Approved
of the Academic Council of
GTU on July 6, 2012
733 by resolution
is Modified
Academic Council of GTU
December 2022

by **Resolution** No. 01-05-02

საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

Doctoral Education Program

Name of the program

Chemistry

Faculty

Faculty of Chemical Technology and Metallurgy

Program Head/Heads

Professor Maia Tsintsadze

Qualifications to be granted

Doctor OF Chemistry
It will be awarded in case of completion of the educational component (50 credits) and the research component of the educational program, the duration of study is not less than 3 years.

Study Language

Georgian

Prerequisite for program admission

A person with a master's degree or equivalent academic degree has the right to study at the "Chemistry" doctoral educational program. 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.).

Applicants to the program must submit: a research project, where the purpose and direction of the applicant's research are outlined; Also, a relevant international certificate proving knowledge of the English language at the B2 level, or must pass an exam at the computer center of GTU. An applicant with a higher education in English is not required to present a certificate or pass an exam.

In case of receiving a positive assessment in the English language, the applicant goes through an interview with the faculty temporary committee. The procedure for admission to doctoral studies and the conditions for enrollment are posted on the university's website:

https://gtu.ge/

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

https://gtu.ge/Study-Dep/Files/Pdf/brZ_10n_16032018_SD.pdf

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 rector of the university and the information is posted on the website of the university

Description of the program

The doctoral educational program "Chemistry" is a combination of educational and scientific/research components, the learning outcomes of which correspond to the generalized learning outcomes of the 8th level of the qualification determining the difficulty of the qualification in the framework of the national qualifications.

The program is made with the ECTS European credit transfer system. At GTU, 1 credit is equal to 25 hours, which includes both contact and independent study hours.

The distribution of credits is presented in the curriculum of the program. The program lasts at least 3 years (6 semesters). The educational component consists of mandatory and optional training courses and in total it amounts to 50 credits, of which the volume of mandatory training courses is 45 credits, and the volume of optional training courses is 5 credits.

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

The doctoral student starts preparing the research components from the second semester and prepares the research project/prospectus;

Third semester: colloquium - 1;

Fourth semester: colloquium - 2;
Fifth semester: colloquium - 3;
Sixth semester: preliminary defense, thesis completion and defense.

Before submitting the paper to the Dissertation Council, the doctoral student is obliged to present the papers reflecting the main results of the research related to the dissertation topic and published during the period of the doctoral student's studies in accordance with the established rules (at least three scientific articles, at least one of which must be without co-authors). One of the 10 papers can be considered if it has been submitted for publication in a foreign high-rated, peer-reviewed/refereable publication, on which a positive conclusion has been received and relevant supporting documentation has been submitted;
The scientific-research component is evaluated once, during the defense of the thesis. The regulations of the Doctorate of the Technical University of Georgia and the "educational and research components of the Doctorate educational programs and their evaluation procedure" can be found in detail on the website of the Technical University of Georgia:
https://gtu.ge/Study-Dep/Files/Pdf/brZ_10n_16032018_SD.pdf

The academic year consists of two - autumn and spring semesters. The dates of mid-semester and final/supplementary exams are set at the beginning of each semester by the order of the rector of the Technical University of Georgia based on the "Instructions for managing the educational process at the Technical University of Georgia", which is posted on the website of the Technical University of Georgia https://gtu.ge/Orders/

Purpose of the program

The purpose of the educational program

- To train qualified chemistry researchers, oriented to the local and international labor market, equipped with interdisciplinary approaches, knowledge based on the latest achievements, as well as new understanding of existing challenges, research and educational process management skills.
- To study the physico-chemical and experimental methods of research and their successful application in practice;
- Training of highly qualified and motivated specialists, which will contribute to the growth of the country's potential, by creating research methods for new/innovative alternative products for obtaining and processing compounds and materials for various functional purposes.
- To participate in the full functioning of competitive production and research laboratories oriented to the local and international labor market.

Learning outcomes/competencies (general and sectoral)

1. Generates new ideas of chemistry for solving research and practical tasks based on critical analysis and evaluation of modern scientific achievements, including in interdisciplinary research;
2. Determines independent planning, implementation and supervision of innovative research;
3. Predicts the chemical nature of individual representatives of inorganic compounds, determination of their reactivity, energetics and kinetics of processes (reactions), mutual transformations between numerous classes of organic compounds, preliminary assessment of the properties of various materials, ways of obtaining biologically active substances independently and possibilities of use;
4. Develops new research and analytical methods and approaches focused on new knowledge;
5. Implements measures focused on the development of knowledge in the academic and professional context and critically evaluates the teaching/pedagogical and research activities;
6. Leads the development of innovative research approaches for the perfection of scientific activity, which is focused on the creation of new knowledge;
7. On the basis of critical analysis, synthesis and evaluation of new, complex and contradictory ideas and approaches, makes correct and effective solutions for problem solving
8. Develops new research and analytical methods and approaches of chemical and biological engineering, which are focused on the creation of new knowledge and are reflected in international refereed publications;
9. Demonstrates the ability to clearly present and transfer new knowledge in relation to existing knowledge, both to colleagues and the general public;
10. Adhering to the principles of academic integrity and taking into account innovative methods based on the latest achievements of the field in the field of interdisciplinary research, prepares research projects in the field of chemistry.

Forms and methods of achieving learning outcomes

☒ lecture ☒ Workshop (group work) ☐ practical ☐ laboratory ☐ practice ☒ Course work/project ☒ Master thesis ☒ Consultation ☒ Independent work

In the learning process, depending on the specifics of the specific training course program, the following activities of the teaching-learning methods are used, which are reflected in the relevant training course programs (syllabi):

Activities corresponding to teaching-learning methods: discussion/debate; cooperative learning; group (collaborative) work; problem-based learning (PBL); case study (Case study); Brain storming; role-playing and situational games; demonstration method; induction method; deductive method; analysis; synthesis; verbal or oral; written work; explanatory; action-oriented learning; Project development and presentation.

Detailed information about teaching-learning methods and relevant activities is provided on the STU website:

https://gtu.ge/quality/Files/Pdf/scavlebis%20metodebi%20da%20aqtivobebi.pdf

Assessment of student knowledge

Evaluation is done with a 100-point system.

Evaluation of the learning component:
Positive evaluations are:
• (A) - Friadid - 91-100 evaluation points;
• (B) - very good - 81-90 evaluation points;
• (C) - good - 71-80 evaluation points;
• (D) - satisfactory - 61-70 assessment points;
• (E) - sufficient - 51-60 assessment points.
Negative evaluations are:
• (FX) - failed - 41-50 assessment points, which means that the student needs more work to pass and is allowed to take the additional exam once with independent work;
(F) - Failed - 40 grade points or less, which means that the work done by the student is not enough and he has to relearn the subject.

Evaluation of scientific-research component/components: a) summa cum laude – excellent paper;
b) very good (magna cum laude) – a result that exceeds the requirements in every way;
c) good (cum laude) – a result that exceeds the requirements;
d) average (bene) – an average-level paper that meets the basic requirements
satisfies;
e) satisfactory (rite) - the result, which, despite the shortcomings, still meets the requirements;
f) Unsatisfactory (insufficient) - work of an unsatisfactory level, which cannot
meets the requirements due to significant gaps in it;
g) completely unsatisfactory (sub omni canone) – a result that does not fully meet the requirements.

Field of Employment:

- Educational institutions and higher schools;
- in scientific-research institutions;
- in diagnostic, research and expert laboratories;

Management and control of processes in chemical, food and biochemical, metallurgical, pharmaceutical, agricultural and mining-geological enterprises.

The necessary human and material resources for the implementation of the program

The program is provided with relevant human and material resources. For more information, see the attached documents.

The number of attached syllabuses: 15

Subject load of the program

№	Teaching and research components	A prerequisite for admission	ECTS Credits					
			I Year		II Year		III Year	
			Semester					
			I	II	III	IV	V	VI
1	Scientific Communication Techniques	Doesn't have	4					
2	Methods of teaching	Doesn't have	6					
3	Modern concepts of inorganic chemistry	Doesn't have	5					
4	Principles and mechanisms of organic reactions	Doesn't have	5					
5	Theoretical aspects of physical chemistry	Doesn't have	5					
6	Modern aspects of substance analysis	Doesn't have	5					
7	Professor's assistantship	Methods of teaching		15				
8	Elective courses							
8.1	Standard and Non-Standard Coordination Chemistry	Modern concepts of inorganic chemistry		5				
8.2	Chemistry in Modern Pharmacy	Modern aspects of substance analysis						
8.3	Chemistry of biologically active natural compounds	Modern concepts of inorganic chemistry						
8.4	Modern Aspects of Dye Chemistry	Principles and mechanisms of organic reactions.						
8.5	Thermodynamic and kinetic modeling of processes	Theoretical aspects of physical chemistry						
8.6	Modern Advances in Polymer Sciences	Principles and mechanisms of organic reactions.						
8.7	Agrochemistry, product quality and substance cycling in the ecosystem	Modern concepts of inorganic chemistry						
8.8	Current tasks of ecological chemistry	Modern aspects of substance analysis						
			30	20				
	Research Components			130				

all:	180

Program Curriculum

№	Subject Code	Learning component	ESTS credit/hour	Hour						
				lecture	Workshop (group work)	practical	laboratory	mid-semester exam	Final exam	Independent work
1	**EDU10312 G1-LS**	Techniques of scientific communication	4/100	15	15			2	4	64
2	**EDU10213 G1-LS**	Teaching methods and education management	6/150	30	30			1	2	87
3	**PHS82404G 1-LS**	Modern concepts of inorganic chemistry	5/125	15	30			2	2	76
4	**PHS82504 G1-LS**	Principles and mechanisms of organic reactions.	5/125	15	30			2	2	76
5	**PHS82604 G1-LS**	Theoretical aspects of physical chemistry	5/125	15	30			2	2	76
6	**PHS12804G 2-LS**	Modern aspects of substance analysis	5/125	15	30			2	2	76
7	**PHS37403G 2-R**	Assistant Professor	15/375				175	2	2	196
8		**Elective subjects**								
8.1	**PHS12904G 2-LS**	Standard and non-standard coordination chemistry	5/125	15	30			2	2	76
8.2	**HTH17904 G1-LS**	Chemistry in modern pharmacy	5/125	15	30			2	2	76
8.3	**PHS14904G 2-LS**	Chemistry of biologically active natural compounds	5/125	15	30			2	2	76

8.4	**PHS13004G2-LS**	Modern Aspects of Dye Chemistry	5/125	15	30			2	2	76
8.5	**PHS13104G2-LS**	Thermodynamic and kinetic modeling of processes	5/125	15	30			2	2	76
8.6	**PHS13204G2-LS**	Modern Advances in Polymer Sciences	5/125	15	30			2	2	76
8.7	**PHS15004G2-LS**	Agrochemistry, product quality and substance cycling in the ecosystem	5/125	15	30			2	2	76
8.8	**PHS13304G2-LS**	Current tasks of ecological chemistry	5/125	15	30			2	2	76

The head of the program Maia Tsintsadze

Chemical technology and metallurgy
Faculty Quality Assurance Mamuka Maisuradze
Head of Service

Faculty Decan Nugzar Tsereteli

Accepted

Chemical technology and metallurgy
at the meeting of the faculty council

It is agreed

At the Quality Assurance Service of the GTU Davit Makhviladze

Is modified
Chemical technology and metallurgy
Faculty Council meeting
Protocol No. 9; 22.12.2022

Chairman of the Faculty Council Nugzar Tsereteli