Computer science

Name of the Educational Programme:	**Computer Science**
Awarded Qualification:	Master of Computer Science
Credit Value of the Programme:	120 ECTS
Language of Education:	English
Programme Admission Preconditions:	Student enrolment is made according to the Georgian legislation - based on the results of the Unified National Master's Exams (Admission to the educational program without passing Unified National exams may be allowed only in cases considered by the Georgian law). A person can become a student of Master program if he/she has a bachelor or equivalent degree. In addition, the applicant should pass the University internal exam in specialty and English language (B2 level). The issues of the entrance exams and the evaluation system will be posted on the University website. Those students who have graduated from English Language Educational Program or presented certificate of exam which correspondent to B2 level, is exempted from passing the language exam. For more information, see Regulation for Master's Education. Exams in English and specialty are distributed according to the following ratio: 40%-60% respectively. International students are enrolled on the program in accordance with the Georgian legislation without Unified National Exams. Program admission preconditions could be accessed on the following link https://iro.ibsu.edu.ge/en/home
Purpose of the Programme:	Aims of the Master's Program in Computer Science are: (1) To provide Master's students research-based learning, which will deepen their knowledge in theoretical and practical issues of computer science. In particular, the Master's program focuses on giving students a deep understanding of courses from three areas of computer science: theoretical computer science, systems design and security, artificial intelligence. (2) To enhance Master's students' knowledge needed for industry. This means that the program will master students to formulate, analyse, solve, and realize with the industry specific tasks. Also, the program will deepen Master's students' skills required for the search and preparation of technical documentation, and the communication with field experts. (3) To enable Master's students' to pursue studies at the next level of academic education in computer science, computer engineering, information sciences, artificial intelligence, and information technology.

Learning outcome	1. Deeply and critically discusses the issues of algorithms and modeling theory, programming languages and systems implementation, data acquisition, protection and processing. 2. Determines the possibilities of using computer science for solving practical and theoretical problems; Describes in detail the computer systems required by industry. Establishes ways to model and solve problem. 3. Classifies research methods, discusses relevant technical literature in the field of computer science, means of preparing a report, writing a master's thesis and making a report. 4. Adhering to the principles of good faith, conducts collaborative research, creates and uses software to solve the relevant task in the field of computer science, observing the norms of professional ethics, academic honesty and standards. 5. Develops secure computer systems and network-based technologies in various fields, using technical knowledge and skills, information technology research and design methods. 6. Develops new approaches for solving complex problems, creates mathematical models, performs algorithmic presentation, analysis and implementation. 7. Divides complex problems into subproblems, searches for a suitable programming paradigm for each subproblem and implements it. 8. In compliance with the standards of academic ethics, he/she investigates information relevant to the field of computer science needed for research and prepares a report/article/master's thesis, a small project proposal. Presents the obtained research results to both the academic and professional community. 9. Solves issues related to computer science in a multidisciplinary environment, takes responsibility for these decisions, independently determines the professional development needs of the team members.
Evaluation Criteria	The goal of evaluation is to determine student's education results qualitatively in relation to academic program goals and parameters. Students may be assessed orally and/or in a written way. A student's knowledge and skills are assessed through 100 points grading system. It consists of midterm and final evaluations, the sum of which makes up 100 points. Grading system allows: a) Five types of positive grades 1) (A) Excellent – 91 – 100: 2) (B) Very good – 81-90. 3) (C) Good – 71-80: 4) (D) Satisfactory – 61-70. 5) (E) Sufficient – 51-60. b) Two types of negative grades 1) (FX) Fail – 41-50 , meaning that a student requires some more work before passing and is given a chance to sit an additional examination after independent work;

	2) (F) Fail – 40 and less , meaning that the work of a student is not acceptable and he/she has to study the subject anew. For the midterm and final evaluations minimal passing grade is set. The final evaluation minimal passing grade is 51% of final evaluation grade. Midterm and final evaluation grade distribution, their minimal competence levels and assessment criteria are described in the corresponding syllabus. A credit can be awarded only after the attainment of learning outcomes, envisaged by the course syllabus and following requirements: a) Obtaining minimal competence levels set for midterm and final evaluations; b) Obtaining minimum 51 points out of 100 points of final grade. A student is allowed to take an additional (make-up) exam in case he/she scored 41-50 points of final grade or minimum 51 points, but did not obtain minimal competence level set for final evaluation. Considering its specification, the format and the assessment criteria of mid-term and final evaluations can be determined in the specific module/course syllabus.
Field of Employment:	The Master of Science program in Computer Science will prepare internationally competitive specialists. The knowledge and skills acquired by the graduates will enable them to respond to modern technology related challenges. Graduates will be able to be employed both the private and public sectors, as a leading specialist, where they perform professional functions both independently and in teams. In particular, they will be able to work as a software developers, software engineers, data analysts, information technology specialists, network administrators, etc. Graduates can also continue their studies at the next level of academic education in the direction of computer science, computer engineering, information science, artificial intelligence and information technologies.

#	Course / Module / Internship / Research Component	Status	Credit number	Distribution of credits per courses and semesters							Distribution of Hours						
				I Year		II Year		Contact Hours								Independent work	Total number of hours
				I Semester	II Semester	III Semester	IV Semester	Lecture	Seminar / Group Work / Laboratory Work / Practical work	Midterm exam(s)	Final exam	Total number of contact hours					

1	Logic for Computer Science and Artificial Intelligence	Mandatory	**7**	**7**				14	14	2	2	32	143	175
2	Principles of Programming Languages	Mandatory	**7**	**7**				16	12	2	2	32	143	175
3	Computer Networks Design	Mandatory	**6**	**6**				14	14	2	2	32	118	150
4	Models of Computation	Mandatory	**8**		**8**			16	12	2	2	32	168	200
5	Advanced Algorithms	Mandatory	**8**		**8**			29	13	2	2	46	154	200
6	Information Security	Mandatory	**6**		**6**			14	14	2	2	32	118	150
7	Seminar I	Mandatory	**3**		**3**			-	28	2	2	32	43	75
8	Data Mining and Analysis	Mandatory	**8**			**8**		16	12	2	2	32	168	200
9	IoT Design	Mandatory	**7**			**7**		14	28	2	2	46	129	175
10	Human-Machine Interaction	Mandatory	6			6		14	14	2	2	32	118	150
11	Seminar II	Mandatory	**3**			**3**		-	28	2	2	32	43	75
12	MSc Thesis	Mandatory	**30**				**30**	-	28	1	1	30	720	750
13	Computer algebra	Elective	**5**	**5**				16	12	2	2	32	93	125
14	Approximation Theory	Elective	**5**	**5**				14	14	2	2	32	93	125
15	Numerical Analysis	Elective	**5**	**5**				16	12	2	2	32	93	125
16	Modelling and Simulation	Elective	**5**	**5**				14	14	2	2	32	93	125
17	Distributed Application Development	Elective	**5**	**5**				18	10	2	2	32	93	125
18	Artificial Intelligence Applications	Elective	**5**	**5**				14	14	2	2	32	93	125
19	Software Development System Analysis	Elective	**5**		**5**			14	14	2	2	32	93	125
20	Semantic Web Technologies	Elective	**5**		**5**			16	12	2	2	32	93	125
21	Knowledge Representation and Reasoning	Elective	**5**		**5**			16	12	2	2	32	93	125

22	Software Verification	Elective	**5**		**5**			14	14	2	2	32	93	125
23	Expert Systems	Elective	**5**		**5**			10	18	2	2	32	93	125
24	Bayesian and probabilistic programming	Elective	**5**		**5**			17	11	2	2	32	93	125
25	Digital Signal Processing	Elective	**5**		**5**			14	14	2	2	32	93	125
26	Graph Algorithms and Computational Geometry	Elective	**6**			**6**		22	6	2	2	32	118	150
27	Neural networks	Elective	**6**			**6**		17	11	2	2	32	118	150
28	Network Modelling	Elective	**6**			**6**		22	6	2	2	32	118	150
29	Operations Research	Elective	**6**			**6**		22	6	2	2	32	118	150
30	Deep Reinforcement Learning	Elective	**6**			**6**		14	14	2	2	32	118	150
31	Internship	Elective	**6**			**6**		-	84	2	2	88	62	150
Total			**120**	**30**	**30**	**30**	**30**							