საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

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

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the Academic Council of GTU
dated December 13, 2021

Master's Educational Program

Program Title

მასალათმცოდნეობა
Material Science

Faculty

ქიმიური ტექნოლოგიის და მეტალურგიის
Faculty of Chemical Technology and Metallurgy

Program Head

Professor Malkhaz KHUTSISHVILI

Qualification to be awarded

Master of Materials Science *Will be awarded upon completion of at least 120 credits of the educational program*

Language of Teaching

Georgian

Prerequisite for Admission to the Program

A person with at least a bachelor's degree or an equivalent academic degree (from the following broad fields of the field of study classifier: 06 information and communication technologies; 05 natural sciences, mathematics and statistics; 07 engineering, production and construction) who is enrolled on the basis of the results of the master's examinations of Georgia has the right to study in the master's program according to the rules established by the law (general master's exam and specialty exam/exams defined by the GTU).

Exam questions/tests will be posted on the website of GTU Teaching Department at least one month before the exams. The applicant must have a certificate confirming the knowledge of one of the foreign languages (English language, German language, French language, Russian language) of at least B2 level, or must have 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 pass the exam in a foreign language. Enrollment in the program without passing the master's exams is possible according to the rules established by the Ministry of Education and Science of Georgia.

External mobility. Enrollment in the educational program is also possible on a mobility basis, in accordance with the "Procedure for transferring from a higher educational institution to another higher educational institution" approved by Order No. 10/N of the Minister of Education and Science of Georgia dated February 2, 2010;

Internal mobility. Applicants will also be admitted to the educational program on the basis of internal mobility. The terms and procedures of internal mobility are determined by the order of the rector of the university and the information is posted on the university's website;

Program Description

The program is based on the ECTS system, 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 duration of the Master's program is 2 academic years, i.e., 4 semesters and includes 120 credits; (4 semesters, each semester includes 30 credits); According to the student's individual workload, the number of credits in one year can be less or more than 60 credits, but not more than 75 credits.

The program includes teaching and research components

Educational component (educational courses), mandatory and elective – 85 credits; research component - 35 credits.

The program is compiled in accordance with foreign analogues:

https://www.rit.edu/study/curriculum/dc09af15-666f-4483-956a-8fbe5c69b8
https://www.upc.edu/ca
https://engineering.tamu.edu/etid/about/index.html
https://tu-freiberg.de/en/studies/master-metallic-materials-technology-0
https://eps.leeds.ac.uk/courses/PG/G591/materials-science-and-engineering
https://www.kth.se/en
http://nmetau.edu.ua/en/mdiv/i2030/p372

The research component is defined in the IV semester, which provides for the execution and defense of a Master's thesis - 35 credits.

Plagiarism check of the master's thesis is a necessary condition for admission to the defense of the master's thesis.

The study schedule, mid-semester and final/supplementary exam dates are determined at the beginning of each semester by the order of the rector, based on the Instructions for managing the educational process at the Georgian Technical University.

Master's thesis is evaluated with 100 points. It is necessary to defend it publicly. The public defense of the qualification thesis is evaluated by the examination commission consisting of 5-7 members.

From the point of view of the students, the assessment of knowledge is adequate, objective and carried out transparently and fairly.

Program Objective

The goal of the Master's program is as follows:

- Training of Materials Science practitioners and personnel with scientific-research skills, who will get deep and systematic knowledge and will be able to work independently in the direction of materials science;
- The Master of Materials Science should be able to: predict the physical-mechanical properties of construction materials based on the metallographic research of the latest achievements;
- According to modern science, obtaining castings of strictly determined composition, designing and manufacturing welded constructions; application of the latest achievements, including plasma and other air-thermal coating technologies;
- Development of appropriate skills and preparation for work in the field of materials science, and/or for doctoral studies;

Learning Outcomes/Competences (general and sectoral)

Collects - the latest information on the topic of the planned scientific work using literary sources;
Describes - structure formation in two-component and three-component systems during the heating-cooling process; the internal tension of the sprayed material; during welding, the physico-chemical processes taking place in the liquid environment and on the phase-separating surface; the foundations and mechanisms of the breakdown of metals and alloys; ways of welding main pipelines with the latest technology;
Explains - the basics of the connection between the properties of alloys and the phase composition and the ways and means of achieving the desired functional characteristics; theoretical and experimental research goals, tasks and ways to solve them;
Determines - interrelationships between technological parameters in the welding process and their influence on the quality of the welded seam; forces and moments for a specific pipe rolling process.
Generalizes the possibility of using the elements of mathematical statistics in the field of materials science research and practically uses the data obtained by the experiment for the purpose of processing and mathematical modeling.
Selects - the rational modern method of construction report of pipeline stand node; pressure welding method and welding technology according to the type, thickness and geometric dimensions of the given material; modern technologies of welding of main pipelines.
Applies - the data of quantitative analysis of macro and microstructure of construction materials in the implementation of works of a practical nature - welding of main pipelines, demanded in the market;

Forms - on the basis of the quantitative study of the structure, phase composition and properties of the construction material and the critical analysis of research data, a justified conclusion about the suitability of the material, the joint of the pipe stand, the ineffectiveness of the welding seams and the reliability of the entire construction.
In accordance with the requirements in the market - evaluates the impact of technology and modes on the quality of the coating; the effect of alloying and modifying elements on the alloy crystallization process; the effect of chemical composition and processing on the cracking of metal or metal alloy;
Presents own conclusions, arguments and research results to both the academic and professional community.
Independently plans further study directions and directs the process of development/enhancement of own learning.

Methods of achieving learning outcomes (teaching-learning)

☒ Lecture ☐ Seminar (group work) ☒ Practical ☒ Laboratory ☒ Practice ☐ Course work/Project ☒ Master'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):

1. Discussion/debate;
2. Group (collaborative) work;
3. Demonstration;
4. Mental attack;
5. Verbal or oral;
6. Written work;
7. Laboratory;
8. Development and presentation of a practical project;
9. Explanatory;
10. Analysis.
11. cooperative teaching;
12. practical;
13. Synthesis

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 the component of the educational program, in case of acceptance of 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 mark obtained in the final grade.

Detailed information is provided on the GTU website: Regulations of the Georgian Technical University on Master's Degree.

Fields of employment

Any branch of industry that serves the production of metal products: machine building, aviation industry, metallurgical production, power engineering, construction metal structures, tool production and others.

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: 23