საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

Approved by
Resolution № 733 of the
Academic Council of GTU
dated July 06, 2012

Amended by
Resolution №01-05-04/220 of the
Academic Council of GTU
dated December 25, 2020

Bachelor's Educational Program

Program Title

მასალათმცოდნეობა
Materials Science

Faculty

ქიმიური ტექნოლოგიის და მეტალურგიის
Chemical Technology and Metallurgy

Program Head/Heads

Associated professor Zurab SABASHVILI

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

Bachelor of Engineering in Materials Science *will be awarded if at least 240 credits are completed* by combining 204 credits of courses with content relevant to the primary field of study and 36 credits of free components

Language of Teaching

Georgian

Prerequisite for Admission to the Program

Only the holder of a state certificate proving complete general education, or an equivalent person 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 bachelor's educational program Materials Science has been developed on the basis of recognized theoretical and practical experience in the field and taking into account the requirements of the labor market. Educational programs of the following universities were also studied and taken into account:

- Rensselaer Polytechnic Institute, Bachelor_Programs "Materials Science and Engineering"; https://mse.rpi.edu/
- Massachusetts Institute of Technology, Bachelor Programs „Materials Science and Engineering"; https://dmse.mit.edu/undergraduate/programs/3
- University of Birmingham, Bachelor of Engineering (Materials Science & Engineering);
- https://www.birmingham.ac.uk/undergraduate/courses/metallurgy-materials/materials-science-engineering.aspx
- University of Connecticut, Bachelor programs "Materials Science & Engineering"; https://www.mse.engr.uconn.edu/undergraduate-program
- Universitat politecnica de Catalunya (BarcelonaTech) "material Science and Technology" https://www.upc.edu/en/bachelors/materials-engineering-barcelona-eebe

The Educational Program is based on the European Credits Transfer System ECTS system. 1 credit is equal to 25 hours, which includes both contact and independent work hours. The study year equals 60 ECTS credits. The duration of the Program is 4 years (8 semesters). One semester includes 20 weeks.

According to the student's individual workload, the number of credits in one year can be less or more than 60 credits, but no more than 75 credits.

210 credits are assigned to the training courses of the content corresponding to the field of basic education. including: production practice - 5 credits; Bachelor thesis - 5 credits; foreign language - 20 credits; Mandatory elective technological courses (9 study courses, 5 credits each, from which the student chooses five study courses) - 25 credits.

In the VIII semester, elective free components are presented, from which the student chooses 30 credit courses in any configuration.

A bachelor's student prepares a bachelor's research project/thesis in the eighth semester of studies. The prerequisite for the bachelor's thesis is the passing of the relevant practice or other component provided by the bachelor's program. The paper must contain research. It should briefly describe the purpose of the research, the task and ways of solving it.

Program Objective

- To provide the graduate with broad theoretical and practical knowledge of the field of Materials Science, skills and professional competencies necessary for the field, corresponding to the modern requirements of the labor market;
- To teach the student the basics of Materials Science, the structure of metallic and non-metallic materials, physical-mechanical properties and chemical composition, the relationship between structure and properties, the main principles and regularities of technological process management, the safe conduct of technological processes and the operation of technical and technological means according to environmental protection requirements, the quality of products expertise methodology;
- To study the properties of the main and new construction materials applied in technology,

Learning Outcomes/Competences (general and professional)

- Describes established theories and principles in the field of Materials Science; purpose of materials applied in production, norms of environmental protection and labor protection;
- Discusses the main issues of Materials Science and materials processing fields and their interrelation;
- Explains the basic operations and processes of different areas of Material Science;
- Based on the knowledge of natural and engineering sciences, as well as technologies, implements a practical project/work in accordance with predetermined guidelines;
- Calculates the qualitative and quantitative indicators of the main physical-mechanical characteristics of materials applied in various fields of Materials Science;
- Evaluates the impact of material processing on the operational characteristics of construction materials; proper functioning of technological devices;
- Selects technological modes and schemes of equipment and machines used in the field of Materials Science.
- Makes conclusions regarding the operation of devices and tools.
- Applies a wide range of professional skills specific to the field in response to challenges arising in the production process;
- With an audience of specialists and non-specialists, in forms appropriate for the context, applying information and communication technologies, produces clear and understandable communication about ideas related to the field, existing problems and ways to solve them.

Methods of Achieving Learning Outcomes (teaching-learning)

☒ Lecture ☒ Seminar (group work) ☒ Practical ☒ Laboratory ☒ Practice ☒ Course work/Project ☒ 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; group (collaborative) work; problem-based learning (PBL); heuristic; case study; Brain storming; demonstration; inductive; deductive; analysis; synthesis; verbal or oral; written work; laboratory; practical explanatory; 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 getting FX in the component of the Educational Program, GTU is obliged to schedule an additional exam at least 5 days after the announcement of the results of the final exam.

The information necessary for the organization of the educational process, assessment of student achievements, educational and financial agreements with students and the accumulation of credits by the student and other students is provided in the "Instructions for managing the educational process at the Georgian Technical University":

Fields of employment

A bachelor of engineering in materials science can be employed in an enterprise/institution whose activities are related to the production and consumption of metal products, as well as medium and capital repairs and modernization of various types of production equipment and agricultural machinery: machine building, aviation industry, metallurgical production, electrical construction, civil, industrial and facilities of hydrotechnical constructions, production of artistic castings, artistic processing of metals and jewelry enterprises.

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: 94