



PhD Educational Program

Program Title

ენერგეტიკა და ელექტროინჟინერია

Energy and Electrical Engineering

Faculty

ენერგეტიკის

Power Engineering

Program Head/Heads

Professor Lena SHATAKISHVILI

Professor Tengiz JISHKARIANI

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

Doctor of Energy and Electrical Engineering

55 credits provided by the educational program will be awarded in case of mastering the educational component and completing the research component. The duration of the program is 3 years.

Language of Teaching

Georgian

Prerequisite for Admission to the Program

- Enrollment in the program is carried out according to the rules established by the legislation of Georgia. The applicant must meet the following requirements:
- Possess a master's degree or equivalent academic degree;
- Have knowledge of a foreign language (English) - B2 level. The applicant must pass the entrance exam at the GTU examination center or present a relevant international certificate proving knowledge of a foreign language. An applicant with a higher education in English is not required to present a certificate or pass an exam.

Applicants for enrollment in the program must submit a research project, which outlines the purpose and direction of the applicant's research.

Applicants must be interviewed by the Faculty Temporary Committee, which is approved annually by GTU's Academic Council.

During the selection of applicants, the following are taken into account: the existence of scientific publications, participation in scientific conferences, other documents and materials related to educational/research activities (certificates, deeds, patents, etc.)

The procedure for admission to doctoral studies and enrollment conditions are posted on the university's website.

It is possible to enroll in the program on the basis of mobility within the terms established by the Ministry of Education and Science of Georgia, following the mandatory procedures and the rules established by the university.

Enrollment in the program or transfer enrollment 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 energy and electrical engineering doctoral educational program has been implemented at the Georgian Technical University since 2012.

The experience of foreign universities is taken into account in the process of bringing the program into compliance with the requirements of the "National Qualifications Framework" approved by the Annex No. 1 of the Order No. 69/N of the Minister of Education, Science, Culture and Sports of Georgia on April 10, 2019, as well as with the motivation of continuous improvement of the program. Including:

- Czech Technical University, Czech Republic <http://www.fel.cvut.cz/en/education/phd/study>
- The Politecnico De Milano, Italy <http://www.dottorato.polimi.it/en/phd-programmes/active-phd-programmes/electrical-engineering/>
- University of Technology, Gdansk, Poland) <https://pg.edu.pl/szkola-doktorska/environmental-engineering-mining-and-power-engineering2> (has a doctoral program in engineering and technology (module energy)

The doctoral educational program "Energy and Electrical Engineering" is a combination of educational and scientific-research components, the learning outcomes of which correspond to the generalized learning outcomes defined for the 8th level of the National Qualifications Framework.

The program is compiled by the European Credit Transfer and Accumulation System (ECTS). At the Georgian Technical University, 1 credit is equal to 25 hours, which includes both contact and independent work hours. The distribution of credits of the educational component is presented in the curriculum of the program and totals 55 credits.

The duration of the program is at least 3 years (6 semesters).

The education component of the educational program of the doctoral program aims at the sectoral and methodological skills of the doctoral student, helps the doctoral student to complete the thesis and prepares him/her for future pedagogical and scientific activities.

The educational component of the doctoral program consists of compulsory and elective courses, which the doctoral student must take in the first and second semesters. 45 credits are defined for the

compulsory courses of the educational component, 10 credits for the elective educational courses.

Compulsory elements of the research component of the program are: project/prospectus; colloquium - 1; colloquium - 2; colloquium- 3; preliminary protection; thesis completion and defense.

The doctoral candidate starts preparing the research components from the **second semester:** project/prospectus; **Third semester:** colloquium - 1; **Fourth semester:** colloquium -2; **Fifth semester:** colloquium -3; **Sixth semester:** preliminary defense of the thesis, completion and defense of the thesis.

The scientific-research component is evaluated once, during the defense of the thesis.

See the Georgian Technical University's Doctoral Regulations and "Educational and Research Components of Doctoral Educational Programs and Their Evaluation Rules" in detail on the website of GTU.

The academic year consists of two semesters - fall and spring. The dates of mid-semester and final/supplementary exams are set at the beginning of each semester by the Rector's order based on the "Instructions for managing the learning process at the Georgian Technical University", which is posted on the GTU website.

Program Objective

Objective of the program is:

- Development of knowledge based on the latest achievements in the field of energy and electrical engineering and a new understanding of the challenges in the field.
- Training of researchers with the ability to independently conduct scientific research and teaching activities, following the principles of academic and professional integrity, focused on expanding existing knowledge in the field and implementing innovative research projects, as well as making a significant contribution to the development of the field by offering new technological opportunities.

Learning Outcomes/Competences (general and professional)

- Has knowledge based on the latest achievements in the field of energy and electrical engineering, which, with a systematic and critical understanding of the field of study and/or activity, allows the expansion of existing knowledge in an interdisciplinary context;
- Using modern research methods and approaches focused on the creation of new knowledge, while adhering to the principles of academic integrity, independently plans and carries out research in the field of production, transmission, distribution and consumption of electrical and thermal energy;
- Independently makes complex and effective decisions as a result of critical analysis and evaluation of new, complex and contradictory considerations related to the large-scale use of alternative energy sources and the practical implementation of energy-efficient technologies;
- In connection with existing theories and concepts in the field of energy and electrical engineering, clearly formulates own research results/opinions for colleagues and the general public, by maintaining the high standard of international refereed publications and by appropriate participation in thematic discussions held at the international level, as well as in academic activities focused on knowledge transfer;
- Following the principles of academic and managerial integrity, independently implements innovative research projects based on the latest technological achievements in the field of energy and electrical engineering;

- In accordance with international standards recognized in the field, using new analytical approaches, designs, implements/develops modern technologies and techniques for installation, maintenance, repair and fault diagnosis of electrical wiring and electrical equipment in industrial, commercial and household sectors.

Methods of Achieving Learning Outcomes (teaching-learning)

Lecture
 Seminar (group work)
 Practical
 Laboratory
 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, Cooperative learning, Collaborative work, Problem-based learning (PBL), Case study, Brain storming, Demonstration method, Inductive method, Deductive method, Method of analysis, Synthesis method, Verbal or oral method, Writing work method, Explanatory method, Activity-based learning, Project development and presentation, problem-based learning, case analysis.

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

Assessment of the scientific research component(s):

- a) with the highest praise (summa cum laude) - excellent performance;
- b) with great praise (magna cum laude) - result exceeding the requirements in all parameters;
- c) with honor (cum laude) - a result that exceeds the requirements;
- d) satisfactory (bene) - an average level work that meets the basic requirements;
- e) sufficient (rite) - a result that, despite its shortcomings, still meets the requirements;
- f) insufficient - an unsatisfactory level work that cannot meet the requirements due to significant deficiencies in the work;
- g) completely unsatisfactory (sub omni canone) - a result that completely fails to meet the

requirements.

The evaluation of the research component of the doctoral educational program is done once, with the final evaluation.

Fields of employment

Graduates will be able to find employment in relevant state (Ministry of Economy and Sustainable Development, relevant public law legal entities included in its system and sub-departmental institutions) and private sector institutions; in scientific-research and training-scientific institutions in the field of energy and electrical engineering, in design departments and construction bureaus in production-institutions, laboratories, separately functioning scientific-research centers and similar organizations, in higher educational institutions, in industrial and commercial enterprises of the heating and energy complex, industrial enterprises and agricultural regions, in sectoral public organizations, consulting firms and agencies, in sectoral international organizations, in power engineering companies.

Human and material resources needed to implement the program

The program is provided with human resources; The authors of study courses, syllabi and supervisors of doctoral students are professors of the Georgian Technical University. The program is provided with appropriate material resources: educational materials, library, laboratories, computer classes, computer programs, continuous Internet.

Additional information about the program's human and material resources is provided in the attached documents.

Number of attached syllabi: 14