



საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

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

Amended by
Resolution 01-05-04/145 of the
Academic Council of GTU
dated October 3, 2023

Master's Educational Program

Program Title

ინფორმატიკა

Informatics

Faculty

ინფორმატიკისა და მართვის სისტემების

Faculty of Informatics and Control Systems

Program Head/Heads

Professor Tinatin KAISHAURI

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

Master of Informatics

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.

The applicant must have a certificate confirming knowledge of the **English** language of at least B2 level, or

must present a document of completion of a corresponding training course of B2 level. In the absence of a similar certificate or other similar document, the **applicant will be tested in the English language at the computer center of GTU.**

Enrollment in the program without passing the master's exams is possible according to the rules established by the Ministry of Education, Science, Culture and Sports of Georgia.

Program Description

The program is compiled by the European Credit Transfer System (ECTS). At Georgian Technical University 1 credit is equal to 25 hours, which includes both contact and independent work hours. The distribution of credits according to subjects is presented in the curriculum. The program lasts 2 years (4 semesters, 30 credits in I and II semesters, 20 credits in III semester, 40 credits in IV semester) and totals 120 credits.

The program consists of educational and research components. The educational component includes 80 credits, and the research component - 40 credits. Completion and defense of the Master's thesis, which is assessed once.

The master's degree program includes six concentrations, each with 85 credits.

Research components: detailed information about the evaluation of the research component is provided in the "Rule for evaluation of the research component of the master's educational program" on the website of GTU.

Academic year schedule:

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

Academic year 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

The objective of the "Informatics" program is to train highly qualified staff who will have theoretical and practical knowledge corresponding to the requirements of the international market to implement the requirements of state structures, large corporations, small businesses and various fields of science:

- Creation, implementation and operation of information and communication technologies, as well as corporate information systems;
- Processing of IT services, analysis of their life cycle and formation of effective management principles;
- Systematic analysis of organizational management objects, revealing their goals, business functions, classification of logistics management business processes, their modeling with object-oriented and process-oriented approaches;
- Analysis of weaknesses and threats of information systems and their solution by methods of solving complex tasks in artificial intelligence and by means of decision-making support systems;
- Based on the valid organizational legal framework, the establishment of the concept of information security of any type of organization and the provision of a complex protection system by various methods and means;
- Creation, management and implementation of web and multimedia projects in various scientific, engineering,

educational, innovative, commercial and creative fields;

The program also provides an opportunity for the student to choose a prospective direction, in which it is possible to discover new employment markets, to organize one's own activities or to work on vacancies for advanced projects.

Learning Outcomes/Competences (general and professional)

Learning outcomes of the program are:

- **Possesses** deep and systematic knowledge of the professional field, computing, information processing, systems analysis, design, programming concepts and methodologies to achieve productivity in research and applied activities;
- **Uses** the acquired knowledge to solve real problems through innovative methods and tools based on classical and human intelligence functions;
- **Analyzes** the information obtained as a result of mathematical and simulation modeling of complex systems and processes and makes appropriate decisions using computational methods;
- **Solves** problem modeling, algorithmization and programming tasks by means of hybrid technologies, client-server and web services-oriented architectures;
- **Conducts** business process reengineering with the help of purposeful and systematic modeling of material, financial and information flows, aimed at improving the main indicators of the organizational structure;
- **Identifies**, formulates, analyzes and solves information security problems of computer networks of any scale for a specific purpose based on knowledge of machine learning methods;
- **Implements** operational and strategic planning of interdisciplinary projects using modern multimedia and web technologies;
- **Evaluates** the received conclusions and recommendations in terms of improving the ways of solving existing problems in the complex field of informatics;
- **Presents** research results, professional documentation and scientific-technical publications in various scientific, educational and commercial projects in a concise, comprehensible manner and in full compliance with language norms;
- **Establishes** communication with the academic and professional community in Georgian and foreign languages, following the norms of ethics of the society in the field of informatics.

In relation to the learning outcomes of the program, the learning outcomes of the concentrations are:

Concentration 1 - information protection management systems

- Has deep and systematic knowledge of modern theories, technologies, methods of information protection and cyber security;
- Prepares the information security management system for certification, identifies, analyzes and eliminates information security problems in the Internet space, organizational structures and information networks using the latest information protection and cyber security technologies;
- Conducts an information security audit, identifies categories of inconsistencies using special programs of risk management systems, and forms reasonable conclusions about the reliability of selected technology of information protection and cyber security in various types of systems;
- Prepares professional documentation/report based on conducted researches and submits presentations in

compliance with the ethical norms of the society of the field of informatics

Concentration 2 - Management Information Systems

- Has systematic knowledge to solve the unified processes of distributed information system software processing - engineering, economic and organizational management tasks, using modern methods and technologies;
- Determines the practical aspects of the use of distributed, relational and non-relational, object-oriented or internet databases, big data, business intelligence management;
- Solves problem modeling, algorithmization and programming tasks by means of hybrid technologies, client-server and web services-oriented architectures and chooses optimal solutions;
- Presents a presentation on the performance of a specific task of different types of management information systems in compliance with the norms of professional ethics.

Concentration 3 - Artificial intelligence

- Has systematic knowledge of classic and innovative theories, methods and technologies in the field of artificial intelligence in research and applied direction;
- Applies the knowledge gained in the field of machine learning, genetic algorithms, deep learning, digital image processing and analysis, intelligent data analysis, artificial neural networks, natural language processing methods, algorithms to solve real problems;
- Based on the analysis of the received results, makes detailed and substantiated conclusions in accordance with the tasks set in different fields of artificial intelligence;
- Submits a report, based on the conducted research, in compliance with the ethical norms of the society in the field of informatics.

Concentration 4 - Computational mathematics

- Has systematic knowledge of computational mathematics theories, modern methods and information technologies;
- Uses the obtained knowledge to solve the problems of computational mathematics, implementation of approximate calculation algorithms, fuzzy logic, machine learning, decision-making, financial activities, by means of standard and some unique methods;
- Analyzes the possibilities of modeling complex systems, decision-making processes, modeling of unclear management systems in accordance with the given task, identifies created problems, finds ways to solve them and formulates reasoned conclusions about the complexity of decision-making, in conditions of incomplete information for data processing;
- Demonstrates a systematic approach to the academic and professional community on the examples of the received research results, concrete mathematical and financial models, in compliance with the norms of ethics.

Concentration 5 - Computer information systems

- Has systematic knowledge of modern technologies of information systems for planning organizational processes and making program decisions;
- Analyzes organizational processes, existing services in the organization, identifies problems and chooses optimal solutions;
- Uses information technologies to solve organizational projects, corporate systems, business process analysis, e-business and financial management tasks and formulates reasoned conclusions in accordance with specific tasks
- Presents the presentation of the finished product to the academic and professional community, following ethical standards.

Concentration 6 - Multimedia and web technologies

- Possesses the essential knowledge to develop modern web and multimedia projects for various purposes;
- Analyzes and uses innovative web and multimedia methods for scientific, educational and commercial projects;
- Creates modern design WEB systems and adapted WEB sites, advertising projects for a specific web platform, dynamic WEB pages, three-dimensional computer models of various shapes and complexity, designs and builds mobile applications in the Android Studio environment;
- Selects the optimal option for creating web and multimedia projects, presents the finished product to academic and professional circles, observing the standards of academic ethics.

Methods of achieving learning outcomes (teaching-learning)

- Lecture Seminar (group work) Practical Laboratory Practice
 Team work 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 teaching-learning methods are used, which are reflected in the relevant course programs (syllabi): verbal or oral, analysis, action-oriented teaching, explanatory, demonstration, discussion/debate, synthesis, Collaborative work, deductive, inductive, cooperative learning, role-playing and situational games, case studies, written work, project development and presentation. link:[https://gtu.ge/quality/Files/Pdf/metodebi%20da%20aqtivobebi%20\(1\).pdf](https://gtu.ge/quality/Files/Pdf/metodebi%20da%20aqtivobebi%20(1).pdf) .

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 of **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 mark.

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.

The scientific-research component of the master's educational program, the public defense of the master's thesis is assessed by the examination commission consisting of 5-7 members. The master's thesis is assessed once, with a 100-point evaluation system, according to the following criteria:

1. Description of the research problem, relevance - assessment up to 5 points;

2. Analysis of the literature surrounding the research topic - assessment up to 4 points;
3. Use of research methods - assessment up to 5 points;
4. Judging the results of the conducted research - assessment up to 4 points;
5. Making a conclusion based on the conducted research - assessment up to 4 points;
6. The quality of the design of the work and the ability to present it - assessment up to 3 points.

The scaled assessment score (S) is obtained by the formula $S = 4 \times M$, where M is the total assessment score of all six components.

The master's thesis presented by the master's student is assessed immediately after the defense, by each member of the examination commission, by secret ballot. Based on the decision of the examination commission, the protocol of the examination commission is drawn up.

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

Fields of Employment

With the knowledge acquired within the mentioned program, the graduate will be able to work in state and private structures: in wide profile scientific research institutes (mathematics, physics, economics, biology, geophysics and others), in heavy and light industries, banks, engineering laboratories, medical and social fields, in higher educational institutions, education system agencies, electronic libraries and everywhere where the use of databases, universal and special purpose computer systems and networks, also, based on the technical (hardware) means and system software of their components, research and development of methodical approaches to the problems of the mentioned branches of science and technology using mathematics, programming, information and communication technologies and automated management systems.

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: 77