საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

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

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Resolution № 01-05-04/38 of the
Academic Council of GTU dated
April 12, 2021

PhD Educational Program

Program Title

საინჟინრო ფიზიკა
Engineering Physics

Faculty

ინფორმატიკისა და მართვის სისტემების ფაკულტეტი
Faculty of Informatics and Control Systems

Program Head/Heads

Professor Levan CHKHARTISHVILI

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

PhD in Engineering Physics
will be awarded upon completion of the study component (50 ECTS credits) and the research component of the educational program. Duration of education is not less than 3 years.

Teaching Language

Georgian

Prerequisite for Admission to the Program

Master's degree or equivalent academic degree. Successfully passing the interview with the temporary faculty committee. Possessing scientific publications and/or inventions, participation in scientific conferences, training and other experience of teaching/research activities, confirmed by relevant prints, patents, certificates, deeds, etc., are taken into account during the interview.

Knowledge of the English language at least B2 level, confirmed by a document of completion of a relevant education course or a relevant certificate of competence or a document of completion and completion of an English-language program / course study. In the absence of a similar document or certificate, the applicant will undergo an interview in English with the faculty's special commission.
Enrollment in the educational program is also possible on a mobility basis twice a year, within the time limits established by the Ministry of Education, Science, Culture and Sports of Georgia, following the mandatory procedures and the rules established by the university.
Enrollment in the program or transfer from a recognized Higher Educational Institution of a foreign country is carried out in accordance with the rules defined by the legislation of Georgia.

Program Description

The program is compiled using the European credit transfer system ECTS. At GTU 1 credit is equal to 25 hours, including contact and independent work hours. The distribution of credits by subject is presented in the curriculum. The duration of the program is at least 3 years (6 semesters).

Program structure

The educational component of the program is 50 credits, including:

Compulsory educational component– 20 credits

Elective component in specialty– 30 credits

The program lasts at least 3 years (6 semesters)

Academic year schedule

The academic year consists of two semesters - fall and spring. The dates of interim and final/additional examinations are set at the beginning of each semester by the Rector's order based on the Instructions for managing the educational process at Georgian Technical University, available on the GTU website.

Before the beginning of the semester, the Rector of the university issues an order on the progress of the educational process, which will be posted on the website.

Research component

The research component is assessed once, and detailed information on its evaluation is provided in the "Teaching and Research Components of the Doctorate Educational Program and the Rules for Their Evaluation", on the website of the Georgian Technical University of Georgia.

The instructions for completing the thesis submitted for obtaining the PhD academic degree are given on the website of the Georgian Technical University.

Program Objective

The objective of the program is:
● To prepare highly qualified personnel for scientific research and teaching activities in such areas of engineering physics as: physical materials science, physics and technology of nanosystems, micro- and optoelectronics, medical physics, radiation safety, physics-technical expertise.
● Formation of skills and competences in the use of modern methods of experimental research and design in engineering physics, focused on the creative solution of current scientific and technological problems.
● Facilitating the creation and implementation of new knowledge. Training of scientific and higher school teaching staff, convergence of academic and research resources, involvement in the international academic and scientific space.
● Promotion of personal and professional perfection to achieve success in the local and international scientific arena.

Learning Outcomes/Competences (general and professional)

1. **Explains** the key provisions of engineering physics, modern concepts and approaches, modeling techniques, as well as development trends of engineering physics.
2. **Determines** the working principles, technical characteristics, fields of application of modern experimental techniques of engineering physics - technological and measuring devices - and the possibilities of their further modernization.
3. **Selects** theoretical, measurement and technological methods, software tools for solving actual research and practical problems of engineering physics.
4. **Performs** computing of engineering physics tasks, modeling of physical events and technological processes.
5. **Conducts** technological processes of obtaining physical systems and structures, advanced and nanomaterials, engineering and measurement of characteristics in compliance with modern standards and avoiding expected risks for humans and the environment.
6. **Analyzes** the physical-technical characteristics of events and processes in physical systems, interprets and generalizes them in compliance with the principle of objectivity.
7. **Presents** one's own views, the results of the conducted research and expert conclusions in a justified manner to the professional / non-professional interested audience using modern communication technologies and being aware of social and legal responsibility for the published research materials.
8. Independently **plans** and **directs** the educational process.
9. Independently **conducts** further professional development, knowledge transfer and activities in the fields of engineering physics in collaboration with groups of scientists and engineers in national and international educational, research, technological and industrial centers.

Methods of achieving learning outcomes (teaching-learning)

☒ Lecture ☒ Seminar (group work) ☒ Practical ☒ Laboratory ☒ Practice ☐ Scientific and thematic seminar ☒ Independent work ☒ Consultation ☒ Research component ☒ Structure of the thesis ☒ Thesis defense

In the learning process, depending on the specifics of a particular study course program, the following activities of the teaching-learning methods are used, which are outlined in the relevant study course programs (syllabi): discussion/debate, collaborative work, case study, brain storming, demonstration, induction, deduction, analysis, synthesis, oral or verbal work, writing work, observation, explanation, action-oriented learning, project development and presentation.

Activities corresponding to teaching-learning methods are provided on the website of the Georgian Technical university.

Student's Knowledge Assessment System

Educational program is assessed on a 100-point scale.

Assessment of the educational component:
A positive assessment of the education course determined by PhD educational program is the following:

- (A) – Excellent – 91% of assessment and above
- (B) – very good – 81 – 90 % of assessment
- (C) – Good – 71 – 80% of the assessment
- (D) – satisfactory – 61 – 70% of the assessment
- (E) – sufficient – 51 – 60 % of the assessment

A negative assessment of the education course determined by PhD educational program is the following

- (FX) - Failed to pass – 41-50 % of the assessment, which means that the student needs more work to pass and is allowed to take an additional exam once with independent work;

In case of FX, an additional examination is scheduled no later than 5 days after the announcement of the results. The grade received at the additional examination is not summarized with the grade received at the final assessment.

- (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.

The assessment of the scientific-research component of the PhD educational program is done once, with a final assessment.

Assessment of the scientific-research component/components:

Five positive and two negative assessments are used for the evaluation of the doctoral thesis.
Positive assessments are:

a) Excellent (summa cum laude) - excellent performance, 91-100 points;

b) Very good (magna cum laude) - result exceeding the requirements in all parameters, 81- 90 points;

c) Good (cum laude) - a result that exceeds the requirements, 71-80 points;

d) Satisfactory (bene) - an average level work that meets the basic requirements; 61 – 70 points;

e) Sufficient (rite) - a result that, despite its shortcomings, still meets the requirements, 51 – 60 points.

Negative assessments are:

a) Insufficient (insufficienter) - an unsatisfactory level work that cannot meet the requirements due to significant deficiencies in the work, 41-50 points;

b) Completely unsatisfactory (sub omni canone) - a result that completely fails to meet the requirements, less than 41 points.

Fields of Employment

A graduate of the PhD in Engineering Physics can be employed in the following institutions and enterprises:

● Universities and other higher educational institutions
● Scientific research institutes and centers
● Design bureaus
● Ministries of health protection and social security, internal affairs, security, defense, energy, agriculture, environment protection and natural resources and their subordinate institutions and organizations
● State customs
● Materials and tools certification bodies
● Clinics and hospitals
● Private structures, organizations and enterprises working in the fields of technical expertise, electronics, information technologies and telecommunications

Human and material resources needed to implement the program

The program is provided with highly qualified human resources. The authors of the programs (syllabi) of the education courses are the professors of the Engineering Physics Department of the Technical University of Georgia.

The program is provided with appropriate material resources: educational materials, library, computer classes and laboratory base.

Additional information about the program's human and material resources can be found in the attached documents.

Number of attached syllabi: 18