



## Doctoral Educational Program

### Program Title

Mining Technology

### Faculty

Mining and Geology

### Head of the Program

Associate Professor Darejan Tevzadze

### Qualification to be Granted

Doctor in Engineering

*Will be granted in case of fulfilling not less than 180 credits of the educational program*

### Language of study

Georgian

### Preconditions of Admission

Master degree or equivalent degree with a diploma. Considering: Scientific publications; Participation in scientific conferences; Other documents and materials related to study / research activities (Certificates, diplomas, patents, etc.) Interview with faculty temporary commission.

## Description of the program

The program was done based on ECTS system, 1 credit is equal to 25 hours, which involves both the contact and independent work hours. The credit distribution is presented in the program curriculum. The duration of the program is 3 years (6 semesters) and includes 180 credits.

**The study component - 60 credits.** Including compulsory elements of study components - 15 credits, special program related to program - 15 credits, two thematic seminars - 30 credits (15-15).

**Research component - 120 credits:** colloquiums (I, II and III) - total 60 (15-15-30) credits, thesis research project / prospectus - 30 (10-20) credits, completion of the thesis and defence - 30 credits.

The study process is as follows: the semester includes 20 weeks, from which the study process continues 16 weeks; XVII week is devoted to the preparation for final examination, the final exam is conducted on the XVIII-XIX week. XX week, if necessary, is devoted for an additional exam.

**The first semester** consists of two compulsory elements (5 and 5 credits) of study components, two special courses (5 and 5 credits) related to the program and the project of thesis research project / prospectus 1 - 10 credits.

**The second semester** includes one compulsory component of the study components (5 credits), a special course related to the program (5 credits) and the project of thesis research project / prospectus-2 - 20 credits.

**The third semester** is dedicated to the first thematic seminar - 15 credits, the compulsory element of the educational program research component: theoretical / experimental research / colloquium - 1 (15 credits).

**The fourth semester** is dedicated to the second thematic seminar - 15 credits, compulsory element of educational program research component: theoretical / experimental research / colloquial - 2 (15 credits).

**The fifth semester** comprises the compulsory element of the educational program research component: theoretical / experimental research / colloquium -3 (30 credits).

**The fifth semester** is a compulsory component of the educational program research component: completion and defence of the doctoral thesis (30 credits).

The doctoral student prepares two scientific thematic seminars during the period of educational program scheme.

Dean organizes the seminar for presentation of colloquium and thematic seminar. The workshop on the seminar is evaluated by a commission comprising 5-9 members, which is based on the submission of the head of the Dean Academic Department, the composition of the Commission is approved by the Faculty Order.

Based on theoretical / experimental research, PhD student is required to prepare three colloquiums in the third, fourth and fifth semester. Colloquiums reflect the findings of the doctorate study.

Completion and protection of the thesis is a major part of the research component. It reflects the scientifically justified results of the theoretical / experimental research conducted by the PhD student and / or solves the topical scientific problem. PhD student submits the dissertation work to the dissertation board consisting of 7-9 representatives of the relevant science field.

## The aim of the Educational Program

The mining and mining industry is of particular importance in the Georgian economy, as the industrial units of this sector successfully function, because our country is poor with oil and gas reserves, Tkibul-Shaori Coal plays the defining role of coal deposit in the thermal energy industry, the color metals (ferroalloys) and the binding construction materials (cement) as the basic fuel raw material.

The role of polymetallic mines in Chiatura manganese and Madneuli is also important in the economy of the country. The exploitation of all these deposits is unimaginable without

obtaining, enriching and transporting minerals, the effectiveness and technical-economic indicators of which are entirely dependent on the perfection of technological processes and the rational use of them in concrete terms.

This is the program that fully encompasses the study and generalization of scientific technical issues related to all the directions of studying and solving the issues related to the abovementioned problems. The aim of the program is to prepare highly qualified academic staff who will be able to work in higher technical institutions, also to train engineers and technical personnel, in turn, they will be able to make great achievements in the above mentioned science and technology and related fields and to raise the standard of modern achievements and technical-economic indicators.

### Outcomes of the Educational Program (General and Sectoral)

**knowledge and understanding** – Knowledge based on the modern technologies of modern mining, includes the knowledge of sustainable minerals, open and quarrying processes, also the latest technologies of mineral processing, exploitation of ore, ore transportation and wastes. Understanding the need to create new economically viable and non-existent technologies through the expansion and re-understanding of the acquired knowledge.

**Ability to use knowledge in practice** Planning, implementing and supervising innovative research related to the extraction and processing of solid minerals. Developing new research and analytical methods and approaches that are oriented toward creating new knowledge and reflecting in international referencing publications;

**Ability of conclusion** – Establishment of substantiated conclusions based on thorough and competent analysis of information received as a result of research.

**Ability of communication** – The ability to convey information in a logical way, both in Georgian and in foreign language. Prepare a detailed written report on ideas, problems and ways to solve them, also the ability to prepare presentations. .

**ability to learn**– Ability to manage learning process independently according to the knowledge gained from the latest achievements, readiness for developing new ideas during the research and learning process.

**Values** –Research the ways of establishing values and developing innovative methods to establish them. Protection of norms of professional values, ethics and morals.

### Methods of achieving learning outcomes (teaching and learning)

Lecture  Seminar (work in group)  Practical  Laboratory  Scientific-thematic seminar  Independent work  Consultation  research component  doctoral paper  Doctoral dissertation

Due to the specifics of the specific course in the learning process, used for teaching and learning methods is in the following activities, which is reflected in the relevant training courses (syllabus):

1. **Verbal or oral method** comprises a lecture, narration, conversation, etc. During the process the teacher conveys, explains the material verbally, and students perceive and learn it by comprehending and memorizing.
2. **Discussion/debates.** This is the most widely spread method of interactive teaching. A discussion process greatly increases the quality of students' involvement and their activity. A discussion may turn into an argument and this process is not merely confined to the questions posed by the teacher. It develops students' skills of reasoning and substantiating their own

ideas.

3. **Analysis Method** - Helping the Study to Become a Part of the Matter It's easy for you.
4. **Synthesis Method** - implies the ability to read the questions by using a group. This is how you are experiencing the development of the problem as the disease.
5. **Written method** implies the following forms of activity: copying, taking notes, composing theses, writing essays, etc.
6. **Demonstrative method** – This method implies visual representation of information. In many cases, it is better to provide students with the material, represented in audio and visual forms simultaneously. The study material can be demonstrated by either teacher or the student. This method helps us to visualize the different levels of learning material, to specify what students will have to do independently; At the same time, this strategy will visually represent the essence of the problem / problem.
7. **Case study** – the teacher discusses concrete cases together with the students and they study the issue thoroughly. E.g., in the sphere of engineering safety it can be a discussion of a concrete accident or catastrophe, or in political science it can be a study of a concrete, e.g., Karabakh problem (Armenian-Azeri conflict).
8. **Demonstration method** implies presenting information with the help of visual aids. It is quite effective in reaching the required result. It is frequently advisable to present the material simultaneously through audio and visual means. The material can be presented both by a teacher and a student. This method helps us to make different steps of perceiving the teaching material more obvious, specify what steps the students are supposed to take independently; at the same time this strategy visually shows the essence of an issue/problem. Demonstration can be very simple.
9. **Deduction Method** - Determines the form of the transformation system, which on the basis of the general knowledge of the discovery of the new mechanism of the process of production is proceeds from the general to the concrete.
10. **Practical methods** unite all the teaching forms that stimulate developing practical skills in students. In this case a student independently performs different kinds of activity on the basis of the knowledge acquired e.g. field study, teaching practice, field work, etc. 7.
11. **Collaborative work**; using this method implies dividing students into separate groups and giving each group its own task. The group members work at their issues individually and at the same time share their opinions with the rest of the group. According to the problem raised, it is possible to shift the functions among the group members in this process. This strategy ensures the students' maximum involvement in the learning process.
12. **Activity-oriented teaching** implies teachers' and students' active involvement in the teaching process, when practical interpretation of the theoretical material takes place.

### Student knowledge assessment system

Assessment by a 100 degree scale.

As the positive grades are considered:

- (A) - Excellent - the rating of 91-100 points;
- (B) – Very good - - the rating of 81-90 points

- (C) - Good - the rating of 71-80 points
- (D) - Satisfactory - the rating of 61-70 points
- (E) - Enough - the rating of 51-60 points

Negative grades:

- (FX) - Did not pass - 41-50 points of rating, which means that the student needs more work to pass and is given the right to take the exam once more with independent work;
- (F) – Failed - 40 points and less, which means that the work carried out by the student is not enough and he/she has to learn the subject from the beginning.

Scientific-Research Component / Components Assessment:

a) Excellent (summa cum laude) – Excellent thesis;

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) Intermediate (bene) – Result, which fully comply with the requirements;

e) Satisfactory (rite) – The result that, despite the shortcomings, still meets the requirements;

f) Unsatisfactory (insufficenter) – A result that does not meet the requirements due to significant deficiencies;

g) Completely unsatisfactory (sub omni canone) –The result that does not meet the requirements at all.

See assessment forms, methods, criteria and scales in the syllabus and the doctoral program of educational and research components estimation rule.

### **The Field of Employment**

Industries of mining and industry fields;

- LTD “Georgian Industrial Group”;
- LTD " Saqnakhshiri" (GIG Group);
- JSC «RMG Cooper»;
- LTD «RMG Gold»;
- LTD "Georgian manganezi";
- LEPL Gr. Tsulukidze Mining Institute;
- United Water Supply Company of Georgia;
- JSC "SaktskalProject"
- Educational institutions.

## Human and Material Resources Necessary for the implementation of the Program

The program is provided with appropriate human and material resources.

- GTU infrastructure and material-technical resources are used to achieve learning outcomes provided by the Doctoral Program. Specifically: Educational classes equipped with appropriate inventory; Library equipped with computer and information-communication technologies; Computer technology involved in the Internet; Labs: Laboratory of Mining and Transport machines, laboratory of Hydraulics, Laboratory of Minerals Enrichment, Training Mine-Lab; Various technical equipment, etc.

The educational program is provided with relevant textbooks. According to the learning course syllabus the University Library provides students with relevant print and electronic textbooks, scientific literature, also the database of the Bibliotec Book Foundation and the electronic catalog provided by the university website.

GTU Laboratories of physics and chemistry departments are involved in the implementation of educational program; GTU Computer Center ; Collaborator at the Republican Center of Gemology and Diagnostic and Processing of Mineral substances. Scientific-research objects of the relevant organizations and others, signed with the memorandum.

- The implementation of the mining technologies educational program is provided by the following professors and associated professors of the Mining and Geological Faculty in Mining Technology Departmentf, that are listed below: Anzor Apshilavaa, Irakli Gujabidze, Revaz Sturua, Demur Talakhadze, Aleksandre Bezhanishvili, Guram Gogia, Roin Enageli, Akaki Gocholeishvili, Zurab Lebanidze, Gela Machaidze, Avtandil Gigineishvili, Darejan Tevzadze, Noring Molodini, Nodar Arudashvili, Victor Zviadauri, Medea Oniani, Teimuraz Javakhishvili; Emeritus: Levan Makharadze, Zaur Arabidze, Tamaz Sharashenidze, Mikheil Tsereteli. Invited Professor Giorgi Javakhishvili.

The program is accompanied by program manager's documents.

**Number of attached syllables: 5**

### Program Study Load

№	Educational components	Precondition of admit	ECTS credits						
			I year		II year		III year		
			semester						
			I	II	III	IV	V	VI	
1	Academic writing and scientific research methods	does not have	5						
2	Educational methods	does not have	5						
3	Field of Mineral Processing Special Methods	does not have	5						
4	Transitional Regimes and Unstated	does not have	5						

	Processes of the Hydrotransportation Systems and their Stabilisation Means						
5	Mineral processing	does not have	5				
6	Professor's Assistance	does not have	5				
7	The first thematic seminar	does not have		15			
8	The second thematic seminar	First thematic seminar			15		
research components							
1	Project of the thesis research/prospectus- 1	does not have	10				
2	Project of the thesis research/prospectus- 2	Thesis research Project / Prospectus - 1		20			
3	Theoretical /Experimental research/ Colloquium - 1	does not have		15			
4	Theoretical /Experimental research/ Colloquium - 2	Theoretical / experimental research / colloquium- 1			15		
5	Theoretical /Experimental research/ Colloquium - 3	Theoretical / experimental research / colloquium- 2				30	
6	Completion of the thesis, defense	All the necessary training and research components					30
<b>Total per year</b>			<b>60</b>	<b>60</b>	<b>60</b>		
<b>total:</b>				<b>180</b>			

### Map of learning outcomes

No	Educational components	Knowledge and understanding	Ability to use knowledge in practice	Making judgments	Communication skills	Learning Skills	Values
1	Academic writing and scientific research methods	X	X	X	X		
2	Educational methods	X	X	X	X		X
3	Professor's Assistance	X	X	X	X	X	X
4	Field of Mineral Processing Special Methods	X	X		X	X	
5	Transitional Regimes and Unstated Processes of the Hydrotransportation Systems and their Stabilisation Means	X	X	X			
6	Mineral processing	X	X	X			
7	The first thematic seminar	X	X	X	X	X	X
8	The second thematic seminar	X	X	X	X	X	X

research component							
1	Project of the thesis research/prospectus- 1	X	X	X	X	X	X
2	Project of the thesis research/prospectus- 2	X	X	X	X	X	X
3	Theoretical /Experimental research/ Colloquium - 1	X	X	X	X	X	X
4	Theoretical /Experimental research/ Colloquium - 2	X	X	X	X	X	X
5	Theoretical /Experimental research/ Colloquium - 3	X	X	X	X	X	X
6	Completion of the thesis, defense	X	X	X	X	X	X

### Program curriculum

№	Code of the Subject	Educational component	ESTS credits/hour	hour						
				Lecture	Seminar (working in group)	Practical	Laboratory	Mid-semester exam	Final exam	Independent work
1	HEL10712G1	Academic writing and scientific research methods	5/125	15	30			2	2	76
2	EDU10912G1	Educational methods	5/125	15	30			2	2	76
3	MAP54103G1	Field of Mineral Processing Special Methods	5/125	45				1	1	78
4	MAP54503G1	Transitional Regimes and Unstated Processes of the Hydrotransportation Systems and their Stabilisation Means	5/125	45				1	1	78
5	MAP42403G1	Mineral processing	5/125	45				1	1	78

Head of the Program

Darejan Tevzadze

Faculty of Mining and Geology  
Head of Quality Assurance Service

Shalva Keleptrishvili

Dean of the Faculty

Anzor Abshilava

**Accepted at**

Quality Assurance Service of GTU

Irma Inashvili

**Agreed with**

Faculty of Mining and Geology  
At the meeting of Faculty Board  
(№ 3) 30.03.2018  
Chairman of the Faculty Board

Anzor Abshilava