საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

Approved by
Resolution № 740 of the
Academic Council of GTU
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Bachelor's Educational Program

Program Title

სამთო და გეოინჟინერია
Mining and Geoengineering

Faculty

სამთო-გეოლოგიური
Mining and Geology

Program head/heads

Professor Irakli GUJABIDZE

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

Bachelor of Mining and Geoengineering wll be awarded by combining 222 credits of the education program's primary specialty and 18 credits of free components if at least 240 credits are completed.

Language of teaching

Georgian

Prerequisite for Admission to the Program

Only the holder of a state certificate confirming complete general education or an equivalent document enrolled in accordance with the procedure established by Georgia law, shall have the right to study at the Bachelor's Educational Program.

Program Description

The program lasts 4 years (8 semesters) and includes 240 credits, of which 222 credits are courses with content corresponding to the primary field of study and 18 are free components. According to the ECTS system, 1 credit includes 25 hours.

Each academic year includes 60 credits. The teaching process of each year lasts 40 weeks, I semester - 20 weeks and II semester - 20 weeks. The subject is taught for 15 weeks each semester. Week IX is for mid-term evaluation.

The maximum grade for each course evaluation in each semester is 100. The maximum grade for the midterm assessment is 60, which consists of two components: a current activity and a mid-semester exam. The maximum score for the current activity is 30 and the maximum score for the mid-semester exam assessment is 30. The overall minimum competency limit for the interim assessment is 30 points. The maximum score for the final/supplementary exam is 40, the minimum score is 11.

If a student does not meet the 51-point threshold on the final exam, the student will receive 41-50 assessment points, which means that the student must complete additional work to pass and is allowed to take the supplemental exam once with independent work. The additional exam is scheduled no later than 5 days after the announcement of the results of the final exam, at the time determined by the final exam retaking table.

First academic year, out of the 60 credits to be completed, 57 credits are allocated to the courses with content corresponding to the primary field of study, two of which are electives (Foreign Language (English, German, French, Russian) 1 - 5 credits; Foreign Language 2 - 5 credits). 3 credits are assigned to free components № 1.

In the second academic year, 60 credits are allocated to the courses with content corresponding to the primary field of study, two of which are electives (Foreign Language 3-5 credits; Foreign Language 2-5 credits).

In the third academic year, out of the 60 credits to be completed, 30 credits are allocated to the compulsory courses with content corresponding to the primary field of study, and 30 credits to elective courses with content corresponding to the primary field of study (there are 35 elective courses from which the student has to choose the 6 he wants).

In the fourth academic year, of the 60 credits in semester VII, 25 credits are allocated to elective concentrations (1. Mine construction and mineral processing; 2. Mineral processing; 3. Mining machinery and electricity supply of mining enterprises; 4. Mineral geology; 5. Oil and gas field exploration and extraction; 6. Well drilling) and 5 credits are allocated to electives courses, from which the student must choose 1 of 6 elective courses (5 credits each), also, each concentration in semester VIII concludes with a "Bachelor's Thesis in Mining and Geoengineering" according to the chosen concentration (5 credits), 15 credits are allocated for free components №2 (the student has to choose 3 of 13 courses), 10 credits are mining and geoengineering internships.

Program Objective

Program objective:

- To train students with some current aspects of knowledge in mining engineering techniques and technology;
- To provide a broad knowledge of mining and mineral extraction with a critical understanding of existing theories and principles;
- To develop skills in solid minerals, oil and gas exploration, reserve estimation, processing and reprocessing.

Learning Outcomes/Competences (general and professional)

- **Describes** methods of prospecting for solid, liquid, and gaseous minerals; processes for organizing mining operations, drilling wells, and processing minerals; types of services for operating machinery, mining electromechanical systems;
- **Lists** mineral deposits, stages of exploration, types of underground and support structures, mining and transportation facilities, geodynamic phenomena and countermeasures to counteract them;
- **Explains** the basic physical and mechanical properties of rocks, the tasks of mineral prospecting, the mechanism of rock destruction by explosion, and the criteria for assessing the stability of underground structures;
- **Examines** the geologic structure of mineral deposits, inventory methods, mining machine designs, technological schemes of mineral processing and mining processes;
- **Determines** the technology of field development, types of operation of machines and equipment of mining-electromechanical systems, parameters of drilling modes, stages of oil and gas field development, structure and texture of ores;
- **Establishes** technological schemes of systems of discovery, preparation and processing of mineral deposits; technical and economic characteristics of tunnel and well construction;
- **Analyzes** technological processes of construction of mining enterprises, minerals processing, extraction and reprocessing, mining electromechanical systems, hydraulic and kinematic schemes of machines and complexes;
- **Calculates** the main parameters of the technology of processing and extraction of minerals, dimensions of the cross-section of the tunnel and support structures, parameters of blasting operations, the amount of air supplied, dynamic loads on various elements of the machine;
- **Selects** methods of processing solid, liquid and gaseous minerals and construction of mine tunnels, mining machines and mining extraction complexes, mine and quarry transportation, technological schemes of mineral processes, basic types of exploration works.

In relation to the program's learning outcomes, traversing groups of subjects focused on a related topic, the learning outcomes of each concentration are concentrated in the following narrow focus area:

Concentration 1 - Mine Construction and Mineral Processing

Describes types of support structures for underground structures of various purposes, as well as methods of their calculation; technologies of construction of underground structures, stages of construction activities; processing systems of open pit and underground mining operations; **calculates** shapes and sizes of tunnels, parameters of blasting; loads acting on the supports of underground structures and bearing elements of support structures; **determines** the technology of open and underground mining; **selects** support structures and materials for underground facilities of various purposes.

Concentration 2 - Mineral Processing

Describes various methods of beneficiation of solid minerals, principles of operation of process equipment at beneficiation plants, regularities of movement of mineral grains in the liquid, the influence of magnetic and electric fields on the trajectory of movement of minerals, auxiliary processes; **examines** the design of flotation machines, the principles of their operation, the rules of safe operation of technological equipment, the purpose and mechanism of action of flotation agents; **determines** the feasibility of beneficiation by various methods and parameters of their technological schemes; **analyzes** sampling data of milling ore and beneficiation product, technological indicators obtained as a result of beneficiation of minerals by different methods; **determines** the places of sampling, the necessary conditions for the safe operation of separate equipment; methods of selection and preparation of technological samples of minerals, means of process control.

Concentration 3 - Mining Machinery and Electricity Supply of Mining Enterprises

Describes the course of dynamic processes in mining electromechanical systems and machines and their specifics; **explains** the importance of proper selection and rational operation of mining transport machines for their efficient use; **examines** issues of automation and telemechanization of power supply systems, issues related to the operation of mining vehicles, hydraulic and pneumatic equipment; **analyzes** the features of hydraulic and pneumatic equipment of mining enterprises in specific conditions, static and dynamic states of mining electromechanical systems and machines; calculates the main parameters of vacuum subzones in special friction units of mining transport machines, dynamic loads on various elements of the machine;

Concentration 4 - Mineral Geology

Studies prospects of ore acreage, major structural types of endogenous ore fields and deposits, classification of reserves, methods of sampling at different stages of exploration, deformation properties of rocks; **evaluates** initial data of the reserves by various methods; **calculates** the amount of minerals in the subsurface; **determines** the main types and methods of sampling, sample taking methods dependence of the distance between samples on changes in ore placings, tectonic elements affecting the distribution of ore fields and deposits; **calculates** variability of characteristics of ore placings; **analyzes** geologic features of the study area, sampling data.

Concentration 5 - Oil and Gas Field Exploration and Extraction

Describes oil and gas field development modes, layer model, technology of artificial watering of the field, logging operations, collecting properties of rock formations; **examines** oil and gas field treatment systems, their technological parameters, location and number of wells to be injected, technical condition of the well; **determines** the energy state of the ore pocket, the amount of production extracted from the ore pocket under the action of elasticity forces, the coefficient of oil availability of the productive layer, water-oil contact, the amount of pressure of the finished layer, changes in technological parameters of field treatment, stages of field treatment; **establishes** lithologic and stratigraphic columns, sections, charts and maps; **validates** oil and gas reserves and resource categories; oil and gas zones; **analyzes** parameters for oil and gas reserve estimation and resource estimation.

Concentration 6 - Well Drilling

Describes technological processes of drilling, methods of geophysical measurements, types of well sealing mechanisms, types of bits and crowns; **explains** the purpose and working conditions of the drill string, methods of prevention and elimination of drill pipe accidents; In accordance with geological and technical conditions, discusses methods of selecting drilling mode parameters and drilling solutions for individual well intervals; Identifies measures to increase core yield, types and sizes of core recovery pipes, the effect of drilling mud on the quality of penetration; **examines** ways of selecting drilling mode parameters and drilling solutions for individual well intervals; **determines** measures to increase core yield, types and sizes of core recovery tubes, influence of drilling mud on the quality of opening the productive layer, methods of opening the layer; **evaluates** the technical condition of wells; **interprets** data obtained from geophysical studies conducted in the well.

Methods of Achieving Learning Outcomes (teaching-learning)

☒ Lecture ☒ Seminar (group work) ☒ Practical ☒ Laboratory ☒ Practice ☒ Course work/Project ☒ Bachelor's thesis ☒ Consultation ☒ Independent work

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, induction, deduction, analysis, synthesis, verbal or oral, written work, explanation, action-oriented learning, project development and presentation.

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 receiving FX, an additional exam is prescribed, 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 assessment.

The number of scores obtained in the final assessment is not added to the score obtained by the student in the additional examination. Assessment obtained in the additional examination is the final assessment and is reflected in the final assessment of the component of the educational program. In the case of obtaining 0-50 points in the final assessment of the educational component or failure to meet the minimum limit of competence in the final / additional examination, the student is assigned a grade of F-0.

Fields of employment

Mining companies; oil and gas production companies; mine and underground construction companies; Ministry of Environmental Protection and Agriculture of Georgia; Ministry of Energy of Georgia; Ministry of Defense of Georgia; Ministry of Economy and Sustainable Development of Georgia; State Oil and Gas Agency; Georgian Oil and Gas Corporation.

Opportunities for continuing education

Master's degree 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: 120