of speech percepti of using colloquial speech, a			ed		
	reading ar	nd writing h	abits.							
11.	During the grammation time, sent Non-special	cal categorion ences, num ialized (collo are you?", F	e main em es in the R bers, and oquial) cult Profession	tussian langu perfect and tural themes	e on mastering the Russian uage: cases, verbs, present imperfect verb forms. shall be used: pets, use of 'y and language, description	tense, 'How m	adjectives, f nuch?", Aski	ng		
12.	Interactive cooperative	_	techniques	•	mework, seminar papers, dis tasks, simulation of extra-cu			I		
13.	Total amo	unt of avail	able time:	120						
14.	Distributio	n of availab	ole time: 2+	+1+1						
15.	Forms of teaching / 15.1 teaching,					30 h	ours			
	learning a	ctivities	15.2	Exercises (practical, laboratory, theoretical, seminars, team work)			ours			
			16.1	Projects			15 hours			
16.	Other forn activities	ns of	16.2	Individual work			ours			
			16.3	Home lear	ning	30 h	ours			
	Method of assessme									
17.	17.1	Tests / Or	al Exam		70 scores					
	17.2	Individual projects, p	work (pres oractical)	sentation,	10 scores					
	17.3	Activity ar	nd participa	ation	20. scores					
					up to 50 points	5	(five)	(F)		
					51 to 60 points	6	(six)	(E)		
18.	Assassma	ent Criteria	(ecores/ no	ointe)	61 to 70 points	7	(seven)	(D)		
10.	Assessine	ent Cinteria ((SCOTES/ PC	Jii ito)	71 to 80 points	8	(eight)	(C)		
					81 to 90 points	9	(nine)	(B)		
					91 to 100 points	10	(ten)	(A)		
19.	_	approval ai / or transition			60% active participation at	t the co	ourse			
20.	Language	of teaching	g / study		English and Russian					
21.	Methods of quality of	of measurin teaching	g / monitor	ring the	Standardized motor tests, observation, survey Self-evaluation					
22.	Literature									
22.	22.1	Bas	sic literatur	e e						

	No	Author	Title	Publisher	Year
	1.	Ирина Осипова	«Ключ» - Учебник русского языка для начинающих.	Corvina, Москва	2005
	2.				
	3.				
22.2	Additio	onal literature			
	No	Author	Title	Publisher	Year
	1.	S. A. Khavronina, A. I. Shirochenskaya	Русский язык в упражнениях. (Russian in exercises)	Русский язык. Курсы 2017 г.	2017
	2.	Л.В.Московкин, Л.В.Сильвина	Русский язык. Учебник для иностранных студентов подготовительных факультетов	СМИО Пресс, Санкт- Петербург	2006
	3.				

		Program of the	Cou	rse for First cycle stud	dies					
1.	Title of Course	Sport and recre	atio	n						
2.	Code	2SC100121								
3.	Study program	Computer Engineering and Technologies								
4.	Organizer of the Study	Goce Delce Uni	versi	ty – Stip						
	program	Faculty of Comp	uter	science						
5.	Level (first, second or third	First cycle								
	cycle of studies)									
6.	Academic year/ semester	First year/	7.	Number of ECTS	0					
		First or second								
		semester								
8.	Professor (s)	Assoc. prof. Biljana Popeska, PhD								
9.	Requirements for enrolling	None								
	the course									
10.	Aims of the course (competen	ces):								
	To fulfill students` needs for m	ovement and phys	ical	activity; to improve and o	develop students					
	movement skills and motor ab	ilities; to adopt info	rmat	ion and knowledge for ir	ndependent choice and					
	participation in adequate type	of physical activity	and	recreational sport based	d on individual needs					
	and preferences; to learn how to practice different forms of active breaks; to learn about the benefits									
	from regular physical activity for overall health and wellbeing.									
11.	Contents of the course (per 15	weeks per semes	ter):							

- 1. Basic physical preparation (introduction in basic principles of physical exercises: warm up activities, exercises for overall fitness, cool down activities application in each workout session; sample of exercises for each muscle group)
- 2. Basic physical preparation
- 3. Basic physical preparation (functional training)
- 4. Aerobics (type of aerobic depending from the structure of the group: high low aerobics, step aerobics, tae bo, body conditioning)
- 5. Aerobic
- 6. Outdoor activities hiking and orienting
- 7. Ball games (basketball, football)
- 8. Ball games (basketball, football)
- 9. Table- tennis and badminton
- 10. Table- tennis and badminton
- 11. Ball games (volleyball, handball)
- 12. Ball games (volleyball, handball)
- 13. Outdoor activities cycling, rollers or hiking
- 14. Dances (modern and traditional)
- 15. Outdoor activities

12.	Methods of	of learning: p	ractical ex	ercises, method of	f sport training				
13.	Total amo	unt of availa	ble time: 4	l8 hours					
14.	Distributio	n of available	e time: 0+0	0+2					
15.	Forms of	teaching /	15.1	Lectures / theore	etical, contact			0 hours	
				teaching, e-learn	ning				
				Exercises (practi	ctical, laboratory, 12 hour				
					nars, team work)				
16.	Other forms of 16.1 Projects			Projects				0 hours	
	activities 16.2			Individual work				0 hours	
			16.3	Home learning				0 hours	
17.	Method of								
	assessme	ent							
	17.1	Tests / Ora	al Exam					0 scores	
	17.2	Individual v	work (pres	entation,				0 scores	
		projects, pr	ractical)						
	17.3	Activity and	d participa	tion				0 scores	
18.	Assessme	ent Criteria (s	cores/ poi	ints)	up to 50 points	5	(five).	(F)	
					51 to 60 points	6	(six)	(E)	
					61 to 70 points	7	(seven)	(D)	
					71 to 80 points	8	(eight)	(C)	
					81 to 90 points	9	(nine)	(B)	

				91 to 100 points	10 (ten)	(A)
19.	Signature approv	al and e	entrance to the final	60% acti	ı ive participation at t	he course
	exam/ or transiti					
			•			
20.	Language of tead	ching / s	tudy			English
21.	Methods of meas	suring / r	nonitoring the quality of	Standardized motor	tests, observation,	survey,
	teaching			self-evaluation		
22.	Literature					
	22.1	Basic I	iterature	l		
		No	Author	Title	Publisher	Year
		1.	Haywood, K., &	Life span motor	Champaign: IL.	2004
			Getchell, N.	development	Human Kinetics.	
		2.	Kohl, H., Murray, D., &	Foundations of	Champaign: IL.	2018
			Salvo, D	Physical Activity	Human Kinetics.	
				and Public Health		
				(Second Edition)		
		3.	Wilmore, J. & Costill, D.	Physiology of	Champaign:	2002
				sport and	Human Kinetic,	
				exercise,	Illinois	
				(Third edition)		
	22.2	Additio	nal literature			
		No	Author	Title	Publisher	Year
		1.	Malina, R., Bouchard,	Growth,	Champaign: IL.	2004
			C. & Bar – Or, O	Maturation and	Human Kinetics.	
				Physical Activity		
				(Second Edition).		
		2.	Beashel, P., Sibon, A.,	Sport examined	Nelson Thornes	2004
			& Tailor,J		Ltd,	

Annex	c 3.	Program of the	Course for Integr	ated	Second cycle studies			
1.	Title of Co	urse	Data Structures	Data Structures and Algorithms				
2.	Code		2FI101921					
3.	Study prog	Computer Engine	erin	g and Technologies				
4.	Organizer program	of the Study	Goce Delchev University – Stip Computer Science Faculty					
5.	Level (first	, second or third udies)	First cycle					
6.	Academic	year/ semester	Second year / III semester	7.	Number of ECTS	8		
7.	Professor	(s)	Full Professor Cveta Martinovska Bande					
8.	Requirements the course	ents for enrolling	None					
9.	Aims of the	e course (compete	nces):					

	as well as Students l	arrays earn to	s, strine o imple	gs and ment d	hash tables. The ata structures and	a structures including lir course covers algorithm techniques for designing	ns for s	orting and	searching.	
10	Represen algorithms binary, bir merge son Technique and backt	ting da s for se nary sea t, select es for co tracking	ata wit earching arch, b ction so design g. Grap	h array g, inser alanceo ort, quid of algo ohs and	ting and deleting of AVL trees and Book sort, counting sortithms: divide and	stacks and queues widata from lists. Trees and trees. Hash tables. Sort ort and heap sort. Asymptonquer, dynamic proggies. Topological sorting	d trave ing algo ptotic a rammir	rsals. Type orithms: inse nalysis, big ng, greedy a	s of trees: ertion sort, Ο, Ω и Θ. algorithms	
11	Methods of	of learn	ning:			, e-learning, individual a	nd tear	n projects, o	office	
12	Total amo	unt of	availab	le time	: 8 ECTS x 30 hou	rs a = 240 hours				
13	Distributio	n of av	/ailable	time: 4	15 + 30 + 30 + 60 -	+ 75 = 240 hours (3 + 2	+2)			
14	Forms of t	teachin	ng 1	5.1	Lectures / theore teaching, e-learn	•	45 ho	urs		
	/ learning activities 15.2			5.2	Exercises (practi theoretical, semi		30 ho	urs		
		16.1 Projects				30 hours				
15	Other forms of activities			6.2	Individual work			60 hours		
			1	6.3	Home learning	Home learning				
16	Method of assessme									
	17.1	Tests	/ Oral	Exam		70 scores				
17	17.2		dual wo cts, pra		sentation,	10 scores				
	17.3	Activit	ty and	particip	ation	20 scores				
						up to 50 points	5	(five)	(F)	
						51 to 60 points	6	(six)	(E)	
18	Assessme	ent Crit	eria (so	cores/ r	ooints)	61 to 70 points	7	(seven)	(D)	
	7.000001110	,	.ona (o	30.00, p	, 6111169	71 to 80 points	8	(eight)	(C)	
						81 to 90 points	9	(nine)	(B)	
						91 to 100 points	10	(ten)	(A)	
19	exam/ or t				ce to the final year	60% active participation	on at the	e course		
20	Language	of tea	ching /	study		English				
21	Methods of teachin		suring /	/ monito	oring the quality	Standardized motor tests, observation, survey Self-evaluation				
	Literature									
22	22.1		Basic I	literatur	е	T	T			
			No	Autho	r	Title	Publis	sher	Year	

	1.	Robert Lafore	Data Structures and Algorithms in Java	Sams Publishing	2003
	2.	Michael Goodrich and Roberto Tamassia	Data Structures and Algorithms in Java	John Wiley	2010
	3.	Sartaj Sahni	Data Structures, Algorithms and Applications in Java	McGraw Hill	2000
22.2	Additio	onal literature			
	No	Author	Title	Publisher	Year
	1.	Miodrag Zivkovic	Algorithms	Faculty of Mathematics, Belgrade, Serbia	2000
	2.	Niklaus Wirth	Algorithms and Data Structures	Prentice Hall	1985
	3.	Robert Sedgewick	Algorithms	Addison- Wesley	1983

Anne	x 3.	Program of the	course for First c	/cle	studies			
23.	Title of Cou	ırse	Digital logic					
24.	Code		2FI102121	2FI102121				
25.	Study prog	ram	Computer Engir	eerir	ng and Technologies			
26.	Organizer of program	of the Study	Goce Delchev L Faculty of Comp					
27.	Level (first, cycle of stu	second or third dies)	First cycle					
28.		/ear/ semester	Second year / Third semester	7.	Number of ECTS	6		
29.	Professor (Professor (s) Vasko Kokalanov						
30.	Requirements for enrolling the course None							
31.	After complogic circuit	s that are an integ	e, students should ral part from compu	ıter s	the basic concepts of sw ystems	itching algebra and		
32.	Number syl Binary arith numbers. E parity. Axio Electronic of of Karnaug and two's of encoders a devices PL Registers a	stems and conversemetic and complersinary codes. Error ms and theorems components for log h maps and Quine omplement, shift and decoders. Imple A and PAL.Flip-flog and Counters.	ment arithmetic. Reductection and corror Boolean algebra ic gates. Minimizate—McCluskey. Combard compare. Combard and compare and systems. Analysis and systems.	ber section. Readination of the contraction of the	system to another. Binary enting negative numbers of codes: Hamming codes alization of switching funct of switching functions with onal circuits for addition, sonal circuits: multiplexers, functions with ROM and pais of sequential circuits.	and formats for reals and codes with logic gates. a method subtraction with single demultiplexers, programmable logic Sequential Circuits:		
33.	Methods of consultation		, theoretical and pr	actic	al exercises, e-learning, to	eam work,		
34.	Total amou	nt of available time	e: 6 FCTS x 30 hou	ırs =	180 hours			

35.	Distribu	ution of	availabl	e time: 30	+ 30 + 30	+ 30 + 60 = 180 hours (2 + 2 +	1)			
	Forms	of teach	ning /	15.1	teaching	t / theoretical - contact , e-teaching eks x 2 hours = 30 hours)	30 hou	ırs		
36.		g activit		15.2	exams, p	Theoretical and practical exercises, e- exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)				
		· ·			Projects		30 hou	ırs		
37.	Other f	orms of		16.2	Individua	al work	30 hou	ırs		
				16.3	Home le	arning	60 hou	ırs		
38.	Method									
	17.1	Te	sts / Ora	al Exam		20+20+30 scores				
39.	17.2		dividual vactical)	work (pres	entation,	10 scores				
	17.3	Ac	tivity an	d participa	ition	20 scores				
		•				up to 50 points	5	(five)	(F)	
						51 to 60 points	6	(six)	(E)	
40	A = = = = =				:ntn)	61 to 70 points	7	(seven)	(D)	
40.	Assess	sment C	riteria (s	scores/ po	ints)	71 to 80 points	8	(eight)	(C)	
						81 to 90 points	9	(nine)	(B)	
						91 to 100 points	10	(ten)	(A)	
41.				d entrance n in the ne		60% active participation at the course				
42.	Langua	age of te	eaching	/ study		English				
43.		ds of me of teach		/ monitori	ng the	Standardized motor tests, obs Self-evaluation	servation	, survey		
	Literatu	ıre								
4.4		Basic	literatur	е						
44.	22.1	No	Autho	or		Title	Publis	her	Year	
		1.	Cveta	a Martinov	ska	Digitalna logika	Univ. (2011	
	22.2	Additi	onal lite	rature						
		No	Autho	or		Title	Publis	her	Year	
		1.		Servini ta Servini		Digitalna elektronika I mikroprocesori	Ministr Educa and So of Mad	tion	2011	
		1.		an Balaba ey Carlsor		Digital Logic Design Pricniples		Viley &	2011	
_										

1 .			••••••••••••••••••••••••••••••••••••••	ı cyt	cle studies			
	Title of Co	urse	Software Eng	nee	ring			
2.	Code		2FI102021					
3 ;	Study prog	gram	Computer engi	neer	ing and technologies			
	Organizer oprogram	of the Study	Goce Delchev Faculty of infor					
	Level (first	, second or third udies)	First cycle					
6.	Academic	year/ semester	2 year / III semester	7.	Number of ECTS	8		
7.	Professor ((s)	Prof. Natasha	Koce	eska			
	Requireme the course	ents for enrolling	None					
9. 1	requirements, as well as various techniques for requirement elicitation and requirement engineering; gaining practical knowledge of writing software specification. Fundamentals of UML language.							
10	Contents of the course (per 15 weeks per semester): This course covers the following topics: Introduction to software engineering and software processes Software engineering basic concepts Software process models: waterfall model, incremental model, evolutionary development model, V-model, spiral model, Rapid Application Development model (RAD), extreme programming. Software Development Life Cycle (SDLC) process Fundamentals of requirements engineering Preparation of system specifications System modelling Fundamentals of UML language Design of software systems							
]]]	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects,							
11	office hour Total amou	s unt of available tim	ne: 8 ECTS x 30	houi	rs = 240 hours			

	Distribution	on of availa	ble time:	45 + 30 + 30 -	+ 60 + 75 = 240 hours (3 + 2 +	2)			
1	Forms of	teaching	15.1	Lectures / the teaching, e-	neoretical, contact	45 ho	ours			
	/ learning		15.2	Exercises (p	Exercises (practical, laboratory, theoretical, seminars, team work)			30 hours		
			16.1	Projects		30 ho	urs			
1	Other for	ms of	16.2	Individual w	ork	60 ho	urs			
	adivido		16.3	Home learn	ing	75 ho	urs			
10	Method o			1						
	17.1	Tests / O	ral Exam				7	70 points		
1	17.2	Individual projects,		esentation,		1	0 point			
	17.3	Activity ar	•	pation			2	20 point		
		•		up to 50 points		5	(five)	(F)		
					51 to 60 points	6	(six)	(E)		
18	Δ	and Order da			61 to 70 points	7	(seven)	(D)		
	Assessment Criteria (scores/ points)		points)	71 to 80 points	8	(eight)	(C)			
					81 to 90 points	9	(nine)	(B)		
					91 to 100 points	10	(ten)	(A)		
1:		approval a			60% active participati	on at th	e course			
20	Language	of teachin	g / study		English					
2	Methods quality of	of measurir teaching	ng / moni	toring the	Standardized tests, o Self-evaluation	bservati	on, survey	/		
	Literature									
		Bas	ic literatu	ire	•					
		No	Author		Title	Publis	sher	Year		
		1.	Ian So	mmerville	Software engineering	Addis Wesle		2009		
2:	22.1 Natasha Koceska, Sasho Koceski			Софтверско инженерство	Униве "Гоце Делче Штип	ев" -	2018			
		3.	Van V	liet H.	Software Engineering - Principles and Practice, (2-nd Edition)	John and S	Wiley Sons	2000		
	22.2	Ado	litional lite	erature			_			
		No	Author		Title	Publis		Year		
		1.	Pressr	nan R.S.	Software Engineering - A Practicioner's	McGr	aw Hill	2005		

		Approach (6-th Edition)		
2.	Schach S.R.	Object Oriented & Classical Software Engineering, 7-th Edition	McGraw Hill	2006
3.	Pont M.J.	Software Engineering with C++ and CASE Tools	Addison- Wesley	1996

Append	dix 3.	Program of the Co	urse for First cycl	e stu	dies			
13.	Title of Co	ourse	Probability and	Statis	stics			
14.	Code		2FI130221					
15.	Study pro	gram	Computer Engin	eerir	ng and Technologies			
16.	program	of the Study	Goce Delchev L Faculty of comp					
17.	Level (first	st, second or third tudies)	First cycle					
18.	Academic	year/ semester	Second year/ third semester	7.	Number of ECTS	4		
38.	Professor	(s)	Prof. Tatjana Ata	anas	ova Pachemska, full profes	ssor		
39.	Requirem the course	ents for enrolling	Enrolment in the	first	cycle of studies of the stud	dy program		
40.	Aims of the course (competences): Introduction and mastery of probability theory, random variables and their distribution functions, random vectors and corresponding distributions, basic limit theorems – law of large numbers, central limit theorem and applicability in technical sciences. Introducing and mastering the basic concepts of mathematical statistics as a prerequisite for working with data. The student is expected to know and use the different types of probability, to describe random variables, random vectors to know how to calculate the numerical characteristics of each random variable and vector, to be able to apply the acquired knowledge in concrete real engineering problems. To know and understand the basic concepts and theories of statistics and their flexible use in practice.							
41.	1. Combir 2. Fundar 3. Axioma 4. Geome 5. Total P 6. Concep 7. Continu 8. Numer coefficien 9. Genera 10. Measi 11. Limit t 12. Limit t 13. Basic (statistics) 14. Descr 15. Paran (probabilit 14. M	atics of the probability tric probability, Con- robability, Bayes Foot of random variable tous random variable tous characteristics ts (Pirson, Spirman alization of the notion ures of central tender theorems - law of lartheorems - Central literms in statistics –	rmutations, variat y theory-experime y space; Classica ditional probability rmulas, Bernoulli e Discrete rando es. Distribution fu of a random varial ency – generalizating numbers and a mit theorem, norm population, samp -parametric statist pothesis testing, s (optionally)	nt, ra I defi Sche m va nctio riable – ion; applii naliza le, fe	andom event, statistical de inition of probability eme, Most Likely Number, la iniables. Law of distribution of a random variable; e — mathematical expectar random vectors and distributions; ation of random variables, eature, data presentation, debasic tests	Poisson Scheme of discrete random variable ation, dispersion, correlation outions		

42.	Methods using ICT	_	Lectures,	exercises, prepara	ation of a seminar paper	and presentatio	ns, teaching with		
43.			able time:	6 ECTS x 30 hou	rs = 180 hours				
44.	Distribution	on of availat	ole time: 30	0+15+15+30+30 =	: 120 hours (2+1+1)				
45.		teaching /	15.1	e-learning	pretical, contact teaching, 30				
45.	learning a	activities	15.2		practical, laboratory, ninars, teamwork) 15				
			16.1	Projects	15				
46.	Other 1	forms of	16.2	Individual work		30			
			16.3	Home learning		30			
	Method assessm	of ent							
47.	17.1	Tests / Ora	al Exam		70 scores				
47.	17.2 Individual work (presentation projects, practical)				10 scores				
	17.3	Activity and	d participa	tion	20 scores				
					up to 50 points	5 (five)	(F)		
					51 to 60 points	6 (six)	(E)		
4.0			,		61 to 70 points	7 (seven)	(D)		
48.	Assessm	ent Criteria	(scores/ po	oints)	71 to 80 points	8 (eight)	(C)		
					81 to 90 points	9 (nine)	(B)		
					91 to 100 points	10 (ten)	(A)		
49.		approval transition in		nce to the final	Apart from 42 points from partial exams, completed homework and regularity of lectures, classroom exercises and laboratory exercises				
50.	Language	e of teaching	g / study		English				
51.	Methods teaching	of measurin	g / monito	ring the quality of	Self-evaluation, periodic tests, debates				
	Literature)							
		Basi	c literature)					
		No	Author	r	Title	Publisher	Year		
52.		Атанасова Пачемска Татјана, Коцева Лазарова Лимонка,		на, Коцева	Веројатност (this book will be translated in English)	УГД Штип, ISBN 978- 608-244-591- 5	2018		
	22.1	2.	Атана Татјан Лазар	сова Пачемска на, Коцева ова Лимонка, назова Елена, Буралиева	Збирка задачи по Веројатност (will be translated in English).	УГД Штип ISBN 978- 608-244-592- 2	2018		
		3.							
	22.2	Add	itional litera	ature					

	No	Author	Title	Publisher	Year
	1.				

Append	dix 3.	Program of the Co	urse for First cycl	e stu	udies			
19.	Title of Co	ourse	Theory of Proba	bility	1			
20.	Code		2FI130121	2FI130121				
21.	Study pro	gram	Computer Engir	eeri	ng and Technologies			
22.	Organizei program	r of the Study	Goce Delchev L Faculty of comp					
23.		st, second or third tudies)	First cycle					
24.	Academic	year/ semester	Second year/ third semester	7.	Number of ECTS	4		
53.	Professor (s) Prof. Tatjana Atanasova Pachemska, full professor					essor		
54.	tne course					tudy program		
55.	Introduction vectors and applies statistics and The student random vectors and to be able	nd corresponding discability in technical as a prerequisite for ent is expected to knectors to know how to apply the acquire	probability theory, stributions, basic sciences. Introd working with data now and use the valuate the ned knowledge in co	limit ucing a. diffe ume oncre	theorems – law of large of and mastering the baserent types of probability, prical characteristics of each	distribution functions, random numbers, central limit theorem sic concepts of mathematical to describe random variables, ch random variable and vector, ems. To know and understand		
56.	Content of 1. Combin 2. Fundar 3. Axioma 4. Geome 5. Total P 6. Concep 7. Continu 8. Numer coefficien 9. Genera 10. Meas: 11. Limit 11. Limit 11. Limit 11. Limit 11. Descript 15. Paran (probabilit 14. N	of the subject programatorial elements-permentals of probability atics of the probability atics of the probability. Concrobability, Bayes Foot of random variable uous random variable to characteristics to (Pirson, Spirman alization of the notion ures of central tenders theorems - law of lartheorems - Central literms in statistics —	m: rmutations, variate y theory-experiment y space; Classical ditional probability rmulas, Bernoullinger. Discrete randomes. Distribution fur of a random varial ency – generalizating enumbers and mit theorem, normoule population, samples of the sistesting, seconds.	ions, rent, r I defined the sent, r I defined the sent th	, combinations; andom event, statistical of inition of probability eme, Most Likely Number ariables. Law of distribution of a random variable; e — mathematical expectations; ation of random variables eature, data presentation, basic tests	definition of probability r, Poisson Scheme on of discrete random variable etation, dispersion, correlation ributions		
57.	Methods	of learning: Lectures				d presentations, teaching with		
58.	using ICT Total amo	ount of available time	e: 6 ECTS x 30 h	ours	= 180 hours			
					20 hours (2+1+1)			

60.		teaching /	15.1	e-learning	etical, contact teaching,	30			
00.	learning a	activities	15.2	Exercises (plant theoretical, semi	ractical, laboratory, nars, teamwork)	15			
			16.1	Projects	,	15			
61.	Other activities	forms of	16.2	Individual work		30			
			16.3	Home learning		30			
	Method assessm	of ent							
62.	17.1	Tests / Ora	al Exam		70 scores				
02.	17.2	7.2 Individual work (presentation projects, practical)			10 scores				
	17.3	Activity and participation			20 scores				
					up to 50 points	5 (five)	(F)		
					51 to 60 points	6 (six)	(E)		
62	A	ant Critaria	(000r00/ p.	61 to 70 points		7 (seven)	(D)		
63.	Assessm	ent Criteria	Criteria (scores/ points)		71 to 80 points	8 (eight)	(C)		
				81 to 90 points	9 (nine)	(B)			
					91 to 100 points	10 (ten)	(A)		
64.	Signature approval and entrance to the fina exam/ or transition in the next year				Apart from 42 points homework and regineration exercises and laborate	ularity of lectu			
65.	Language	e of teaching	g / study		English				
66.	Methods teaching	of measurin	g / monito	ring the quality of	Self-evaluation, periodic tests, debates				
	Literature)							
		Basi	ic literature	9	- •				
		No	Author	r	Title	Publisher	Year		
67.		1.	Атана Татјан Лазар Карам	на, Коцева	Bepojатност (this book will be translated in English)	УГД Штип, ISBN 978- 608-244-591- 5	2018		
	22.1	2.	Атана Татјан Лазар	сова Пачемска на, Коцева юва Лимонка, иазова Елена, Буралиева	Збирка задачи по Веројатност (will be translated in English).	УГД Штип ISBN 978- 608-244-592- 2	2018		
		3.							
	22.2	Add	itional litera	ature					
		No	Author	r	Title	Publisher	Year		
		1.							

Anne	x 3.	Program	of the co	ourse for Fi	irst cy	cle	studies				
45.	Title of Co	urse		Profession	nal ski	lls					
46.	Code			2FI130421							
47.	Study prog	gram		Computer	engine	erin	g and technologies				
48.	Organizer program	of the Study	/	Faculty of	Comp	uter	Science				
49.		, second or udies)	third	First	First						
50.		year/ seme	ster	Second ye Third semester	7. Number of ECTS 4						
51.	Professor	(s)		Asso. Prof.	. Aleks	and	ar Krstev PhD				
52.	Requirements the course	ents for enro	olling	None							
53.	Aims of the	e course (co			minary	, pro	ofessional, scientific a	and deg	ree works.		
54.	Elements introduced accessorie	on the subject program: on academically writing, structure on the labor (cover side, text, font, content, abstract, d part, main part, conclusion, used literature, summary), programs for writing on text and ies, presentation on the paper, publication on labor, correction, review.									
55.		f learning: Leamwork, co		, auditory and laboratory exercises, electronically learning, homemade							
56.	Total amou	unt of availa	ble time:	ne: 4 ECTS x 30 hours = 120 hours							
57.	Distribution	n of availabl	e time: 30	0+15+30+30	0+15 =	120	hours (2+1+1)				
	Forms of to	eaching /	15.1	teaching	, e-tea	chin	al - contact g rs = 30 hours)	30 ho	ours		
58.	learning ad		15.2	Theoretical and practical exercises, e- exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)				15 hours			
			16.1	Projects				30 hours			
59.	Other form activities	ns of	16.2	Individua	Individual work				ours		
	donvinos		16.3	Home lea	arning			15 h	ours		
60.	Method of assessmen										
	17.1	Tests / Ora	al Exam		20+2	0+3	0 points				
61.	17.2	Individual work (prese				oints					
	17.3	Activity an	d particip	ation	10+1	0 pc	pints				
		•			up to 50 points			5	(five)	(F)	
					51 to	60	points	6	(six)	(E)	
62.	Assessme	nt Criteria (scores/ po	oints)	61 to	70	points	7	(seven)	(D)	
					71 to 80 points				(eight)	(C)	
					81 to	90	points	9	(nine)	(B)	

				91 to 100 points	10 (ten)	(A)			
63.	_		roval and entrance to the transition in the next year	60% success from all pre-exams activities that is 42 points from both colloquia, the seminary, regularity on lectures and exercises					
64.	Langu	age of t	eaching / study	English					
65.		ds of me	easuring / monitoring the hing	Self-evaluation					
	Literat	ure							
		Basic	literature						
66.		No Author		Title	Publisher	Year			
	22.1	1.	A. Krstev, Z. Zdravev	Academic writhing	UDG	2019			
		2.	Margot Northey/Judy Jevinsky	Writing with meaning	Arberia design, Aunt	2010			
	22.2	Additi	ional literature						
		No	Author	Title	Publisher	Year			

Annex	3.	Program of the c	ourse for First c	ycle	studies			
1.	Title of Cou	irse	Algebraic Structures					
2.	Code		2FI131221					
3.	Study progr	ram	Computer Engir	eerir	ng and Technologies			
4.	Organizer o	Goce Delchev University – Stip Faculty of Computer Science						
5.	Level (first, cycle of stu	second or third dies)	First cycle					
6.	Academic y	/ear/ semester	Second year / Third semester	7.	Number of ECTS	4		
7.	Professor (s)	prof. Limonka Koceva Lazarova					
8.	Requirement the course	nts for enrolling	None					
9.	Students to	e course (compete become familiar wi prove simpler clair	ith the basic algel	oraic	and numerical structure	es, to solve successfully		
10	Content of Groupoid. S A subgroup groups. Dih domain. Fie	on the subject prog Semigroup. Subgrou b. Finite groups. Ho dedral groups. Symn elds.	ram: upoids. Congruen momorphisms an netric groups. Pel	d iso muta	morphisms of groups. Cation groups. Normal sul	ce of numbers. A group. Cyclic and finite Abelian bgroups. Rings. Integral		
11	Methods of learning: Lectures, theoretical and practical exercises, e-learning, teamwork, consultations.							
12	2 Total amount of available time: 4 ECTS x 30 hours = 120 hours							
13	3 Distribution of available time: 30 + 30 + 15 + 15 + 30 = 120 hours (2 + 1 +1)							

14		of teac		15.1	(15 wee	, e-teaching ks x 2 hours = 30 hours) cal and practical exercises, e-	30 h	nurs		
	lealilli				exams, p seminar	preparation of independent	30 110	30 hours		
				16.1	Projects		15 h	ours		
15	Other activiti	forms o es	f	16.2	Individua	al work	15 h	ours		
				16.3	Home le	arning	30 h	ours		
16	Metho						•			
	17.1 Tests / Oral Exam					70 scores				
17	17.2 Individual practical)			work (pres	sentation,	10 scores				
	17.3	Ac	ctivity an	d participa	ation	20 scores				
						up to 50 points	5	(five)	(F)	
						51 to 60 points	6	(six)	(E)	
4.0	Assessment Criteria (scores/ points)					61 to 70 points	7	(seven)	(D)	
18	Asses	sment C	zriteria (s	scores/ po	ints)	71 to 80 points	8	(eight)	(C)	
						81 to 90 points	9	(nine)	(B)	
						91 to 100 points	10	(ten)	(A)	
19				d entrance n in the ne		60% active participation at the course				
20	Langu	age of t	eaching	/ study		English				
21		ds of mo		J / monitor	ing the	Standardized motor tests, observation, survey Self-evaluation				
	Literat	ure								
		Basic	literatur	re						
22		No	Autho	or		Title	Publi	sher	Year	
4 4	22.1	1.	Peter	J. Camer	on	Notes on Algebraic Structures			2006	
		2.	Janko Mara	ko Böhm, Magdaleen ais		Introduction to Algebraic Structures Lecture Notes 2019			2019	
	22.2	Addit	ional lite	rature						
		No	Autho	or		Title	Publi	sher	Year	

Appendix 3.	Program of the Course for First cycle studies
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1.	Title of	Course		Operating Syst	tems						
2.	Code			2FI102421							
3.	Study p	rogram		Computer Engir	neering and Technol	ogies					
4.	Organiz program	er of the		Goce Delchev U	Jniversity – Stip outer science						
5.		first, seco		First cycle							
6.	Academ semeste		yeai/	Second year / IV semester	Number of ECTS	3	6				
1.	Profess	or (s)		Ass. Professor I	Mirjana Kocaleva Vi	tanova					
2.	Require enrolling	ements g the cours	for e	None							
3.					ncepts and way of fu heir components, as						
4.	Contents of the course (per 15 weeks per semester): Introduction to operating systems, function, concepts, structure of operating systems. Processes, core concept, program, process, process states, process implementation. Process management, process behaviour, process scheduling algorithms, and threads. Inter process communication and synchronization, race condition, critical section model. Congestion, Resources, Resource Acquisition, Congestion Handling. Memory management, memory address binding, memory allocation algorithms. Virtual memory and paging, page table, paging algorithms. Input/output devices, device classification, I/O system architecture, principles of I/O software. File system, data entities – files, directories, security, and protection of file systems. File system performance, file system examples. Disks and secondary memories, structure of secondary memory, optical disks. Disk Arm Algorithms, Stable Storage, Redundant Array of Inexpensive Disks (RAID).										
5.	Method	s of learnii	ng: Lectu		and practical exerc	cises, c	onsultation	s; creation of an			
6.					0 hours = 180 hours	3					
7.	Distribu	tion of avai	lable tim	e: 30+30+30+3(0+60 = 180 hours (2	+2+1)					
8.	Forms teaching	of g /	15.1	Lectures / tl teaching, e-lea	heoretical, contact arning	30 hours					
•	learning activities		15.2		actical, laboratory, minars, teamwork)	30 ho	ours				
			16.1	Projects		30 ho	urs				
9.	Other activities		16.2	Individual worl	k	30 ho	urs				
1	1		16.3	Home learning)	60 ho	urs				
	Method assessr										
10	47.4	Tests / O	ral Exam		70 scores						
	17.2 Individual work projects, practical)			(presentation,	10 scores						
	17.3	Activity a	nd partici	pation	20 scores						
		-			up to 50 points	5	(five)	(F)			
	Assessi	ment Criter	ia (score	s/ points)	51 to 60 points	6	(six)	(E)			
					61 to 70 points	7	(seven)	(D)			

				71 to 80 points	8 (eight)	(C)		
				81 to 90 points	9 (nine)	(B)		
				91 to 100 points	10 (ten)	(A)		
12.			and entrance to the ion in the next year	60% active participa	ation at the cour	se		
13.	Language of	teachin	g / study	English				
14.	Methods of quality of tead		ing / monitoring the	Self-evaluation				
	Literature							
•		Basic	literature					
		No Author		Title	Publisher	Year		
15.	22.1	1.	William Stallings	Operating Systems: Internals and Design Principles	Prentice Hall	2011		
		2.	Andrew Tannenbaum	Modern operating systems	Pearson Prentice-Hall	2015		
	22.2	Additi	onal literature					
		No	Author	Title	Publisher	Year		
•		1.	Andrew Tannenbaum	Modern operating systems	Prentice Hall	2007		

Anne	x 3.	Program of the	course for First c	ycle	studies				
67.	Title of Cou	ırse	Operational research						
68.	Code		2FI102123						
69.	Study prog	ram	Computer engin	eerir	g and technologies				
70.	Organizer of the Study program		Faculty of Comp	Faculty of Computer Science					
71.	Level (first, cycle of stu	second or third dies)	First						
72.	Academic y	/ear/ semester	Second year / Fourth semester	7.	Number of ECTS	6			
73.	Professor (s)	Asso. Prof. Alek	sand	ar Krstev PhD				
74.	Requireme the course	nts for enrolling	None						
75.	Introduction	ims of the course (competences): attroduction in Operational research through lin., integer and non-linear programming, and other echniques of i.e., and application							

76.	Models algorith applica	on Ope m, adv	rational anced ory on	lin. progra games, no	LP, graphic mming, in	c solve, simplex method, app teger linearly programming ogramming, methods for solv	g, Analysis	on decis	ions and	
77.					boratory exk, consulta	xercises, numerical exercise itions.	s, electroni	cally learni	ng,	
78.						0 hours = 180 hours				
79.	Distribu	ition of a	availabl	e time: 30-	+30+30+30	0+60 = 180 hours (2+2+1)				
	Forms	of teach	nina /	15.1	teaching	/ theoretical - contact , e-teaching ks x 2 hours = 30 hours)	30 hours	3		
80.		learning activities			e-exams independ	cal and practical exercises, , preparation of dent seminar work ks x 2 hours = 30 hours)	30 hours	3		
				16.1	Projects		30 hours	3		
81.	Other for	orms of		16.2	Individua	al work	30 hours	3		
				16.3	Home lea	arning	60 hours	60 hours		
82.	Method of assessment									
	17.1	Tes	sts / Ora	al Exam		20+20+30 points				
83.	17.2		ividual	work (pres	entation,	10 points				
	17.3	Act	tivity an	d participa	tion	10+10 points				
						up to 50 points	5	(five)	(F)	
						51 to 60 points	6	(six)	(E)	
84.	Accocc	ment C	ritoria (s	scores/ poi	inte)	61 to 70 points	7	(seven)	(D)	
04.	A33633	ineni O	interia (s	scores/ por	1113)	71 to 80 points	8	(eight)	(C)	
						81 to 90 points	9	(nine)	(B)	
						91 to 100 points	10	(ten)	(A)	
85.				d entrance n in the ne		60% success from all pre- points from both colloquia lectures and exercises				
86.	Langua	ige of te	aching	/ study		English				
87.		ls of me of teach		/ monitori	ng the	Self-evaluation				
	Literatu	ıre								
		Basic	literatur	е						
88.		No	Autho	or		Title	Publishe	r	Year	
	22.1	1.	Hamo	di A. Taha		Operational research: introduction	Magor, S	Skopje,	2010	
		2.	S. Kr	čevinac an	d others	Operational research	Faculty organiza	itional	2004	

				science, Belgrade	
22.2	Additio	nal literature			
	No	Author	Title	Publisher	Year
	1.	Dr John J. Petric	Operational research: book first book _ another	Contemporary administration, Belgrade	1974
	2.	A.Krstev, Z.Zdravev, M.Lukarevski	Operational research	UGD	2018

1.	3. Program of the Course for Integrated First cycle studies								
'.[Title of Co	urse		Database Syste	ems				
2.	Code			2FI102521					
3.	Study prog	ıram		Computer Engineering and Technologies					
	Organizer program	of the Stud	у		Goce Delchev University – Stip Computer Science Faculty				
5.		, second or udies)	third	First cycle		,			
6.	Academic	year/ seme	ster	Second year / IV semester	7.	Number of ECTS		6	
7.	Professor	(s)		Full Professor C	veta	Martinovska Bande)		
	Requirements	ents for enro	olling	None					
9.	This cours and impler	nentation ir	ndamenta Microsof	als of database ma t SQL Server.		ement systems, prii	nciples o	f database o	design
10	Contents of the course (per 15 weeks per semester): Characteristics of the modern relational database systems. Data models: E-R model, object-oriented and object-relational. Semi-structured models and XML. Functional dependencies and Boyce-Codd normal form. Schema design and normalization. Multivalued dependencies. Relational algebra and operations (selection, projection, product, join). Query language, query processing and optimization. Integrity constraints, assertions, and triggers. System aspects of SQL, SQL in a programming environment. Functions and procedures stored in the schema. Transaction management, recovery and concurrency control.								
		f learning: I		Discussions, Lab	s, Pra	actical exercises, e-	-learning,	, individual a	and
12 .	Total amou	unt of availa	able time:	6 ECTS x 30 hou	rs a	= 180 hours			
13	Distribution	n of availab	le time: 30	0 + 30 + 30 + 30 -	+ 60	= 180 hours (2 + 2	+1)		
14	Forms of to	eaching /	15.1	Lectures / theo teaching, e-lea		-	30 hours		
	learning ad	ctivities	15.2	Exercises (pra theoretical, se			30 hc	ours	
			16.1	Projects			30 hc	ours	
	Other form activities	s of	16.2	Individual worl	<		30 hc	ours	
			16.3	Home learning	J		60 hc	ours	
	Method of assessmen	nt					•		
	17.1	Tests / Or	al Exam		7	0 scores			
17	17.2	Individual projects, p		sentation,	1	0 scores			
	17.3	Activity an		ation	2	0 scores			
					u	p to 50 points	5	(five)	(F)
18	Assessment Criteria (scores/ p			oints)	5	1 to 60 points	6	(six)	(E)

1						
				71 to 80 points	8 (eight)	(C)
				81 to 90 points	9 (nine)	(B)
				91 to 100 points	10 (ten)	(A)
19	exam/ or transition		ntrance to the final next year	60% active participation	on at the course	
20	Language of tea	ching / st	tudy	English		
21	Methods of measteaching	suring / r	nonitoring the quality of	Standardized motor te Self-evaluation	sts, observation,	survey
	Literature					
		Basic I	iterature			
		No	Author	Title	Publisher	Year
22	22.1	1.	Hector Garcia Molina, Jeffrey Ullman and Jennifer Widom	Database Systems: The Complete Book	Prentice Hall	2002
		2.	Ramez Elmastri and Shamkant Navathe	Fundamentals of Database Systems	Addison- Wesley	2007
		3.	Raghu Ramakrishnan and Johannes Gehrke	Database Management Systems	McGraw Hill	2003
	22.2	Additio	nal literature			
		No	Author	Title	Publisher	Year
		1.	Avi Silberschatz, Henry Korth, and S. Sudarshan	Database System Concepts	McGraw Hill	2010
		2.	Paul DuBois	MySQL	Addison- Wesley	2008
			Microsoft SQL Server 2022	https://learn.microsof t.com/en- us/sql/relational- databases/database s/databases?view=s gl-server-ver16	Microsoft	2022

Anne	x 3.	Program of the	Course for Firs	t cyc	le studies				
1.	Title of Course		Visual prograr	Visual programming					
2.	Code		2FI102621						
3.	Study program		Computer engir	Computer engineering and technologies					
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of informatics						
5.	Level (first, s	second or third dies)	First cycle	First cycle					
6.	Academic ye	ear/ semester	2 year / II semester	7.	Number of ECTS	6			
7.	Professor (s)	Prof. Sasho Ko	Prof. Sasho Koceski					
8	Requiremen the course	ts for enrolling	None						

9	Acquisitio working w of basic p experienc (Graphica	rith a visual ractical kno e in visual p I User Interf e in visual p	ical knowle tool for rap wledge of programmi face - GUI	edge of Visual Propid application de object-oriented prog of Windows ap using Visual C #	ogramming; Gaining p velopment - Visual Stu rogramming language oplications with graphic programming langua /EB applications using	udio 2010; C#; Gaini cal user int ge; Gainin	The acquisit ng practical erface g practical		
10 1	Fundame Visual Stu Studio and multiple for Browse for Picker, Do Font Dialo with advar Open Dialo Print Dialo Radio But advanced advanced of databas C #	ntals of visuatio as a dedits configuorms, button or Folder, Cromain Up-Dog, Group Bog; Visual pog Box, Printons, Rich Tvisual controls programme	ral program velopment uration; Vis us, menus) neck Box, own; Visua ox, Image controls: N programmi ut Preview; Fext Box, S rols: Tab C rols: Tick (tool for visual programming and events; Visu Checked List Box al programming w List, Label, Link I Masked Text Box, ng with advanced Visual programm Save dialog, Scro Control, Table, La Counter, Timer Ti	ter): programs for visual programming; Operating - basic visual controls al programming with a c, Color Dialog, Combo rith advanced visual co abel, List Box, List Vi Menu Strip, Month Ca I visual controls: Page hing with advanced vis II Bar, Split Container; yout Panel, Text Box; me Picker, Track Bar, lamentals of database	environmos (forms an advanced vontrols: Floew; Visual alendar, Nu Setup, Paual control Visual provisual progree View	ent of Visual d work with visual contro text Menu D w Layout Paprogramminumeric Up-Dnel, Pictures: Progress gramming wgramming w; Fundamen	ls: ate anel, g own, Box, Bar, iith ith	
ו "ו	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours								
11		unt of availa	able time:	6 ECTS x 30 hou	rs = 180 hours				
1: 1	Distributio	n of availab	ole time: 30)+30+30+30+60 =	= 180 hours (2+2+1)				
	Forms of		15.1	Lectures / theo teaching, e-lear	rning				
	learning a	ctivities	15.2		ctical, laboratory, ninars, team work)	30 hours			
			16.1	Projects	<u> </u>	30 hours			
	Other forn	ns of	16.2	Individual work		30 hours			
			16.3	Home learning		60 hours			
	Method of assessme			-		•			
	17.1	Tests / Ora	al Exam				70 p	oints	
1 .	17.2	Individual v projects, p		entation,			10 p	oints	
-	17.3	Activity and		tion			20 p	oints	
					up to 50 points	5	(five)	(F)	
11	Assessme	ent Criteria ((scores/ po	pints)	51 to 60 points	6	(six)	(E)	
	61 to 70 points 7 (seven) D								

				71 to 80 points	8 ((eight)	(C)
				81 to 90 points	9	(nine)	(B)
				91 to 100 points	10	(ten)	(A)
19	Signature appro exam/ or transiti		entrance to the final e next year	60% active participa	tion at the co	urse	
20	Language of tea	ching /	study	English			
2	Methods of mea of teaching	suring /	monitoring the quality	Standardized tests, of Self-evaluation	observation, s	survey	
	Literature						
		Basic	literature				
		No Author		Title	Publisher		Yea r
22	22.1	1.	Џон Ц. Мичел	Концепти во програмските јазици	Cambridge University Press- преводи од Влада на РМ		201
		2.	Хектор Гарсија – Молина, Џефри Д. Улман и Џенифер Видом	Системи за бази на податоци – комплетна книга	а податоци – Education-		200
		3.	Џенифер Тидвел	Дизајнирање интерфејси	Oʻ Reilly Media- преводи од Влада на РМ		200
	22.2	Additi	onal literature				
		No	Author	Title	Publisher		Year
		1.	Сашо Коцески	Визуелно програмирање	Универзите Гоце Делче Штип		2013
		2.	John Sharp	Microsoft® Visual C#® 2010 Step by Step	Microsoft Pi		2010
		3.	BEN WATSON	C# 4.0 How-To, 2010 SAMS Publisher, ISBN- 13: 978-0-672- 33063-6	SAMS Publ	isher	2010

Annex 3.		Program of the course for First cycle studies			
1.	1. Title of Course		Computer Networks		
2.			2FI102721		
3.	3. Study program		Computer Engineering and Technologies		

4.	Organizer program	of the Study			elchev University – Stip of Computer Sciences					
5.		, second or a	third	First cycle						
6.	Academic	year/ semes	ter	Second ye Fourth semester	ar /	7.	Number of ECTS		6	
7.	Professor	(s)		Aleksandra Mileva						
8.	Requirements	ents for enro	lling	None						
9.	Students to contempor	e course (competences): o acquire theoretical and practical knowledge of computer networks, as well as of ary network technologies, protocols and standards								
	Contents of the course (per 15 weeks per semester): Introduction in computer networks, protocol architecture, OSI and TCP/IP models, Circuit switching networks vs Packet-switching networks; Physical layer: data transmission, transmission media, signal encoding techniques;									
10	Data-link layer: Data link control protocols, HDLC, multiplexing, spread spectrum, MAC sublayer, local networks, topologies, hubs, bridges, switches, Ethernet, Fibre Channel, Wireless LANs (IEEE 802.11);									
	Network layer: routers, internetworking, IPv4, IPv6, ICMP, ARP, RARP, DHCP, multicasting, IGMP, routing protocols (OSPF, RIP, BGP), RSVP, Integrated Services Architecture, Differentiated services, VPN and IPSec;									
	•	Transport layer: TCP and UDP;								
11	Application layer: HTTP, DNS, FTP, SMTP, IMAP, POP3, etc. Methods of learning: Lectures, theoretical and practical exercises, e-learning, team work, consultations.									
12	Total amo	unt of availa	ble time: 6	ECTS x 3	0 hour	's = '	180 hours			
13	Distribution	n of available	e time: 30	+ 30 + 30 -	+ 30 +	60 =	= 180 hours (2 + 2 +	1)		
14	Forms of teaching / learning activities		15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)			30 ho	urs		
14			15.2	Theoretical and practical exercises, e- exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)				30 ho	urs	
	Other forms of activities		16.1	Projects			30 ho	urs		
15			16.2	Individual work			30 ho	urs		
			16.3	Home lea	arning		60 ho	urs		
16	Method of assessme	nt								
	17.1 Tests / Oral Exa			70 scores			3			
17	17.2 Individual work (presentation, practical)			10 scores						
	17.3	7.3 Activity and participation			20 scores					

l i				T	1			
18	Assessment Criteria (scores/ points)			up to 50 points	5	(five)	(F)	
				51 to 60 points	6	(six)	(E)	
				61 to 70 points	7	(seven)	(D)	
				71 to 80 points	8	(eight)	(C)	
				81 to 90 points	9	(nine)	(B)	
				91 to 100 points	10	(ten)	(A)	
19	Signature approval and entrance to the final exam/ or transition in the next year			60% active participation at the course				
20	Langua	age of te	aching / study	English				
21		ds of me of teach	asuring / monitoring the ing	Standardized motor tests, observation, survey Self-evaluation				
	Literature							
		Basic	literature					
22	22.1	No	Author	Title	Publis	sher	Year	
22		1 1. William Stallings		Data and Computer Communications, 8 th Edition - има превод на макед. јазик (9 th Edition)			2007 (2010)	
		2.	Andrew S. Tanenbaum, David J. Wetherall	Computer Networks, 5 th Edition	Prentice Hall		2010	
	22.2	Additional literature						
		No	Author	Title	Publis	sher	Year	
·		1.	Alberto Leon-Garcia, Indra Widjaja	Communication Networks: fundamental concepts and key architectures, 2 nd Edition	McGr	aw-Hill	2003	

Append	Appendix 3. Program of the		Course for First cycle studies						
1.	Title of Co	ourse	Computational tools in engineering						
2.	Code		2FI102023						
3.	Study pro	gram	Computer Engineering and Technologies						
4.	Organize program	r of the Study	Goce Delchev University – Stip Faculty of computer science						
5.	Level (first	st, second or third tudies)	First cycle						
6.	Academic year/ semester		2/4	7.	Number of ECTS	6			
1.	Professor	· (s)	Prof. Vlado Gicev						
2.	Requirem	nents for enrolling e	none						
3.	Aims of the course (competences): Gain theoretical and practical knowledge of the computational tools using in engineering sciences. Acquiring skills and knowledge for using and coding in Matlab.								

	Contents	s of the cour	se (per 15	weeks per seme	ester):				
4.	auto cor eigenved	relation and ctors in eng	cross coi ineering. I	relation. Eigenva ntroduction in pa	rms. Time series and o lues and eigenvectors. rtial differential equatio les. Initial and boundar	Application of e	eigenvalues and olution of partial		
5.					work assignments, min	•			
6.	Total am	ount of ava	ilable time	: 6 ECTS x 30 ho	ours = 180 hours				
7.	Distribut	ion of availa	hle time: 1	30 + 30 + 30 + 30	+ 60 = 180 hours (2 +	2 ±1)			
8.	Forms of	f teaching /	15.1	•	theoretical, contact	, 	nours		
	learning	activities	15.2		ractical, laboratory, inars, team work)	30 l	nours		
	•		16.1	Projects	, , , , , , , , , , , , , , , , , , , ,	30 l	nours		
9.	Other activities	forms of	16.2	Individual work		30 l	nours		
			16.3	Home learning		60 I	nours		
	Method assessm	of nent							
10.	17.1	Tests / Ora	al Exam		70 scores				
	17.2	Individual projects, p	work	(presentation,	10 scores				
	17.3	Activity an		ation	20 scores				
					up to 50 points	5 (five)	(F)		
					51 to 60 points	6 (six)	(E)		
11.	Accocca	nent Criteria	(ccoroc/r	oointe)	61 to 70 points	7 (seven)	(D)		
	A33C3311	neni Chiena	(300163/)	Joints)	71 to 80 points	8 (eight)	(C)		
					81 to 90 points	9 (nine)	(B)		
					91 to 100 points	10 (ten)	(A)		
12.		e approval r transition in		nce to the final year	Gaining at least 42 during the semester midterm exams, 10 p from presence on lect	r from which: oints from proje	40 points from ct and 20 points		
13.	Languag	ge of teachin	g / study		English				
14.	Methods of teachi		ng / monit	oring the quality	,				
	Literatur	e							
		Basi	c literature	Э	.				
15.		No	Autho		Title	Publisher	Year		
	22.1	1.	E Krey	/szig	Advanced engineering mathematics	John Wiley & Sons	1999		
		2.							

	3.				
22.2	Additio	nal literature			
	No	Author	Title	Publisher	Year
	1.				

Append	dix 3.	Program	of the C	ourse for First cy	/cle	studies					
1.	Title of C	ourse		Computer Arch	itect	ure					
2.	Code			2FI103321							
3.	Study program			Computer Engi	ineei	ring and Technologies					
4.	Organizer of the Study program			Goce Delchev Faculty of com							
5.		st, second	or third	First cycle	paro						
6.		c year/ ser	nester	Third / V	7.	Number of ECTS	8				
1.	Professor (s) Ass. Professor Dusan Bikov										
2.	Requiren	nents for e	nrolling	None							
3.	Aims of the Aim	he course of the cou	se is for	students to bed	ome	familiar with the compone	nts of modern computer				
4.	Introduction development of the computation organization addressing addressing addressing the control of the co	Systems and their functionality. Contents of the course (per 15 weeks per semester): Introduction, computer system design and concepts, historical development, contemporary trends in development. Data presentation and logic circuits, number systems, binary operations, nomenclature. Hardware organization, single and multiple processor systems, multiple function computation, structure of a modern computer system. Architecture of a simple computer, organization of central processing unit, bus. System clock, I/O devices, memory organization and addressing, instruction processing, assembly language. Instruction set, instruction formats, addressing methods. Arithmetic logic unit, architecture, functional units, real implementations. Control unit and microprogramming, functional description, microprogramming, nano-programming. Memory organization, memory types, memory hierarchy, cache memory, virtual memory. CPU Chips and Buses, CPU Chips, Buses, Bus Arbitrage, Bus Operations. Examples of CPU chips and buses, Pentium IV –CPU, ISA bus, PCI bus, PCI Express bus, USB. I/O units and data storage systems,									
5.	Lectures,		al and p			onsultations, seminar work colloquiums; consultations.					
6.				ne: 8 ECTS x 30		·					
7.	Distribution	on of avail	able time	e: 45+30+30+60	+75	= 240 hours (3+2+2)					
8.	Forms of	teaching learning	15.1	learning		tical, contact teaching, e-	45 hours				
	activities	9	15.2	Exercises (pr seminars, tea		cal, laboratory, theoretical, ork)	30 hours				
9.	Other fo	orms of	16.1	Projects			30 hours				
	activities		16.2	Individual wo	rk		60 hours				

			16.3	Home learning				75 hours	
	Method assessr	of nent					•		
10.	17.1	Tests / Ora	al Exam		70 scores				
	17.2	Individual projects, p	work ractical)	(presentation,	10 scores				
	17.3	Activity and	d particip	ation	20 scores				
					up to 50 points	5	(five)	(F)	
					51 to 60 points	6	(six)	(E)	
11.	A 	n and Oritaria	. ((nainta)	61 to 70 points	7	(seven)	(D)	
	Assessi	nent Criteria	(scores/	points)	71 to 80 points	8	(eight)	(C)	
					81 to 90 points	9	(nine)	(B)	
					91 to 100 points	10	(ten)	(A)	
12.		re approval r transition in		ance to the final t year	60% active participation at the course				
13.		ge of teachir			English				
14.		s of meas of teaching	uring /	monitoring the	Self-evaluation				
	Literatu								
		Basi	c literatur	re	<u> </u>				
		No	Autho	or	Title	Publis	her	Year	
15.	22.1	1.	Willia	m Stallings	Computer Organization and Architecture: Designing for Performance	Prenti	ce Hall	2009	
		2.	Andre Taner	ew S. nbaum	Structured Computer Organization	Pears Colleg		2006	
		3.		L. Hennessy, A. Patterson	Computer Architecture: A Quantitative Approach	Morga Kaufm		2006	
	22.2	Addi	itional lite	rature					
		No	Autho	or	Title	Publis	her	Year	
		1.							
		2.							

,	Appendix 3. Program of the C			ourse for First cycle studies
	1.	Title of Course		Internet Programming
	2.	Code		2FI103421

3.	Study pr	ogram		Computer Engi	Computer Engineering and Technologies							
4.	Organize program	er of the	Study	Goce Delchev Faculty of comp								
5.		st, second	or third	First cycle								
6.	Academ	ic year/ sen	nester	Third / fifth	7.	Number of ECTS		8				
1.	Professo	or (s)		Ass. Prof. Dr. A	leks	andar Velinov						
2.	Requirer	ments for er se	nrolling									
3.	Introduc	the course tion to web ipt an JQue	develop		o pro	ogramming languag	je, MyS	SQL, HTM	L5, Bootstrap,			
4.	- Introdu - Introdu - Introdu - Introdu - PHP fil - Strings - Strings - Introdu - Search - User de - Databae - Authen	 Introduction, Web architecture; Introduction to HTML and XHTML; Introduction to Bootstrap Introduction to JavaScript and JQuery Introduction to PHP; PHP files; Strings and functions in PHP, regular expressions; Strings and sessions; Introduction to web applications with databases; Searching web-oriented databases; User driven search; Databases in web applications; Authentication Security of web applications Analysis of web applications 										
5.		of learni			/ e>	cercises, e-learning	g, sem	inar work	k, team work,			
6.			ilable tin	ne: 8 ECTS x 30	hou	ırs = 240 hours						
7.	Distribut	ion of availa	able time	e: 45+30+30+60-	⊦75 :	= 240 hours (3+2+2)					
8.	Forms o	f teaching learning	15.1	Lectures / teaching, e-le		eoretical, contact	45 hc	ours				
	activities	•	15.2	,	•	tical, laboratory, ars, teamwork)	30 hc	ours				
	Other	fa	16.1	Projects			30 hc	ours				
9.	Other activities		16.2	Individual wor			60 hc					
	Method	of	16.3	Home learnin	g		75 hc	ours				
	assessm											
10.					_	0 scores						
	17.2	Individual projects, p	work oractical)	(presentation	' 1	0 scores						
	17.3	Activity an	d partici	pation	2	20 scores						
				up to 50 points 5 (five) (F)				, _ \				
11.	Assessn	nent Criteria	a (scores	:/ noints)	u	p to 50 points	5	(five)	(F)			

				61 to 70 points	7 (seven)	(D)		
				71 to 80 points	8 (eight)	(C)		
				81 to 90 points	9 (nine)	(B)		
				91 to 100 points	10 (ten)	(A)		
	exam/ or trans		nd entrance to the final the next year	60% success from all pre-exam activities ie. 42 points from the two colloquiums, the seminar paper, attendance at lectures and exercises				
13.	Language of to	eaching	/ study	English				
14.	Methods of quality of teach		ing / monitoring the	Self-evaluation				
	Literature							
		Basic	literature					
	. 22.1	No	Author	Title	Publisher	Year		
15.		1.	Anuradha A. Puntambekar	Internet Programming	Technical Publications	2020		
10.		2.	Scobey, Pawan Lingras	Web Programming and Internet Technologies	Jones & Bartlett Publishers	2016		
		3.	Robin Nixon	Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5	O'Reilly Media	2015		
	22.2	Additio	onal literature					
		No	Author	Title	Publisher	Year		
		1. Kris Jamsa		Introduction to Web Development Using HTML 5	Jones & Bartlett Publishers	2014		
		2.	Max Bramer	Web Programming with PHP and MySQL: A Practical Guide	Springer	2015		

Anne	x 3.	Course for First cycle studies								
1.	1. Title of Course		Computer Gra	Computer Graphics and Visualization						
2.	Code		2FI103521							
3.	3. Study program		Computer engineering and technologies							
4.	Organizer of program	of the Study	Goce Delchev University – Stip Faculty of informatics							
5.	Level (first, cycle of stu	second or third udies)	First cycle							
6.	Academic year/ semester		3 year / V semester	7.	Number of ECTS	6				
7.	Professor ((s)	Prof. Sasho Koceski							

8.	Requirem the course	ents for enr	olling	None							
		e course (c his course a			o computer graphic	S.					
	• To	o give an ov	erview o	f the technologies	and devices used in	n compu	ter graphics:				
	• Vi	ideo control	lers, mor	nitors, walkers, poi	nting devices.						
9.		o familiarize ased	students	s with the theoretic	cal concepts on whic	ch comp	uter graphics	sis			
		To introduce students to algorithms, methods and techniques used in computer graphics and visualization									
	 To introduce students to the principles of graphics systems and APIs with main emphasis on OpenGL 										
	To give students practical programming skills in the field of computer graphics										
10	This cours Computer foundation Removal/0 technique	Contents of the course (per 15 weeks per semester): This course covers the following topics: Introduction to computer graphics and visualization, Computer Graphics Devices, Computer Graphics libraries and OpenGL, Mathematical foundations for Computer Graphics, Geometry for KG, 3D views, 3D transformations, Removal/Clipping of invisible surfaces, Rasterization and filling, Anti-aliasing, Photogrametry techniques, Computer games, Information visualization – methods, techniques and tools, Applicative software for Computer Graphics									
11	Methods of	of learning: Discussions		•	es, e-learning, indivi	dual and	I team projec	cts,			
12			able time	: 6 ECTS x 30 hou	ırs = 180 hours						
13	Distributio	n of availab	le time: 3	30+30+30+30+60	= 180 hours (2+2+1)					
14	Forms of t	teaching /	15.1	Lectures / theor teaching, e-lear	30 hours						
	learning a	ctivities	15.2	Exercises (practheoretical, sem	30 hours						
			16.1	Projects		30 hou	ırs				
15	Other forn activities	ns of	16.2	Individual work		30 hou					
	N (1 1 (16.3	Home learning		60 hours					
16	Method of assessme										
	17.1	Tests / Ora	al Exam				70) points			
17	17.2	Individual projects, p		esentation,			10) points			
	17.3	Activity an	d particip	ation			20) points			
					up to 50 points	5	(five)	(F)			
18	Δεερεεπε	ent Criteria (scores/ r	ooints)	51 to 60 points	6	(six)	(E)			
	~3353311lt	on Cinena ((300169/ F	onito)	61 to 70 points	7	(seven)	(D)			
					71 to 80 points	8	(eight)	(C)			

				81 to 90 points	9 (nine)	(B)
				•	,	. ,
				91 to 100 points	10 (ten)	(A)
19	Signature appro exam/ or transit		entrance to the final e next year	60% active particip	oation at the course)
20	Language of tea	aching /	study	English		
21	Methods of mea	asuring /	monitoring the quality	Standardized tests Self-evaluation	s, observation, surv	еу
	Literature					
1		Basic	literature			
		No	Author	Title	Publisher	Year
22	22.1	1.	Foley, J., van Dam, A., Feiner, S., Hughes, J.	Computer Graphics – Principles and Practice (3rd edition in C)	Addison Wesley	2013
		2.	Watt, Alan	3D Computer Graphics	Addison Wesley	2000
		3. Sasho Koceski		Графика и визуелизација	· · ·	
	22.2	Additio	onal literature			
		No	Author	Title	Publisher	Year
		1.	Dave Shreiner, D., Woo, M., Neider, J., Davis, T.	OpenGL Programming Guide:The Official Guide to Learning OpenGL, Version 2(5th Edition)	AddisonWesley Professional	2005
		2.	Jeffrey J. McConnell	Computer Graphics: Theory Into Practice	Jones and Bartlett Publishers	2009

Annex	Annex 3. Program of the co		ourse for First cycle studies							
1.	1. Title of Course		Advanced algo	Advanced algorithms						
2.	Code		2FI131721							
3.	Study program		Computer Engineering and Technologies							
4.	Organizer of program	of the Study	Goce Delchev University – Stip Faculty of Computer Sciences							
5.	Level (first, second or third cycle of studies)		First cycle							
6.	Academic y	/ear/ semester	Third year / Fifth semester	7.	Number of ECTS	4				

7.	Professor	(s)		Natasha S	tojkovikj				
8.	Requirements the course	ents for enro	lling	None					
9.	Students to algorithms		eoretical a	ınd practica	al knowledge for design and ana	alyse of	f various		
10	Introduction big O, Ω μ Ramdomiz Technique and backtr Algorithm, algorithm.	O. Data struced algorithms for design cacking. Grashortest paspanning tr	d space couctures: st n.: Las Ve of algorith aph algorith th Algorith ees: Krusk	omplexity of acks ,queugas algorithms: dividems:Depth Firms:Dijkstrakal's algorit	semester): of algorithms. Analysis of algorities, linked lists, treesbinary searthm and Monte Calro algorithms and conquer, dynamic program First Search (DFS) Algorithm, Ea's algorithm, Bellman-Ford algorithm, Prim algorithm. Flow netwoerson algorithm.	rch tree . Sortin nming, Breadth orithm,	e, hash table ng algorithm: greedy algo n First Search Floyd–Wars	rithms n (BFS)	
11	Methods o consultation	_	ectures, th	neoretical a	and practical exercises, e-learni	ng, tea	m work,		
12	Total amo	unt of availa	ble time: 4	4 ECTS x 3	0 hours = 120 hours				
13	Distribution	n of availabl	e time: 30	+ 15 + 30	+ 30 + 15 = 120 hours (2 + 1 +1)			
14	Forms of to	eaching /	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)			30 hours		
	learning ad	15.2	exams, p	cal and practical exercises, e- preparation of independent work ks x 1 hours = 15 hours)	15 ho	ours			
			16.1	Projects		30 hc	ours		
15	Other form activities	is of	16.2	Individual work			30 hours		
			16.3	Home lea	earning 15 hours				
16	Method of assessme	nt							
	17.1	Tests / Ora	al Exam		70 scores				
17	17.2	Individual v practical)	work (pres	entation,	10 scores				
	17.3	Activity and	d participa	ition	20 scores				
					up to 50 points	5	(five)	(F)	
					51 to 60 points	6	(six)	(E)	
18	Assassma	nt Criteria (s	cores/ no	inte)	61 to 70 points	7	(seven)	(D)	
	Assessine	iii Ciiteila (s	scores/ por	1116)	71 to 80 points	8	(eight)	(C)	
					81 to 90 points	9	(nine)	(B)	
					91 to 100 points	10	(ten)	(A)	
19		approval and or transitio			60% active participation at the	course	е		

20	Langua	age of tea	aching / study	English			
21	Methods of measuring / monitoring the quality of teaching			Standardized motor tests, observation, survey Self-evaluation			
	Literatu	ıre					
		Basic I	iterature				
00		No	Author	Title	Publisher	Year	
22	22.1	1. Thomas H. Cormen Charles E. Leiserson Ronald L. Rivest Clifford Stein		Introduction to Algorithms, 3rd Edition	MIT Press	2009	
		2.	Robert Lafore	Data structures and algorithms in Java	Sams	2003	
	22.2	Additio	nal literature				
		No	Author	Title	Publisher	Year	
		1.	Michael Goodrich Roberto Tamassia	Data Structures and Algorithms in Java	2010		

Appen	dix 3.	Program of the	Course for First	сус	cle studies			
1.	Title of C	Course	Parallel Programming					
2.	Code		2FI131821					
3.	Study pr	ogram	Computer Eng	gine	ering and Technologies			
4.	Organizo program	er of the Study	Goce Delchev		iversity – Stip ter science			
5.	Level (f	irst, second or ele of studies)	First cycle					
6.						4		
1.	Professo	or (s)	Ass. Professor Dusan Bikov					
2.	- 1	ments for the course	None					
3.	The aim of parall	el programing, by	or students to by presenting th	e m	nodel of heterogeneous	c principles and characteristics parallel programming. For the		
4.	principles of parallel programming model as MPI and CUDA C. Parallel communication models: map, scatter, gather, reduce, etc. Memory model and different types of variables. Flow control and synchronization. Warp shuffles, and reduction / scan operations. Parallel implementation of matrix multiplication. Parallel Patterns, Convolution, Scan, Histogram. Parallel Sorting Algorithms. Parallel							
5.	sorting algorithms. Optimizing MPI and CUDA programs. Methods of learning: Lectures, theoretical and practical exercises, consultations, seminar work / project; home study, homework, preparatory teaching for exams and colloquiums; consultations.							

6.	Total ar	mount of av	/ailable t	me: 4 ECTS x 3	30 hours = 120 hours	3			
7.	Distribu	tion of ava	ilable tim	e: 30+15+30+3	0+15 = 120 hours (2-	+1+1)			
8.	Forms teachin	of g /	15.1	Lectures / the	oretical, contact teac		30 hours		
	learning activitie		15.2	Exercises theoretical, se	(practical, labora minars, teamwork)		15 hours		
			16.1	Projects				30 hours	
9.	Other activitie	forms of s	16.2	Individual wor	k				30 hours
			16.3	Home learning	9				15 hours
	Method assessi								
10	17.1	Tests / O	ral Exam		70 scores				
	17.2	Individua projects,		(presentation,	10 scores				
	17.3	Activity a	nd partic	pation	20 scores				
					up to 50 points	5	(five)	(F)	
					51 to 60 points	6	(six)	(E)	
11	Assessment Criteria (scores/ points)				61 to 70 points	7	(seven)	(D)	
	Assess	ment Chte	:s/ points)	71 to 80 points	8	(eight)	(C)		
				81 to 90 points	9	(nine)	(B)		
					91 to 100 points	10	(ten)	(A)	
12	final ex			ntrance to the the next year	60% active particip	ation a	at the cou	rse	
13	Langua	ge of teach	ning / stu	dy	English				
14		s of meas		monitoring the	Self-evaluation				
	Literatu	re							
		Bas	ic literatu	ıre					
		No	Autho	or	Title	Publ	isher	Year	
15		1.	Calvi Snyd		Principles of Parallel Programming	Pea	rson	2008	
13	22.1	D. Kirk and W. Hwu 2.		Programming Massively Parallel Processors – A Hands-on Approach	Moro Kaut	Edition, gan fman lisher	2013		
		3.	Micha	ael J, Quinn	Parallel Programming in C with MPI and OpenMP	McGraw-Hill Science /Engineering /Math		2003	
<u> </u>	22.2	Ado	litional lit	erature		ı		1	
		No	Autho	or	Title	Publ	isher	Year	

	4		
	1		
	1.		

Annex	· 3.	Program	of the co	urse for First cycle studies				
1.	Title of Cou	irse		Network Protocols				
2.	Code			2FI132021				
3.	Study progr	ram		Computer Engineering and Technologies				
4.	Organizer o	of the Study		Goce Delchev University – Stip Faculty of Computer Sciences				
5.	Level (first, cycle of stu		third	First cycle				
6.	Academic y	,		Third year / 7. Number of ECTS	4			
7.	Professor (s)		Aleksandra Mileva				
8.	Requirement the course	nts for enro	olling	None				
9.	Aims of the course (competences): Students to acquire theoretical and practical knowledge of network protocols and network administration, as well as of contemporary network technologies and standards Contents of the course (per 15 weeks per semester):							
10	Virtual loca Configuration Trunking Proposition Spanning Toperation First Hop Roder CDP, Layer Virtualization DHCP and	h configura I networks on of Route rotocol - VT ree Protoce edundancy r discovery on, installing DHCP serv NS server ate Networl	tion and m (VLANs) er-on-a-stice P ol (STP) and Protocol of Protocol of g and confiver installation ks (VPNs)	nanagement ok and multilayer switch, Dynamic Trunkin and Rapid STP (FHRP), and Level 2 discovery protocols (LLDP) iguring some virtualization software (Virtuation, configuration and management an, configuration and management	Cisco Discovery Protocol -			
11	Methods of consultation	_	ectures, th	neoretical and practical exercises, e-learni	ng, team work,			
12			ble time: 4	ECTS x 30 hours = 120 hours				
13	Distribution	of availabl	e time: 30	+ 15 + 30 + 30 + 15 = 120 hours (2 + 1 +	1)			
14	Forms of te	aching /	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours			
. 7		Forms of teaching / learning activities		Theoretical and practical exercises, e- exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)	15 hours			
15		s of	16.1	Projects	30 hours			
	activities		16.2	Individual work	30 hours			

			16.3	Home le	arning	15 ho	urs			
16	Method assessi									
	17.1	Tests	/ Oral Exam		70 scores					
17	17.2	Individ practio	lual work (prese cal)	entation,	10 scores					
	17.3	Activity	y and participat	ion	20 scores					
					up to 50 points	5	(five)	(F)		
					51 to 60 points	6	(six)	(E)		
18	^	t Oit -		-4-\	61 to 70 points	7	(seven)	(D)		
	Assess	ment Crite	ria (scores/ poi	nts)	71 to 80 points	8	(eight)	(C)		
					81 to 90 points	9	(nine)	(B)		
					91 to 100 points	10	(ten)	(A)		
19			al and entrance sition in the ne		60% active participation at the course					
20	Langua	ge of teach	ning / study	•	English					
21		ls of measu	uring / monitorir	ng the	Standardized motor tests, obs Self-evaluation	ervatio	n, survey			
	Literatu	re								
		Basic literature								
		No A	uthor		Title	Publisher		Year		
	22.1	William Stallings 1.		Data and Computer Communications, 8 th Edition - има превод на макед. јазик (9 th Edition)			2007 (2010)			
		/	andrew S. Tane David J. Wether	-	Computer Networks, 5 th Edition	Prent	ice Hall	2010		
22		Additiona	l literature			•				
		No A	uthor		Title	Publis	sher	Year		
	22.2		alberto Leon-Ga ndra Widjaja	arcia,	Communication Networks: fundamental concepts and key architectures, 2 nd Edition	McGr	aw-Hill	2003		
	22.2	2.			Tutorial from Internet about installation, configuration and management of router, switch, DHCP server, DNS server, virtualization software, etc.					

Appendix 3. Program of the Co			ourse for First cycle studies
1.	Title of Co	ourse	Mobile and Wireless Networks
2.			2FI131921

3.	Study program	Computer Engi	neeri	ng and Technologies	
4.	Organizer of the Study program	Goce Delchev U			
5.	Level (first, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	2023 / 5	7.	Number of ECTS	4
1.	Professor	Associate Profe	essor	. Done Stojanov	
2.	Requirements for enrolling the course	/			
3.	Aims of the course (competer The course studies modern to students will be able to under transmission.	elecommunication			
4.	Contents of the course (per Signals as carriers of Sinusoidal signal electrical Noise Noise Mathematical model Fourier series Channel capacity Commutation technic ATM switching Antennas Antenna – types and Signal attenuation Modulation basic pri The concept of carrier Amplitude modulation Frequency modulation Phase modulation	of information ements: amplitude of the noise ques d specifications nciples er		,	
	 QAM: quadrature an 	nplitude modulati	on		
5.	Methods of learning: Lecture	s, practice in lab	orato	ory, home learning	
6.	Total amount of available tim	ne: 4 ECTS x 30	h = 1	20 h	
7.	Distribution of available time	: 30+30+15+15+	30=1	20 h (2+1+1)	

/ learning activities Exercises (practical, laboratory, theoretical, seminars, teamwork) 30				
9. Other forms of 16.2 Individual work 15				
1 16 2 I Individual Work 1 15				
16.3 Home learning 30	30			
Method of assessment				
10. 17.1 Tests / Oral Exam 70 scores				
17.2 Individual work (presentation, projects, practical) 10 scores				
17.3 Activity and participation 20 scores				
up to 50 points 5 (five	e) (F)			
51 to 60 points 6 (six	(E)			
11. 61 to 70 points 7 (se	ven) (D)			
Assessment Criteria (scores/ points) 71 to 80 points 8 (eight	ght) (C)			
81 to 90 points 9 (nin	ne) (B)			
91 to 100 points 10 (ter	n) (A)			
12. Signature approval and entrance to the final exam/ or transition in the next year	/			
13. Language of teaching / study English	English			
14 Methods of measuring / monitoring the quality				
of teaching	Self-evaluation			
Literature				
Basic literature				
No Author Title Publisher				
22.1 1. Al Agha, K., Pujolle, Mobile and wireless John Wile Sons.	ey & 2016.			
2.				
3.				
22.2 Additional literature				
No Author Title Publisher	Year			
1.				

Anne	x 3.	Program	of the Co	Course for First cycle studies							
23	Title of Co	urse		Microcom	puter S	yst	ems				
24	Code			2FI103921	2FI103921						
25	Study prog	ıram		Computer Engineering and Technologies							
26	Organizer program	of the Study	1	Goce Delchev University – Stip Faculty of Computer Sciences							
27	Level (first	, second or	third	First cycle							
28	cycle of stu	•	ster	Third year Sixth seme	/ 7	7 .	Number of ECTS		6		
29	Professor	(s)		Aleksandra		ova	a Ilievska				
30	Requirements the course	ents for enro	lling	None							
31	Aims of the course (competences):									ples for	
32	Contents of the course (per 15 weeks per semester): Introduction to Microcomputer Systems, 8085 Microprocessor Architecture, Machine Cycles, Memory, I/O, Interrupts, Programming with 8085 assembler, Architecture of 8086 and 8088 microprocessors, Machine cycles, memory, input/output, interrupts, 8086 and 8088 assembler language and assembler programming, Introduction to Microcontrollers - Similarities and Differences with Microprocessors. Introduction to some microcontrollers, their architecture, and applications										
33	Methods of learning: Lectures, theoretical and practical exercises, e-learning, team projects, practical work with different tools, consultations.										
34											
35	Distribution	n of availabl	e time: 30	+ 30 + 30	+ 30 + 6	60 =	= 180 hours (2 + 2 -	+ 1)			
		a a a bisa a /	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)			30 h	30 hours			
36	Forms of to learning ac		15.2	Theoretical and practical exercises, e- exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)			30 h	30 hours			
			16.1	Projects			,	30 h	ours		
37	Other form activities	s of	16.2	Individua	al work			30 h	ours		
			16.3	Home le	arning			60 h	ours		
38	Method of assessmen	nt									
	17.1	Tests / Ora	al Exam /	Team	70 sco	res					
39	Individual work (presentation			sentation,	10 sco	res					
	17.3 Activity and participation			20 sco	res						
					up to 5	0 p	points	5	(five)	(F)	
40	Assessme	nt Critoria (s	scores/ no	ints)	51 to 6	60 p	points	6	(six)	(E)	
40	799699III6	in Ontena (S	ooies/ þ0	mito)	61 to 7	'0 p	ooints	7	(seven)	(D)	
					71 to 80 points			8	(eight)	(C)	

				81 to 90 points	9 (nine)	(B)		
				91 to 100 points	10 (ten)	(A)		
41			roval and entrance to the transition in the next year	60% active participation at the course				
42	Langu	age of te	eaching / study	English				
43		ds of me of teach	easuring / monitoring the ning	Standardized motor tests, obs Self-evaluation	servation, survey			
	Literat	ure						
		Basic	literature					
	22.1	No	Author	Title	Publisher	Year		
44		1.	BREY B	INTEL MICROPROCESSORS: Architecture, Programming, and Interfacing, 8th Ed	Pearson, Prentice Hall	2009		
		2.	N.S.Kumar, M. Saravanan, S Jeevananthan	Microprocessors and Oxford Microcontrollers University Press				
		3.	Douglas V. Hall	Microprocessors and Interfacing	Tata McGraw Hill Publications Ltd., Revised Third Edition	2008		
	22.2	Additi	onal literature					
		No	Author	Title	Publisher	Year		
	1. R. J. Tocci, F. J. Ambrossio		•	Microprocessors and Microcomputers: Hardware and Software, 6th Ed	Prentice Hall	2002		
		2.						
		3.						

Annex 3. Program of the course for First cycle studies									
89.	Title of Course		ICT Project Management						
90.	Code		2FI104021						
91.	Study program		Computer engineering and technologies						
92.	Organizer of the Study program		Faculty of Computer Science						
93.	Level (first, second or third cycle of studies)		First						
94.	Academic y	rear/ semester	Third year / Sixth semester	7.	Number of ECTS	6			
95.	Professor (s)	Asso. Prof. Alek	sand	ar Krstev PhD				
96.	Requirement the course	nts for enrolling	None						
97.	Aims of the	ns of the course (competences):							

	estimate of interface of understandestimating	n the necess with the gov ding on the	sary one's referring one one of the one of t	esources for team. The team. The team organize on the team organize on the team of the tea	ailed project plans, schedule for the project, allocation and one same as that everything rationally change, identifying the projects, how and overco	coordinati expects on thos	ng on resourd to develop s se concerned	ces, and kills for d sides,
98.	Content of ICT mana communic Planning of The role of Reports for as well as Testing and Change mon the charagem on the charagem with issue implication Managem Meeting wanagem	on the subject gement _ pation, negotion the project in the project risks) and plans for anagement anges and the gand concept the challenges on motions on internation politic with both ment Body of	ct program projects: lif ciation, active ct (definition tory, library ct and cont testing in organ ne process eptualizatio es on the in vation, inter ational team cs on the or nost used Knowledge	ie cycle of on, and property on the property on the property on the change of the chan	schedule, costs, quality, reso oject, as well as control on the tition, the volume, schedule, of the role on IT specialists how ses. hanges. ation, understanding and controlled in the role on IT specialists how ses. hanges. ation, understanding and controlled in the role of the	urces, hone version expenses agents for ping with a the project d Enviror	ow and risks). ns. s, quality, res or change, pro resistance. ocess on cl s: PMBOK onments 2).	ources, ediction Dealing nanges; (Project
99.		laboratory e consultatio		umerically	exercises, electronically lead	rning, ser	minary work,	project,
100.	Total amo	unt of availa	ıble time: 6	ECTS x 3	30 hours = 180 hours			
101.	Distributio	n of availabl	le time: 30-	+30+30+30	0+60=180 hours (2+2+1)			
			15.1	teaching	/ theoretical - contact , e-teaching ks x 2 hours = 30 hours)	30 hour	rs .	
102.		Forms of teaching / learning activities		e-exams independ	cal and practical exercises, , preparation of dent seminar work ks x 1 hours = 15 hours)	30 hours		
			16.1	Projects		30 hours		
103.	Other form activities	ns of	16.2	Individua	al work	30 hour	'S	
			16.3	Home le	arning	60 hour	s	
104.	Method of assessme							
	17.1	Tests / Ora	al Exam		20+20+30 points			
105.	17.2	Individual practical)	work (pres	entation,	10 points			
	17.3	Activity an	d participa	tion	10+10 points			
					up to 50 points	5	(five)	(F)
					51 to 60 points	6	(six)	(E)
106.	Assessme	ent Criteria (scores/ poi	nts)	61 to 70 points	7	(seven)	(D)
					71 to 80 points	8	(eight)	(C)
					81 to 90 points	9	(nine)	(B)

				91 to 100 points	10 (te	n) (A)					
107.			oval and entrance to the ransition in the next year	60% success from all pre-exams activities that is 42 points from both colloquia, the seminary, regularity on lectures and exercises							
108.	Langua	age of te	eaching / study	English							
109.		ds of me of teach	asuring / monitoring the ing	Self-evaluation							
	Literat	ure									
		Basic	literature								
		No	Author	Title	Publisher	Year					
110.	22.1	1.	Harold Kerzner	Project Management: A J.Wiley&Sons 20 Systems Approach to Planning, Scheduling, and Controlling							
		2.	Esther Cameron, Mike Green	Making Sense of Change Management: A Complete Guide to the Models Tools and Techniques of Organizational Change							
		3.	A. Krstev, Z. Zdravev	Management on IT projects	UDG Stip	2019					
	22.2	Additio	onal literature								
		No	Author	Title	Publisher	Year					
		1.									
		2.									

Annex	c 3.	Program of the C	Course for First	cycle	studies				
1.	1. Title of Course		Information Theory						
2.	Code		2FI104121						
3.	Study program		Computer Engineering and Technologies						
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of Computer Sciences						
5.	Level (first, cycle of stu	second or third idies)	First cycle	First cycle					
6.	Academic y	year/ semester	Fourth year / Sixth semester	7.	Number of ECTS	6			
7.	Professor (s)	Natasha Stojkovikj						
8.	Requireme the course	nts for enrolling	None						

appropriate mathematical models, and their application. Contents of the course (per 15 weeks per semester): Introduction to Information Theory. Deterministic and probabilistic systems. Information measures: entropy, information, mutual information, condicentropy. Properties of entropy. Relative entropy. Chain Rules. Some in	itional entropies, joint nequalities for entropy and					
Introduction to Information Theory. Deterministic and probabilistic system. Information measures: entropy, information, mutual information, condi	itional entropies, joint nequalities for entropy and					
system. Information measures: entropy, information, mutual information, condi	itional entropies, joint nequalities for entropy and					
Information measures: entropy, information, mutual information, condi	nequalities for entropy and					
	nequalities for entropy and					
	inequality, Fano's inequality.					
10 information: Jensen's inequality, Log-sum inequality, Data processing						
Asymptotic Equipartition Property (AEP).	Lance Marilla Control Pro					
Differential entropy. Information Sources: Discrete, stationary, memory General aspects of coding. Fixed-Length and Variable-Length Codes.						
algorithm. Shannon's binary code. Gilbert - Moore code. Shannon - Fa						
communication channel. Encoder and decoder of communication chan						
11 Methods of learning: Lectures, theoretical and practical exercises, e-le	earning, team projects,					
practical work with different tools, consultations.						
Total amount of available time: 6 ECTS x 30 hours = 180 hours						
Distribution of available time: $30 + 30 + 30 + 60 = 180$ nours (2 +	,					
Lectures / theoretical - contact teaching, e-teaching	30 hours					
(15 weeks x 2 hours – 30 hours)						
14 Forms of teaching / Theoretical and practical evereigns (e- 30 hours					
learning activities exams, preparation of independent						
15.2 seminar work						
(15 weeks x 2 hours = 30 hours)						
15 Other forms of	30 hours					
activities 16.2 Individual work	30 hours					
16.3 Home learning	60 hours					
16 Method of						
assessment Tests / Oral Exam / Team						
project 70 scores	70 scores					
17 17.2 Individual work (presentation, practical) 10 scores	10 scores					
17.3 Activity and participation 20 scores						
up to 50 points	5 (five) (F)					
51 to 60 points	6 (six) (E)					
18 Assessment Criteria (scores/ points) 61 to 70 points	7 (seven) (D)					
71 to 80 points	8 (eight) (C)					
81 to 90 points	9 (nine) (B)					
91 to 100 points	10 (ten) (A)					
19 Signature approval and entrance to the final exam/ or transition in the next year 60% active participation at	the course					
Language of teaching / study English						
21 Methods of measuring / monitoring the quality of teaching Standardized motor tests, so Self-evaluation	observation, survey					

	Literatu	ıre							
		Basic I	literature						
		No	Author	Title	Publisher	Year			
22	22.1	Stojkovikj,N, Miteva M, 1. Utkovski Z, Karamazova E		Information theory -Teaching material	UGD	2018			
		2. Miteva M, Stojkovikj,N, Utkovski Z		Information theory -Teaching practicum	UGD	2018			
	22.2	Additio	onal literature						
		No	Author	Title	Publisher	Year			
		1.	Thomas M. Cover, Joy A. Thomas	Elements of Information Theory	John Wiley & Sons	2006			
	2. 3.		Z. Pause	Introduction to information theory	Skolska knjiga, Zagreb	1980			
			David J.,C. MacKay	Information Theory, Inference, and Learning Algorithms	Cambridge University Press	2003			

Append	dix 3.	Program of the C	ourse for First c	ycle	studies				
1.	Title of C	ourse	Numerical Met	Numerical Methods					
2.	Code		2FI104221						
3.	Study pro	ogram	Computer Engineering and Technologies						
4.	Organize program	er of the Study	Goce Delchev Faculty of com						
5.		st, second or third studies)	First cycle						
6.		c year/ semester	3 / 6 7. Number of ECTS 6						
1.	Professo	r (s)	Prof. Vlado Gicev						
2.	Requiren enrolling	nents for the course	none						
3.	Getting s solutions	. The student ge	nathematical and ts competencies	s for	gineering problems for wl finding approximative n				
4.	satisfactory accuracy for the considered problem. Contents of the course (per 15 weeks per semester): Introduction. Vector norms. Errors. Direct and indirect methods for solving system of linear algebraic equations. Numerical methods for solving nonlinear equations. Polynomial interpolation. Lagrange and Newton interpolation formulae. Method of least squares. Methods of approximative solutions of a definite integral – quadrature. Numerical methods for solving ordinary differential equations.								
5.	Methods	Methods of learning: lectures, excercises. Homework assignments, two mini projects.							

6.	Total am	ount of ava	ailable tim	e: 6 EKTS x 30 ł	nours = 18	30 ho	urs			
7.	Distribut	ion of availa	able time:							
8.	Forms of	f teaching	15.1	Lectures / contact teachin	theoret g, e-learn	,		30 hours		
0.	/ activities	learning	15.2	Exercises laboratory, seminars, team	(pract theoret work)		30 hours			
			16.1	Projects			30 hours			
9.	Other factivities		16.2	Individual work			30 hours			
			16.3	Home learning				60 hours		
	Method assessm	of nent								
10.	17.1	Tests / Or	al Exam		70 score	s				
	17.2	Individual projects, p		(presentation,	10 score	s				
	17.3	Activity an	d particip	ation	20 score	s				
					up to points	50	5	(five)	(F)	
					51 to points	60	6	(six)	(E)	
11.	^	/ : t \	61 to points	70	7	(seven)	(D)			
	Assessm	points)	71 to points	80	8	(eight)	(C)			
					81 to points	90	9	(nine)	(B)	
					•	100	10	(ten)	(A)	
12.		e approval transition		ance to the final	Gaining at least 42 out of 70 points from activities during the semester from which: 40 points from midterm exams, 10 points from project and 20 points from presence on lectures and discussions.					
13.	Languag	e of teachi	ng / study	,	English					
14.		of meas	uring /	monitoring the	•					
	Literatur									
		Bas	ic literatu	re						
		No	Autho	or	Title		Publisher			Year
15.	22.1	1.	wu_C	Y. Yang Wen ao Tae- Chung John	Applied numerica methods using Matlab	i	John Wiley and Sons, E – book: https://fmipa.umri.ac.id/wp- content/uploads/2016/03/W on Y. Yang Wenwu Cao Tae- Sang Chung John Morr BookZZ.orgpdf		2005	
	2. W.H. Press, Teukolsky,				Numeric recipes Fortran	in	Cambridge	University F	Press	2003

			Vetterling, B.P. Flannery									
		3.										
	22.2	Additio	Additional literature									
		No	Author	Title	Publisher	Year						
		1.										

Append	dix 3.	Program	of the C	Course for First o	ycle s	tudies					
1.	Title of C	ourse		Modern Comp	uter A	rchitectu	res				
2.	Code			2FI103323							
3.	Study pro	gram		Computer Eng	ineeri	ng and T	echnologi	es			
4.	Organize program	r of the	Study		Goce Delchev University – Stip Faculty of computer science						
5.	Level (first	st, second studies)	or third	First cycle	First cycle						
6.	Academi	c year/ ser	nester	Third / VI	7.	Number	of ECTS		6		
1.	Professo	r (s)		Ass. Professor	Dusa	n Bikov					
2.	Requirem enrolling	nents the course	for	None							
3.	The aim systems.	Students	irse is fo will be a	or students to b ble to design, m	aintai	n and pr	ogram mo		eterogeneous computer leterogeneous computer		
4.	systems with modern processors and computer elements. Contents of the course (per 15 weeks per semester): Modern microprocessors, POST RISC technology, superscalar and VLIW processors, GPUs, sequential and out-of-order processing, register renaming, branch prediction, instruction issuance, instruction storage and delivery, instruction execution, instruction completion, and instruction recall. Memory architecture design. Analysis of modern processors from Intel, IBM and Sun. Clusters, Shared Memory Multiprocessors, and their performance. Programming on multicore processors. Advanced graphic processing units and their utilization. Algorithmic techniques in GPU programming.										
5.	Methods Lectures,	of learning theoretics	al and p	ractical exercise					k / project; home study,		
6.	Total amo	ount of ava	ailable tii	me: 6 ECTS x 3	0 hou	rs = 180	hours				
7.	Distribution	on of avail	able time	e: 30+30+30+30)+60 =	: 180 hou	urs (2+2+1	1)			
8.	Forms of / activities	teaching learning	15.1 15.2	Lectures / teaching, e-le Exercises (theoretical, se	earnin (practi	g cal, la	contact boratory, work)	30 hc			
	,		16.1	Projects		2, 200.11	/	30 hc	ours		
9.	Other for activities	orms of	16.2	Individual wo	rk			30 hc	ours		
			16.3	Home learning	ng			60 hc	ours		

	Method assessn	of nent							
10.	17.1	Tests / Oral	Exam	70 scores					
	17.2	Individual projects, pra	work (presentation, actical)	10 scores					
	17.3	Activity and	participation	20 scores					
				up to 50 points	5 (five)	(F)			
				51 to 60 points	6 (six)	(E)			
11.	A	aant Critaria ((accrea / painta)	61 to 70 points	7 (seven)	(D)			
	Assessi	neni Chiena ((scores/ points)	71 to 80 points	8 (eight)	(C)			
				81 to 90 points	9 (nine)	(B)			
				91 to 100 points	10 (ten)	(A)			
12.			nd entrance to the final the next year	60% active participation at the course					
13.		ge of teaching		English					
14.		of measur	ring / monitoring the	Self-evaluation					
	Literatur	е							
		Basic	literature						
		No	Author	Title	Publisher	Year			
15.		1.	Hennessy, Patterson	Computer Architecture	Morgan Kauffmn	2012			
13.	22.1	2.	John L. Hennessy, David A. Patterson	Computer Architecture: A Quantitative Approach	Morgan Kaufmann	2006			
		3. Jerome Saltz Frans Kaasho		Principles of Computer System Morgan Design: An Kaufmann Introduction		2009			
	22.2	Additio	onal literature						
		No	Author	Title	Publisher	Year			
		1.							

Annex	3.	Program of the c	ourse for First cycle studies					
45	Title of Course		Introduction to statistical analysis					
46	Code		2FI103423					
47	Study program		Computer Engineering and Technologies					
48	Organizer of the Study program		Goce Delchev University – Stip Faculty of Computer Science					
49	Level (first, cycle of stud	second or third dies)	First cycle					

50	Academic	year/ semes	ster	Third year Sixth seme		7.	Number of EC	TS	6		
51	Professor	(s)		prof. Limo	nka K	ocev	a Lazarova				
52	Requirements the course	ents for enro	lling	None							
53	Students t		familiar w ble to ap _l	ith the bas			ts of statistics a wledge in solvir				
54		e statistics; I e intervals. I					statistics; Evalu analysis.	uation of para	ameters;		
55	Methods o		ectures, tl	heoretical a	and pr	actic	al exercises, e-le	earning, tear	mwork,		
56	Total amou	unt of availa	ble time: 6	ECTS x 3	0 hou	ırs =	180 hours				
57	Distribution	n of availabl	e time: 30	+ 30 + 30	+ 30 -	+ 60	= 180 hours (2 +	- 2 +1)			
	Forms of to	eaching /	15.1	teaching	, e-tea	achin	al - contact g rs = 30 hours)	30 ho	urs		
58	learning ac		15.2	Theoretical and practical exercises, e- exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)					30 hours		
			16.1	Projects				30 ho	urs		
59	Other forms of activities		16.2	Individua	al worl	<		30 ho	urs		
			16.3	Home lea	Home learning			60 ho	urs		
60	Method of assessme	nt									
	17.1	Tests / Ora	al Exam		70 scores						
61	17.2	Individual v practical)	work (pres	sentation,	10 s	core	3				
	17.3	Activity and	d participa	ation	20 s	core	5				
					up to	o 50	points	5	(five)	(F)	
					51 to	o 60 _l	ooints	6	(six)	(E)	
63	Accossmo	nt Criteria (s	coroc/ po	inte)	61 to	o 70	points	7	(seven)	(D)	
02	Assessine	in Cinena (s	scores/ po	iiiis)	71 to	o 80 c	points	8	(eight)	(C)	
					81 to	o 90	points	9	(nine)	(B)	
					91 1	to 10) points	10	(ten)	(A)	
63		approval an / or transitio			60%	activ	e participation a	at the course)		
64		of teaching		-	Eng	lish					
65	Methods o	f measuring eaching	/ monitori	ing the			ized motor tests uation	, observation	n, survey		
					1						

	Basic I	iterature			
	No Author		Title	Publisher	Year
22.1	Michael Longnecker		An Introduction to Statistical Methods and Data Analysis Fifth Edition	Duxbury Thomson Learning	2001
	2.	Roxy Peck, Chris Olsen, Jay Devore	Introduction to Statistics and Data Analysis Third Edition	Thomson Brooks/Cole	2008
22.2	Additio	nal literature			
	No	Author	Title	Publisher	Year

Annex	c 3.	Program of the (Course for First c	ycle	studies			
1.	Title of Cou	ırse	Computer Syste	em s	Security			
2.	Code		2FI104821					
3.	Study prog	ram	Computer Engin	Computer Engineering and Technologies				
4.	Organizer of program	of the Study	Goce Delchev U Faculty of Comp					
5.	Level (first, cycle of stu	second or third idies)	First cycle					
6.	Academic	year/ semester	Fourth year / Seventh semester	7.	Number of ECTS	8		
7.	Professor (s) Aleksandra Mileva							
8.	Requirements for enrolling the course None							
9.	Students to acquire theoretical and practical knowledge of the various aspects of computer							
10	Introduction Intro in crypauthenticat Software soverflow, in Identification Web secur	Systems security. Contents of the course (per 15 weeks per semester): Introduction, Security goals and design principles, Malware; Intro in cryptography – classical cryptography, PRNGs, stream and block cipher, message authentication codes, hash functions, public key cryptography, digital signatures; Software security – unsafe programming languages and common implementation flows, buffer overflow, integer overflow, format string vulnerability etc. Protection; Identification, authentication, authorization, UNIX and Windows security; Web security – security issues with session management, web application security and attacks – SQL injection, XSS, CSRF, web-browser security;						
11					and DDoS attacks.	am projects		
į I		ork with different to	•	aoti	oai oxoroisos, e-icarriirig, te			

12	Total a	mount o	f availa	able time: 8	B ECTS x 3	30 hours = 240 hours			
13	Distribu	ition of a	availab	le time: 45	+ 30 + 30	+ 60 + 75 = 240 hours (3 + 2 -	+ 2)		
1.0	Forms	Forms of teaching /		15.1	teaching	/ theoretical - contact , e-teaching ks x 3 hours = 45 hours)	45 hours		
14		g activiti		15.2	exams, p seminar	cal and practical exercises, e- preparation of independent work ks x 2 hours = 30 hours)	30 hours		
				16.1	Projects		30 hours		
15	Other for activities			16.2	Individua	al work	60 hours		
				16.3	Home lea	arning	75 hours		
16	Method assess				•				
	17.1			al Exam /	Геат	70 scores			
17	17.2 Individual work (presentation, practical)			work (pres	entation,	10 scores			
	17.3	Act	ivity an	nd participation 20 scores					
						up to 50 points	5 (five)	(F)	
						51 to 60 points	6 (six)	(E)	
18	A		.:		:nto\	61 to 70 points	7 (seven)	(D)	
	Assess	ment Ci	iteria (scores/ po	inis)	71 to 80 points	8 (eight)	(C)	
						81 to 90 points	9 (nine)	(B)	
						91 to 100 points	10 (ten)	(A)	
19				nd entrance on in the ne		60% active participation at the course			
20	Langua	ige of te	aching	/ study		English			
21		ls of me of teach		g / monitori	ing the	Standardized motor tests, obs	servation, survey	1	
	Literatu	ire							
		Basic	literatu	re					
22		No	Autho	or		Title	Publisher	Year	
	22.1	1.	C. P. Pflee	Pfleeger 8 ger	& S. L.	Security in Computing, 4 th Edition	Prentice Hall	2006	
		2.	Ross	J. Anders	on	Security Engineering, 2 nd Edition	Wiley	2008	
		3.							
	22.2	Additio	nal lite	rature					
		No	Autho			Title	Publisher	Year	
		1.	Diete	r Golman		Computer Security	Wiley	2006	

2.	A. J. Menezes, P. C. Van Oorschot, S. A. Vanstone	Handbook of Applied Cryptography	CRC Press	1996
3.	N. Smart	Cryptography: An Introduction, 3 rd Edition	McGraw Hill	2004

Annex	3.	Program	of the (Course for Integ	grate	d Second cycle stu	dies	
1.	Title of Co	urse		Artificial Intell	igen	се		
2.	Code			2FI104921				
3.	Study prog	ıram		Computer Engi	Computer Engineering and Technologies			
4.	Organizer of the Study program			Goce Delchev Computer Scie				
5.	Level (first, second or third cycle of studies)			First cycle				
6.	Academic	<i>'</i>	ester	Fourth year / VII semester	7.	Number of ECTS		8
7.	Professor	(s)			Cveta	a Martinovska Bande)	
8.	Requirements the course		olling	None				
9.	representation, inference, machine learning, problem solving and searching that are used in computer vision, robotics, natural language processing and understanding.							
1(Contents of the course (per 15 weeks per semester): Overview of Al. Knowledge representation and inference with predicate and propositional logic. Programming language Prolog. State space searching: Breadth First Search, Depth First Search, Best First Search, Hill climbing, A* algorithm. Constraint satisfaction problems. Supervised learning, regression, gradient descent. Classification: Bayesian classifier, Decision trees. Support Vector Machines. Reinforcement learning, Markov Decision Processes. Robotics, motion planning. Geometric vision. Artificial neural networks, perceptron, Adaline, backpropagation algorithm. Modeling uncertainty, Bayesian networks, Fuzzy logic. Implementation of machine learning algorithms in Python.							
	hours.	JISCUSSION	s, Labs,	Practical exercis	es, e	-learning, individual	and te	eam projects, office
12	Total amo	unt of avail	able time	e: 8 ECTS x 30 h	ours	a = 2 40 hours		
11	Distribution	n of availab	ole time:	45 + 30 + 30 + 6	60 + 7	75 = 240 hours (3 +	2 + 2))
14			15.1	Lectures / the teaching, e-le	arnir	ng	45 h	ours
	learning ad	ctivities	15.2			al, laboratory, ars, team work)	30 h	ours
			16.1	Projects			30 h	ours
15	Other form activities	is of	16.2	Individual work			60 h	ours
			16.3	Home learnin	g		75 h	ours
16	Method of assessmen	nt			_			
	17.1	Tests / Or	al Exam		7	0 scores		

17	17.2	Individual w projects, pra	ork (presentation, actical)	10 scores			
	17.3	Activity and	participation	20 scores			
				up to 50 points	5 (five)	(F)	
				51 to 60 points	6 (six)	(E)	
18		+ Oi+i /	/:	61 to 70 points	7 (seven)	(D)	
	Assessme	ent Criteria (se	cores/ points)	71 to 80 points	8 (eight)	(C)	
				81 to 90 points	9 (nine)	(B)	
				91 to 100 points	10 (ten)	(A)	
19		approval and transition in th	l entrance to the final ne next year	60% active participat	ion at the course	Э	
20	Language	of teaching /	study	English			
2′	Methods of teaching		/ monitoring the quality	Standardized motor tests, observation, survey Self-evaluation			
	Literature						
		Basic	literature				
	22.1	No	Author	Title	Publisher	Year	
22		1.	Stuart Russell and Peter Norvig	Artificial Intelligence: A Modern Approach, 3 ed.	Prentice Hall (преводи од Влада на PM)	2014	
		2.	Kevin Warwick	Artificial Intelligence, The basics	Routledge	2012	
		3.	Prateek Joshi	Artificial Intelligence with Python	Packt Publising	2017	
	22.2	Additi	onal literature				
		No	Author	Title	Publisher	Year	
		1.	Denis Rothman	Artificial Intelligence by Example	Packt Publising	2018	
			Aurélien Géron	Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow	O'Reilly Media	2019	
		3.	Ivan Bratko	Prolog Programming for Artificial Intelligence	Addison- Wesley	2001	

Annex	c 3.	Program of the C	Course for First cycle studies
1.	Title of Cou	ırse	Digital Signal Processing
2.	Code		2FI105021
3.	Study program		Computer Engineering and Technologies

4.	Organizer program	of the Study	/	Goce Delo Faculty of			rsity – Stip Sciences			
5.	Level (first cycle of st	t, second or udies)	third	First cycle						
6.	Academic	year/ seme	ster	Fourth year Seventh semester	ar /	7.	Number of ECTS		6	
7.	Professor	(s)		Natasha S	Stojkov	ʻikj				
8.	Requirements the course	ents for enro	olling	None						
9.	Students t	e course (co to acquire th of systems f	eoretical	and practic			lge of algorithms for gital filters.	signal p	orocessing,	,
10	Basic condoffrequent spectrum of properties theorem. I invariance random sign of DFT and the DFT. If (Window of the condom sign	cy in continuof analog sign of Z-transformatroduction or Stability are gnals, analod relation to sast Fourier	nals and sucus time gnal. Fou orm, inverse discreted causal g sgnal sucus a Z-transfor (FFT) transfor (FFT) transfor causal sucus sucus a causal sucus a cau	systems the and discretier Series. se Z-transfere linear systems ampling an orm, Propernsform. Digaiser window	eory, dete time Z-tra orm. F stems: e respond recording fill gital fill w desi	iscree signsforms Disconstrate the term disc	ete signals, digital signals. Fourier transform: definition, region tency spectrum of a crete time signal, Spetromere, Difference equation uction. Discrete Four DFT, Linear and peresign: Finite impulse echnique, Equiripple	rm and of convidiscrete scial sections. Discrete training indicase or respon	frequency vergence, e signal. Ca quences, S retization consform: De phyolution use (FIR) filt	auchy's hift of finition using ters
11		of learning: L				raction	cal exercises, e-learr	ning, tea	am projects	3,
12	•	unt of availa		•		ırs =	180 hours			
13							= 180 hours (2 + 2 +			
			15.1	teaching	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)			30 hc	ours	
14	Forms of t learning a	-	15.2	exams, p seminar	cal and practical exercises, e- preparation of independent work			30 hours		
			16.1	Projects			·	30 ho	ours	
15	Other form activities	ns of	16.2	Individua	al work	(30 hc	ours	
4.6	NA - (L - L - C		16.3	Home le	arning			60 ho	ours	
16	Method of assessme	nt								
	17.1	Tests / Ora project			70 s	core	3			
17	17.2	Individual practical)	work (pre	sentation,	10 s	core	5			
	17.3	Activity an	d particip	ation	20 s	core	3			
18	Assessme	ent Criteria (s	scores/ n	oints)	up to	50	points	5	(five)	(F)
		- 22.00/ P	,	51 to	60	points	6	(six)	(E)	

	II.						
				61 to 70 points	7	(seven)	(D)
				71 to 80 points	8	(eight)	(C)
				81 to 90 points	9	(nine)	(B)
				91 to 100 points	10	(ten)	(A)
19			oval and entrance to the ransition in the next year	60% active participation at the	course)	
20	Langua	age of te	eaching / study	English			
21		ds of me of teach	asuring / monitoring the iing	Standardized motor tests, obs Self-evaluation	servation	n, survey	
	Literatu	ıre					
		Basic	literature				
	22.1	No	Author	Title	Publis	her	Year
22		1.	Bogdanov M., Bogdanova S.	Digital signal processing	ETF S	kopje	1998
		2.	John G. Proakis, Dimitris G. Manolakis	Digital Signal Processing, Principles, Algorithms and Apllications , 4th Edition	Prentio	ce Hall	2006
		3.					
	22.2	Additio	onal literature				
		No	Author	Title	Publis	her	Year
		1.	Lizhe Tan, Jean Jiang	Digital Signal Processing, Principles,3 rd Edition	Acade Press	emic	2018
		2.	John G. Proakis Vinay K. Ingle	Digital Signal Processing Using MATLAB	CL Engine	2011	
		3.					

Anne	x 3.	ourse for First cy	cle s	tudies				
1.	Title of Course		Javascript-based technologies					
2.	Code		2FI133921					
3.	Study program		Computer engine	ering	and technologies			
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of informatics					
5.	Level (first, se of studies)	cond or third cycle	First cycle					
6.	Academic yea	r/ semester	4 year / VII semester	7.	Number of ECTS	4		
7.	Professor (s)		Prof. Sasho Koc	eski				
8.	Requirements course	for enrolling the	None					
9.								

		The course aims at introducing students to the basic principles and characteristics of JavaScipt based technologies for client-side and server-side programming.								
10	This course peculiarities Programmir	covers the f and mechang with Java	ollowing top nism on the Script.	as per semester): ics: Basics of Java functioning of vario	Script. JavaScript object	model. Sy jies. Asynd	yntax, sema chronous	ntics,		
1.	Methods of	learning:	-		earning, individual and te	am projec	ts office ho	ure		
12				TS x 30 hours = 1		am projec	ts, office flo	uis		
1;	Distribution	of available	time: 30 + 1	5 + 30 + 30 + 15 =	120 hours (2 + 1 + 1)					
14			15.1		etical, contact teaching,	30 hours	3			
	learning act		15.2	Exercises (pract	ical, laboratory, nars, team work)	15 hours	3			
			16.1	Projects	,	30 hours	3			
15	Other forms activities	of	16.2	Individual work		30 hours	3			
			16.3	Home learning		15 hours	3			
16	Method of a	Method of assessment								
	17.1	Tests / Ora	l Exam					70 points		
17	17.2 Individual work (presentation, projects, practical)							10 points		
	17.3	Activity and	d participatio	n		_		20 points		
					up to 50 points	5	(five)	(F)		
					51 to 60 points	6	(six)	(E)		
18	Assessmen	t Criteria (sc	ores/ points)	ı	61 to 70 points	7	(seven)	(D)		
	7.00000		o. oo, poo,		71 to 80 points	8	(eight)	(C)		
					81 to 90 points	9	(nine)	(B)		
					91 to 100 points	10	(ten)	(A)		
19		pproval and the next yea		the final exam/ or	60% active participatio	n at the co	ourse			
20	Language o	of teaching /	study		English					
2′	Methods of teaching	measuring /	monitoring t	he quality of	Standardized tests, obs	servation,	survey			
	Literature									
		Bas	sic literature							
22		No	Author		Title	Publishe	er	Year		
	22.1	1.	Deitel,	P	JavaScript for Programmers	Prentice	Hall	2009		
		2.	Herron	, D.	Node.js Web Development - Third Edition	Packt publishing		2016		

	3.	Marijn Haverbeke	Eloquent JavaScript, 3rd Edition: A Modern Introduction to Programming	No Starch Press; 3r edition	d 2018			
22.2	Addition	Additional literature						
	No	Author	Title	Publisher	Year			
	1.							
	2.							
	3.							

Anne	Annex 3. Program of t			e Course for	First	cycle studies			
1	1 Title of Course			Basics of robotics					
2	Code			2FI134021					
3	Study program			Computer engineering and technologies					
4	Organizer o	f the Stu		Goce Delchev Faculty of info					
5	Level (first, third cycle o		or	First cycle					
6	Academic y semester			4 year / VII semester	7.	Number of ECT	S	4	
7	Professor (s	s)		Prof. Sasho K	ocesk	(i			
8	Requirement enrolling the			None					
9	Aims of the course (competences): This course aims to introduce students to the basic concepts of robotics and with the basic types and								
1	Methods of	learning	:			Application of rol			
1							dividual and	team projects, office hours	
	Total amount of available time: 4 ECTS x 30 hours = 120 hours								
1	Distribution of available time: $30 + 15 + 30 + 30 + 15 = 120$ hours $(2 + 1 + 1)$								
1	Forms of to	aching	15.1	teaching, e	-learn		30 hours		
'		•		Forms of teaching / learning activities 15.2		,	(practical, laboratory, , seminars, team		

			16.1	Projects		30 hours			
1	Other for activities	ms of	16.2	Individual wor	k	30 hours			
			16.3	Home learning	9	15 hours			
1	Method o								
	17.1		s / Oral Exam						
1	17.2	Individua projects,		resentation,				10 points	
	17.3	Activity a						20 points	
		I			up to 50 points	5 (five)		(F)	
'					51 to 60 points	6	6 (six)		
1			,		61 to 70 points	7	(seven)	(D)	
	Assessm	ent Criteria	a (scores	/ points)	71 to 80 points	8	(eight)	(C)	
					81 to 90 points	9	(nine)	(B)	
					91 to 100 points	10	(ten) (A)		
1				ance to the e next year	60% active particip	pation at the co	ourse		
2	Languag	e of teachi	ng / stud	y	English				
2	Methods quality of	of measur	ing / mor	nitoring the	Standardized tests, observation, survey Self-evaluation				
	Literature				os. oranganon				
			asic litera	ature					
			o Auth	nor	Title	Publisher		Year	
2			Џон Џ.Крег 1. .1			Вовед во роботика од Влада на РМ - механика и контрола			
			Вол	астијан Трун, фрам Бургард итер Фокс	Веројатносна роботика	Massachuse Institute of Technologyп Влада на РМ	2006		
			Maja	a Mataric	The robotic primer	MIT Press	2007		
	22.2	A	dditional	literature	, pinner	l .			
		No Author Title				Publisher	Year		
			Dan	ny Staple	Learn Robotics Programming: Build and control autonomous robots using Raspberry Pi 3 and Python	Packt Publis	hing	2018	
			Wer Fue	g Sergiyenko, ndy Flores- ntes, Paolo corelli	Machine Vision and Navigation	Springer		2020	

3.	Frank Chongwoo Park and Kevin M. Lynch	Modern Robotics	Cambridge University Press	2017
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Anne	x 3.	Program	of the co	ourse for First c	ycle	studies			
111.	Title of Course			Software Testing and Analysis					
112.	Code			2FI134121					
113.	Study prog	ram		Computer engin	eerin	g and technologie	S		
114.	Organizer of program	of the Study	/	Faculty of Comp	outer	Science			
115.	Level (first, cycle of stu		third	First					
116.	Academic y	ear/ seme	ster	Fourth/ seventh	7.	Number of ECTS	S	4	
117.	Professor (s)		Asso. Prof. Alek	sand	ar Krstev PhD			
118.	Requireme the course			None					
119.	Aims of the course (competences): This course is for the students with one from the most important phases in the process on development on software that is the design on his architecture. At the same time through practical examples the students will everything acquired with applicative knowledge for documentation on architecture, hers modeling with CASE tools and with the basic one's templates and frames on software architectures. Crafting on basic components of desktop, web, and mobile applications.								
120.	Content on the subject program: Introduction in software architectures. Planning and documenting on the software one's architectures. Basic types on software architectures - object-oriented architectures, architectures based on events. Basic types on software architectures - hierarchically and architectures who they share data. Basic types on software architectures - service oriented architectures. Basic types on software architectures - architectures who they use interlayers. Basic templates for creation on object - oriented software architectures. Behavioral templates and templates based on collections. Structural templates. Competitive templates. Language for formal analysis and design on the software one's architectures (Architecture Analysis and Design Language AADL). CASE tools for modeling and design on software architectures, types, and species on testing on software								
121.						Iltations; making only only on the state of		ndent seminary ms; consultations	
122.	· · ·	•		4 ECTS x 30 hou			•	,	
123.	Distribution	of availab	e time: 3	0+15+30+30+15 :	= 120	hours (2+1+1)			
101	Forms of te	eaching /	15.1	Lectures / the teaching, e-te (15 weeks x 2	achin		30 hours		
124.	learning activities		15.2	Theoretical and practical exer e-exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)		on of ar work	15 hours	S	
			16.1	Projects			30 hours	<u> </u>	
125.	Other forms activities	s of	16.2	Individual work		30 hours			
			16.3	Home learning			15 hours		
126.	Method of assessmen	t					•		

	17.1	Tes	sts / Oral Exam	20+20+30 points						
127.	17.2		ividual work (presentation, ctical)	10 points						
	17.3	Act	ivity and participation	10+10 points						
		1		up to 50 points	5	(five)	(F)			
				51 to 60 points	6	(six)	(E)			
400		0	::t-=:-((:t)	61 to 70 points	7	(seven)	(D)			
128.	Assess	sment Ci	riteria (scores/ points)	71 to 80 points	8	(eight)	(C)			
				81 to 90 points	9	(nine)	(B)			
				91 to 100 points	10	(ten)	(A)			
129.			oval and entrance to the ransition in the next year	60% success from all pre-exams activities that is 42 points from both colloquia, the seminary, regularity on lectures and exercises						
130.	Langua	age of te	aching / study	English						
131.		ds of me of teach	asuring / monitoring the ing	Self-evaluation						
	Literati									
		Basic	literature							
		No	Author	Title	Publisher		Year			
	22.1	1.	Ian Gorton	Essential Software Architecture (2nd Edition)	Springer- Berlin He		2011			
132.		2.	Zheng Qin, Jiankuan Xing, Xiang Zheng	Software Architecture	Springer- Berlin He		2008			
		3.	Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, Paulo Merson, Robert North, Judith Stafford	Documenting Software Architectures Views and Beyond (2nd Edition)	addison-	Wesley	2010			
	22.2	Additio	onal literature							
		No	Author	Title	Publisher		Year			
		1.	Partha Kuchana	Software Architecture Design Patterns in Java	CRC Pres	ss LLC	2004			
		2.								

Append	dix 3.	Program of the Course for First cycle studies					
1.	1. Title of Course		Data Storage and Management				
2.	Code		2FI134221				
3.	Study program		Computer Engineering and Technologies				
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of computer science				
5.	5. Level (first, second or third cycle of studies)		First cycle				

6.	Academic year/ sem	nester	2023 / 7	7.	Number of ECTS		4			
1.	Professor		Associate Professor. Done Stojanov							
2.	Requirements for enrolling the course									
3.	Aims of the course (competences): The course provides insights upon fundamental principles of storage architecture design/implementation. Upon successful completion of the course, students will be able to design, analyze and implement modern data storage systems.									
	Contents of the course (per 15 weeks per semester): - Architecture of data storage									
	- Data storag	- Data storage environment								
	- CPU, memo	ory, bus,	HDD, file syste	ms						
	- HDD compo	onents								
	- Software R	AID								
	- Hardware RAID									
	- Raid levels									
4.	- Direct attached storage									
	- Optic cable technology									
	- Storage Area Network									
	- Network attached storage									
	- CIFS and NFS protocols									
	- Backup and recovery									
	- Data replica									
	- Storage virt	ualizatio	n							
5.	Methods of learning	: Lecture	es, practice in la	bora	tory, home learning					
6.	Total amount of available time: 4 ECTS x 30 h = 120 h									
7.	Distribution of available time: 30+30+15+15+30=120 h (2+1+1)									
8.	Forms of teaching / learning	15.1	teaching, e-learning		ng	30				
	activities	15.2			tical, laboratory, ars, teamwork)	30				
9.	Other forms of	16.1	Projects			15				
9.	activities	16.2	Individual work 15							
		16.3	Home learning			30				

	Method assessr		of								
10.	17.1	Test	s / Oral	Exam		70 :	scores				
	17.2		ridual ects, pra	work ctical)	(presentation,	10 scores					
	17.3	Activ	ity and	participa	ation	20 scores					
						up t	o 50 points	5 (f	ive)	(F)	
						51 t	o 60 points	6 (s	six)	(E)	
11.	Assess	mant (`ritoria (scores/	nointe)	61 t	o 70 points	7 (s	seven)	(D)	
	A33633	mem c	ontena (300163/	points)	71 t	o 80 points	8 (6	eight)	(C)	
						81 t	o 90 points	9 (r	nine)	(B)	
						91	to 100 points	10 (t	en)	(A)	
12.	Signatu exam/ c				nce to the final tyear	/					
13.	Langua	ge of t	eaching	/ study		Eng	llish				
14.	Method quality			ing / r	monitoring the	Self	Self-evaluation				
	Literatu										
			Basic	literatur	е						
45			No	Author		Title)	Publish	er	Year	
15.	22.1	22.1		Toigo,	Toigo, J.W.		holy grail of a storage nagement.	Prentice- Hall, Inc.		1999	
			2.								
			3.								
	22.2		Additio	onal liter	rature						
			No	Autho	r	Title)	Publish	er	Year	
			1.								
Append	dix 3.		Progran	n of the	Course for First	cycle	studies				
1.	Title	of Cou	rse		Introduction t	o Da	ta Science				
2.	Code				2FI105621						
3.	Study	, progr	am		Computer Eng	ineer	ing and Technolo	gies			
4.	Orga		of the	Study	Goce Delchev Faculty of com						
5.	Level	(first	seco	nd or s)	First cycle	1 2.131					
6.			ear/ ser		Fourth / eighth	7.	Number of ECT	S	4		
1.	Profe	ssor (s	s)		Ass. Prof. Dr. /	Aleks	andar Velinov				

2.	Requirements enrolling the course	for								
3.	Aims of the course This course introdu tool for solving bus	(competer ices studer iness challe	nts to the field of enges. The cour		e cycle of data analytics as a ation for basic and advanced ologies and tools.					
	Contents of the cou	**	•	nester):						
	- Data, Data	bases and	SQL							
	- Big Data									
	- MapReduce									
	- Big Data Analytics									
	- Techniques for Data Analysis									
	- Getting Ins	ights from	Data							
4.	- Data Quality and Preprocessing									
	- Clustering									
	- Classification									
	- Predictive Methods									
	- Popular Data Analytics Applications									
	- Python Pro	Python Programming Language								
	- Machine Lo	earning for	Data Science							
	- Data Colle	ction, Expe	erimentation and	Evaluation						
5.		ng: Lecture	es, laboratory ex	kercises, e-learning,	seminar work, team work,					
6.	consultations. Total amount of av	ailable time	e: 4 ECTS x 30 l	nours = 120 hours						
7.	Distribution of avail	able time:	30+15+30+30+	15 = 120 hours (2+1-	+1)					
		15.1	Lectures / th	neoretical, contact	30					
8.	Forms of teaching / learning activities	45.0	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	actical, laboratory,	15					
		15.2 16.1	Projects	minars, teamwork)	30					
9.	Other forms of activities	16.2	Individual worl	(30					
		16.3	Home learning		15					
10.	Method of assessment									
	17.1 Tests / Or	al Exam		70 scores						

	17.2	Individual projects, pra	work (presentation, ctical)	10 scores				
	17.3	Activity and p	participation	20 scores				
				up to 50 points	5 (five)	(F)		
				51 to 60 points	6 (six)	(E)		
11.	٨٥٥٥٥٥	mant Critaria (accrec/points)	61 to 70 points	7 (seven)	(D)		
	Assess	ment Chteria (scores/ points)	71 to 80 points	8 (eight)	(C)		
				81 to 90 points	9 (nine)	(B)		
				91 to 100 points	10 (ten)	(A)		
12.		re approval ar	nd entrance to the final the next year	60% success from all pre-exam activities i.e. 42 points from the two colloquiums, the seminar paper, attendance at lectures and exercises				
13.	Langua	ge of teaching	/ study	English				
14.		s of measur of teaching	ing / monitoring the	Self-evaluation				
	Literatu	re						
		Basic	literature					
	22.1	No	Author	Title	Publisher	Year		
15.		1.	Chirag Shah	A Hands-On Introduction to Data Science	Cambridge University Pres	s 2020		
		2.	João Moreira, Andre Carvalho, Tomás Horvath	A General Introduction to Data Analytics	John Wiley Sons	& 2019		
		3.	Joel Grus	Data Science from Scratch: First Principles with Python	O'Reilly Medi	a, 2015		
	22.2	Additi	onal literature					
		No	Author	Title	Publisher	Year		
		1.	Francesco Corea	An Introduction to Data: Everything You Need to Know About AI, Big Data and Data Science	Springer	2019		
		2.	John D. Kelleher, Brendan Tierney	Data Science	MIT Press	2018		

Appendix	x 3.	Program of the C	Course for First cycle studies			
1.	Title of Cou	urse	Distributed Computer Systems			
2.	Code		2FI104421			
3.	3. Study program		Computer Engineering and Technologies			

program Faculty of computer science 5. Level (first, second or third cycle of studies) First cycle Academic year/ semester 2023 / 8 7. Number of ECTS 4									
6. Academic year/ semester 2023 / 8 7. Number of ECTS 4	<u> </u>								
	4								
Professor Associate Professor. Done Stojanov									
2. Requirements for enrolling / the course									
Aims of the course (competences): The design and implementation of distributed computer systems/applications objectives. Upon successful completion of the course, students will be able to paradigm behind distributed systems and implement socket-based applicat communication.	to understand the								
Contents of the course (per 15 weeks per semester): - Client/server model - OSI model - TCP/IP - TCP-based communication - UDP-based communication - Inter process communication - Remote procedure call - Client/Server failure in RPC 4. STUB - BSD sockets - Socket descriptors - Socket functions - Implementation of TCP socket-based client/server chat app in C++ - Protocols: Finger, TFTP, FTP, POP3, SMTP - P2P systems - Introduction into parallel computing - Amdahl's law	paradigm behind distributed systems and implement socket-based application for real-time communication. Contents of the course (per 15 weeks per semester):								
5. Methods of learning: Lectures, practice in laboratory, home learning									
6. Total amount of available time: 4 ECTS x 30 h = 120 h									
7. Distribution of available time: 30+30+15+15+30=120 h (2+1+1)									

8.		of teaching /	15.1	teaching, e-lear	theoretical, contact	30			
	learning	activities	15.2		ractical, laboratory, ninars, teamwork)	30			
			16.1	Projects		15			
9.	Other activities	forms of	16.2	Individual work		15			
			16.3	Home learning		30			
	Method assessn	of nent							
10.	17.1	Tests / Ora	l Exam		70 scores				
	17.2	Individual projects, pr	work actical)	(presentation,	10 scores				
	17.3	Activity and	l participat	ion	20 scores				
					up to 50 points	5 (five)	(F)		
					51 to 60 points	6 (six)	(E)		
11.	A 00000	mant Critaria	(acaraa) n	ointo)	61 to 70 points	7 (seven)	(D)		
	Assessi	nent Criteria	(scores/ po	omis)	71 to 80 points	8 (eight)	(C)		
					81 to 90 points	9 (nine)	(B)		
					91 to 100 points	10 (ten)	(A)		
12.		re approval r transition in		nce to the final ear	1				
13.	Langua	ge of teachin	g / study		English				
14.	Methods of teach		ng / monito	oring the quality	Self-evaluation				
	Literatur								
		Bas	sic literature	e					
		No	Author	ſ	Title	Publisher	Year		
15.	22.1	1.	Varela	ı, C.A.	Programming Distributed Computing Systems: A Foundational Approach.	MIT Press.	2013.		
		2.	Rieker Weima	*	Adventures in UNIX Network Applications Programming.	John Wiley Sons, Inc.	& _{1992.}		
		3.							
	22.2	Ado	litional liter	rature					
		No	Author	r	Title	Publisher	Year		
		1.							

Appendix	3.	Program of the	Course for First	cycle	studies				
1.	Title of Co	urse	Cloud Infrastr	uctu	re and Services				
2.	Code		2FI105721						
3.	Study prog	ıram	Computer Eng	ineer	ing and Technologies				
4.	Organizer program	of the Study	Goce Delchev Faculty of com						
5.		, second or third udies)	First cycle	First cycle					
6.	Academic	year/ semester	Fourth / eighth	7.	Number of ECTS	4			
1.	Professor ((s)	Ass. Prof. Dr. A	Aleks	andar Velinov	•			
2.	Requirements the course	ents for enrolling							
3.	The aim of	the course is for	students to bec	ome	familiar with the concept a	nd way of functioning			
4 .	Aims of the course (competences): The aim of the course is for students to become familiar with the concept and way of cloud systems and cloud infrastructure Contents of the course (per 15 weeks per semester): Introduction to cloud computing Introduction to cloud service models Cloud deployment models Cloud computing reference model Building a Cloud Infrastructure Physical layer of the cloud computing reference model Virtual layer of the cloud computing reference model Control layer of the cloud computing reference model Service and orchestration layers of the cloud computing reference models Business Continuity Security Service Management Cloud providers Creating a cloud architecture Migration of applications in the cloud								
5. 6.	consultatio	ns.			rcises, e-learning, semina	ai work, team work,			
	Total amou	unt of available tii	me: 4 ECTS x 30) hou	rs = 120 hours				
7.	Distribution	n of available time	e: 30+20+20+20	+30 =	= 120 hours (2+1+1)				

8.	Forms	of teaching	15.1	Lectures / teaching, e-le	theoretical, contact arning	30 hours		
	/ learnin	g activities	15.2		ractical, laboratory, eminars, teamwork)	20 hours		
			16.1	Projects		20 hours		
9.	Other activities	forms of	16.2	Individual wor	·k	20 hours		
			16.3	Home learning	g	30 hours		
	Method assessr	of nent						
10.	17.1	Tests / Ora	al Exam		70 scores			
_	17.2	Individual projects, p		(presentation,	10 scores			
	17.3	Activity and	d participat	ion	20 scores			
		•			up to 50 points	5 (five)	(F	
					51 to 60 points	6 (six)		
11.					61 to 70 points	7 (seven)	(D	
• • • •	Assessi	ment Criteria	ı (scores/ p	oints)	71 to 80 points	8 (eight)	(C	
					81 to 90 points	9 (nine)	(B	
					91 to 100 points	10 (ten)	(A	
12.	Signature approval and entrance to the final exam/ or transition in the next year				60% success from minimum 42 points seminar paper, a exercises	from the two coll	oquiums, t	
13.	Langua	ge of teachir	ng / study		English			
14.		s of meas of teaching	uring / m	onitoring the	Self-evaluation			
	Literatu							
		Bas	sic literature)				
		No	Author		Title	Publisher	Year	
		1.	M.N. R	ao	Cloud Computing	PHI Learning P Ltd.	vt. 2015	
15.	22.1	2.	Nelson Fonsed Boutab	a, Raouf	Cloud Services, Networking, and Management	John Wiley Sons	& 2015	
		3.	Kamal Ruchi Temita Mehul	Doshi,	Cloud Computing: Master the Concepts, Architecture and Applications with Real-world examples and Case studies	BPB Publicatio	ns 2019	
	22.2	Add	ditional liter	ature				
		No	Author		Title	Publisher	Year	
		1.	Justin Nova	Garrison, Kris	Cloud Native Infrastructure: Patterns for	"O'Reilly Media, Inc."	2017	

			Scalable Infrastructure and Applications in a Dynamic Environment		
	2.	Bento, Al	Cloud Computing Service and Deployment Models: Layers and Management: Layers and Management	IGI Global	2012

Anne	x 3.	Prograi	m of the	Course for Fir	st cy	cle studies				
1.	Title of Cour	se		Mobile Applica	ation	s Development				
2.	Code			2FI135321						
3.	Study progra	am		Computer engi	Computer engineering and technologies					
4.	Organizer of the Study program		Goce Delchev Faculty of infor							
5.	Level (first, s		r third	First cycle						
6.	Academic ye	,	ester	4 year / VIII semester	7.	Number of ECTS	3	4		
7.	Professor (s)		Prof. Sasho Ko	ceski			•		
8.	Requirements for enrolling the course None									
9.	Aims of the course (competences):									
10	This course application of Operating sy Mobile appli	covers the developm ystems for cation are	e follow ent, Cor r mobile chitectur	mmunication with devices, Metho	duction mob dolog ciples,	n to mobile applica ile devices, Mobile ies for developing User Interface De	e application application	allenges for mobile on development IDEs, ns for mobile devices, ing applications for		
1	Methods of I	learning:					ual and tea	am projects, office		
1:	Total amour	nt of avail	able tim	e: 4 ECTS x 30 I	nours	= 120 hours				
1:	Distribution	of availab	le time:	30 + 15 + 30 + 3	30 + 1	5 = 120 hours (2 -	+ 1 + 1)			
1.	Forms of tea		15.1	Lectures / th teaching, e-l	earniı	ng	30 hours	5		
	learning acti	vities	15.2			al, laboratory, ars, team work)	15 hours	5		
			16.1	Projects			30 hours	3		
1	Other forms activities	of	16.2	Individual wo	ork		30 hours	3		
			16.3	Home learni	ng		15 hours	3		

	assessme	ent							
	17.1	Tests	/ Oral	Exam				70 point	
1	17.2		dual wo	ork (presentation, ctical)				10 point	
	17.3	Activi	ty and	participation				20 point	
					up to 50 points	5	(five)	(F)	
					51 to 60 points	6	6 (six)		
18			. ,		61 to 70 points	7	(seven)	(D)	
	Assessm	ent Crit	eria (so	cores/ points)	71 to 80 points	8	(C)		
					81 to 90 points	9	(B)		
					91 to 100 points	10	(ten)	(A)	
19				entrance to the final e next year	60% active participa	tion at the	course		
20	Language	e of tea	ching /	study	English				
2	Methods of teaching		suring ,	/ monitoring the quality	Standardized tests, observation, survey Self-evaluation				
	Literature	•							
			Basic literature						
			No	Author	Title	Publisher	•	Year	
22		22.1		Tommi Mikkonen	Programming John Wiley & Sons Inc. An Introduction for Practitioners			2007	
	22.1			Dawn Griffiths David Griffiths		Head First Android Development: A Brain-Friendly Guide	Shroff/O'F Second e	2017	
			3.	John Horton	Android Programming for Beginners (2nd edition)	Packt Pul	blishing	2018	
	22.2		Addit	ional literature					
			No	Author	Title	Publisher	-	Year	
ľ			1.	Ian Darwin	Android Cookbook: Problems and Solutions for Android Developers	Oreilly & Associate	es Inc	2017	
			2.						
			3.						

Annex	3.	Program	of the cou	ırse for Fi	rst cy	cle	studies			
67	Title of Co	urse	I	Embedde	d Con	put	er Systems			
68	Code		2	2FI135221						
69	Study prog	gram	(Computer	Engin	eerir	g and Technologi	es		
70	Organizer program	of the Study		Goce Delc			sity – Stip Sciences			
71		, second or udies)	third	First cycle				_		
72	Academic	year/ semes	ster l	Fourth yea Eighth semester	r/	7.	Number of ECTS	i	4	
73	Professor	(s)	,	Aleksandra	a Stoja	nov	a Ilievska			
74	Requirements the course	ents for enro	olling	None						
75	Aims of the course (competences): The aim of this course is to enable students develop theoretical and practical knowledge about embedded systems hardware as well as acquire skills in programming embedded processors. Contents of the course (per 15 weeks per semester): Microprocessors and microcontrollers. Introduction to microcomputers and embedded systems. Processor architectures, microcontrollers used in embedded systems (The CPU, memory and input									
76	output units, Interrupts) Architecture of Microprocessors and Microcontrollers. Comparison of different types of processors for embedded systems: microcontrollers, GPUs, heterogeneous SoCs. FPGA based processors. Introduction to hardware level programming of embedded systems (Programming in assembler, Programmering in C, Development platforms for embedded software) Parallel I/O. Asynchronous and synchronous serial communication. Interrupts and timing. Conversion of analog and digital signals. Control, sensors and actuators. Techniques for working with low consumption. Networking and mobility of embedded systems – a step towards the Internet of Things (IoT). Advanced Serial Communication and Memory Protocols for Embedded Systems. Programming languages and embedded systems programming. Integrated development environments for programming microcontrollers. Adruino, Keil uVision5, etc.									
77	Methods o consultation	-	ectures, th	eoretical a	ind pra	actic	al exercises, e-lea	rning, tea	m work,	
78	Total amou	unt of availa	ble time: 4	ECTS x 3	0 houi	rs =	120 hours			
79	Distribution	n of availabl	e time: 30	+ 15 + 30	+ 30 +	15:	= 120 hours (2 + 1	+1)		
80	Forms of to	eaching /	15.1	teaching	, e-tea	chin	al - contact g rs = 30 hours)	30 hc	ours	
80	learning ad	ctivities	15.2	exams, p seminar	repara work	ation	ctical exercises, e of independent rs = 15 hours)	- 15 hc	ours	
			16.1	Projects				30 hc	ours	
81	Other form activities	ns of	16.2	Individua	l work	_		30 hc	ours	
			16.3	Home lea	arning			15 hc	ours	
82	Method of assessme									
83	3 17.1 Tests / Oral Exam 70 scores									

	17.2		lividual work (presentation, actical)	10 scores						
	17.3	Act	tivity and participation	20 scores						
				up to 50 points	5	(five)	(F)			
				51 to 60 points	6	(six)	(E)			
0.4			"	61 to 70 points	7	(seven)	(D)			
84	Assess	sment C	riteria (scores/ points)	71 to 80 points	8	(eight)	(C)			
				81 to 90 points	9	(nine)	(B)			
				91 to 100 points	10	(ten)	(A)			
85	Signati final ex	ure appr am/ or t	roval and entrance to the transition in the next year	60% active participation at the course						
86	Langua	age of te	eaching / study	English						
87		ds of me of teach	easuring / monitoring the ning	Standardized motor tests, observation, survey Self-evaluation						
	Literatu	ıre								
		Basic	literature							
88		No	Author	Title	Publis	sher	Year			
88	22.1	1.	Ed Lipiansky	Embedded Systems Hardware for Software Engineers	McGr	aw-Hill	2012			
		2.	Peter Marwedel -	Embedded System Design IV edition	Sprin	ger	2021			
	22.2	Additio	onal literature							
		No	Author	Title	Publis	sher	Year			
		1.	John Catsoulis	Designing Embedded Hardware: Create New Computers and Devices	O'Re	illy	2005			

Annex 3. Program of the Co			ourse for First c	ycle	studies		
1.	1. Title of Course		Human-Computer Interaction				
2.	Code		2FI135421				
3.	Study progr	Computer engineering and technologies					
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of informatics				
5.	Level (first, cycle of stu	second or third idies)	First cycle				
6.	Academic y	year/ semester	4 year / VIII semester	7.	Number of ECTS	4	
7.	Professor (s)		Prof. Natasha Koceska				
8.	Requirement the course	nts for enrolling	None				

9.	Aims of the course (competences): Fundamentals of human-computer interaction will be studied. The elements of system interaction (human with his perception, audio, tactile channels), the computer (with its input-output devices), and the various types of interaction will also be analysed. Usability: definition, purpose, principles; usability testing. The course will provide the students with practical skills for designing, evaluation and implementation of user interfaces using a variety of interactive technologies.								
10	Contents of the course (per 15 weeks per semester): This course covers the following topics:								
11	Methods of Lectures, I hours		, Labs, Nι	umerical exercises,	e-learning, individual ar	nd tean	n projects, c	office	
12		unt of availa	ble time: 4	4 ECTS x 30 hours	= 120 hours				
13	Distribution	n of availabl	e time: 30) + 15 + 30 + 30 + 1	15 = 120 hours (2 + 1 +	1)			
14	Forms of t	eaching /	15.1	Lectures / theoreteaching, e-learn	ning	30 ho	ours		
	learning activities		15.2		Exercises (practical, laboratory, theoretical, seminars, team work)			15 hours	
			16.1	Projects		30 hours			
15	Other form activities	ns of	16.2	Individual work		30 h			
			16.3	Home learning		15 ho	ours		
16	Method of assessme								
	17.1 Tests / Oral Exam 70 points							ooints	
17	17.2	Individual projects, p		sentation,	10 points				
	17.3	Activity an		ation	20 points				
					up to 50 points	5	(five)	(F)	
18	Assessme	ent Criteria (s	scores/ po	oints)	51 to 60 points	6	(six)	(E)	
					61 to 70 points	7	(seven)	(D)	

1 .					1	
				71 to 80 points	8 (eight)	(C)
				81 to 90 points	9 (nine)	(B)
				91 to 100 points	10 (ten)	(A)
19	Signature approvexam/ or transition		entrance to the final next year	60% active participation	n at the course	
20	Language of tea	ching / s	tudy	English		
21	Methods of measteaching	suring / r	monitoring the quality of	Standardized tests, ob Self-evaluation	servation, surve	y
	Literature					
		Basic I	iterature			
		No	Author	Title	Publisher	Year
22	22.1	1.	Alan Dix, Janet Finlay, Gregory D.Abowd, Russell Beale	Human Computer Interaction	Prentice Hall	2003
		2.	Helen Sharp, Yvonne Rogers, Jennifer Preece	Interaction Design: beyond human- computer interaction	John Wiley & Sons, Inc.	2010
		3.	Andrew Sears and Julie A. Jacko	The Human– Computer Interaction Handbook	CRC Press	2017
	22.2	Additio	nal literature			
		No	Author	Title	Publisher	Year
		1.	Andrew Sears and Julie A. Jacko	The Human– Computer Interaction - Fundamentals	CRC Press	2012
			Panayiotis Zaphiris, Chee Siang Ang	Human–Computer Interaction: Concepts, Methodologies, Tools, and Applications	Information Science Reference	2008
		3.	Constantine Stephanidis	User Interfaces for All: Concepts, Methods, and Tools	CRC Press	2000

Append	dix 3.	Program of the Course for First cycle studies						
1.	Title of Course		Differential equations					
2.	Code		2FI135521					
3.	3. Study program		Computer Engineering and Technologies					
4.	Organizer of the Study program		Goce Delchev University – Stip Faculty of computer science					
5.	Level (first	st, second or third studies)	First cycle					
6.	Academi	c year/ semester	IV/8	7.	Number of ECTS	4		
1.	Professo	r (s)	Associate Professor Biljana Zlatanovska, PhD					

2.	Requirements for enrolling the course The students should have passed Mathematics 1 and Mathematics 2								
3.	Aims of the Stud	the course	(compet ected to		content to use it in ot	her s	cientific dis	ciplines a	nd in
4. 5.	Contents of the course (per 15 weeks per semester): 1. First Order Ordinary Differential Equations: Separable Equations, Exact Differential Equation, Integrating Factors, Linear First Order Equations, Bernoulli Equation, Homogeneous Equations; 2. Applications and Examples of First Order Ordinary Differential Equations: Orthogonal Trajectories, Exponential Growth and Decay, Population Growth, Newton's Law of Cooling. 3. Linear Differential Equations: Homogeneous Linear Equations, Linear Differential Equations with Constant Coefficients, Nonhomogeneous Linear Equation; 4. Second Order Linear Equations: Reduction of Order, Undetermined Coefficients, Variation of Parameters; 5. Applications of Second Order Differential Equations: Motion of Object Hanging from a Spring, Electrical Circuits. 6. Higher Order Linear Differential Equations: Undetermined Coefficients, Variation of Parameter, Euler's Equation. Methods of learning:								
					consultations; Semina ms; Consultations.	r worl	k/project; H	ome stud	y;
6.	Total am	ount of ava	ailable tir	me: 4 ECTS x 30	hours = 120 hours				
7.	Distribution of available time: 30+15+30+30+15 = 120 hours (2+1+1)								
8.	Forms o	f teaching learning	15.1	Lectures / teaching, e-lear	theoretical, contact rning	30 hours			
	activities		15.2		ractical, laboratory, 15 hours minars, teamwork)				nours
	Other forms of activities		16.1	Projects	30 hours			nours	
9.			16.2	Individual work	Individual work			30 hours	
		- 1	16.3	Home learning	15 hours				nours
	Method assessm	of nent							
10.	17.1	Tests / Or	al Exam		70 scores				
	17.2	Individual projects, p		(presentation,	10 scores				
	17.3	Activity an			20 scores				
					up to 50 points	5	(five)	(F)	
					51 to 60 points	6	(six)	(E)	
11.	Assassn	nent Criteria	a (score	s/ noints)	61 to 70 points	7	(seven)	(D)	
	710000011	ioni onioni	a (5001C	or pointo)	71 to 80 points	8	(eight)	(C)	
					81 to 90 points	9	(nine)	(B)	
					91 to 100 points	10	(ten)	(A)	
12.	exam/ or transition in the next year				60% success from minimum 42 points seminar work, the exercises.	from:	the two co	lloquiums	s, the
13.	Languag	e of teachi	ng / stud	dy	English				

14.	Methods of quality of teac		ring / monitoring the	Self-evaluation		
	Literature					
		Basic	literature			
		No	Author	Title	Publisher	Year
15.	22.1	1.	William F. Trench	Elementary differential equations	Brooks/Cole Thomson Learning	2001, Free Edition December, 2013
		2.	Gabriel Nagy	Ordinary differential equations	Mathematics Department, Michigan State University	2021
		3.			-	
	22.2	Additio	onal literature			
		No	Author	Title	Publisher	Year
		1.				