Appendix 3.	Program of the Course for First cycle studies					
1.	Title of Course	Fundamentals of computer programming				
2.	Code	2FI100221				
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	1/1	7.	Number of ECTS	6	
1.	Professor (s)	Prof. Vlado Gicev				
2.	Requirements for enrolling the course	none				
3.	Aims of the course (competences): Gain theoretical and practical knowledge in the field of structural programming by studying the C++ programming language. Acquiring competencies for solving problems, developing algorithms and their implementation in a programming language.					
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 of learning: lectures, exercises, labs. Team project: Developing C++ program on specific practical problem.					
6.	Total amount of available time: 6 EKTS x 30 hours = 180 hours					
7.	Distribution of available time: 30+30+30+30+60 =180 hours (2+2+1)					
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30 hours		
9.	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)		
12.	Signature approval and entrance to the final exam/ or transition in the 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 teaching / study		English			
14.	Methods of measuring / monitoring the quality of teaching		Self evaluation			
15.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Dale, N., Weems, C., Headington, M	Programming and Problem Solving with C++	Jones and Bartlett Publishers	2000
		2.				
		3.				
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.				

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Mathemetics 1			
2.	Code	2FI100121			
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/ first semester	7.	Number of ECTS	8
8.	Professor (s)	Prof. Tatjana Atanasova Pachemska, full professor			
9.	Requirements for enrolling the course	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 research in applied sciences. Students should know the intended contents, be able to apply them in solving mathematical and other problems, as well as be able to develop concepts and mathematical opinions for solving problems.				
11.	Contents of the course (per 15 weeks per semester):				

	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 of learning: Lectures, exercises, preparation of a seminar paper and presentations, teaching with using ICT						
13.	Total amount of available time: 8 ECTS x 30 hours = 240 hours						
14.	Distribution of available time: 45+30+30+60+75 = 240 hours (3+2+2)						
15.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	45			
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30			
16.	Other forms of activities	16.1	Projects	30			
		16.2	Individual work	60			
		16.3	Home learning	75			
17.	Method of assessment						
	17.1	Tests / Oral Exam	70 scores				
	17.2	Individual work (presentation, projects, practical)	10 scores				
	17.3	Activity and participation	20 scores				
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		Apart from 42 points from partial exams, completed homework and regularity of lectures, classroom exercises and laboratory exercises			
20.	Language of teaching / study		English			
21.	Methods of measuring / monitoring the quality of teaching		Self-evaluation, periodic tests, debates			
22.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		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	Additional literature				
		No	Author	Title	Publisher	Year
		1.				

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

9.	Aims of the course (competences): Understanding the basics of ICT, history, current situation and future; the way that computers operate; computer components; data transmission; defining computer networks, network topology, computer viruses, structure of the Internet, Internet protocols, addressing, technology for voice transmission over IP, multimedia. Creating web pages, basics of HTML and CSS.						
10	Contents of the course (per 15 weeks per semester): This course covers the following topics: - History of computers and programming languages - Hardware: peripheral devices, memory... - Software: operating systems, software types… - Computer network: network types, topology, OSI model, TCP/IP model, protocols - Internet: structure of the Internet, Internet protocols and services. - Computer viruses - Multimedia - VoIP - HTML, CSS						
11	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours						
12	Total amount of available time: 6 ECTS x 30 hours = 180 hours						
13	Distribution of available time: 30+30+30+30+60 = 180 hours (2+2+1)						
14	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours			
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours			
15	Other forms of activities	16.1	Projects	30 hours			
		16.2	Individual work	30 hours			
		16.3	Home learning	60 hours			
16	Method of assessment						
17	17.1	Tests / Oral Exam		70 points			
	17.2	Individual work (presentation, projects, practical)		10 points			
	17.3	Activity and participation		20 points			
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	Language of teaching / study		English				
21	Methods of measuring / monitoring the quality of teaching		Standardized tests, observation, survey Self-evaluation				
	Literature						

22	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Natasha Koceska	Интернет технологии	Универзитет ,,Гоце Делчев" - Штип.	2013
		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	Additional 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.				

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	**Fundamentals of Electrical Engineering**			
2.	Code	2FI100321			
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 / I semester	7.	Number of ECTS	6
1.	Professor (s)	Ass. Professor Mirjana Kocaleva Vitanova			
2.	Requirements for enrolling the course	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.	Methods of learning: Lectures, theoretical and practical exercises, consultations; creation of an independent seminar work / project; home study					
6.	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
7.	Distribution of available time: 30+30+30+30+60 = 180 hours (2+2+1)					
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30 hours		
9.	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the next year		60% active participation at the course			
13.	Language of teaching / study		English			
14.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
15.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Charles A. Gross Thaddeus A. Roppel	Fundamentals of Electrical Engineering	CRC Press	2012
		2.	Giorgio Rizzoni	Fundamentals of Electrical Engineering	McGraw-Hill	2009
	22.2	Additional literature				

		No	Author	Title	Publisher	Year

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 / First 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 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.				
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,				

<table>
<tr><td></td><td colspan="6">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.</td></tr>
<tr><td>12.</td><td colspan="6">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.</td></tr>
<tr><td>13.</td><td colspan="6">Total amount of available time: 120</td></tr>
<tr><td>14.</td><td colspan="6">Distribution of available time: 2+1+1</td></tr>
<tr><td rowspan="2">15.</td><td rowspan="2">Forms of teaching / learning activities</td><td>15.1</td><td colspan="2">Lectures / theoretical, contact teaching, e-learning</td><td colspan="2">30 hours</td></tr>
<tr><td>15.2</td><td colspan="2">Exercises (practical, laboratory, theoretical, seminars, team work)</td><td colspan="2">15. ours</td></tr>
<tr><td rowspan="3">16.</td><td rowspan="3">Other forms of activities</td><td>16.1</td><td colspan="2">Projects</td><td colspan="2">15 hours</td></tr>
<tr><td>16.2</td><td colspan="2">Individual work</td><td colspan="2">30 hours</td></tr>
<tr><td>16.3</td><td colspan="2">Home learning</td><td colspan="2">30. ours</td></tr>
<tr><td rowspan="4">17.</td><td colspan="2">Method of assessment</td><td colspan="4"></td></tr>
<tr><td>17.1</td><td colspan="2">Tests / Oral Exam</td><td colspan="3">70 scores</td></tr>
<tr><td>17.2</td><td colspan="2">Individual work (presentation, projects, practical)</td><td colspan="3">10 scores</td></tr>
<tr><td>17.3</td><td colspan="2">Activity and participation</td><td colspan="3">20 scores</td></tr>
<tr><td rowspan="6">18.</td><td colspan="3" rowspan="6">Assessment Criteria (scores/ points)</td><td>up to 50 points</td><td>5 (five)</td><td>(F)</td></tr>
<tr><td>51 to 60 points</td><td>6 (six)</td><td>(E)</td></tr>
<tr><td>61 to 70 points</td><td>7 (seven)</td><td>(D)</td></tr>
<tr><td>71 to 80 points</td><td>8 (eight)</td><td>(C)</td></tr>
<tr><td>81 to 90 points</td><td>9 (nine)</td><td>(B)</td></tr>
<tr><td>91 to 100 points</td><td>10 (ten)</td><td>(A)</td></tr>
<tr><td>19.</td><td colspan="3">Signature approval and entrance to the final exam/ or transition in the next year</td><td colspan="3">60% active participation at the course</td></tr>
</table>

20.	Language of teaching / study			English		
21.	Methods of measuring / monitoring the quality of teaching			Standardized motor tests, observation, survey Self-evaluation		
22.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		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	Additional 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.				

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	French language level A1.1			
2.	Code	4FF100521			
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 / First semester	7.	Number of ECTS	4
8.	Professor (s)	Svetlana Jakimovska			
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 and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type;				

<table>
<tr><td></td><td colspan="4">- 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.</td></tr>
<tr><td>11.</td><td colspan="4">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.</td></tr>
<tr><td>12.</td><td colspan="4">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.</td></tr>
<tr><td>13.</td><td colspan="4">Total amount of available time: 120</td></tr>
<tr><td>14.</td><td colspan="4">Distribution of available time: 2+1+1</td></tr>
<tr><td rowspan="2">15.</td><td rowspan="2">Forms of teaching / learning activities</td><td>15.1</td><td>Lectures / theoretical, contact teaching, e-learning</td><td>30 hours</td></tr>
<tr><td>15.2</td><td>Exercises (practical, laboratory, theoretical, seminars, team work)</td><td>15. hours</td></tr>
<tr><td rowspan="3">16.</td><td rowspan="3">Other forms of activities</td><td>16.1</td><td>Projects</td><td>15 hours</td></tr>
<tr><td>16.2</td><td>Individual work</td><td>30 hours</td></tr>
<tr><td>16.3</td><td>Home learning</td><td>30. hours</td></tr>
</table>

17.	Method of assessment				
	17.1	Tests / Oral Exam	70 scores		
	17.2	Individual work (presentation, projects, practical)	10 scores		
	17.3	Activity and participation	20. scores		
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.	Language of teaching / study		English and French		
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation		
22.	Literature				
	22.1	Basic literature			
		No	Author	Title	Publisher	Year
		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.				

Appendix 3.	Program of the Course for First cycle studies	
1.	Title of Course	German language level A1.1
2.	Code	4FF100221
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 / First semester	7.	Number of ECTS	4
8.	Professor (s)	Lecturer MA Marica Tasevska			
9.	Requirements for enrolling the course	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.				
11.	Contents of the course (per 15 weeks per semester): *Grammar:* 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, furniture, household appliances, numbers, colors, activities and leisure, weather, professions, human body parts, diagnoses and recommendations, landmarks of the city, transportation, fashion and clothing, more important holidays in the German-speaking countries, etc. *Speaking:* dialogues when meeting, first meeting, description of person, dialogues in the market, restaurant, description of an apartment or particular room, description of activities we undertake in our free time, description of a profession, description of a city that you visited and country, scheduling, rescheduling or cancellation of an appointment, description of a particular location, answering machine message, dialogues in shopping center, fashion magazine image description, sharing specialty opinions, greetings and phrases to celebrate holidays or festivities in German-speaking countries.				
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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours	
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15. hours	
16.	Other forms of activities	16.1	Projects	15 hours	
		16.2	Individual work	30 hours	

		16.3	Home learning		30. hours	
17.	Method of assessment					
	17.1	Tests / Oral Exam		70 scores		
	17.2	Individual work (presentation, projects, practical)		10 scores		
	17.3	Activity and participation		20. scores		
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.	Language of teaching / study			English and German		
21.	Methods of measuring / monitoring the quality of teaching			Standardized motor tests, observation, survey Self-evaluation		
22.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Marion Kerner, Silke Hilpert, Monika Reimann,Andreas Tomaszewski..	Schritte International 1 Kusrbuch + Arbeitsbuch	Hueber Verlag	2006
		2.	Friederike Jin, Ute Voß	Grammatik aktiv Üben, Hören, Sprechen	Cornelsen	2018
		3.	Ранка Грчева Петер Рау	Голем македонско-германски и германско-македонски речник	Магор	2006
	22.2	Additional literature				
		No				
		1.	Димитрија Гацов	Германска Граматика	НУБ „Климент Охридски“ - Скопје	1995
		2.	Evans Sandra, Pude Angela, Sprecht Franz	Menschen A1.2	Hueber Verlag	2012

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

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Italian language level A1.1			
2.	Code	4FF100421			
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 / First semester	7.	Number of ECTS	4
8.	Professor (s)	Nadica Negrievska			
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 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.				

<table>
<tr><td></td><td colspan="6"></td></tr>
<tr><td>11.</td><td colspan="6">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 Italian, verbs *essere/avere*, 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 Italian culture.</td></tr>
<tr><td>12.</td><td colspan="6">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.</td></tr>
<tr><td>13.</td><td colspan="6">Total amount of available time: 120</td></tr>
<tr><td>14.</td><td colspan="6">Distribution of available time: 2+1+1</td></tr>
<tr><td rowspan="2">15.</td><td rowspan="2">Forms of teaching / learning activities</td><td>15.1</td><td colspan="2">Lectures / theoretical, contact teaching, e-learning</td><td>30 hours</td></tr>
<tr><td>15.2</td><td colspan="2">Exercises (practical, laboratory, theoretical, seminars, team work)</td><td>15. hours</td></tr>
<tr><td rowspan="3">16.</td><td rowspan="3">Other forms of activities</td><td>16.1</td><td colspan="2">Projects</td><td>15 hours</td></tr>
<tr><td>16.2</td><td colspan="2">Individual work</td><td>30 hours</td></tr>
<tr><td>16.3</td><td colspan="2">Home learning</td><td>30. hours</td></tr>
<tr><td rowspan="4">17.</td><td colspan="2">Method of assessment</td><td colspan="3"></td></tr>
<tr><td>17.1</td><td>Tests / Oral Exam</td><td colspan="3">70 scores</td></tr>
<tr><td>17.2</td><td>Individual work (presentation, projects, practical)</td><td colspan="3">10 scores</td></tr>
<tr><td>17.3</td><td>Activity and participation</td><td colspan="3">20. scores</td></tr>
<tr><td rowspan="6">18.</td><td colspan="2" rowspan="6">Assessment Criteria (scores/ points)</td><td>up to 50 points</td><td>5 (five)</td><td>(F)</td></tr>
<tr><td>51 to 60 points</td><td>6 (six)</td><td>(E)</td></tr>
<tr><td>61 to 70 points</td><td>7 (seven)</td><td>(D)</td></tr>
<tr><td>71 to 80 points</td><td>8 (eight)</td><td>(C)</td></tr>
<tr><td>81 to 90 points</td><td>9 (nine)</td><td>(B)</td></tr>
<tr><td>91 to 100 points</td><td>10 (ten)</td><td>(A)</td></tr>
<tr><td>19.</td><td colspan="2">Signature approval and entrance to the final exam/ or transition in the next year</td><td colspan="3">60% active participation at the course</td></tr>
<tr><td>20.</td><td colspan="2">Language of teaching / study</td><td colspan="3">English and Italian</td></tr>
</table>

21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
22.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Marin,T. & Magnelli,S.	Progetto italiano 1, nuovo (Libro dello studente)	Edilingua	2006
		2.	Marin,T. & Magnelli,S.	Progetto italiano 1, nuovo (Quaderno degli esercizi)	Edilingua	2006
		3.				
	22.2	Additional 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
		3.	Cozzi, N., Federico F. & Tancorre, A.	Caffè Italia, Corso di italiano 1	ELI s.r.l.	2005

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Spanish language level A1.1			
2.	Code	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, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	First year / First semester	7.	Number of ECTS	4
8.	Professor (s)	Marija Todorova			
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 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.			
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, 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.			
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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15. hours
16.	Other forms of activities	16.1	Projects	15 hours
		16.2	Individual work	30 hours
		16.3	Home learning	30. hours

17.	Method of assessment				
	17.1	Tests / Oral Exam	70 scores		
	17.2	Individual work (presentation, projects, practical)	10 scores		
	17.3	Activity and participation	20. scores		
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.	Language of teaching / study		English and Spanish		
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation		
22.	Literature				
	22.1	Basic literature			
		No	Author	Title	Publisher	Year
		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	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

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Russian Language Level A1.1			
2.	Code	4FF100321			
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 / First semester	7.	Number of ECTS	4
8.	Professor (s)	Igor Stanojoski			
9.	Requirements for enrolling the course	None			
10.	Aims of the course (competences): The main goal of the course is to train students in practical Russian language proficiency, typical of the basic level of Russian language proficiency, through which they will acquire a vocabulary of Russian words - from 500 to 800 words, developed habits for perceiving speech in the form of 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, Wh-questions.				
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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours	
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15. hours	
16.	Other forms of activities	16.1	Projects	15 hours	
		16.2	Individual work	30 hours	
		16.3	Home learning	30. hours	

17.	Method of assessment				
	17.1	Tests / Oral Exam	70 scores		
	17.2	Individual work (presentation, projects, practical)	10 scores		
	17.3	Activity and participation	20. scores		
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.	Language of teaching / study		English and Russian		
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation		
22.	Literature				
	22.1	Basic literature			
		No	Author	Title	Publisher	Year
		1.	Ирина Осипова	«Ключ» - Учебник русского языка для начинающих.	Corvina, Москва	2005
		2.				
		3.				
	22.2	Additional 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.				

<table>
<tr><td colspan="2">Appendix 3.</td><td colspan="5">Program of the Course for First cycle studies</td></tr>
<tr><td>1.</td><td>Title of Course</td><td colspan="5">Macedonian language 1</td></tr>
<tr><td>2.</td><td>Code</td><td colspan="5">4FF100721</td></tr>
<tr><td>3.</td><td>Study program</td><td colspan="5">Computer Engineering and Technologies</td></tr>
<tr><td>4.</td><td>Organizer of the Study program</td><td colspan="5">Goce Delchev University – Stip
Faculty of computer science</td></tr>
<tr><td>5.</td><td>Level (first, second or third cycle of studies)</td><td colspan="5">First cycle</td></tr>
<tr><td>6.</td><td>Academic year/ semester</td><td>First year / First semester</td><td>7.</td><td>Number of ECTS</td><td colspan="2">4</td></tr>
<tr><td>8.</td><td>Professor (s)</td><td colspan="5">Ana Vitanova-Ringaceva</td></tr>
<tr><td>9.</td><td>Requirements for enrolling the course</td><td colspan="5">None</td></tr>
<tr><td>10.</td><td colspan="6">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.</td></tr>
<tr><td>11.</td><td colspan="6">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 “сум“ – “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</td></tr>
</table>

	about daily routines, telling time, talking about houses and locations, talking about food preferences and preparing food, etc. The students will acquire basic knowledge of Macedonian culture.					
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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15. ours		
16.	Other forms of activities	16.1	Projects	15 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	30. ours		
17.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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.	Language of teaching / study		English			
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
22.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Марија Кусевска, Лилјана Митковска	Зборувате ли македонски? (учебник)	МЕДИС-информатика	1995/ 2016
		2.	Елени Бужаровска, Татјана Гочкова-Стојановска	Зборувате ли македонски?	МЕДИС-информатика	1995

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

Appendix 3.	Program of the Course for First cycle studies				
7.	Title of Course	Mathematics 2			
8.	Code	2FI101121			
9.	Study program	Computer Engineering and Technologies			
10.	Organizer of the Study program	Goce Delchev University – Stip Faculty of computer science			
11.	Level (first, second or third cycle of studies)	First cycle			
12.	Academic year/ semester	First year/ second semester	7.	Number of ECTS	6
23.	Professor (s)	Prof. Tatjana Atanasova Pachemska, full professor			
24.	Requirements for enrolling the course	Enrolment in the first cycle of studies of the study program and taken course in Mathematics 1			
25.	Aims of the course (competences): To adopt and apply the integral calculus for a function of one variable, to understand and apply the concept of generalization of the notion of an infinite numerical sequence, functional sequence and applications, to adopt the basic concepts of differential and integral calculus of functions of several variables , to understand the concept of analogy and generalization, to learn to solve first-order ordinary differential equations. Development of analytical opinion, critical abilities, ability to generalize and analogies as the highest level of learning is also expected. The student should know and understand basic mathematical concepts and theories, should use ICT to support the acquisition of mathematical knowledge, flexible use of knowledge in engineering and teaching practice.				
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; 3. Indefinite integral – concept, properties, relationship between indefinite and definite integral, integration techniques; 4. Integrating some types of functions – rational, irrational, trigonometric, transcendental functions 5. Application of a definite integral – length of an arc of a curve, area of a figure in a plane, volume of rotational 3D shapes that are obtained by rotation around the coordinate axes 6. Improper integral and application				

	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						
27.	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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30			
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30			
31.	Other forms of activities	16.1	Projects	15			
		16.2	Individual work	60			
		16.3	Home learning	45			
32.	Method of assessment						
	17.1	Tests / Oral Exam	70 scores				
	17.2	Individual work (presentation, projects, practical)	10 scores				
	17.3	Activity and participation	20 scores				
33.	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)	
34.	Signature approval and entrance to the final exam/ or transition in the next year		Apart from 42 points from partial exams, completed homework and regularity of lectures, classroom exercises and laboratory exercises				
35.	Language of teaching / study		English				
36.	Methods of measuring / monitoring the quality of teaching		Self-evaluation, periodic tests, debates				
37.	Literature						
	22.1	Basic literature					
		No	Author	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	Additional literature				
		No	Author	Title	Publisher	Year
		1.				

Annex 3.	**Program of the course for First cycle studies**				
1.	Title of Course	**Discrete mathematics**			
2.	Code	2FI101421			
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	6
7.	Professor (s)	prof. Limonka Koceva Lazarova			
8.	Requirements for enrolling the course	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.	Propositional logic and logical laws. Boolean functions. Application of propositional logic in the construction of logic circuits. Minimization. Predicate logic and quantifiers. Derivation of logical conclusions. Theory of sets. Relations. Mappings. Principles of counting. Combinatorics. Basic concepts of graph theory. Graph representation, matrix of adjacency, adjacency list, incidence matrix. Isomorphic graphs. Eulerov and Hamiltonian graphs. Recurrent equations. Techniques of proof.				
11.	Methods of learning: Lectures, theoretical and practical exercises, e-learning, teamwork, consultations.				
12.	Total amount of available time: 6 ECTS x 30 hours = 180 hours				
13.	Distribution of available 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 hours	

		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)	30 hours
15.	Other forms of activities	16.1	Projects	30 hours
		16.2	Individual work	30 hours
		16.3	Home learning	60 hours
16.	Method of assessment			
17.	17.1	Tests / Oral Exam	70 scores	
	17.2	Individual work (presentation, practical)	10 scores	
	17.3	Activity and participation	20 scores	
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.	Language of teaching / study		English	
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation	
22.	Literature			

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	Kenneth H. Rosen	Discrete Mathematics and Its Applications Seventh Edition	Mc Graw Hill	2007
	2.	Susanna S. Epp	Discrete Mathematics with Applications Fourth Edition	Brooks/Cole	2010
22.2	Additional literature				
	No	Author	Title	Publisher	Year

Annex 3.	**Program of the Course for Integrated Second cycle studies**

1.	Title of Course	**Object Oriented Programming**				
2.	Code	2FI101221				
3.	Study program	Computer Engineering and Technologies				
4.	Organizer of the Study program	Goce Delchev University – Stip Computer Science Faculty _____				
5.	Level (first, second or third cycle of studies)	First cycle				
6.	Academic year/ semester	First year / II semester	7.	Number of ECTS	6	
7.	Professor (s)	Full Professor Cveta Martinovska Bande				
8.	Requirements for enrolling the course	None				
9.	Aims of the course (competences): This course teaches the fundamental concepts behind the object-oriented approach to programming through C++ programming language.					
10	Contents of the course (per 15 weeks per semester): 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 of learning: Lectures, Discussions, Labs, Practical exercises, e-learning, individual and team projects, office hours.					
12	Total amount of available time: 6 ECTS x 30 hours a = 180 hours					
13	Distribution of available time: 30 + 30 + 30 + 30 + 60 = 180 hours (2 + 2 +1)					
14	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours		
15	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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	Language of teaching / study		English			
21	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
22	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		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	Additional 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

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	**Computer Electronic Components**			
2.	Code	2FI101321			
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 / 2	7.	Number of ECTS	6
8.	Professor	Prof. Done Stojanov			
9.	Requirements for enrolling the course	/			
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):				

<table>
<tr><td></td><td colspan="5">- 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</td></tr>
<tr><td>12.</td><td colspan="5">Methods of learning: Lectures, practice in laboratory, home learning</td></tr>
<tr><td>13.</td><td colspan="5">Total amount of available time: 6 ECTS x 30 h = 180 h</td></tr>
<tr><td>14.</td><td colspan="5">Distribution of available time: 30+30+30+30+60=180 h (2+2+1)</td></tr>
<tr><td rowspan="2">15.</td><td rowspan="2">Forms of teaching / learning activities</td><td>15.1</td><td>Lectures / theoretical, contact teaching, e-learning</td><td>30</td></tr>
<tr><td>15.2</td><td>Exercises (practical, laboratory, theoretical, seminars, teamwork)</td><td>30</td></tr>
<tr><td rowspan="3">16.</td><td rowspan="3">Other forms of activities</td><td>16.1</td><td>Projects</td><td>30</td></tr>
<tr><td>16.2</td><td>Individual work</td><td>30</td></tr>
<tr><td>16.3</td><td>Home learning</td><td>60</td></tr>
<tr><td rowspan="3">17.</td><td colspan="2">Method of assessment</td><td colspan="2"></td></tr>
<tr><td>17.1</td><td colspan="2">Tests / Oral Exam</td><td>70 scores</td></tr>
<tr><td>17.2</td><td colspan="2">Individual work (presentation, projects, practical)</td><td>10 scores</td></tr>
</table>

	17.3	Activity and participation	20 cores			
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		/			
20.	Language of teaching / study		English			
21.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
22.	Literature					

22.	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	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 the 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			

<table>
<tr><td>9.</td><td>Requirements for enrolling the course</td><td colspan="3">None</td></tr>
<tr><td>10.</td><td colspan="4">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.</td></tr>
<tr><td>11.</td><td colspan="4">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.</td></tr>
<tr><td>12.</td><td colspan="4">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.</td></tr>
<tr><td>13.</td><td colspan="4">Total amount of available time: 120</td></tr>
<tr><td>14.</td><td colspan="4">Distribution of available time: 2+1+1</td></tr>
<tr><td rowspan="2">15.</td><td rowspan="2">Forms of teaching / learning activities</td><td>15.1</td><td>Lectures / theoretical, contact teaching, e-learning</td><td>30 hours</td></tr>
<tr><td>15.2</td><td>Exercises (practical, laboratory, theoretical, seminars, teamwork)</td><td>15. hours</td></tr>
<tr><td rowspan="2">16.</td><td rowspan="2">Other forms of activities</td><td>16.1</td><td>Projects</td><td>15 hours</td></tr>
<tr><td>16.2</td><td>Individual work</td><td>30 hours</td></tr>
</table>

		16.3	Home learning		30 hours	
17.	Method of assessment					
	17.1	Tests / Oral Exam		70 scores		
	17.2	Individual work (presentation, projects, practical)		10 scores		
	17.3	Activity and participation		20 scores		
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.	Language of teaching / study			English		
21.	Methods of measuring / monitoring the quality of teaching			Standardized motor tests, observation, survey Self-evaluation		
22.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		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	Additional 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.				

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

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)	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 weeks per semester): *vocabulary:* holidays and vacations, weather; names of relatives; dishes, courses of a meal, and meals, food and beverages, types of restaurants, setting the table; articles of clothing, shoes, daily routines, accessories; modes of transportation, shops, places in a city; sporting activities. *grammar structures*: demonstrative pronouns *questo* and *quello*; possessive adjectives; nouns ending in -ista; the polite form; the present indicative of *andare, venire, fare, sapere;* the prepositions *in, da, a, al*; adverbs and expressions of frequency; numbers from 101 to 10000; articulated prepositions; locative *ci;* possessive adjectives, possessive adjectives with family members; prepositions of location; reflexive verbs with modal verbs; present perfect (passato prossimo); past participles of regular verbs; expressions of time; auxiliary verbs in the present perfect: essere or avere?; expressions of place; irregular past participles; adverbs of time with the present perfect. all communicative skills are equally included in the course including basic communication: extend invitations, accept or decline an invitation, talk about leisure activities, talk about the frequency of activities; express uncertainty and doubt; talk about professions; ask for and tell time; ask for and express the date; talk about holidays; organize a trip; talk about prices; exchange holiday greetings; ask about and describe the weather; describe personality; ask for and provide addresses; talk about family; talk about dishes and meals; express preferences; order at a restaurant; talk about clothing styles; describe an article of clothing; talk about 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.	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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15 hours
16.	Other forms of activities	16.1	Projects	15 hours
		16.2	Individual work	30 hours
		16.3	Home learning	30 hours
17.	Method of assessment			
	17.1	Tests / Oral Exam	70 scores	
	17.2	Individual work (presentation, projects, practical)	10 scores	
	17.3	Activity and participation	20. scores	

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.	Language of teaching / study	English and Italian
21.	Methods of measuring / monitoring the quality of teaching	Standardized motor tests, observation, survey Self-evaluation
22.	Literature	

Basic literature

No	Author	Title	Publisher	Year
1.	Marin,T. & Magnelli,S.	Progetto italiano 1, nuovo (Libro dello studente)	Edilingua	2006
2.	Marin,T. & Magnelli,S.	Progetto italiano 1, nuovo (Quaderno degli esercizi)	Edilingua	2006
3.				

22.2 Additional 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

		3.	Cozzi, N., Federico F. & Tancorre, A.	Caffè Italia, Corso di italiano 1	ELI s.r.l.	2005

Appendix 3.	Program of the Course for First cycle studies				
	Title of Course	German language level A1.2			
	Code	4FF101223			
	Study program	Computer Engineering and Technologies			
	Organizer of the Study program	Goce Delchev University – Stip Faculty of computer science			
	Level (first, second or third cycle of studies)	First cycle			
	Academic year/ semester	First year / second semester	7.	Number of ECTS	4
8.	Professor (s)	Marica Tasevska			
9.	Requirements for enrolling the course	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.				
11.	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“ *Vocabulary:* profession, health, sights of German-speaking cities, fashion and clothing, more important holidays in the German-speaking countries *Speaking:* naming and defining occupations, reporting on past activities, sharing information from present and future, establishing diagnoses and recommendations, describing people (character and clothes), giving advice, concluding deals, rescheduling and canceling appointments, discussions about household rules, finding a hotel reception, giving instructions on a specific location, discussing a timetable, finding a service, expression of liking/disliking, naming and evaluating pieces of clothing, discussing about favorite holiday.				
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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours	
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	hours	
16.	Other forms of activities	16.1	Projects	15 hours	
		16.2	Individual work	30 hours	

		16.3	Home learning		hours		
17.	Method of assessment						
	17.1	Tests / Oral Exam		70 scores			
	17.2	Individual work (presentation, projects, practical)		10 scores			
	17.3	Activity and participation		scores			
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.	Language of teaching / study			English and German			
21.	Methods of measuring / monitoring the quality of teaching			Standardized motor tests, observation, survey Self-evaluation			
22.	Literature						
	22.1	Basic literature					
		No	Author	Title	Publisher	Year	
		1.	Daniela Niebisch, Sylvette Penning-Hiemstra, Franz Sprecht, Monika Bovermann, Monika Reimann	Schritte International 2 Kusrbuch + Arbeitsbuch	Hueber Verlag	2006	
		2.	Friederike Jin, Ute Voß	Grammatik aktiv Üben, Hören, Sprechen	Cornelsen	2018	
		3.	Ранка Грчева Петер Рау	Голем македонско-германски и германско-македонски речник	Магор	2006	
	22.2	Additional literature					
		No					
		1.	Димитрија Гацов	Германска Граматика	НУБ „Климент Охридски“ - Скопје	1995	
		2.	Evans Sandra, Pude Angela, Sprecht Franz	Menschen A1.2	Hueber Verlag	2012	
		3.	Olga Swerlowa	Grammatik & Konversation Arbeitsblätter für den Deutschunterricht	Langenscheid	2013	

				A1-A2-B1		

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Spanish language level A1.2			
2.	Code	4FF100823			
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)	Marija Todorova			
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 weeks per semester): *vocabulary:* holidays and vacations, weather; names of relatives; dishes, courses of a meal, and meals, food and beverages, types of restaurants, setting the table; articles of clothing, shoes, daily routines, accessories; modes of transportation, shops, places in a city; sporting activities. *grammar structures*: adverbs of time, demonstrative pronouns, possessive adjectives; the present indicative of irregular verbs, the prepositions *en, de, a, con*; adverbs and expressions of frequency; numbers from 101 to 1 million, possessive adjectives, prepositions of location; reflexive verbs, present perfect, past participles of regular verbs; expressions of time, expressions of place; irregular past participles; adverbs of time with the present perfect, past simple tense, future tense. all communicative skills are equally included in the course including basic communication: extend invitations, accept or decline an invitation, talk about leisure activities, talk about the frequency of activities; express uncertainty and doubt; talk about professions; ask for and tell time; ask for and express the date; talk about holidays; organize a trip; talk about prices; exchange holiday greetings; ask about and describe the weather; describe personality; ask for and provide addresses; talk about family; talk about dishes and meals; express preferences; order at a restaurant; talk about clothing styles; describe an article of clothing; talk about				

	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.	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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15 hours		
16.	Other forms of activities	16.1	Projects	15 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	30 hours		
17.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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.	Language of teaching / study		English and Spanish			
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
22.	Literature					

	Basic literature				
22.1	No	Author	Title	Publisher	Year
	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	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

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	French language level A1.2			
2.	Code	4FF101023			
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)	Svetlana Jakimovska			
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 weeks per semester): *vocabulary:* holidays and vacations, weather; names of relatives; dishes, courses of a meal, and meals, food and beverages, types of restaurants, setting the table; articles of clothing, shoes, daily routines, accessories; modes of transportation, shops, places in a city; sporting activities. *grammar structures*: demonstrative pronouns; possessive adjectives; the present of basic verbs*;* expressions of frequency; numbers from 101 to 10000 prepositions; possessive adjectives, possessive adjectives with family members; prepositions of location; reflexive verbs with modal verbs; present perfect (passé composé); past participles of regular verbs; expressions of time; auxiliary verbs in the present perfect: être or avoir?; expressions of place; irregular past participles; adverbs of time with the present perfect. all communicative skills are equally included in the course including basic communication: extend invitations, accept or decline an invitation, talk about leisure activities, talk about the frequency of activities; express uncertainty and doubt; talk about professions; ask for and tell time; ask for and express the date; talk about holidays; organize a trip; talk about prices; exchange holiday greetings; ask about and describe the weather; describe personality; ask for and provide addresses; talk about family; talk about dishes and meals; express preferences; order at a restaurant; talk about clothing styles; describe an article of clothing; talk about 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.	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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15. hours		
16.	Other forms of activities	16.1	Projects	15 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	30. hours		
17.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20. scores			
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.	Language of teaching / study		English and French			
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
22.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		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.				

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Russian language level A1.2			
2.	Code	4FF101323			
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)	Igor Stanojoski			
9.	Requirements for enrolling the course	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				

	Russian words - 700 - 1000 words; developed habits of speech perception in the form of monologue and dialogue; developed habits of using colloquial speech, as well as developed reading and writing habits.					
11.	Contents of the course During the course, the main emphasis will be on mastering the Russian alphabet and the grammatical categories in the Russian language: cases, verbs, present tense, adjectives, future time, sentences, numbers, and perfect and imperfect verb forms. Non-specialized (colloquial) cultural themes shall be used: pets, use of "How much?", Asking "How old are you?", Profession / job, country and language, description of place of residence, description of home, asking Wh-questions.					
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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15 hours		
16.	Other forms of activities	16.1	Projects	15 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	30 hours		
17.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20. scores			
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.	Language of teaching / study		English and Russian			
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
22.	Literature					
	22.1	Basic literature				

		No	Author	Title	Publisher	Year
		1.	Ирина Осипова	«Ключ» - Учебник русского языка для начинающих.	Corvina, Москва	2005
		2.				
		3.				
	22.2	Additional 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 Course for First cycle studies			
1.	Title of Course	**Sport and recreation**			
2.	Code	2SC100121			
3.	Study program	Computer Engineering and Technologies			
4.	Organizer of the Study program	Goce Delce University – Stip Faculty of Computer science			
5.	Level (first, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	First year/ First or second semester	7.	Number of ECTS	0
8.	Professor (s)	Assoc. prof. Biljana Popeska, PhD			
9.	Requirements for enrolling the course	None			
10.	Aims of the course (competences): To fulfill students` needs for movement and physical activity; to improve and develop students movement skills and motor abilities; to adopt information and knowledge for independent choice and participation in adequate type of physical activity and recreational sport based 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 semester):				

	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 learning: practical exercises, method of sport training			
13.	Total amount of available time: 48 hours			
14.	Distribution of available time: 0+0+2			
15.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	0 hours
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	12 hours
16.	Other forms of activities	16.1	Projects	0 hours
		16.2	Individual work	0 hours
		16.3	Home learning	0 hours
17.	Method of assessment			
	17.1	Tests / Oral Exam		0 scores
	17.2	Individual work (presentation, projects, practical)		0 scores
	17.3	Activity and participation		0 scores
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.	Language of teaching / study		English			
21.	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey, self-evaluation			
22.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Haywood, K., & Getchell, N.	Life span motor development	Champaign: IL. Human Kinetics.	2004
		2.	Kohl, H., Murray, D., & Salvo, D	Foundations of Physical Activity and Public Health (Second Edition)	Champaign: IL. Human Kinetics.	2018
		3.	Wilmore, J. & Costill, D.	Physiology of sport and exercise, (Third edition)	Champaign: Human Kinetic, Illinois	2002
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.	Malina, R., Bouchard, C. & Bar – Or, O	Growth, Maturation and Physical Activity (Second Edition).	Champaign: IL. Human Kinetics.	2004
		2.	Beashel, P., Sibon, A., & Tailor,J	Sport examined	Nelson Thornes Ltd,	2004

Annex 3.	**Program of the Course for Integrated Second cycle studies**				
1.	Title of Course	**Data Structures and Algorithms**			
2.	Code	2FI101921			
3.	Study program	Computer Engineering and Technologies			
4.	Organizer of the Study program	Goce Delchev University – Stip Computer Science Faculty			
5.	Level (first, second or third cycle of studies)	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 for enrolling the course	None			
9.	Aims of the course (competences):				

	Students acquire knowledge about dynamic data structures including linear lists, queues and trees, as well as arrays, strings and hash tables. The course covers algorithms for sorting and searching. Students learn to implement data structures and techniques for designing algorithms in Java.						
10	Contents of the course (per 15 weeks per semester): Representing data with arrays. Implementing stacks and queues with arrays. Linked lists and algorithms for searching, inserting and deleting data from lists. Trees and traversals. Types of trees: binary, binary search, balanced AVL trees and B trees. Hash tables. Sorting algorithms: insertion sort, merge sort, selection sort, quick sort, counting sort and heap sort. Asymptotic analysis, big O, Ω и Θ. Techniques for design of algorithms: divide and conquer, dynamic programming, greedy algorithms and backtracking. Graphs and searching strategies. Topological sorting. Algorithms for finding the shortest path in graph and minimal spanning tree.						
11	Methods of learning: Lectures, Discussions, Labs, Practical exercises, e-learning, individual and team projects, office hours.						
12	Total amount of available time: 8 ECTS x 30 hours a = 240 hours						
13	Distribution of available time: 45 + 30 + 30 + 60 + 75 = 240 hours (3 + 2 + 2)						
14	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	45 hours			
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours			
15	Other forms of activities	16.1	Projects	30 hours			
		16.2	Individual work	60 hours			
		16.3	Home learning	75 hours			
16	Method of assessment						
17	17.1	Tests / Oral Exam	70 scores				
	17.2	Individual work (presentation, projects, practical)	10 scores				
	17.3	Activity and participation	20 scores				
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	Language of teaching / study		English				
21	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation				
22	Literature						
	22.1	Basic literature					
		No	Author	Title	Publisher	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	Additional 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

Annex 3.	**Program of the course for First cycle studies**				
23.	Title of Course	**Digital logic**			
24.	Code	2FI102121			
25.	Study program	Computer Engineering and Technologies			
26.	Organizer of the Study program	Goce Delchev University – Stip Faculty of Computer Sciences_____			
27.	Level (first, second or third cycle of studies)	First cycle			
28.	Academic year/ semester	Second year / Third semester	7.	Number of ECTS	6
29.	Professor (s)	Vasko Kokalanov			
30.	Requirements for enrolling the course	None			
31.	Aims of the course (competences): After competition of the course, students should know the basic concepts of switching algebra and logic circuits that are an integral part from computer systems				
32.	Contents of the course (per 15 weeks per semester): Number systems and conversions from one number system to another. Binary number system. Binary arithmetic and complement arithmetic. Representing negative numbers and formats for reals numbers. Binary codes. Error detection and correction codes: Hamming codes and codes with parity. Axioms and theorems of Boolean algebra. Realization of switching functions with logic gates. Electronic components for logic gates. Minimization of switching functions with a method of Karnaugh maps and Quine–McCluskey. Combinational circuits for addition, subtraction with single and two's complement, shift and compare. Combinational circuits: multiplexers, demultiplexers, encoders and decoders. Implementation of switching functions with ROM and programmable logic devices PLA and PAL.Flip-flops. Analysis and synthesis of sequential circuits. Sequential Circuits: Registers and Counters.				
33.	Methods of learning: Lectures, theoretical and practical exercises, e-learning, team work, consultations.				
34.	Total amount of available time: 6 ECTS x 30 hours = 180 hours				

35.	Distribution of available time: 30 + 30 + 30 + 30 + 60 = 180 hours (2 + 2 +1)			
36.	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)	30 hours
37.	Other forms of activities	16.1	Projects	30 hours
		16.2	Individual work	30 hours
		16.3	Home learning	60 hours
38.	Method of assessment			

39.	17.1	Tests / Oral Exam	20+20+30 scores
	17.2	Individual work (presentation, practical)	10 scores
	17.3	Activity and participation	20 scores

40.	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)

41.	Signature approval and entrance to the final exam/ or transition in the next year	60% active participation at the course
42.	Language of teaching / study	English
43.	Methods of measuring / monitoring the quality of teaching	Standardized motor tests, observation, survey Self-evaluation
44.	Literature	

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	Cveta Martinovska	Digitalna logika	Univ. Goce Delcev	2011
22.2	Additional literature				
	No	Author	Title	Publisher	Year
	1.	Jani Servini Zaneta Servini	Digitalna elektronika I mikroprocesori	Ministry of Education and Science of Macedonia	2011
	1.	Norman Balabanian Bradley Carlson	Digital Logic Design Pricniples	John Wiley & Sons	2011

Annex 3.	**Program of the Course for First cycle studies**				
1.	Title of Course	**Software Engineering**			
2.	Code	2FI102021			
3.	Study program	Computer engineering and technologies			
4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of informatics			
5.	Level (first, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	2 year / III semester	7.	Number of ECTS	8
7.	Professor (s)	Prof. Natasha Koceska			
8.	Requirements for enrolling the course	None			
9.	Aims of the course (competences): Gaining a fundamental theoretical knowledge of software engineering and Software Development Life Cycle (SDLC) process. Understanding the basic models of software processes and ability to use them on practical projects. Understanding the user 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 • Software verification and validation				
11.	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours				
12.	Total amount of available time: 8 ECTS x 30 hours = 240 hours				

13	Distribution of available time: 45 + 30 + 30 + 60 + 75 = 240 hours (3 + 2 + 2)						
14	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	45 hours			
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours			
15	Other forms of activities	16.1	Projects	30 hours			
		16.2	Individual work	60 hours			
		16.3	Home learning	75 hours			
16	Method of assessment						
17	17.1	Tests / Oral Exam		70 points			
	17.2	Individual work (presentation, projects, practical)		10 points			
	17.3	Activity and participation		20 points			
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	Language of teaching / study		English				
21	Methods of measuring / monitoring the quality of teaching		Standardized tests, observation, survey Self-evaluation				
22	Literature						

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	Ian Sommerville	Software engineering	Addison Wesley	2009
	2.	Natasha Koceska, Sasho Koceski	Софтверско инженерство	Универзитет ,,Гоце Делчев" - Штип.	2018
	3.	Van Vliet H.	Software Engineering - Principles and Practice, (2-nd Edition)	John Wiley and Sons	2000
22.2	Additional literature				
	No	Author	Title	Publisher	Year
	1.	Pressman R.S.	Software Engineering - A Practicioner’s	McGraw 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

Appendix 3.	Program of the Course for First cycle studies				
13.	Title of Course	Probability and Statistics			
14.	Code	2FI130221			
15.	Study program	Computer Engineering and Technologies			
16.	Organizer of the Study program	Goce Delchev University – Stip Faculty of computer science			
17.	Level (first, second or third cycle of studies)	First cycle			
18.	Academic year/ semester	Second year/ third semester	7.	Number of ECTS	4
38.	Professor (s)	Prof. Tatjana Atanasova Pachemska, full professor			
39.	Requirements for enrolling the course	Enrolment in the first cycle of studies of the study 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.	Content of the subject program: 1. Combinatorial elements-permutations, variations, combinations; 2. Fundamentals of probability theory-experiment, random event, statistical definition of probability 3. Axiomatics of the probability space; Classical definition of probability 4. Geometric probability, Conditional probability 5. Total Probability, Bayes Formulas, Bernoulli Scheme, Most Likely Number, Poisson Scheme 6. Concept of random variable-. Discrete random variables. Law of distribution of discrete random variable 7. Continuous random variables. Distribution function of a random variable; 8. Numerous characteristics of a random variable – mathematical expectation, dispersion, correlation coefficients (Pirson, Spirman, …) 9. Generalization of the notion of random variable – random vectors and distributions 10. Measures of central tendency – generalization; 11. Limit theorems - law of large numbers and applications; 12. Limit theorems - Central limit theorem, normalization of random variables, applications 13. Basic terms in statistics – population, sample, feature, data presentation, data grouping, clustering (statistics) 14. Descriptive statistics, non-parametric statistics 15. Parametric statistics – hypothesis testing, some basic tests (probability theory - applied) 14. Monte Carlo method (optionally) 15. Markov chains – mass service systems (optionally)				

42.	Methods of learning: Lectures, exercises, preparation of a seminar paper and presentations, teaching with using ICT						
43.	Total amount of available time: 6 ECTS x 30 hours = 180 hours						
44.	Distribution of available time: 30+15+15+30+30 = 120 hours (2+1+1)						
45.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30			
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	15			
46.	Other forms of activities	16.1	Projects	15			
		16.2	Individual work	30			
		16.3	Home learning	30			
47.	Method of assessment						
	17.1	Tests / Oral Exam	70 scores				
	17.2	Individual work (presentation, projects, practical)	10 scores				
	17.3	Activity and participation	20 scores				
48.	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)	
49.	Signature approval and entrance to the final exam/ or transition in the next year		Apart from 42 points from partial exams, completed homework and regularity of lectures, classroom exercises and laboratory exercises				
50.	Language of teaching / study		English				
51.	Methods of measuring / monitoring the quality of teaching		Self-evaluation, periodic tests, debates				
52.	Literature						
	22.1	Basic literature					
		No	Author	Title	Publisher	Year	
		1.	Атанасова Пачемска Татјана, Коцева Лазарова Лимонка, Карамазова Елена	Веројатност (this book will be translated in English)	УГД Штип, ISBN 978-608-244-591-5	2018	
		2.	Атанасова Пачемска Татјана, Коцева Лазарова Лимонка, Карамазова Елена, Вета Буралиева Јасмина	*Збирка задачи по Веројатност (will be translated in English).*	УГД Штип ISBN 978-608-244-592-2	2018	
		3.					
	22.2	Additional literature					

		No	Author	Title	Publisher	Year
		1.				

Appendix 3.	Program of the Course for First cycle studies				
19.	Title of Course	Theory of Probability			
20.	Code	2FI130121			
21.	Study program	Computer Engineering and Technologies			
22.	Organizer of the Study program	Goce Delchev University – Stip Faculty of computer science			
23.	Level (first, second or third cycle of studies)	First cycle			
24.	Academic year/ semester	Second year/ third semester	7.	Number of ECTS	4
53.	Professor (s)	Prof. Tatjana Atanasova Pachemska, full professor			
54.	Requirements for enrolling the course	Enrolment in the first cycle of studies of the study program			
55.	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.				
56.	Content of the subject program: 1. Combinatorial elements-permutations, variations, combinations; 2. Fundamentals of probability theory-experiment, random event, statistical definition of probability 3. Axiomatics of the probability space; Classical definition of probability 4. Geometric probability, Conditional probability 5. Total Probability, Bayes Formulas, Bernoulli Scheme, Most Likely Number, Poisson Scheme 6. Concept of random variable-. Discrete random variables. Law of distribution of discrete random variable 7. Continuous random variables. Distribution function of a random variable; 8. Numerous characteristics of a random variable – mathematical expectation, dispersion, correlation coefficients (Pirson, Spirman, …) 9. Generalization of the notion of random variable – random vectors and distributions 10. Measures of central tendency – generalization; 11. Limit theorems - law of large numbers and applications; 12. Limit theorems - Central limit theorem, normalization of random variables, applications 13. Basic terms in statistics – population, sample, feature, data presentation, data grouping, clustering (statistics) 14. Descriptive statistics, non-parametric statistics 15. Parametric statistics – hypothesis testing, some basic tests (probability theory - applied) 14. Monte Carlo method (optionally) 15. Markov chains – mass service systems (optionally)				
57.	Methods of learning: Lectures, exercises, preparation of a seminar paper and presentations, teaching with using ICT				
58.	Total amount of available time: 6 ECTS x 30 hours = 180 hours				
59.	Distribution of available time: 30+15+15+30+30 = 120 hours (2+1+1)				

60.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30		
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	15		
61.	Other forms of activities	16.1	Projects	15		
		16.2	Individual work	30		
		16.3	Home learning	30		
62.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
63.	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)
64.	Signature approval and entrance to the final exam/ or transition in the next year		Apart from 42 points from partial exams, completed homework and regularity of lectures, classroom exercises and laboratory exercises			
65.	Language of teaching / study		English			
66.	Methods of measuring / monitoring the quality of teaching		Self-evaluation, periodic tests, debates			
67.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Атанасова Пачемска Татјана, Коцева Лазарова Лимонка, Карамазова Елена	Веројатност (this book will be translated in English)	УГД Штип, ISBN 978-608-244-591-5	2018
		2.	Атанасова Пачемска Татјана, Коцева Лазарова Лимонка, Карамазова Елена, Вета Буралиева Јасмина	*Збирка задачи по Веројатност (will be translated in English).*	УГД Штип ISBN 978-608-244-592-2	2018
		3.				
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.				

Annex 3.	**Program of the course for First cycle studies**					
45.	Title of Course	**Professional skills**				
46.	Code	2FI130421				
47.	Study program	Computer engineering and technologies				
48.	Organizer of the Study program	Faculty of Computer Science				
49.	Level (first, second or third cycle of studies)	First				
50.	Academic year/ semester	Second year / Third semester	7.	Number of ECTS	4	
51.	Professor (s)	Asso. Prof. Aleksandar Krstev PhD				
52.	Requirements for enrolling the course	None				
53.	Aims of the course (competences): Familiarity with techniques for writing on seminary, professional, scientific and degree works.					
54.	Content on the subject program: Elements on academically writing, structure on the labor (cover side, text, font, content, abstract, introduced part, main part, conclusion, used literature, summary), programs for writing on text and accessories, presentation on the paper, publication on labor, correction, review.					
55.	Methods of learning: Lectures, auditory and laboratory exercises, electronically learning, homemade learning, teamwork, consulting					
56.	Total amount of available time: 4 ECTS x 30 hours = 120 hours					
57.	Distribution of available time: 30+15+30+30+15 = 120 hours (2+1+1)					
58.	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)	15 hours		
59.	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	15 hours		
60.	Method of assessment					
61.	17.1	Tests / Oral Exam	20+20+30 points			
	17.2	Individual work (presentation, practical)	10 points			
	17.3	Activity and participation	10+10 points			
62.	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)		
63.	Signature approval and entrance to the final exam/ or 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.	Language of teaching / study		English			
65.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
66.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	A. Krstev, Z. Zdravev	Academic writhing	UDG	2019
		2.	Margot Northey/Judy Jevinsky	Writing with meaning	Arberia design, Aunt	2010
	22.2	Additional literature				
		No	Author	Title	Publisher	Year

Annex 3.	**Program of the course for First cycle studies**				
1.	Title of Course	**Algebraic Structures**			
2.	Code	2FI131221			
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	Second year / Third semester	7.	Number of ECTS	4
7.	Professor (s)	prof. Limonka Koceva Lazarova			
8.	Requirements for enrolling the course	None			
9.	**Aims of the course (competences):** Students to become familiar with the basic algebraic and numerical structures, to solve successfully tasks and to prove simpler claims.				
10	**Content on the subject program:** Groupoid. Semigroup. Subgroupoids. Congruences of groupoids. Congruence of numbers. A group. A subgroup. Finite groups. Homomorphisms and isomorphisms of groups. Cyclic and finite Abelian groups. Dihedral groups. Symmetric groups. Permutation groups. Normal subgroups. Rings. Integral domain. Fields.				
11	**Methods of learning:** Lectures, theoretical and practical exercises, e-learning, teamwork, consultations.				
12	Total amount of available time: 4 ECTS x 30 hours = 120 hours				
13	Distribution of available time: 30 + 30 + 15 + 15 + 30 = 120 hours (2 + 1 +1)				

14	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)	30 hours
15	Other forms of activities	16.1	Projects	15 hours
		16.2	Individual work	15 hours
		16.3	Home learning	30 hours
16	Method of assessment			

17	17.1	Tests / Oral Exam	70 scores
	17.2	Individual work (presentation, practical)	10 scores
	17.3	Activity and participation	20 scores

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	Language of teaching / study	English		
21	Methods of measuring / monitoring the quality of teaching	Standardized motor tests, observation, survey Self-evaluation		

22	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Peter J. Cameron	Notes on Algebraic Structures		2006
		2.	Janko Böhm, Magdaleen Marais	Introduction to Algebraic Structures Lecture Notes 2019		2019
	22.2	Additional literature				
		No	Author	Title	Publisher	Year

Appendix 3.	Program of the Course for First cycle studies

1.	Title of Course	**Operating Systems**				
2.	Code	2FI102421				
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	Second year / IV semester	7.	Number of ECTS	6	
1.	Professor (s)	Ass. Professor Mirjana Kocaleva Vitanova				
2.	Requirements for enrolling the course	None				
3.	Aims of the course (competences): The concepts and way of functioning of the operating systems, and the algorithms for the development of their components, as well as their practical performance.					
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.	Methods of learning: Lectures, theoretical and practical exercises, consultations; creation of an independent seminar work / project; home study					
6.	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
7.	Distribution of available time: 30+30+30+30+60 = 180 hours (2+2+1)					
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30 hours		
9.	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
	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			
11.	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)

12.	Signature approval and entrance to the final exam/ or transition in the next year	60% active participation at the course
13.	Language of teaching / study	English
14.	Methods of measuring / monitoring the quality of teaching	Self-evaluation
15.	Literature	

22.1 Basic literature

No	Author	Title	Publisher	Year
1.	William Stallings	Operating Systems: Internals and Design Principles	Prentice Hall	2011
2.	Andrew Tannenbaum	Modern operating systems	Pearson Prentice-Hall	2015

22.2 Additional literature

No	Author	Title	Publisher	Year
1.	Andrew Tannenbaum	Modern operating systems	Prentice Hall	2007

Annex 3.	**Program of the course for First cycle studies**				
67.	Title of Course	**Operational research**			
68.	Code	2FI102123			
69.	Study program	Computer engineering and technologies			
70.	Organizer of the Study program	Faculty of Computer Science			
71.	Level (first, second or third cycle of studies)	First			
72.	Academic year/ semester	Second year / Fourth semester	7.	Number of ECTS	6
73.	Professor (s)	Asso. Prof. Aleksandar Krstev PhD			
74.	Requirements for enrolling the course	None			
75.	Aims of the course (competences): Introduction in Operational research through lin., integer and non-linear programming, and other techniques of i.e., and application				

76.	Content on the subject program: Models on Operational research, LP, graphic solve, simplex method, application on Solver, dual simplex algorithm, advanced lin. programming, integer linearly programming, Analysis on decisions and application, theory on games, non-linear programming, methods for solve, gradient method, simulation languages, simulation.					
77.	Methods of learning: Lectures, laboratory exercises, numerical exercises, electronically learning, seminary work, project, team work, consultations.					
78.	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
79.	Distribution of available time: 30+30+30+30+60 = 180 hours (2+2+1)					
80.	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)	30 hours		
81.	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
82.	Method of assessment					
83.	17.1	Tests / Oral Exam	20+20+30 points			
	17.2	Individual work (presentation, practical)	10 points			
	17.3	Activity and participation	10+10 points			
84.	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)
85.	Signature approval and entrance to the final exam/ or 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			
86.	Language of teaching / study		English			
87.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
88.	Literature					

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	Hamdi A. Taha	Operational research: introduction	Magor, Skopje,	2010
	2.	S. Krčevinac and others	Operational research	Faculty organizational	2004

					science, Belgrade	
	22.2	Additional 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

Annex 3.	**Program of the Course for Integrated First cycle studies**					
1.	Title of Course	**Database Systems**				
2.	Code	2FI102521				
3.	Study program	Computer Engineering and Technologies				
4.	Organizer of the Study program	Goce Delchev University – Stip Computer Science Faculty _____				
5.	Level (first, second or third cycle of studies)	First cycle				
6.	Academic year/ semester	Second year / IV semester	7.	Number of ECTS	6	
7.	Professor (s)	Full Professor Cveta Martinovska Bande				
8.	Requirements for enrolling the course	None				
9.	Aims of the course (competences): This course covers fundamentals of database management systems, principles of database design and implementation in Microsoft SQL Server.					
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.					
11	Methods of learning: Lectures, Discussions, Labs, Practical exercises, e-learning, individual and team projects, office hours.					
12	Total amount of available time: 6 ECTS x 30 hours a = 180 hours					
13	Distribution of available time: 30 + 30 + 30 + 30 + 60 = 180 hours (2 + 2 +1)					
14	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours		
15	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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	Language of teaching / study		English		
21	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation		
22	Literature				
	22.1	Basic literature			
		No	Author	Title	Publisher	Year
		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	Additional 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
		3.	Microsoft SQL Server 2022	https://learn.microsoft.com/en-us/sql/relational-databases/databases/databases?view=sql-server-ver16	Microsoft	2022

Annex 3.	**Program of the Course for First cycle studies**			
1	Title of Course	**Visual programming**		
2	Code	2FI102621		
3	Study program	Computer engineering and technologies		
4	Organizer of the Study program	Goce Delchev University – Stip Faculty of informatics		
5	Level (first, second or third cycle of studies)	First cycle		
6	Academic year/ semester	2 year / II semester	7. Number of ECTS	6
7	Professor (s)	Prof. Sasho Koceski		
8	Requirements for enrolling the course	None		

9.	Aims of the course (competences): Acquisition of theoretical knowledge of Visual Programming; Gaining practical experience in working with a visual tool for rapid application development - Visual Studio 2010; The acquisition of basic practical knowledge of object-oriented programming language C #; Gaining practical experience in visual programming of Windows applications with graphical user interface (Graphical User Interface - GUI) using Visual C # programming language; Gaining practical experience in visual programming of ASP.NET WEB applications using Visual C # programming language.			
10.	Contents of the course (per 15 weeks per semester): Fundamentals of visual programming, review of programs for visual programming and review of Visual Studio as a development tool for visual programming; Operating environment of Visual Studio and its configuration; Visual programming - basic visual controls (forms and work with multiple forms, buttons, menus) and events; Visual programming with advanced visual controls: Browse for Folder, Check Box, Checked List Box, Color Dialog, Combo Box, Context Menu Date Picker, Domain Up-Down; Visual programming with advanced visual controls: Flow Layout Panel, Font Dialog, Group Box, Image List, Label, Link Label, List Box, List View; Visual programming with advanced visual controls: Masked Text Box, Menu Strip, Month Calendar, Numeric Up-Down, Open Dialog; Visual programming with advanced visual controls: Page Setup, Panel, Picture Box, Print Dialog Box, Print Preview; Visual programming with advanced visual controls: Progress Bar, Radio Buttons, Rich Text Box, Save dialog, Scroll Bar, Split Container; Visual programming with advanced visual controls: Tab Control, Table, Layout Panel, Text Box; Visual programming with advanced visual controls: Tick Counter, Timer Time Picker, Track Bar, Tree View; Fundamentals of database programming with VS and C #; Fundamentals of database programming with VS and C #			
11.	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours			
12.	Total amount of available time: 6 ECTS x 30 hours = 180 hours			
13.	Distribution of available time: 30+30+30+30+60 = 180 hours (2+2+1)			
14.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours
15.	Other forms of activities	16.1	Projects	30 hours
		16.2	Individual work	30 hours
		16.3	Home learning	60 hours
16.	Method of assessment			

17.	17.1	Tests / Oral Exam	70 points
	17.2	Individual work (presentation, projects, practical)	10 points
	17.3	Activity and participation	20 points

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	Language of teaching / study		English		
21	Methods of measuring / monitoring the quality of teaching		Standardized tests, observation, survey Self-evaluation		
22	Literature				
	22.1	Basic literature			
		No / Author / Title / Publisher / Year			
		1. Џон Ц. Мичел — Концепти во програмските јазици — Cambridge University Press-преводи од Влада на РМ — 2010			
		2. Хектор Гарсија – Молина, Џефри Д. Улман и Џенифер Видом — Системи за бази на податоци – комплетна книга — Pearson Education-преводи од Влада на РМ — 2009			
		3. Џенифер Тидвел — Дизајнирање интерфејси — O‘ Reilly Media-преводи од Влада на РМ — 2005			
	22.2	Additional literature			
		No / Author / Title / Publisher / Year			
		1. Сашо Коцески — Визуелно програмирање — Универзитет Гоце Делчев - Штип — 2013			
		2. John Sharp — Microsoft® Visual C#® 2010 Step by Step — Microsoft Press — 2010			
		3. BEN WATSON — C# 4.0 How-To, 2010 SAMS Publisher, ISBN-13: 978-0-672-33063-6 — SAMS Publisher — 2010			

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

4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of Computer Sciences			
5.	Level (first, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	Second year / Fourth semester	7.	Number of ECTS	6
7.	Professor (s)	Aleksandra Mileva			
8.	Requirements for enrolling the course	None			
9.	Aims of the course (competences): Students to acquire theoretical and practical knowledge of computer networks, as well as of contemporary network technologies, protocols and standards				
10	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; 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; Application layer: HTTP, DNS, FTP, SMTP, IMAP, POP3, etc.				
11	Methods of learning: Lectures, theoretical and practical exercises, e-learning, team work, consultations.				
12	Total amount of available time: 6 ECTS x 30 hours = 180 hours				
13	Distribution of available 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 hours	
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)	30 hours	
15	Other forms of activities	16.1	Projects	30 hours	
		16.2	Individual work	30 hours	
		16.3	Home learning	60 hours	
16	Method of assessment				
17	17.1	Tests / Oral Exam	70 scores		
	17.2	Individual work (presentation, practical)	10 scores		
	17.3	Activity and participation	20 scores		

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	Language of teaching / study	English			
21	Methods of measuring / monitoring the quality of teaching	Standardized motor tests, observation, survey Self-evaluation			

22	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	William Stallings	Data and Computer Communications, 8th Edition - има превод на макед. јазик (9th Edition)	Prentice Hall	2007 (2010)
		2.	Andrew S. Tanenbaum, David J. Wetherall	Computer Networks, 5th Edition	Prentice Hall	2010
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.	Alberto Leon-Garcia, Indra Widjaja	Communication Networks: fundamental concepts and key architectures, 2nd Edition	McGraw-Hill	2003

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Computational tools in engineering			
2.	Code	2FI102023			
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	2/4	7.	Number of ECTS	6
1.	Professor (s)	Prof. Vlado Gicev			
2.	Requirements for enrolling the course	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.				

4.	Contents of the course (per 15 weeks per semester): Introduction. Fourier series and Fourier transforms. Time series and operations on them. Convolution, auto correlation and cross correlation. Eigenvalues and eigenvectors. Application of eigenvalues and eigenvectors in engineering. Introduction in partial differential equations. Analytical solution of partial differential equations using separation of variables. Initial and boundary valued problems.					
5.	Methods of learning: lectures, exercises. Homework assignments, mini projects.					
6.	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
7.	Distribution of available time: 30 + 30 + 30 + 30 + 60 = 180 hours (2 + 2 +1)					
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours		
9.	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the 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 teaching / study		English			
14.	Methods of measuring / monitoring the quality of teaching		Self evaluation			
15.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	E Kreyszig	Advanced engineering mathematics	John Wiley & Sons	1999
		2.				

		3.				
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.				

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Computer Architecture			
2.	Code	2FI103321			
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	Third / V	7.	Number of ECTS	8
1.	Professor (s)	Ass. Professor Dusan Bikov			
2.	Requirements for enrolling the course	None			
3.	Aims of the course (competences): The aim of the course is for students to become familiar with the components of modern computer systems and their functionality.				
4.	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, I/O architectures, magnetic disk technology, optical disks.				
5.	Methods of learning: Lectures, theoretical and practical exercises, consultations, seminar work / project; home study, homework, preparatory teaching for exams and colloquiums; consultations.				
6.	Total amount of available time: 8 ECTS x 30 hours = 240 hours				
7.	Distribution of available time: 45+30+30+60+75 = 240 hours (3+2+2)				
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning		45 hours
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)		30 hours
9.	Other forms of activities	16.1	Projects		30 hours
		16.2	Individual work		60 hours

		16.3	Home learning	75 hours
10.	Method of assessment			
	17.1	Tests / Oral Exam	70 scores	
	17.2	Individual work (presentation, projects, practical)	10 scores	
	17.3	Activity and participation	20 scores	

11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the next year	60% active participation at the course		
13.	Language of teaching / study	English		
14.	Methods of measuring / monitoring the quality of teaching	Self-evaluation		
15.	Literature			

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	William Stallings	Computer Organization and Architecture: Designing for Performance	Prentice Hall	2009
	2.	Andrew S. Tanenbaum	Structured Computer Organization	Pearson College Div	2006
	3.	John L. Hennessy, David A. Patterson	Computer Architecture: A Quantitative Approach	Morgan Kaufmann	2006
22.2	Additional literature				
	No	Author	Title	Publisher	Year
	1.				
	2.				

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

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	Third / fifth	7.	Number of ECTS	8	
1.	Professor (s)	Ass. Prof. Dr. Aleksandar Velinov				
2.	Requirements for enrolling the course					
3.	Aims of the course (competences): Introduction to web development using PHP programming language, MySQL, HTML5, Bootstrap, JavaScript an JQuery.					
4.	Contents of the course (per 15 weeks per semester): - 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.	Methods of learning: Lectures, laboratory exercises, e-learning, seminar work, team work, consultations.					
6.	Total amount of available time: 8 ECTS x 30 hours = 240 hours					
7.	Distribution of available time: 45+30+30+60+75 = 240 hours (3+2+2)					
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	45 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30 hours		
9.	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	60 hours		
		16.3	Home learning	75 hours		
10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)		
12.	Signature approval and entrance to the final exam/ or transition in 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 teaching / study		English			
14.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
15.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Anuradha A. Puntambekar	Internet Programming	Technical Publications	2020
		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	Additional 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

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

8.	Requirements for enrolling the course	None				
9.	Aims of the course (competences): • This course aims to introduce students to computer graphics. • To give an overview of the technologies and devices used in computer graphics: • Video controllers, monitors, walkers, pointing devices. • To familiarize students with the theoretical concepts on which computer graphics is based • 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	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 learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours					
12	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
13	Distribution of available time: 30+30+30+30+60 = 180 hours (2+2+1)					
14	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours		
15	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam		70 points		
	17.2	Individual work (presentation, projects, practical)		10 points		
	17.3	Activity and participation		20 points		
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	Language of teaching / study		English			
21	Methods of measuring / monitoring the quality of teaching		Standardized tests, observation, survey Self-evaluation			
22	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		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	Универзитет Гоце Делчев - Штип	2016
	22.2	Additional 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 3.	**Program of the course for First cycle studies**				
1.	Title of Course	**Advanced algorithms**			
2.	Code	2FI131721			
3.	Study program	Computer Engineering and Technologies			
4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of Computer Sciences			
5.	Level (first, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	Third year / Fifth semester	7.	Number of ECTS	4

7.	Professor (s)		Natasha Stojkovikj			
8.	Requirements for enrolling the course		None			
9.	Aims of the course (competences): Students to acquire theoretical and practical knowledge for design and analyse of various algorithms.					
10	Contents of the course (per 15 weeks per semester): Introduction to time and space complexity of algorithms. Analysis of algorithms. Asymptotic analysis, big O, Ω и Θ. Data structures: stacks ,queues, linked lists, treesbinary search tree, hash tables. Ramdomized algorithm.: Las Vegas algorithm and Monte Calro algorithms. Sorting algorithm: Techniques for design of algorithms: divide and conquer, dynamic programming, greedy algorithms and backtracking. Graph algoritms:Depth First Search (DFS) Algorithm, Breadth First Search (BFS) Algorithm, Shortest path Algorithms:Dijkstra's algorithm, Bellman-Ford algorithm, Floyd–Warshall algorithm. Spanning trees: Kruskal's algorithm, Prim algorithm. Flow network: Residual network, Augmenting path, Minimum cut, Ford-Fulkerson algorithm..					
11	Methods of learning: Lectures, theoretical and practical exercises, e-learning, team work, consultations.					
12	Total amount of available time: 4 ECTS x 30 hours = 120 hours					
13	Distribution of available time: 30 + 15 + 30 + 30 + 15 = 120 hours (2 + 1 +1)					
14	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)	15 hours		
15	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	15 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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	Language of teaching / study		English		
21	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation		
22	Literature				
	22.1	Basic literature			
		No	Author	Title	Publisher	Year
		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	Additional literature				
		No	Author	Title	Publisher	Year
		1.	Michael Goodrich Roberto Tamassia	Data Structures and Algorithms in Java	John Wiley	2010

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Parallel Programming			
2.	Code	2FI131821			
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	Third / V	7.	Number of ECTS	4
1.	Professor (s)	Ass. Professor Dusan Bikov			
2.	Requirements for enrolling the course	None			
3.	Aims of the course (competences): The aim of the course is for students to become familiar with the basic principles and characteristics of parallel programing, by presenting the model of heterogeneous parallel programming. For the purposes of the course students will work with MPI and CUDA C.				
4.	Contents of the course (per 15 weeks per semester): Parallel Architectures, basic principles. Multiprocessors, clusters. Flynn's Taxonomy. Development of parallel algorithms. Functional decomposition and data decomposition. Ian Foster's Methodology. Performance analysis of parallel programs. Laws of Amdahl, Gustafson. Basic features and 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 sorting algorithms. Optimizing MPI and CUDA programs.				
5.	Methods of learning: Lectures, theoretical and practical exercises, consultations, seminar work / project; home study, homework, preparatory teaching for exams and colloquiums; consultations.				

6.	Total amount of available time: 4 ECTS x 30 hours = 120 hours			
7.	Distribution of available time: 30+15+30+30+15 = 120 hours (2+1+1)			
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	15 hours
9.	Other forms of activities	16.1	Projects	30 hours
		16.2	Individual work	30 hours
		16.3	Home learning	15 hours

10	Method of assessment				
	17.1	Tests / Oral Exam	70 scores		
	17.2	Individual work (presentation, projects, practical)	10 scores		
	17.3	Activity and participation	20 scores		
11	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)
12	Signature approval and entrance to the final exam/ or transition in the next year		60% active participation at the course		
13	Language of teaching / study		English		
14	Methods of measuring / monitoring the quality of teaching		Self-evaluation		

15	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Calvin Lin, Larry Snyder	Principles of Parallel Programming	Pearson	2008
		2.	D. Kirk and W. Hwu	Programming Massively Parallel Processors – A Hands-on Approach	2nd Edition, Morgan Kaufman Publisher	2013
		3.	Michael J, Quinn	Parallel Programming in C with MPI and OpenMP	McGraw-Hill Science /Engineering /Math	2003
	22.2	Additional literature				
		No	Author	Title	Publisher	Year

		1.				

Annex 3.	**Program of the course for First cycle studies**				
1.	Title of Course	**Network Protocols**			
2.	Code	2FI132021			
3.	Study program	Computer Engineering and Technologies			
4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of Computer Sciences			
5.	Level (first, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	Third year / Fifth semester	7.	Number of ECTS	4
7.	Professor (s)	Aleksandra Mileva			
8.	Requirements for enrolling the course	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				
10	Contents of the course (per 15 weeks per semester): Router configuration and management Basic switch configuration and management Virtual local networks (VLANs) Configuration of Router-on-a-stick and multilayer switch, Dynamic Trunking Protocol – DTP, VLAN Trunking Protocol - VTP Spanning Tree Protocol (STP) and Rapid STP First Hop Redundancy Protocol (FHRP), and Level 2 discovery protocols (Cisco Discovery Protocol - CDP, Layer discovery Protocol - LLDP) Virtualization, installing and configuring some virtualization software (Virtual Box or VMWare) DHCP and DHCP server installation, configuration and management DNS and DNS server installation, configuration and management Virtual Private Networks (VPNs) SNMP and Network Management.				
11	Methods of learning: Lectures, theoretical and practical exercises, e-learning, team work, consultations.				
12	Total amount of available time: 4 ECTS x 30 hours = 120 hours				
13	Distribution of available time: 30 + 15 + 30 + 30 + 15 = 120 hours (2 + 1 +1)				
14	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours	
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)	15 hours	
15	Other forms of activities	16.1	Projects	30 hours	
		16.2	Individual work	30 hours	

		16.3	Home learning	15 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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	Language of teaching / study		English			
21	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
22	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	William Stallings	Data and Computer Communications, 8th Edition - има превод на макед. јазик (9th Edition)	Prentice Hall	2007 (2010)
		2.	Andrew S. Tanenbaum, David J. Wetherall	Computer Networks, 5th Edition	Prentice Hall	2010
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.	Alberto Leon-Garcia, Indra Widjaja	Communication Networks: fundamental concepts and key architectures, 2nd Edition	McGraw-Hill	2003
		2.		Tutorial from Internet about installation, configuration and management of router, switch, DHCP server, DNS server, virtualization software, etc.		

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

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	2023 / 5	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 studies modern telecommunication techniques. Upon successful completion of the course, students will be able to understand and implement different modulation techniques for wireless data transmission.				
4.	Contents of the course (per 15 weeks per semester): - Signals as carriers of information - Sinusoidal signal elements: amplitude, phase and frequency - Noise - Mathematical model of the noise - Fourier series - Channel capacity - Commutation techniques - ATM switching - Antennas - Antenna – types and specifications - Signal attenuation - Modulation basic principles - The concept of carrier - Amplitude modulation - Frequency modulation - Phase modulation - QAM: quadrature amplitude modulation				
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.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30
9.	Other forms of activities	16.1	Projects	15
		16.2	Individual work	15
		16.3	Home learning	30

10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the next year		/			
13.	Language of teaching / study		English			
14.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
15.	Literature					

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	Al Agha, K., Pujolle, G. and Yahiya, T.A.	Mobile and wireless networks.	John Wiley & Sons.	2016.
	2.				
	3.				
22.2	Additional literature				
	No	Author	Title	Publisher	Year
	1.				

Annex 3.	Program of the Course for First cycle studies					
23	Title of Course	**Microcomputer Systems**				
24	Code	2FI103921				
25	Study program	Computer Engineering and Technologies				
26	Organizer of the Study program	Goce Delchev University – Stip Faculty of Computer Sciences_____				
27	Level (first, second or third cycle of studies)	First cycle				
28	Academic year/ semester	Third year / Sixth semester	7.	Number of ECTS	6	
29	Professor (s)	Aleksandra Stojanova Ilievska				
30	Requirements for enrolling the course	None				
31	Aims of the course (competences): Students acquire theoretical knowledge about basic elements of microprocessors and microcontrollers, their similarities and differences, as well as presenting some practical examples for their application in practical applications.					
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	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
35	Distribution of available time: 30 + 30 + 30 + 30 + 60 = 180 hours (2 + 2 +1)					
36	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)	30 hours		
37	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
38	Method of assessment					
39	17.1	Tests / Oral Exam / Team project	70 scores			
	17.2	Individual work (presentation, practical)	10 scores			
	17.3	Activity and participation	20 scores			
40	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)
41	Signature approval and entrance to the final exam/ or transition in the next year		60% active participation at the course		
42	Language of teaching / study		English		
43	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation		
44	Literature				
	22.1	Basic literature			
		No / Author	Title	Publisher	Year
		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 Microcontrollers	Oxford University Press	2011
		3. Douglas V. Hall	Microprocessors and Interfacing	Tata McGraw Hill Publications Ltd., Revised Third Edition	2008
	22.2	Additional 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 year/ semester	Third year / Sixth semester	7.	Number of ECTS	6
95.	Professor (s)	Asso. Prof. Aleksandar Krstev PhD			
96.	Requirements for enrolling the course	None			
97.	Aims of the course (competences):				

<table>
<tr><td></td><td colspan="6">For the students to be able to develop detailed project plans, schedules, and budgets. So, they can estimate on the necessary one's resources for the project, allocation and coordinating on resources, and interface with the governing one team. The same as that everything expects to develop skills for understanding on the process on organizationally change, identifying on those concerned sides, estimating on the potential influence on the projects, how and overcoming on various resistances, politics, and others human questions.</td></tr>
<tr><td>98.</td><td colspan="6">Content on the subject program:
ICT management _ projects: life cycle on the project, skills for management of project (driving, communication, negotiation, action, and presenting).
Planning on the project (definition, scope, schedule, costs, quality, resources, how and risks).
The role on the repository, library on the project, as well as control on the versions.
Reports for the project and controls (definition, the volume, schedule, expenses, quality, resources, as well as risks)
Testing and plans for testing.
Change management _ in organization: the role on IT specialists how agents for change, prediction on the changes and the process on changes.
Diagnosing and conceptualization on the changes.
Dealing with challenges on the implementation, understanding and coping with resistance. Dealing with issues on motivation, interpersonal relationships, leadership in the process on changes; implications on international teams.
Management of politics on the organization.
Meeting with both most used methodologies for management with projects: PMBOK (Project Management Body of Knowledge) and PRINCE2 (Projects IN Controlled Environments 2).</td></tr>
<tr><td>99.</td><td colspan="6">Lectures, laboratory exercises, numerically exercises, electronically learning, seminary work, project, teamwork, consultations.</td></tr>
<tr><td>100.</td><td colspan="6">Total amount of available time: 6 ECTS x 30 hours = 180 hours</td></tr>
<tr><td>101.</td><td colspan="6">Distribution of available time: 30+30+30+30+60=180 hours (2+2+1)</td></tr>
<tr><td rowspan="2">102.</td><td rowspan="2">Forms of teaching / learning activities</td><td>15.1</td><td colspan="2">Lectures / theoretical - contact teaching, e-teaching
(15 weeks x 2 hours = 30 hours)</td><td colspan="2">30 hours</td></tr>
<tr><td>15.2</td><td colspan="2">Theoretical and practical exercises, e-exams, preparation of independent seminar work
(15 weeks x 1 hours = 15 hours)</td><td colspan="2">30 hours</td></tr>
<tr><td rowspan="3">103.</td><td rowspan="3">Other forms of activities</td><td>16.1</td><td colspan="2">Projects</td><td colspan="2">30 hours</td></tr>
<tr><td>16.2</td><td colspan="2">Individual work</td><td colspan="2">30 hours</td></tr>
<tr><td>16.3</td><td colspan="2">Home learning</td><td colspan="2">60 hours</td></tr>
<tr><td>104.</td><td colspan="2">Method of assessment</td><td colspan="4"></td></tr>
<tr><td rowspan="3">105.</td><td>17.1</td><td colspan="2">Tests / Oral Exam</td><td colspan="3">20+20+30 points</td></tr>
<tr><td>17.2</td><td colspan="2">Individual work (presentation, practical)</td><td colspan="3">10 points</td></tr>
<tr><td>17.3</td><td colspan="2">Activity and participation</td><td colspan="3">10+10 points</td></tr>
<tr><td rowspan="6">106.</td><td colspan="3" rowspan="6">Assessment Criteria (scores/ points)</td><td>up to 50 points</td><td>5</td><td>(five)</td><td>(F)</td></tr>
<tr><td>51 to 60 points</td><td>6</td><td>(six)</td><td>(E)</td></tr>
<tr><td>61 to 70 points</td><td>7</td><td>(seven)</td><td>(D)</td></tr>
<tr><td>71 to 80 points</td><td>8</td><td>(eight)</td><td>(C)</td></tr>
<tr><td>81 to 90 points</td><td>9</td><td>(nine)</td><td>(B)</td></tr>
</table>

			91 to 100 points	10 (ten) (A)	
107.	Signature approval and entrance to the final exam/ or 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		
108.	Language of teaching / study		English		
109.	Methods of measuring / monitoring the quality of teaching		Self-evaluation		
110.	Literature				
	22.1	Basic literature			
		No	Author	Title	Publisher	Year
		1.	Harold Kerzner	Project Management: A Systems Approach to Planning, Scheduling, and Controlling	J.Wiley&Sons	2009
		2.	Esther Cameron, Mike Green	Making Sense of Change Management: A Complete Guide to the Models Tools and Techniques of Organizational Change	Kogan Page	2009
		3.	A. Krstev, Z. Zdravev	Management on IT projects	UDG Stip	2019
	22.2	Additional literature			
		No	Author	Title	Publisher	Year
		1.				
		2.				

Annex 3.	**Program of the Course for First cycle studies**				
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, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	Fourth year / Sixth semester	7.	Number of ECTS	6
7.	Professor (s)	Natasha Stojkovikj			
8.	Requirements for enrolling the course	None			

9.	Aims of the course (competences): Students to acquire theoretical and practical knowledge on basic concepts of information theory, appropriate mathematical models, and their application.					
10	Contents of the course (per 15 weeks per semester): Introduction to Information Theory. Deterministic and probabilistic systems. Communication system. Information measures: entropy, information, mutual information, conditional entropies, joint entropy. Properties of entropy. Relative entropy. Chain Rules. Some inequalities for entropy and information: Jensen's inequality, Log-sum inequality, Data processing inequality, Fano's inequality. Asymptotic Equipartition Property (AEP). Differential entropy. Information Sources: Discrete, stationary, memoryless, Markov, ergodic. General aspects of coding. Fixed-Length and Variable-Length Codes. Kraft's inequality. Huffman's algorithm. Shannon's binary code. Gilbert - Moore code. Shannon - Fano code. Discrete communication channel. Encoder and decoder of communication channel.					
11	Methods of learning: Lectures, theoretical and practical exercises, e-learning, team projects, practical work with different tools, consultations.					
12	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
13	Distribution of available 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 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)	30 hours		
15	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam / Team project	70 scores			
	17.2	Individual work (presentation, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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	Language of teaching / study		English			
21	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			

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

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Numerical Methods			
2.	Code	2FI104221			
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	3 / 6	7.	Number of ECTS	6
1.	Professor (s)	Prof. Vlado Gicev			
2.	Requirements for enrolling the course	none			
3.	Aims of the course (competences): Getting skills for solving mathematical and engineering problems for which there are no close solutions. The student gets competencies for finding approximative numerical solutions with satisfactory accuracy for the considered problem.				
4.	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 of learning: lectures, excercises. Homework assignments, two mini projects.				

6.	Total amount of available time: 6 EKTS x 30 hours = 180 hours			
7.	Distribution of available time:			
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30 hours
9.	Other forms of activities	16.1	Projects	30 hours
		16.2	Individual work	30 hours
		16.3	Home learning	60 hours
10.	Method of assessment			
	17.1	Tests / Oral Exam	70 scores	
	17.2	Individual work (presentation, projects, practical)	10 scores	
	17.3	Activity and participation	20 scores	
11.	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)	
12.	Signature approval and entrance to the final exam/ or transition in the 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 teaching / study	English		
14.	Methods of measuring / monitoring the quality of teaching	Self evaluation		
15.	Literature			

22.1 Basic literature

No	Author	Title	Publisher	Year
1.	Won_Y._Yang_Wenwu_Cao_Tae-Sang_Chung_John_Morris	Applied numerical methods using Matlab	John Wiley and Sons, E – book: https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Won_Y._Yang_Wenwu_Cao_Tae-Sang_Chung_John_Morr BookZZ.org_.pdf	2005
2.	W.H. Press, S.A. Teukolsky, W.T.	Numerical recipes in Fortran 77	Cambridge University Press	2003

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

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	Modern Computer Architectures			
2.	Code	2FI103323			
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	Third / VI	7.	Number of ECTS	6
1.	Professor (s)	Ass. Professor Dusan Bikov			
2.	Requirements for enrolling the course	None			
3.	Aims of the course (competences): The aim of the course is for students to become familiar with modern heterogeneous computer systems. Students will be able to design, maintain and program modern heterogeneous computer systems with modern processors and computer elements.				
4.	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 of learning: Lectures, theoretical and practical exercises, consultations, seminar work / project; home study, homework, preparatory teaching for exams and colloquiums; consultations.				
6.	Total amount of available time: 6 ECTS x 30 hours = 180 hours				
7.	Distribution of available time: 30+30+30+30+60 = 180 hours (2+2+1)				
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours	
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30 hours	
9.	Other forms of activities	16.1	Projects	30 hours	
		16.2	Individual work	30 hours	
		16.3	Home learning	60 hours	

10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the next year		60% active participation at the course			
13.	Language of teaching / study		English			
14.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
15.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Hennessy, Patterson	Computer Architecture	Morgan Kauffmn	2012
		2.	John L. Hennessy, David A. Patterson	Computer Architecture: A Quantitative Approach	Morgan Kaufmann	2006
		3.	Jerome Saltzer, M. Frans Kaashoek	Principles of Computer System Design: An Introduction	Morgan Kaufmann	2009
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.				

Annex 3.	**Program of the course 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, second or third cycle of studies)	First cycle

50	Academic year/ semester	Third year / Sixth semester	7.	Number of ECTS	6	
51	Professor (s)	prof. Limonka Koceva Lazarova				
52	Requirements for enrolling the course	None				
53	Aims of the course (competences): Students to become familiar with the basic concepts of statistics as a science of data analysis. Students should be able to apply the acquired knowledge in solving practical problems by using statistical software SPSS, Excel.					
54	Descriptive statistics; Basic concepts of mathematical statistics; Evaluation of parameters; Confidence intervals. Hypothesis testing; Regression analysis.					
55	Methods of learning: Lectures, theoretical and practical exercises, e-learning, teamwork, consultations.					
56	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
57	Distribution of available time: 30 + 30 + 30 + 30 + 60 = 180 hours (2 + 2 +1)					
58	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)	30 hours		
59	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
60	Method of assessment					
61	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, practical)	10 scores			
	17.3	Activity and participation	20 scores			
62	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)
63	Signature approval and entrance to the final exam/ or transition in the next year	60% active participation at the course				
64	Language of teaching / study	English				
65	Methods of measuring / monitoring the quality of teaching	Standardized motor tests, observation, survey Self-evaluation				
66	Literature					

	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	R. Lyman Ott 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	Additional literature				
		No	Author	Title	Publisher	Year

Annex 3.	**Program of the Course for First cycle studies**				
1.	Title of Course	**Computer System Security**			
2.	Code	2FI104821			
3.	Study program	Computer Engineering and Technologies			
4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of Computer Sciences_____			
5.	Level (first, second or third cycle of studies)	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.	Aims of the course (competences): Students to acquire theoretical and practical knowledge of the various aspects of computer systems security.				
10	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; Network security and wireless network security, DoS and DDoS attacks.				
11	Methods of learning: Lectures, theoretical and practical exercises, e-learning, team projects, practical work with different tools, consultations.				

12	Total amount of available time: 8 ECTS x 30 hours = 240 hours					
13	Distribution of available time: 45 + 30 + 30 + 60 + 75 = 240 hours (3 + 2 + 2)					
14	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 3 hours = 45 hours)	45 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)	30 hours		
15	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	60 hours		
		16.3	Home learning	75 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam / Team project	70 scores			
	17.2	Individual work (presentation, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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	Language of teaching / study		English			
21	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
22	Literature					

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	C. P. Pfleeger & S. L. Pfleeger	Security in Computing, 4th Edition	Prentice Hall	2006
	2.	Ross J. Anderson	Security Engineering, 2nd Edition	Wiley	2008
	3.				
22.2	Additional literature				
	No	Author	Title	Publisher	Year
	1.	Dieter 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, 3rd Edition	McGraw Hill	2004

Annex 3.	**Program of the Course for Integrated Second cycle studies**				
1.	Title of Course	**Artificial Intelligence**			
2.	Code	2FI104921			
3.	Study program	Computer Engineering and Technologies			
4.	Organizer of the Study program	Goce Delchev University – Stip Computer Science Faculty _____			
5.	Level (first, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	Fourth year / VII semester	7.	Number of ECTS	8
7.	Professor (s)	Full Professor Cveta Martinovska Bande			
8.	Requirements for enrolling the course	None			
9.	Aims of the course (competences): This course teaches the fundamentals of Artificial Intelligence, such as knowledge representation, inference, machine learning, problem solving and searching that are used in computer vision, robotics, natural language processing and understanding.				
10	Contents of the course (per 15 weeks per semester): Overview of AI. 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.				
11	Methods of learning: Lectures, Discussions, Labs, Practical exercises, e-learning, individual and team projects, office hours.				
12	Total amount of available time: 8 ECTS x 30 hours a = 2 40 hours				
13	Distribution of available time: 45 + 30 + 30 + 60 + 75 = 240 hours (3 + 2 + 2)				
14	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	45 hours	
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	30 hours	
15	Other forms of activities	16.1	Projects	30 hours	
		16.2	Individual work	60 hours	
		16.3	Home learning	75 hours	
16	Method of assessment				
	17.1	Tests / Oral Exam		70 scores	

17	17.2	Individual work (presentation, projects, practical)	10 scores		
	17.3	Activity and participation	20 scores		
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	Language of teaching / study		English		
21	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation		
22	Literature				

22.1 Basic literature

No	Author	Title	Publisher	Year
1.	Stuart Russell and Peter Norvig	Artificial Intelligence: A Modern Approach, 3 ed.	Prentice Hall (преводи од Влада на РМ)	2014
2.	Kevin Warwick	Artificial Intelligence, The basics	Routledge	2012
3.	Prateek Joshi	Artificial Intelligence with Python	Packt Publising	2017

22.2 Additional literature

No	Author	Title	Publisher	Year
1.	Denis Rothman	Artificial Intelligence by Example	Packt Publising	2018
2.	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 3.	**Program of the Course for First cycle studies**	
1.	Title of Course	**Digital Signal Processing**
2.	Code	2FI105021
3.	Study program	Computer Engineering and Technologies

4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of Computer Sciences_____				
5.	Level (first, second or third cycle of studies)	First cycle				
6.	Academic year/ semester	Fourth year / Seventh semester	7.	Number of ECTS	6	
7.	Professor (s)	Natasha Stojkovikj				
8.	Requirements for enrolling the course	None				
9.	Aims of the course (competences): Students to acquire theoretical and practical knowledge of algorithms for signal processing, modeling of systems for processing - FIR and IIR digital filters.					
10	Contents of the course (per 15 weeks per semester): Basic concepts of signals and systems theory, discrete signals, digital signal processing. Concept of frequency in continuous time and discrete time signals. Fourier transform and frequency spectrum of analog signal. Fourier Series. Z-transform: definition, region of convergence, properties of Z-transform, inverse Z-transform. Frequency spectrum of a discrete signal. Cauchy's theorem. Introduction to discrete linear systems: Discrete time signal,Special sequences, Shift invariance, Stability and causality, Impulse response, Difference equations. Discretization of random signals, analog sgnal sampling and reconstruction. Discrete Fourier transform: Definition of DFT and relation to Z-transform, Properties of the DFT, Linear and periodic convolution using the DFT. Fast Fourier (FFT) transform. Digital filter design:Finite impulse response (FIR) filters (Window design techniques, Kaiser window design technique,Equiripple approximations.. Infinite impulse response (IIR) filters (Bilinear transform method).					
11	Methods of learning: Lectures, theoretical and practical exercises, e-learning, team projects, practical work with different tools, consultations.					
12	Total amount of available time: 6 ECTS x 30 hours = 180 hours					
13	Distribution of available 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 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 2 hours = 30 hours)	30 hours		
15	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	60 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam / Team project	70 scores			
	17.2	Individual work (presentation, practical)	10 scores			
	17.3	Activity and participation	20 scores			
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	Language of teaching / study	English			
21	Methods of measuring / monitoring the quality of teaching	Standardized motor tests, observation, survey Self-evaluation			
22	Literature				
	22.1 Basic literature				
	No	Author	Title	Publisher	Year
	1.	Bogdanov M., Bogdanova S.	Digital signal processing	ETF Skopje	1998
	2.	John G. Proakis, Dimitris G. Manolakis	Digital Signal Processing, Principles, Algorithms and Apllications , 4th Edition	Prentice Hall	2006
	3.				
	22.2 Additional literature				
	No	Author	Title	Publisher	Year
	1.	Lizhe Tan, Jean Jiang	Digital Signal Processing, Principles,3rd Edition	Academic Press	2018
	2.	John G. Proakis Vinay K. Ingle	Digital Signal Processing Using MATLAB	CL Engineering	2011
	3.				

Annex 3.	**Program of the Course for First cycle studies**			
1.	Title of Course	**Javascript-based technologies**		
2.	Code	2FI133921		
3.	Study program	Computer engineering and technologies		
4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of informatics		
5.	Level (first, second or third cycle of studies)	First cycle		
6.	Academic year/ semester	4 year / VII semester	7. Number of ECTS	4
7.	Professor (s)	Prof. Sasho Koceski		
8.	Requirements for enrolling the course	None		
9.	Aims of the course (competences):			

	The course aims at introducing students to the basic principles and characteristics of JavaScipt based technologies for client-side and server-side programming.					
10	Contents of the course (per 15 weeks per semester): This course covers the following topics: Basics of JavaScript. JavaScript object model. Syntax, semantics, peculiarities and mechanism on the functioning of various JavaScirpt technologies. Asynchronous Programming with JavaScript. Overview of multiple JavaScript-based frameworks					
11	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours					
12	Total amount of available time: 4 ECTS x 30 hours = 120 hours					
13	Distribution of available time: 30 + 15 + 30 + 30 + 15 = 120 hours (2 + 1 + 1)					
14	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15 hours		
15	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	15 hours		
16	Method of assessment					
17	17.1	Tests / Oral Exam		70 points		
	17.2	Individual work (presentation, projects, practical)		10 points		
	17.3	Activity and participation		20 points		
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	Language of teaching / study		English			
21	Methods of measuring / monitoring the quality of teaching		Standardized tests, observation, survey Self-evaluation			
22	Literature					

Basic literature

No	Author	Title	Publisher	Year
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; 3rd edition	2018
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.				
		2.				
		3.				

Annex 3.	**Program of the Course for First cycle studies**				
1	Title of Course	**Basics of robotics**			
2	Code	2FI134021			
3	Study program	Computer engineering and technologies			
4	Organizer of the Study program	Goce Delchev University – Stip Faculty of informatics			
5	Level (first, second or third cycle of studies)	First cycle			
6	Academic year/ semester	4 year / VII semester	7.	Number of ECTS	4
7	Professor (s)	Prof. Sasho Koceski			
8	Requirements for enrolling the course	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 classes of robots as well as their applications. Students will also get familiar with the basic building blocks and the architecture of robotic systems. This course will offer an opportunity to students to gain practical experience to build robotic systems and to apply the acquired IT knowledge to program and control intelligent robotic systems.				
1	Contents of the course (per 15 weeks per semester): This course covers the following topics: Introduction to robotics, Fundamentals of the movement of solid bodies (coordinate systems, translational, rotational and compound movements), Components and architecture of robotic systems, Sensors and their application in robotics, Actuators and transmission systems – types and application, Connecting elements – types, way of functioning and application, Robotic manipulators – direct kinematics, Robotic manipulators – inverse kinematics, Walking robots and robots with other types of propulsion, Management and control of robotic systems, Intelligent agents and their behaviour, Application of robotic systems				
1	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours				
1	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 teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours	
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15 hours	

1	Other forms of activities	16.1	Projects	30 hours			
		16.2	Individual work	30 hours			
		16.3	Home learning	15 hours			
1	Method of assessment						
1	17.1	Tests / Oral Exam		70 points			
	17.2	Individual work (presentation, projects, practical)		10 points			
	17.3	Activity and participation		20 points			
1	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)	
1	Signature approval and entrance to the final exam/ or transition in the next year		60% active participation at the course				
2	Language of teaching / study		English				
2	Methods of measuring / monitoring the quality of teaching		Standardized tests, observation, survey Self-evaluation				
2	Literature						
	22.1	Basic literature					
		No	Author	Title	Publisher	Year	
		1.	Џон Џ.Крег	Вовед во роботика – механика и контрола	МИО-преводи од Влада на РМ	2011	
		2.	Себастијан Трун, Волфрам Бургард и Дитер Фокс	Веројатносна роботика	Massachusetts Institute of Technologyупреводи од Влада на РМ	2006	
		3.	Maja Mataric	The robotic primer	MIT Press	2007	
	22.2	Additional literature					
		No	Author	Title	Publisher	Year	
		1.	Danny Staple	Learn Robotics Programming: Build and control autonomous robots using Raspberry Pi 3 and Python	Packt Publishing	2018	
		2.	Oleg Sergiyenko, Wendy Flores-Fuentes, Paolo Mercorelli	Machine Vision and Navigation	Springer	2020	

		3.	Frank Chongwoo Park and Kevin M. Lynch	Modern Robotics	Cambridge University Press	2017

Annex 3.	**Program of the course for First cycle studies**				
111.	Title of Course	**Software Testing and Analysis**			
112.	Code	2FI134121			
113.	Study program	Computer engineering and technologies			
114.	Organizer of the Study program	Faculty of Computer Science			
115.	Level (first, second or third cycle of studies)	First			
116.	Academic year/ semester	Fourth/ seventh	7.	Number of ECTS	4
117.	Professor (s)	Asso. Prof. Aleksandar Krstev PhD			
118.	Requirements for enrolling 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.	Lectures, theoretically and practical exercises, consultations; making on independent seminary work / project; homemade learning; preparatory teaching for exams and colloquiums; consultations				
122.	Total amount of available time: 4 ECTS x 30 hours = 120 hours				
123.	Distribution of available time: 30+15+30+30+15 = 120 hours (2+1+1)				
124.	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours	
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)	15 hours	
125.	Other forms of activities	16.1	Projects	30 hours	
		16.2	Individual work	30 hours	
		16.3	Home learning	15 hours	
126.	Method of assessment				

127.	17.1	Tests / Oral Exam	20+20+30 points			
	17.2	Individual work (presentation, practical)	10 points			
	17.3	Activity and participation	10+10 points			
128.	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)
129.	Signature approval and entrance to the final exam/ or 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			
130.	Language of teaching / study		English			
131.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
132.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Ian Gorton	Essential Software Architecture (2nd Edition)	Springer-Verlag Berlin Heidelberg	2011
		2.	Zheng Qin, Jiankuan Xing, Xiang Zheng	Software Architecture	Springer-Verlag Berlin Heidelberg	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	Additional literature				
		No	Author	Title	Publisher	Year
		1.	Partha Kuchana	Software Architecture Design Patterns in Java	CRC Press LLC	2004
		2.				

Appendix 3.	Program of the Course for First cycle studies	
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.	Level (first, second or third cycle of studies)	First cycle

6.	Academic year/ semester	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.				
4.	Contents of the course (per 15 weeks per semester): - Architecture of data storage - Data storage environment - CPU, memory, bus, HDD, file systems - HDD components - Software RAID - Hardware RAID - Raid levels - Direct attached storage - Optic cable technology - Storage Area Network - Network attached storage - CIFS and NFS protocols - Backup and recovery - Data replication - Storage virtualization				
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.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30	
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30	
9.	Other forms of activities	16.1	Projects	15	
		16.2	Individual work	15	
		16.3	Home learning	30	

10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the next year		/			
13.	Language of teaching / study		English			
14.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
15.	Literature					

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	Toigo, J.W.	The holy grail of data storage management.	Prentice-Hall, Inc.	1999
	2.				
	3.				
22.2	Additional literature				
	No	Author	Title	Publisher	Year
	1.				

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	**Introduction to Data Science**			
2.	Code	2FI105621			
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	Fourth / eighth	7.	Number of ECTS	4
1.	Professor (s)	Ass. Prof. Dr. Aleksandar Velinov			

<table>
<tr><td>2.</td><td colspan="5">Requirements for enrolling the course</td><td></td></tr>
<tr><td>3.</td><td colspan="6">Aims of the course (competences):
This course introduces students to the field of big data and the life cycle of data analytics as a tool for solving business challenges. The course provides a foundation for basic and advanced analytical methods and an introduction to big data analytics technologies and tools.</td></tr>
<tr><td>4.</td><td colspan="6">Contents of the course (per 15 weeks per semester):
- Introduction to Data Science
- Data, Databases and SQL
- Big Data
- MapReduce
- Big Data Analytics
- Techniques for Data Analysis
- Getting Insights from Data
- Data Quality and Preprocessing
- Clustering
- Classification
- Predictive Methods
- Popular Data Analytics Applications
- Python Programming Language
- Machine Learning for Data Science
- Data Collection, Experimentation and Evaluation</td></tr>
<tr><td>5.</td><td colspan="6">Methods of learning: Lectures, laboratory exercises, e-learning, seminar work, team work, consultations.</td></tr>
<tr><td>6.</td><td colspan="6">Total amount of available time: 4 ECTS x 30 hours = 120 hours</td></tr>
<tr><td>7.</td><td colspan="6">Distribution of available time: 30+15+30+30+15 = 120 hours (2+1+1)</td></tr>
<tr><td rowspan="2">8.</td><td rowspan="2">Forms of teaching / learning activities</td><td>15.1</td><td colspan="2">Lectures / theoretical, contact teaching, e-learning</td><td>30</td></tr>
<tr><td>15.2</td><td colspan="2">Exercises (practical, laboratory, theoretical, seminars, teamwork)</td><td>15</td></tr>
<tr><td rowspan="3">9.</td><td rowspan="3">Other forms of activities</td><td>16.1</td><td colspan="2">Projects</td><td>30</td></tr>
<tr><td>16.2</td><td colspan="2">Individual work</td><td>30</td></tr>
<tr><td>16.3</td><td colspan="2">Home learning</td><td>15</td></tr>
<tr><td rowspan="2">10.</td><td>Method of assessment</td><td colspan="4"></td></tr>
<tr><td>17.1</td><td colspan="2">Tests / Oral Exam</td><td colspan="2">70 scores</td></tr>
</table>

	17.2	Individual work (presentation, projects, practical)	10 scores		
	17.3	Activity and participation	20 scores		
11.	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)
12.	Signature approval and entrance to the final exam/ or transition in 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.	Language of teaching / study		English		
14.	Methods of measuring / monitoring the quality of teaching		Self-evaluation		
15.	Literature				

22.1	Basic literature				
	No	Author	Title	Publisher	Year
	1.	Chirag Shah	A Hands-On Introduction to Data Science	Cambridge University Press	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 Media, Inc.	2015
22.2	Additional 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 3.	Program of the Course for First cycle studies	
1.	Title of Course	Distributed Computer Systems
2.	Code	2FI104421
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	2023 / 8	7.	Number of ECTS	4
1.	Professor	Associate Professor. Done Stojanov			
2.	Requirements for enrolling the course	/			
3.	Aims of the course (competences): The design and implementation of distributed computer systems/applications are course main objectives. Upon successful completion of the course, students will be able to understand the paradigm behind distributed systems and implement socket-based application for real-time communication.				
4.	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 - 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				
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.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	30
9.	Other forms of activities	16.1	Projects	15
		16.2	Individual work	15
		16.3	Home learning	30

10.	Method of assessment		
	17.1	Tests / Oral Exam	70 scores
	17.2	Individual work (presentation, projects, practical)	10 scores
	17.3	Activity and participation	20 scores

11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the next year	/		
13.	Language of teaching / study	English		
14.	Methods of measuring / monitoring the quality of teaching	Self-evaluation		

15. Literature

22.1 Basic literature

No	Author	Title	Publisher	Year
1.	Varela, C.A.	Programming Distributed Computing Systems: A Foundational Approach.	MIT Press.	2013.
2.	Rieken, B. and Weiman, L.	Adventures in UNIX Network Applications Programming.	John Wiley & Sons, Inc.	1992.
3.				

22.2 Additional literature

No	Author	Title	Publisher	Year
1.				

Appendix 3.	Program of the Course for First cycle studies				
1.	Title of Course	**Cloud Infrastructure and Services**			
2.	Code	2FI105721			
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	Fourth / eighth	7.	Number of ECTS	4
1.	Professor (s)	Ass. Prof. Dr. Aleksandar Velinov			
2.	Requirements for enrolling the course				
3.	Aims of the course (competences): The aim of the course is for students to become familiar with the concept and way of functioning of cloud systems and cloud infrastructure				
4.	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.	Methods of learning: Lectures, laboratory exercises, e-learning, seminar work, team work, consultations.				
6.	Total amount of available time: 4 ECTS x 30 hours = 120 hours				
7.	Distribution of available time: 30+20+20+20+30 = 120 hours (2+1+1)				

8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	20 hours		
9.	Other forms of activities	16.1	Projects	20 hours		
		16.2	Individual work	20 hours		
		16.3	Home learning	30 hours		
10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the next year		60% success from all pre-exam activities, i.e. minimum 42 points from the two colloquiums, the seminar paper, attendance at lectures and exercises			
13.	Language of teaching / study		English			
14.	Methods of measuring / monitoring the quality of teaching		Self-evaluation			
15.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	M.N. Rao	Cloud Computing	PHI Learning Pvt. Ltd.	2015
		2.	Nelson L. S. da Fonseca, Raouf Boutaba	Cloud Services, Networking, and Management	John Wiley & Sons	2015
		3.	Kamal Kant Hiran, Ruchi Doshi, Temitayo Fagbola, Mehul Mahrishi	Cloud Computing: Master the Concepts, Architecture and Applications with Real-world examples and Case studies	BPB Publications	2019
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.	Justin Garrison, Kris Nova	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

Annex 3.	**Program of the Course for First cycle studies**				
1.	Title of Course	**Mobile Applications Development**			
2.	Code	2FI135321			
3.	Study program	Computer engineering and technologies			
4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of informatics			
5.	Level (first, second or third cycle of studies)	First cycle			
6.	Academic year/ semester	4 year / VIII semester	7.	Number of ECTS	4
7.	Professor (s)	Prof. Sasho Koceski			
8.	Requirements for enrolling the course	None			
9.	Aims of the course (competences): The aim of the course is to introduce the students with the basic principles for mobile application development. It also aims to equip students with the necessary skills for designing and developing mobile applications using contemporary integrated development environments.				
10.	Contents of the course (per 15 weeks per semester): This course covers the following topics: Introduction to mobile applications, Challenges for mobile application development, Communication with mobile devices, Mobile application development IDEs, Operating systems for mobile devices, Methodologies for developing applications for mobile devices, Mobile application architectures, Coding principles, User Interface Design, Testing applications for mobile devices, Security of Applications for Mobile Devices				
11.	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours				
12.	Total amount of available time: 4 ECTS x 30 hours = 120 hours				
13.	Distribution of available time: 30 + 15 + 30 + 30 + 15 = 120 hours (2 + 1 + 1)				
14.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours	
		15.2	Exercises (practical, laboratory, theoretical, seminars, team work)	15 hours	
15.	Other forms of activities	16.1	Projects	30 hours	
		16.2	Individual work	30 hours	
		16.3	Home learning	15 hours	

16	Method of assessment					
17	17.1	Tests / Oral Exam				70 points
	17.2	Individual work (presentation, projects, practical)				10 points
	17.3	Activity and participation				20 points
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	Language of teaching / study		English			
21	Methods of measuring / monitoring the quality of teaching		Standardized tests, observation, survey Self-evaluation			
22	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		1.	Tommi Mikkonen	Programming Mobile Devices: An Introduction for Practitioners	John Wiley & Sons Inc.	2007
		2.	Dawn Griffiths David Griffiths	Head First Android Development: A Brain-Friendly Guide	Shroff/O'Reilly; Second edition	2017
		3.	John Horton	Android Programming for Beginners (2nd edition)	Packt Publishing	2018
	22.2	Additional literature				
		No	Author	Title	Publisher	Year
		1.	Ian Darwin	Android Cookbook: Problems and Solutions for Android Developers	Oreilly & Associates Inc	2017
		2.				
		3.				

Annex 3.	**Program of the course for First cycle studies**					
67	Title of Course	**Embedded Computer Systems**				
68	Code	2FI135221				
69	Study program	Computer Engineering and Technologies				
70	Organizer of the Study program	Goce Delchev University – Stip Faculty of Computer Sciences_____				
71	Level (first, second or third cycle of studies)	First cycle				
72	Academic year/ semester	Fourth year / Eighth semester	7.	Number of ECTS	4	
73	Professor (s)	Aleksandra Stojanova Ilievska				
74	Requirements for enrolling the course	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.					
76	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 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 of learning: Lectures, theoretical and practical exercises, e-learning, team work, consultations.					
78	Total amount of available time: 4 ECTS x 30 hours = 120 hours					
79	Distribution of available time: 30 + 15 + 30 + 30 + 15 = 120 hours (2 + 1 +1)					
80	Forms of teaching / learning activities	15.1	Lectures / theoretical - contact teaching, e-teaching (15 weeks x 2 hours = 30 hours)	30 hours		
		15.2	Theoretical and practical exercises, e-exams, preparation of independent seminar work (15 weeks x 1 hours = 15 hours)	15 hours		
81	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	15 hours		
82	Method of assessment					
83	17.1	Tests / Oral Exam	70 scores			

	17.2	Individual work (presentation, practical)	10 scores			
	17.3	Activity and participation	20 scores			
84	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)
85	Signature approval and entrance to the final exam/ or transition in the next year		60% active participation at the course			
86	Language of teaching / study		English			
87	Methods of measuring / monitoring the quality of teaching		Standardized motor tests, observation, survey Self-evaluation			
88	Literature					
	22.1	Basic literature				
		No / Author	Title	Publisher	Year	
		1. Ed Lipiansky	Embedded Systems Hardware for Software Engineers	McGraw-Hill	2012	
		2. Peter Marwedel -	Embedded System Design IV edition	Springer	2021	
	22.2	Additional literature				
		No / Author	Title	Publisher	Year	
		1. John Catsoulis	Designing Embedded Hardware: Create New Computers and Devices	O'Reilly	2005	

Annex 3.	**Program of the Course for First cycle studies**			
1.	Title of Course	**Human-Computer Interaction**		
2.	Code	2FI135421		
3.	Study program	Computer engineering and technologies		
4.	Organizer of the Study program	Goce Delchev University – Stip Faculty of informatics		
5.	Level (first, second or third cycle of studies)	First cycle		
6.	Academic year/ semester	4 year / VIII semester	7. Number of ECTS	4
7.	Professor (s)	Prof. Natasha Koceska		
8.	Requirements for enrolling the course	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: • An introduction of human-computer interaction • Elements of the system interaction, types of interaction • Human interactive model • Computer as part of the interaction • Types of interaction - command languages, window-oriented interaction, interaction based on voice commands, interaction based on gestures ... • Interactive design • HCI laws and rules for user interface design • Usability definition, purpose and main principles • Evaluation of user interfaces
11	Methods of learning: Lectures, Discussions, Labs, Numerical exercises, e-learning, individual and team projects, office hours
12	Total amount of available time: 4 ECTS x 30 hours = 120 hours
13	Distribution of available time: 30 + 15 + 30 + 30 + 15 = 120 hours (2 + 1 + 1)

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

17	17.1	Tests / Oral Exam	70 points
	17.2	Individual work (presentation, projects, practical)	10 points
	17.3	Activity and participation	20 points

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	Language of teaching / study		English		
21	Methods of measuring / monitoring the quality of teaching		Standardized tests, observation, survey Self-evaluation		
22	Literature				
	22.1	Basic literature			
		No	Author	Title	Publisher	Year
		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	Additional literature			
		No	Author	Title	Publisher	Year
		1.	Andrew Sears and Julie A. Jacko	The Human–Computer Interaction - Fundamentals	CRC Press	2012
		2.	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

Appendix 3.	Program of the Course for First cycle studies			
1.	Title of Course	Differential equations		
2.	Code	2FI135521		
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	IV/8	7. Number of ECTS	4
1.	Professor (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 course (competences): The student is expected to learn the teaching content to use it in other scientific disciplines and in solving practical problems.					
4.	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.					
5.	Methods of learning: Lectures, theoretical and practical exercises, consultations; Seminar work/project; Home study; Preparatory teaching for exams and colloquiums; Consultations.					
6.	Total amount of available time: 4 ECTS x 30 hours = 120 hours					
7.	Distribution of available time: 30+15+30+30+15 = 120 hours (2+1+1)					
8.	Forms of teaching / learning activities	15.1	Lectures / theoretical, contact teaching, e-learning	30 hours		
		15.2	Exercises (practical, laboratory, theoretical, seminars, teamwork)	15 hours		
9.	Other forms of activities	16.1	Projects	30 hours		
		16.2	Individual work	30 hours		
		16.3	Home learning	15 hours		
10.	Method of assessment					
	17.1	Tests / Oral Exam	70 scores			
	17.2	Individual work (presentation, projects, practical)	10 scores			
	17.3	Activity and participation	20 scores			
11.	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)
12.	Signature approval and entrance to the final exam/ or transition in the next year		60% success from all pre-exam activities, i.e. minimum 42 points from: the two colloquiums, the seminar work, the regularity of lectures and exercises.			
13.	Language of teaching / study		English			

14.	Methods of measuring / monitoring the quality of teaching			Self-evaluation		
15.	Literature					
	22.1	Basic literature				
		No	Author	Title	Publisher	Year
		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	Additional literature				
		No	Author	Title	Publisher	Year
		1.				