საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

Approved by
Resolution № 733 of the Academic Council of GTU dated July 6, 2012

Amended by
Resolution № 01-05-04/13 of the Academic Council of GTU dated February 11, 2022

Master's Educational Program

Program Title

საინჟინრო ფიზიკა

Engineering Physics

Faculty

ინფორმატიკისა და მართვის სისტემები

Informatics and Control Systems

Program Head/Heads

Professor, Tamar BZHALAVA

Qualification to be Awarded and the Extent of the Program in terms of Credit

Master of Engineering Physics

Will be awarded upon completion of at least 120 credits of the educational program

Teaching Language

Georgian

Prerequisite for Admission to the Program

A person with at least a Bachelor's degree or an academic degree equivalent to it, who is enrolled based on the results of the master's exams, according to the rules established by the Georgian legislation, has the right to study in the master's program (general master's exam and specialty exam/exams determined by GTU). Exam questions/tests will be posted on the GTU website at least one month before the commencement of the specialty exams. Enrollment in the program without passing the master's exams is possible in accordance with the legislation of Georgia.

The applicant must have a certificate confirming knowledge of the English language at least B2 level or must have presented a document of completion of an educational course corresponding to B2 level. In the absence of a similar certificate or other similar document, the applicant will undergo an interview in English at a special commission determined by the Georgian Technical University.
Enrollment in the program without passing the master's exams is possible according to the rules established by the Ministry of Education and Science of Georgia.

Program Description

The program is compiled by the European Credit Transfer System (ECTS) 1 credit equals 25 hours, which includes both contact and independent work hours. The distribution of credits (ECTS) by subjects is presented in the curriculum.

The program lasts 2 years (4 semesters)

The program consists of **educational** and **research components.**

Educational component (educational courses), compulsory and elective – 85 ECTS.
Research component - 35 ECTS.

Educational component
Specialty subjects
Compulsory - 50 ECTS, elective - 25 ECTS.
Practice component - 10 ECTS.

Research component
The research component is evaluated once, completion and defense of Master's Thesis - 35 ECTS.

Detailed information on the evaluation of the research component is provided in the "Rules for evaluation of the research component of the master's degree program" on the web page of GTU.
The instructions for completing the paper submitted for obtaining the academic degree of Master are given on the website of GTU.

Academic year schedule:
The academic year consists of two semesters, fall and spring. Academic schedule, mid-semester and final/supplementary exam dates are determined at the beginning of each semester by the rector's order, based on the "Instructions for managing the educational process at Georgian Technical University".

Program Objective

Preparation of highly qualified specialists of nano-micro structures and systems technologies, physical-technical expertise for production-technological and scientific research activities in engineering physics and related fields.

Teaching modern theories of physics, new methods of research and design, focused on the analysis and practical solution of current scientific technological problems of applied physics and engineering.

Development of skills and competencies of analytical and experimental research, use of engineering tools, integration with theoretical knowledge, focused on formation of independent and creative views of engineer-researchers.

Creating a solid platform for personal and professional advancement, mastering future professions, self-realization and achieving career success in the local and international arena.

Learning Outcomes/Competences (general and professional)

1. **Explains** the fundamental laws and principles of physics, technology and engineering, modern concepts and theories, methods of mathematical description, the spectrum of engineering physics problems and development trends, based on a deep, systematic knowledge and understanding of the issues.

2. **Defines** the principles, characteristics, segments of practical use and modernization possibilities of modern measuring instruments, experimental techniques, nano-micro- and optoelectronic devices.

3. **Considers** and **selects** theoretical, analytical, laboratory and technological methods, mathematical, technical and software tools, engineering technological and research, including forensics, to solve problems.

4. **Conducts** computing of physics and engineering tasks, modeling of physical and technological processes, systems, simulation study, independent machine experiments, computer processing of information.

5. Independently **solves** field-specific experimental, theoretical, computational, as well as technology and design actual tasks, using the right strategy, critical analysis of information, proven, new methods and original views,

following the requirements of academic ethics.

6. **Implements** the technological processes of obtaining new nano and micro structures, materials, electrical and optosystems, engineering, in compliance with modern standards, being aware of the related risks.

7. **Evaluates** properties of nano- and micro-structures, materials and systems, physical processes, physical-technical analysis, interprets and formalizes results by observing the principles of objectivity and rigor, taking into account life and environmental protection aspects.

8. **Presents** own views, research and activity results, argumentative, expert conclusions and documentation to the interested public using communication technologies, being aware of social and legal responsibility for published results.

9. Independently **conducts** studies and professional development, knowledge transfer and activities in collaboration with scientists, technologists, engineers and other groups in regional and international research, industrial and technological centers.

Methods of achieving learning outcomes (teaching-learning)

☒ Lecture ☒ Seminar (group work) ☒ Practical ☒ Laboratory ☒ Practice ☐ Course work/Project ☒ Master's Thesis ☒ Consultation ☒ Independent work

In the educational process, depending on the specifics of the specific educational course program, the following activities of the teaching-learning methods are used, which are reflected in the relevant course programs (syllabi):
Discussion/debate, cooperative learning, case study, demonstration,inductive, deductive,analysis,synthesis,verbal or oral, written work, explanatory, action-oriented learning.
Activities corresponding to teaching-learning methods are provided on the web page of GTU.

Student's Knowledge Assessment System

The student's knowledge is assessed on a 100-point scale.

Positive grades are:

- **(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 are:

- **(FX)** - Failed to pass – 41-50 points, which means that the student needs more work to pass and is allowed to take an additional exam once with independent work;
- **(F)** - Failed - 40 points or less, which means that the work done by the student is insufficient and he/she will have to study the subject again.

In case of receiving **FX,** an additional exam is scheduled, not less than 5 days after the announcement of the results. The grade obtained in the additional exam is not added to the grade obtained in the final assessment.
Detailed information is provided on the GTU website: Instruction for managing the educational process at Georgian Technical University.

Fields of Employment

Graduates will be able to successfully work in both state and private structures with the knowledge acquired within the framework of the "Engineering Physics" master's program:

- Scientific-research institutes;
- Engineering and technological profile Hi Tech industry;
- Electronics, electronic equipment manufacturers and service companies;
- Optical technologies and modern materials industry;
- Examination bodies;
- Military objects;
- Ministry of Internal Affairs;
- Customs services;
- Analytical services;
- Higher educational institutions;
- Science and technology management services;
- Environmental protection, telecommunications organizations;
- Computer factories and firms;
- Information technology services;
- Consulting companies;
- Tool-making, agriculture, chemical industry enterprises.

Opportunities for continuing education

PhD educational programs

Human and material resources needed to implement the program

The program is provided with adequate human and material resources. For additional information, please find the attached documentation

Number of attached syllabi: 22