



საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

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

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September 30, 2022

PhD Educational Program

Program Title

მართვის სისტემები, ავტომატიზაცია და ტესტ-ინჟინერინგი

Control Systems, Automation and Test-Engineering

Faculty

ინფორმატიკისა და მართვის სისტემების ფაკულტეტი

Faculty of Informatics and Control Systems

Program Head/Heads

Professor Besarion SHANSHIASHVILI

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

PhD in Instrumentation, Automation and Control Systems

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 or equivalent academic degree in engineering, informatics, mathematics, physics and other related specialties;
- Persons wishing to enroll in the program must submit: a research project, where the purpose and direction of the applicant's research are outlined;
- It is compulsory to present a certificate/document confirming the knowledge of the English language at least B2 level. The applicant, who cannot present the said certificate, is obliged to pass the test in the computer center of GTU in the English language. Applicants who have received one level of higher education in English are not required to pass an exam or present a certificate;
- In case of receiving a positive assessment in the English language, the applicant goes through an interview with the faculty temporary committee; during the interview, scientific publications and/or inventions, participation in scientific conferences, trainings and other experience of educational/research activities, confirmed by relevant prints, patents, certificates, deeds, etc. will be taken into account. The procedure for admission to PhD studies and enrollment conditions are given on the university's website.

Enrollment in the educational program is also possible on a mobility basis, in accordance with the order No. 10/N of the Minister of Education and Science of Georgia dated February 2, 2010 "Rule of transfer from a higher educational institution to another higher educational institution":

Applicants will also be admitted to the educational program on the basis of internal mobility. The terms and procedures of internal mobility are established by the order of the university Rector and the information is posted on the university's website.

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

Program represents a combination of educational and scientific/research components

The program is compiled using the European credit transfer system ECTS. 1 credit is equal to 25 hours, including contact and independent work hours. The distribution of credits in accordance with subjects is presented in the program curriculum.

The educational component of the program consists of compulsory and elective courses, which the PhD student must take in the first and second semesters. The capacity of compulsory educational courses is 30 credits, the capacity of elective educational courses is 20 credits, the total educational component equals to 50 credits.

The implementation of the research component is envisaged from the 2nd semester, and its stages, in order, are: project/prospectus; colloquium 1; colloquium 2; colloquium 3; preliminary defense of the thesis; Completion and defense of the thesis. Each stage of the research component is a compulsory prerequisite for the next stage.

The research component is assessed once, at the defense of the thesis in the final assessment.

The academic year consists of two semesters - fall and spring. The academic year schedule, 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.

Program Objective

To prepare highly qualified staff in the field of management systems, automation and test engineering for scientific-research and pedagogical activities, who will be able to:

- Understand the latest achievements of modern management computer equipment and information technologies;
- Develop research and analytical methods and approaches focused on the creation of new knowledge;
- Independently plan, implement and supervise innovative research;
- Plan and manage the educational process independently.

Learning Outcomes/Competences (general and professional)

1. **Possesses** deep knowledge of new methods of system analysis, system identification, optimization, decision-making and information processing in the field of control systems, automation and test engineering, which allows him/her to expand existing knowledge and use innovative methods;
2. **Discusses** the issues of evaluating and predicting the effectiveness of complex (automatic management, measuring) systems, quality and reliability, the possibilities of independent research planning, implementation and supervision;
3. **Classifies** the tasks of system analysis, system identification, optimization, decision-making and information processing and discusses the possibilities of developing new research and analytical methods and approaches, algorithms and software for their solution;
4. **Conducts** active and passive experiments and measurements with deterministic and random signals entering the system and processing the received data for the identification and management of control objects;
5. **Uses** new research and analytical methods and approaches, algorithms and software for system analysis, system identification, optimization, decision-making and information processing tasks, and for planning and conducting the educational process independently;
6. **Compares** measurements, experimental data processing, function approximation, systems identification, controllability and observability, system stability, optimal, adaptive and robust control methods for designing and building control systems, automation and test engineering systems;
7. **Explains** the necessity of problem-oriented systems identification, management, decision-making and optimization of complex objects of various nature and development of the intelligent methods, algorithms and software for the purpose of support.
8. **Develops** new research and analytical methods and approaches, algorithms and software tools for solving problems in the field of management systems, automation and test-engineering (at the level of the standard required for an international referral publication);
9. **Establishes** a deterministic or stochastic approach, taking into account the peculiarities of the processes in the system, to solve the tasks of analysis and synthesis of management systems, automation and test-engineering systems with innovative methods;
10. **Discusses** and makes a conclusion about the management objectives and the use of the type of management system based on the constructed mathematical model, the results of theoretical and experimental research while participating in thematic discussions held at the local and international level.

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:

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.

A student who does not agree with the assessment of the study results has the right to appeal to the dean with a reasoned complaint and request a revision of the results within five working days of being informed of the results of the evaluation.

Detailed information is provided on the website of GTU: Instruction on managing the educational process at Georgian Technical University.

The assessment of the research component is done once, during the completion and defense stage of the thesis, with the final evaluation.

Assessment of the scientific-research component/components:

- 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.

Negative assessments are:

- a) insufficient (insufficenter) - an unsatisfactory level work that cannot meet the requirements due to significant deficiencies in the work;
- b) completely unsatisfactory (sub omni canone) - a result that completely fails to meet the requirements.

Fields of Employment

A PhD graduate can be employed:

in state and private institutions; in such structures and organizations of industry, agriculture, energy, transport, economy and other fields, where automatic and automated management and control systems and means with appropriate mathematical, informational, technical and software support will be used; in higher educational institutions according to the profile and transfer their knowledge to students-youth; to be employed as a scientific employee in scientific-research institutes, where he/she will be involved in the researches of current problematic topics in them.

Human and material resources needed to implement the program

The educational program is provided with appropriate highly qualified human and material resources, educational materials, computer classes, library, educational and scientific laboratory.

Technical support of the laboratory is given in the annex.

Additional information about the program head and implementers can be found in the attached documents.

Number of attached syllabi: 17