APPROVED
by the Academic Council of
Georgian Technical University
22 July 2019
Resolution No. 01–05–04/204

MODIFIED
by the Academic Council of
Georgian Technical University
15 September 2026
Resolution No. 01-05-04/110

BACHELOR'S EDUCATIONAL PROGRAM

Program Title

კომპიუტერული ინჟინერია
Computer Engineering

Faculty

ინფორმატიკისა და მართვის სისტემების
Informatics and Control Systems

Program Head

Professor Levan Imnaishvili

Qualification Awarded and Program Volume in Credits

Bachelor in Computer Engineering
The qualification is awarded upon completion of at least 240 ECTS credits of the educational program.

Language of Instruction

Georgian

Admission Requirements

Admission to the Bachelor's program is open only to holders of a state certificate confirming completion of full general education, or an equivalent document, who are enrolled in accordance with the procedures established by the legislation of Georgia.

Passing the Unified National Examinations in accordance with the procedures established by the legislation of Georgia: Mathematics or Physics; Georgian Language; Foreign Language (English).

Program Description

The program is designed based on the European Credit Transfer and Accumulation System (ECTS). At the Georgian Technical University, one credit corresponds to 25 hours, encompassing both contact hours and independent study. The distribution of credits across subjects is outlined in the curriculum. The program spans four years (eight semesters: 35 credits in the 1st semester; 30 credits each in the 2nd, 5th, and 6th semesters; 28 credits in the 3rd semester; 32 credits in the 4th semester; 31 credits in the 7th semester; and 24 credits in the 8th semester), totaling 240 credits.

The qualification of „Bachelor in Computer Engineering“ is awarded upon the completion of at least 240 credits, comprising a combination of core specialization courses (230 credits) and elective components (10 credits) as prescribed by the program curriculum.

Program Structure. The program consists of mandatory and elective specialization courses, mandatory and elective general courses, free component courses, a mandatory internship, and a capstone design project. The specialization comprises mandatory courses (163 ECTS), elective specialization courses (12 ECTS), mandatory general courses (34 ECTS), elective general courses (5 ECTS), a mandatory specialization internship (6 ECTS), an introduction to the capstone design project (4 ECTS), the capstone design project (6 ECTS), and free components (10 ECTS).

The structure of the program's curriculum, organized by semester, is as follows:

Semester I	• Compulsory major courses – 20 ECTS • General education courses – 15 ECTS
Semester II	• Compulsory major courses – 20 ECTS • General education course – 5 ECTS • General elective course – 5 ECTS
Semester III	• Compulsory major courses – 23 ECTS • General education courses – 5 ECTS
Semester IV	• Compulsory major courses – 27 ECTS • General education courses – 5 ECTS
Semester V	• Compulsory major courses – 30 ECTS
Semester VI	• Compulsory major courses – 21 ECTS • Compulsory major elective course 1 – 4 ECTS • Free component 1 – 5 ECTS
Semester VII	• Compulsory Industrial Practice – 6 ECTS • Compulsory Introduction to the Capstone Design Project – 4 ECTS • Compulsory major courses – 17 ECTS • General education courses – 4 ECTS
Semester VIII	• Capstone Design Project – Final Project – 6 ECTS • Compulsory major courses – 5 ECTS • Compulsory major elective courses 2 and 3 – 8 ECTS • Free component 2 – 5 ECTS
Total (Semesters I–VIII)	• Compulsory specialization courses – 163 ECTS • Compulsory elective specialization courses – 12 ECTS • Compulsory internship – 6 ECTS • Introduction to the compulsory capstone design project – 4 ECTS • Capstone design project – final project – 6 ECTS • General courses – 39 ECTS • Free components – 10 ECTS

A number of courses in the Bachelor's Educational Program in Computer Engineering combine lectures with practical and laboratory work. Laboratory work is conducted on computerized laboratory stands. A substantial proportion of practical classes is also conducted in computer laboratories using specialized computer equipment. There are 24 courses of this type. This is important for demonstrating the practical application of theoretical concepts.

Several courses also include a course project in addition to lectures, practical classes and/or laboratory work. This enables students, on the basis of theoretical and practical knowledge, to develop the ability to synthesize small-scale hardware or software objects. Seven courses of this type are distributed across different semesters.

Internship practice is compulsory and supports the development of skills for applying theoretical knowledge in practice.

Completion of a Capstone Design Project is also compulsory. The project involves the design of a device or system in the field of computer engineering. It is completed over two semesters through two courses: "Introduction to the Capstone Design Project" (4 ECTS) and "Capstone Design Project" (6 ECTS), for a total of 10 ECTS. Distribution over two semesters enables students to devote greater attention to analysis of theoretical and practical issues from completed and concurrent courses when synthesizing the object to be designed.

Students have complete freedom in selecting courses within the free components.

The Computer Engineering educational program was developed taking into account advanced trends in contemporary Computer Engineering and Computer Systems Engineering programs at:

- University of Newcastle (Australia), Computer Systems Engineering https://www.newcastle.edu.au/degrees/bachelor-of-computer-systems-engineering-honours
- University of Alaska Anchorage, Computer Systems Engineering https://www.uaa.alaska.edu/admissions/academic-programs/computer-systems-engineering-bs.cshtml
- University of Michigan, Computer Engineering https://ece.engin.umich.edu/academics/undergraduate-programs/computer-engineering/
- Arizona State University, Computer Systems Engineering https://webapp4.asu.edu/programs/t5/majorinfo/ASU00/ESCSEBSE/undergrad/false
- Georgia Institute of Technology, Computer Engineering https://www.ece.gatech.edu/computer-engineering-degree
- San Diego State University, Computer Engineering https://electrical.sdsu.edu/undergraduate/compengr

Program Objectives

Computer engineering focuses on theoretical and practical issues related to the analysis and design of complex digital systems. It covers a broad spectrum of digital technologies, ranging from supercomputers and computer systems to integrated circuits. At the current stage of high-technology development, computer engineering plays a decisive role in digital technologies and application-oriented fields. Consequently, labor-market demand for computer engineering specialists is high and continues to grow.

The educational program aims to prepare highly qualified specialists who meet labor-market requirements, are able to maintain and further develop the knowledge acquired through the program, and respond to the latest challenges in the field. Accordingly, the specific objectives of the program are:

Graduates of the CE program:

- with broad technical, engineering knowledge and skills, will have advanced their careers in the field of computer engineering.
- will effectively use advanced methods and tools from the field of computer engineering in other fields.
- will pursue further education and continuous professional development.

Learning Outcomes / Competencies (General and Professional)

The learning outcomes of the Bachelor's Educational Program in Computer Engineering correspond to the program objectives and encompass the core knowledge, skills, responsibility and autonomy envisaged by the program:

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.

Methods for Achieving Learning Outcomes (Teaching and Learning Methods)

Lecture; Seminar (group work); Practical class; Laboratory work; Practice; Course work/project; Consultation; Independent study.

Depending on the specific nature of a course, the program uses the following teaching and learning activities, as reflected in the corresponding course syllabi:

Verbal/oral method. The lecturer conveys knowledge and explains learning material during lectures.

- **Demonstration method.** Learning material is presented visually using a projector; software functionality and experiments on computerized specialized stands are demonstrated.
- **Practical work.** Students gradually master theoretical material through solving specific tasks and develop skills for its independent application. Practical work may be conducted in computer laboratories or with specialized laboratory equipment.
- **Laboratory work.** Students conduct experiments and investigations using specialized equipment, learning to configure devices, adjust them and establish operating modes.
- **Collaborative group work.** Students work in groups during practical classes or course projects. Members work on assigned issues, share views, and may distribute functions according to the task.
- **Course project.** A group project may involve developing the architecture, schematic, structure or design of a device, system, database or software product and, for software products, its implementation. The project combines theory and practice and is carried out independently by the student group under instructor supervision.
- **Seminar / group work.** Students deepen lecture topics by finding and processing additional information, preparing presentations, discussing results and drawing conclusions under instructor coordination.
- **Industrial practice.** Deepens and consolidates acquired knowledge and develops the ability to apply it in practice using field-specific methods for problem solving.
- **Bachelor's Project.** The final stage of Bachelor’s studies, aimed at systematizing theoretical and practical knowledge and providing a substantiated solution to a specific technical problem. It demonstrates the student’s command of elements of research methods and experiments and readiness for independent professional work.
- **Written work.** Includes making extracts and notes, preparing laboratory reports, summarizing material, preparing theses and project reports.
- **Consultation.** Supports the development of independent work skills, effective use of literature and other sources, and resolution of issues arising during independent study.
- **Independent study.** Students actively use core and supplementary literature and methodological guidelines and independently develop project-related issues.
- **Explanatory method.** Based on reasoning around a given issue and detailed discussion of specific examples.
- **Action-oriented learning.** The instructor demonstrates and discusses examples for the practical interpretation of theoretical material, with active student participation.
- **Analysis method.** Used to analyze experiments, electronic circuits, devices, system operation, software functionality and research results, and to prepare summary reports.
- **Synthesis method.** Combines individual issues into an integrated whole and is particularly effective in projects involving new circuits, devices, systems or software products.
- **Discussion/debate.** Group analysis of an issue, including consideration of the strengths and weaknesses of explanations proposed by students.
- **Case study.** Specific objects and cases are analyzed during practical classes to help students formulate and solve problems independently.
- **Inductive method.** The learning process moves from specific facts toward generalization.
- **Deductive method.** The learning process proceeds from general knowledge toward specific conclusions and new knowledge.
- **Cooperative learning.** Each group member is responsible not only for their own learning but also for helping teammates master the subject.

- **Brainstorming.** Students generate as many, preferably diverse, ideas as possible regarding a specific problem and evaluate them against predefined criteria.

Elements of e-learning are also used in the educational program. Through the LMS Moodle platform, instructors provide students with learning materials and assignments and receive completed assignments.

Student Assessment System

Assessment is carried out on a 100-point scale.

Positive grades:

- **(A)** Excellent – 91–100 points;
- **(B)** Very Good – 81–90 points;
- **(C)** Good – 71–80 points;
- **(D)** Satisfactory – 61–70 points;
- **(E)** Sufficient – 51–60 points.

Negative grades:

- **(FX)** Failed – 41–50 points, meaning that the student needs additional work and is allowed to take one additional examination after independent study;
- **(F)** Failed – 40 points or less, meaning that the student's work is insufficient and the course must be taken again.

In the event of receiving an FX grade, a supplementary exam is scheduled no earlier than five days after the announcement of the results. The grade obtained in the supplementary exam is not added to the score received in the final assessment.

Detailed information regarding the grading system is available on the GTU website: "Instructions for Managing the Educational Process at the Georgian Technical University" https://www.gtu.edu.ge/uploads/2026/03/educational-process2-1.pdf.

Employment Opportunities

The program enables graduates to seek employment:

- In public and private organizations whose activities require the use of digital technologies in machinery, technological processes and business processes;
- In companies focused on the development and servicing of hardware and software for computer systems and embedded systems;
- In companies focused on implementation, administration and servicing of computer networks;
- In any organization requiring the use of a broad range of digital-technology tools.

Opportunities for Further Study

Graduates may continue their studies in Master’s educational programs.

Human and Material Resources Required for Program Implementation

The program is provided with appropriate human and material resources. Additional information is presented in the attached documents.

Number of Attached Syllabi: 51