

Computer Engineering (International)										
Semester	Code	Title	Prerequisites	ECTS	Contact Hours	Independent Hours	Status	Instructor	EQE Module	ABET Module
1	MATH150	Calculus I	No Prerequisite	6	62	88	Mandatory	Nino Manjavidze, Mariam Manjikashvili	Free Component	Math & Basic Sciences
1	PHYS105	Basics of Physics I (Including Lab)	Co-requisite: MATH150	8	77	123	Mandatory	Giorgi Dalakishvili	Free Component	Math & Basic Sciences
1	Q186/R376/	English Language Course C1-1 / Practical Course of German	No Prerequisite	6			Elective	Nino Rukhadze, Nino Tsulaia, Maia Dushidze	Free Component	General Education
1	P432	Introduction to Modern Thought I	No Prerequisite	6	29	121	Mandatory		Free Component	General Education
1	CS90	Introduction to Programming	No Prerequisite	6	48	102	Mandatory	Erekle Magradze, Hongbo Yang, Revaz Tskhadadze	Major	Engineering
2	MATH151	Calculus II	MATH150	6	62	88	Mandatory	Nino Manjavidze, Mariam Manjikashvili	Free Component	Math & Basic Sciences
2	PHYS106	Basics of Physics II	PHYS105	6	47	103	Mandatory	Giorgi Dalakishvili	Free Component	Math & Basic Sciences
2	Q955/S038/	English Language Course C1-2/ Practical Course of German	Q186/R376/P434	6	90/66	60/84	Elective	Nino Rukhadze, Nino Tsulaia, Maia Dushidze	Free Component	General Education
2	DE112	Mathematical Foundation of Computing	MATH150, CS90	6	48	102	Mandatory	Maia Mrevlishvili	Major	Math & Basic Sciences
2	DE111	Computer Organization	CS90	6	62	88	Mandatory	Anelma Malania	Major	Engineering
3	MATH252	Calculus III	MATH151	6	62	88	Mandatory	Nino Manjavidze, Mariam Manjikashvili	Free Component	Math & Basic Sciences
3	CHEM109	Introduction to General Chemistry (Including Lab)	No Prerequisite	8	62	138	Mandatory	Ketevan Kipatadze	Free Component	Math & Basic Sciences
3	MATH254	Introduction to Linear Algebra	MATH151	6	48	87	Mandatory	Maia Mrevlishvili	Free Component	Math & Basic Sciences
3	EE210	Circuit Analysis I	PHYS106, MATH151	6	62	88	Mandatory	Zurab Ratiani	Major	Engineering
3	CE111	Procedural Programming with C	CS90	6	31	119	Mandatory	Hongbo Yang	Major	Engineering
4	EE300	Computational and Statistical Methods	MATH252	6	78	74	Mandatory	Shota Tsiskaridze	Major	Math & Basic Sciences
4	CS312	Computer and Data Networks	DE111	6	48	102	Mandatory	Archil Shengelia	Major	Engineering
4	CS221	Algorithms and Data Structures	CS90	6	48	102	Mandatory	Shota Tsiskaridze	Major	Engineering
4	MATH111	Principles of Numerical Methods	MATH252, MATH254	6	34	116	Mandatory	Ivane Murusidze	Major	Engineering
4	EE310	Circuit Analysis II	EE210, MATH254	6	62	88	Mandatory	Zurab Ratiani	Major	Engineering
5	CE375	Embedded Systems	DE111, CE111, DE112	6	63	87	Mandatory	Tsotne Putkaradze	Major	Engineering
5	DE101	Introduction to Operating Systems	DE111	6	48	102	Mandatory	Pasta Gogishvili	Major	Engineering
5	CE470	Digital Circuits	EE300, EE310	6	32	118	Mandatory	Tsotne Putkaradze	Major	Engineering
5	P737	Academic Techniques	No Prerequisite	6	48	102	Mandatory	Center of Academic Techniques	Free Component	General Education
5	EE410	Signals and Systems	EE300, EE310	6	47	103	Mandatory	Giorgi Veshapidze	Major	Engineering
6	BA205	Basics of Entrepreneurship	No Prerequisite	6	48	102	Mandatory		Free Component	General Education
6	TO77	Architecture and Programming of Microprocessors	DE111, CE470	6	63	87	Mandatory	David Chkhaidze	Major	Engineering
6	CS246	System Programming	DE111	6	77	73	Mandatory	Aniran Malania	Major	Engineering
6		Elective		6			Elective		Major	Engineering
6		Elective		6			Elective		Major	Engineering
7	TO28	IT Project Management	CS90	6	32	118	Mandatory	Nino Kodzakidze	Major	Engineering
7	CS223	Introduction to Cybersecurity	CS112	6	48	102	Mandatory	Pasta Gogishvili	Major	Engineering
7	CE490A	Senior Design Project A	At least 102 ECTS in Major Program	6	34	116	Mandatory	Giorgi Veshapidze, Archil Gvinradze, Tsotne Putkaradze	Major	Engineering
7		Elective		6			Elective		Major	Engineering
7		Elective		6			Elective		Major	Engineering
8	CE490B	Senior Design Project B	CE490A	6	48	102	Mandatory	Giorgi Veshapidze, Archil Gvinradze, Tsotne Putkaradze	Major	Engineering
8		Elective		6			Elective		Major	Engineering
8		Elective		6			Elective		Major	Engineering
8		Elective		6			Elective		Major	Engineering
8		Elective		6			Elective		Major	Engineering
8		Elective		6			Elective		Major	Engineering
Electives										
6	UR37	Drones	No Prerequisite	6	47	103	Elective	Avtandil Mgebrishvili	Major	Engineering
6	UG89	AWS Cloud Practitioner	No Prerequisite	6	48	102	Elective	Erekle Magradze	Major	Engineering
6	CE470L	Digital Logic Laboratory	CE470	6	48	102	Elective	Tsotne Putkaradze	Major	Engineering
6	SR26	Introduction to Computer Modeling	CE111, MATH151	6	33	117	Elective	Ivane Murusidze	Major	Engineering
6	TO26	Software Architecture and Engineering	CE111, CS221	6	63	87	Elective		Major	Engineering
6	CS212	Cyber Law and Ethics	No Prerequisite	6	47	103	Elective	Nino Niauri, Nino Jincharadze	Major	Engineering
6	CS325	Computer Graphics	CE111, CS221	6	48	102	Elective	Giorgi Partskhaladze	Major	Engineering
6	EE458	Analog and Pulse Communication Systems	EE410	6	62	88	Elective	Giorgi Veshapidze	Major	Engineering
7	CS214	Introduction to Computational Linguistics	CS90, DE112	6	47	103	Elective	Irina Lobjanidze	Major	Engineering
7	CS222	Advanced Algorithms and Data Structures	CS221	6	48	102	Elective	Giorgi Partskhaladze	Major	Engineering
7	CS311	Programming Languages	CE111	6	47	103	Elective	Revaz Tatishvili	Major	Engineering
7	CS314	Distributed and Parallel Computing	CS112	6	48	102	Elective	Erekle Magradze	Major	Engineering
7	CS413	Web Programming	CS90	6	48	102	Elective	Teimuraz Tuteridze	Major	Engineering
7	CS417	Introduction to Natural Language Processing	EE300	6	47	103	Elective	Irina Lobjanidze	Major	Engineering
7	EE380	Electrical Energy Conversion	EE310	6	62	88	Elective	Archil Gvinradze	Major	Engineering
7	EE558	Digital Communications	EE458	6	47	103	Elective	Giorgi Veshapidze	Major	Engineering
7	EE534	Solid State Devices	PHYS106	6	62	88	Elective	Zurab Ratiani	Major	Engineering
8	EE450	Feedback Control Systems	EE410	6	47	103	Elective	Giorgi Veshapidze	Major	Engineering
8	CS321	Introduction to Machine Learning	CS90, MATH254	6	48	102	Elective	Shota Tsiskaridze	Major	Engineering
8	CS324	Artificial Neural Networks	EE300	6	63	87	Elective	Pasta Gogishvili	Major	Engineering
8	CS322	Databases and Information Systems	CS112, CS221	6	47	103	Elective		Major	Engineering
8	CS424	DevOps Technologies	DE101, CS312	6	48	102	Elective	Erekle Magradze	Major	Engineering
8	CS421	Mobile Applications Development	DE111	6	48	102	Elective	Teimuraz Tuteridze	Major	Engineering
8	CS425	Message Queuing and Data Streaming	Co-requisite: CS322	6	48	102	Elective	Erekle Magradze	Major	Engineering
8	CS426	Big Data Systems	Co-requisite: CS322	6	48	102	Elective	Erekle Magradze	Major	Engineering
8	EE450	Digital Signal Processing	EE410	6	47	103	Elective	Giorgi Veshapidze	Major	Engineering
8	EE480	Power System Analysis	EE380	6	62	88	Elective	Archil Gvinradze	Major	Engineering
8	EE483	Power Distribution Systems	EE380	6	62	88	Elective	Archil Gvinradze	Major	Engineering
8	EE481	Power System Dynamics	EE480	6	62	88	Elective		Major	Engineering

Ilia State University
Faculty of Business, Technology and Education
Bachelor Program: Computer Engineering (International)
Curriculum

Faculty	Faculty of Business, Technology and Education
Program Title	Computer Engineering (International)
Awarded Academic Degree/Qualification	Bachelor of Computer Engineering
Program Duration/ECTS Credits	8 Semesters, 244 ECTS (1 ECTS: 25 hours) • Free-elective Component: General Module – 76 ECTS; • Major - 168 ECTS (including 48 ECTS electives).
Language of Instruction	English
Head of the Program	Paata Gogishvili, Associate Professor
The Date of Program development and Update	The program was launched in 2018 and recently updated in 2021. Subject to periodic review changes to the curriculum might be introduced prior to the beginning of each academic year.
Admission Requirements to the Program	
Georgian citizens must pass the Unified National Exams. Admission for the program requires minimal competence levels in the following Unified National Exams: • English Language - 70% + 1; • Georgian Language determined by National Assessment and Examinations Centre - 25%+1; • Mathematics - 40% + 1 or Physics - 40%+1. International applicants should follow the rules and terms defined by the Ministry of Education, Science, Culture and Sports of Georgia according to the order №224/N (December 29, 2011). The Applicant should prove English language qualification equivalent to CEFR level B2 or higher. To prove the English qualification, the applicant must submit one of the following: a) an official international language certificate (the main certificates and minimum scores accepted are given below*); b) an English Proficiency Statement from the university, high school or college, confirming that English was the language of instruction; c) a certificate issued by a local or international English language instruction provider (e.g. language school), confirming the acquisition of B2 level as a result of a language course the applicant attended. d) Or apply and take University's institutional paper-based or online language test aligned with CEFR level B2. <i>Note: The English language requirement may be waived if the applicant is a native of or graduated from an English medium high school/university in countries, the official language of which is English.</i> * The following are the minimum English test scores for admission: TOEFL • paper-based PBT 513 • internet-based iBT 65 • computer-based CBT 183 IELTS • Academic (Band 5.5) Cambridge ESOL (English for Speakers of Other Languages) • Certificate of Advanced English CAE: 160/Level B2 (also grades A/B/C) • First Certificate in English FCE: 160/Grade C (also grades A/B) • Business English Certificate (Higher) BEC: 45/Level B2 (also grades A/B/C) • Business English Certificate (Vantage) BEC: 60/Grade C (also grades A/B) • Business Language Testing Service BULATS: 60 overall • PTE (General level 3) • PTE Academic (59-75 points) TELC (The European Language Certificates) • TELC English B2: Pass Michigan (Cambridge Michigan)	

- Examination for the Certificate of Proficiency in English ECPE: Low Pass
- Examination for the Certificate of Competency in English ECCE: Pass
- MELAB: B2

International Students shall undergo a paper or online-based entry test in Mathematics or Physics - Entry-Level Test 40% + 1. The test will be administered by the University to a similar level as required by Georgian students.

Program Objectives

The aim of the bachelor program is to prepare highly qualified computer engineers who will be equipped with extensive knowledge in design, developing and operation of computer hardware, as well as in the development of computer software. To this end, it intends to well-pad its students with broad knowledge of computer hardware, electronic devices, their technical characteristics and related physical processes, as well as computational and engineering skills for using various ways and methods for their improvement. At the same time, the program aims to develop the professional skills of the students that will allow them to have successful careers in computer engineering.

Program Educational Objectives:

The objectives of the Computer Engineering program are to produce graduates who within 3-5 years after graduation, will be able to:

- PEO1:** Have a successful career, including leadership opportunities, in the computer engineering profession.
- PEO2:** Solve advanced technological problems and become technical leaders in their field of specialization.
- PEO3:** Continue learning through graduate courses, seminars, and research to stay current with the profession as it evolves and expands.

Program Learning Outcomes

The program learning outcomes aim at equipping students with:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors;
3. An ability to communicate effectively with a range of audiences;
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Relationship between the program educational objectives and the student learning outcomes is given in the following table:

Program Educational Objectives	Program Learning Outcomes						
	1	2	3	4	5	6	7
PEO 1: Have a successful career, including leadership opportunities, in the computer engineering profession.		X	X	X	X	X	X
PEO 2: Solve advanced technological problems and become technical leaders in their field of specialization.	X	X		X		X	
PEO 3: Continue learning through graduate courses, seminars, and research to stay current with the profession as it evolves and expands.					X		X

Teaching Methods

- Interactive lectures and seminars;
- Active learning methods;
- Analysis and synthesis;
- Problem-based learning;
- Individual and group work;
- Laboratory work;
- Practical work;
- Flipped Classroom;
- Brainstorming and reflection;
- Projects.

Note: Specific teaching methods are identified and listed in each course syllabus.

Program Structure

All students admitted to the bachelor program are required to accumulate **244 ECTS** to be awarded their Bachelor's Degree in Computer Engineering.

8 Semesters, 244 ECTS (1 ECTS: 25 hours)

- Free-elective Component: General Module – 76 ECTS;
- Major - 168 ECTS (including 48 ECTS electives).

Senior Design Project

The bachelor program in Computer Engineering culminates with a Senior Design Project (12 ECTS). The main purpose of the design experience is to prepare students for the real-world challenges in the field of Computer Engineering by allowing them to use their problem-solving skills to find engineering design solutions to industry problems. The students will also develop their managerial skills through planning, design and meeting deadlines together with industry participation. Finally, students will improve their communication, presentation and teamwork skills during these practical components of the program.

Senior-design teams will under the supervision of a faculty mentor/supervisor and with an agreed industry sponsor that will be involved in the forerunning semester for collaboration with the students in the Project Concept Development phase and in the final semester as Project Reviewer. Even though students will be working in groups, each student will need to submit an individual activity report showing which tasks they have been assigned by the group and approved by the Faculty advisor and how they have managed to complete their individual tasks. All group members will also assess each other anonymously against such criteria as active involvement/contribution, availability and ability to meet team set deadlines.

Student Assessment

Student assessment should be based on a 100-point grading scale:

(A) 91-100 Excellent

(B) 81-90 Very Good

(C) 71-80 Good

(D) 61-70 Satisfactory

(E) 51-60 Sufficient

(FX) 41-50 Unsatisfactory - meaning a student needs more effort to pass an examination and is given an extra chance to pass an additional examination through independent work.

(F) Failure - 40 and less of the maximum of grades, meaning the student's effort is not enough and he has to learn the subject anew.

Note: Assessment components and criteria are detailed in the syllabus of each course.

Employment Opportunities

Program graduates will be qualified to pursue their professional careers in:

- High-Tech Companies;
- Automotive Industry;
- Manufacturing plants;
- Computer and Electronics Service;
- Smart systems;
- IOT;
- Telecommunications;
- Medical and BioLabs;
- Tech Startups;
- Hardware R&D.

Also, the graduates of the program can continue their academic studies at a master level.

Necessary Auxiliary Conditions /Resources For Learning

Teaching and learning resources:

- Classes;
- Computer labs;
- Computing Centre;
- Electrical and Electronic Engineering teaching laboratories;
- Ilia State University Library;
- Electronic platform of the University - Argus;
- E-Learning, Turnitin;

- Data Center;
- Teaching Staff Development Center (TSDC).
- Scientific Databases.

Partner organizations, supporting the development and implementation of the program:

- San Diego State University;
- Edison LTD;
- Innotec LTD;
- Kartli Generation LTD.
- Idea Design Group LTD;
- Ozorix LTD.