



საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

Approved by

Academic Council of
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Modified by

Academic Board of GTU
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Order № 01-05-04/95

Doctoral Education Program

Title of the program

Road Infrastructure and the artificial underground constructions

საგზაო ინფრასტრუქტურა და მიწისქვეშა ხელოვნური ნაგებობები

Faculty

Civil Engineering

სამშენებლო

Program Supervisor / Supervisors

Professor Boris Maisuradze

Qualification to award

Doctor of Engineering

Will be awarded in the case of passing not less than 180 credits of an educational program.

The language of teaching

Georgian

Prerequisite for access to the program

http://gtu.ge/Study-Dep/Files/Pdf/doqtorantura_debuleb_2014.10.14_SD.pdf

Has a Master's or equivalent academic degree. Considering: Existence of: scientific publications; Participation in scientific conferences; Other documents and materials related to studying/ research activities (certificates, diplomas, patents, etc.).

If the applicant submits the certificate confirming B2 level knowledge of English language, it is exempt from the test in a English. Otherwise, it is required to pass testing in English language in the computer center of GTU.

Compliance with a doctoral candidate for doctoral program is established by the Faculty Temporary Commission GTU's Regulations about Doctoral Council Doctorate Studies, Please see it in the link:

http://gtu.ge/Study-Dep/Files/Pdf/doqtorantura_debuleb_2014.10.14_SD.pdf

Description of the program

Program was developed according ECTS system, 1 credit is equal to 25 hours, which is meant as a contact, as well as independent work hours. The distribution of credits represented in the curriculum.

The doctorate program includes 180 credits. During one academic year - 60 credits, 30 credits per semester; The student's annual workload may exceed 60 credits, but not more than 75 (ECTS) credit or less than 60 credits; Study component - 60 credits and research component 120 credits.

Doctoral Education Program Continues 3 years (6 semesters). The semester covers 20 weeks, the learning process takes place 15 weeks.

The right to go to the final exam is given by the doctor who has fully fulfilled the prerequisites provided by the educational program and passed the minimum competency margin in the interim assessments. At the same time, the minimum amount of work defined by the program was passed.

In case of accumulation of the score of 41-50 points for the interim assessment and the final examination (FX evaluation can't be passed), or accumulating the total 51 or more points of the assessment, the doctorate is entitled to pass an additional examination during the same session. The interval between the conclusion and the addition test must be at least 5 days.

The number of points received in the final assessment is not added to the assessment received by the doctorate. The additional assessment is the final evaluation and will be reflected in the final assessment of the educational program component.

In case of non-excuse or inadequate scores on the final or additional examination, as well as non-compliance or timely interruption of the documentary material, the student will be able to evaluate the F-0 score and learn the subject from the beginning.

Assessment of the level of student learning results in each component of the program consists of intermediate assessments that involve current activity and midterm examination, and the final exam. Each component of the assessment has the minimum limit of competence defined by academic personnel and is set out in the syllabus.

The program's Educational component does not exceed 60 credits and consists of the following courses: Academic writing and scientific research methods, Teaching methods, Main directions of improvement of structural elements of road infrastructure, Main directions of development of railway infrastructure and actual problems, Problems of transport construction of the XXI century, Professor's Assistance

Professor's Assistance– 5 credits;

Special courses related to Doctoral Program– 15 credits;

Also the thematic seminar -1 – 15 credits; Thematic seminar 2 - 15 credits;

Compulsory Elements of the Doctorate Program Research Component:

Research Project / Prospectus - 1 – 10 credits;

Research Project / Prospectus - 2 - 20 credits;

Theoretical / Experimental Research / Colloquium- 1 – 15 credits;

Theoretical / Experimental Research / Colloquium -2–15 credits;

Theoretical / Experimental Research / Colloquium - 3 – 30 credits;

Completion of the thesis, presentation– 30 credits

It is inadmissible to complete other components parallel to "Completion and Protection of Thesis"

In the first semester of the first year Doctoral will study five training components:

Academic Writing and Scientific Research Methods - 5 Credits, Teaching methods - 5 credits; Special courses related to Doctoral Program: Problems of transport construction in the XXI century - 5 credits, Main directions of development of railway infrastructure and actual problems - 5 credits; Dissertation Research Project / Prospectus -1 - 10 credits. The first prospectus includes the development of scientific literature by the doctorate and the basic bibliography required for research, as well as the history of the study. Doctoral should briefly discuss what is currently being done and what is currently being done (who works and what direction). Prospectus should look at the novelty and actuality of the subject matter, logical explanation and justification of the scientific and theoretical / practical values of the selected topic.

Author should know what types of resources (literature, statistics) are based on and where to find this resource. Prospectus is evaluated simultaneously on the basis of 6 component by the supervisor of the doctorate.

- The work is rated at a maximum of 100 points. Assessment Scaled Score (S) is obtained by formula $S = 3.33 \times M$, where M is the total score for all six components evaluation. The first Prospectus assessment criteria are:
 - Explanation and justification of the research topic - maximum score 5 points;
 - Explanation of the subject matter of the research topic and the justification - maximum score 5 points;
 - Logical reasoning of scientific value of selected topic - maximum score 5 points;
 - Selected material, primary sources, scientific literature - maximum score 5 points;
 - Theoretical / practical value of selected topic - maximum score of 5 points;
 - Ability to present topic - maximum score of 5 points.

In the case of positive evaluation of the first prospectus (51 and more points), the doctoral student continues to study. In case of negative evaluation of the first prospectus (less than 51 points), the doctor will reiterate the work in accordance with the existing rule.

In the **second** semester of the first year of the course, the Doctoral will study three teaching components: Professor's Assistance - 5 credits; Special courses related to Doctoral Program "Main Directions for Improvement of Constructive Elements of Road Infrastructure" - 5 credits And Dissertation Research Project / Prospectus -2 - 20 Credits.

The author of the **second prospectus** should have the idea of planned research and analysis methods.

The Doctoral must present a preliminary view / expectation about the expected results of the research in a logical manner. He should develop research problems, methodology and major issues of research. At this stage Doctoral should present the research plan of the thesis of the thesis.

The second prospectus is evaluated simultaneously by the doctor's head by 6 components. The second prospectus assessment criteria are:

- the originality of the research topic - the maximum score of 5 points;
- The importance of problem solving - maximum score 5 points;
- Estimated structure of the dissertation and schedule of performance - maximum score of 5 points;
- Methodology for Research in Dissertation Paper - Maximum Rate 5 Points;
- Estimation of the expected outcomes of the survey - maximum score of 5 points;
- Ability to present topic - maximum score of 5 points.

The first prospectus is the prerequisite for the second prospectus. In the case of positive evaluation of second prospectus (51 and more points), the doctoral student continues to study. In case of negative evaluation of second prospectus (less than 51 points), the doctor will reiterate the work according to the existing rule.

In the first and second semester of the second year of the course, the Doctoral will perform the first and second thematic seminars, each 15 credits.

The main goal of the **thematic seminar** is to teach Doctoral: to provide knowledge based on the latest achievements of the specific field / subdivision within the relevant research community; Develop the ability to understand the problematic issues, correctly and efficiently solving the problem, analyze the new research and analytical approaches, criticize the issue and innovative methods, as well as in the thematic discussions

The subject of the seminar work is selected by the doctorate student in agreement with the doctorate. The theme of the seminar is dedicated to topical issues of the field / subdivision and it may not be a part of the dissertation topic. The Doctorate will present a seminar on the subject of the seminar on the basis of 4 components, evaluating the contents of the seminar. The work is rated at a maximum of 30 points. Evaluation Scaled Score (S) is obtained by the formula $S = 1.5 \times M$ where M is the total score for all four components evaluation.

- Intermediate evaluation criteria of the thematic seminar are:
 - Access to the required information / maximum score - 5 points;
 - Identification of the problem / maximum assessment - 5 points;
 - Effectiveness / Maximum Appraisal of Information - 5 points;
 - The system of research methods used / maximum evaluation - 5 points.

For the purpose of final assessment, the thematic seminars will be handed over to the Academic Department by the intermediate assessment of the supervisor, until the completion of the corresponding training semester (not later than the 15th week of the week). Dean organizes the workshop for presentation of the 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 Council.

Representatives of academic personnel, invited professors and specialists of other institutions may be included in the commission. The Commission elects the chairman and the secretary from its composition. The date and place of the

seminar should be placed on the faculty website and posted on a visible place a week before the seminar to allow anyone to attend. Each member of the Commission shall evaluate participation in the Seminar, its public presentation and discussion, with a maximum of 40 points based on 4 components.

The maximum evaluation of thematic seminars is 40 points. The final score is determined by the average arithmetic of scores written by all members of the commission (the total number of scores calculated on the number of appraisers divided). Scoring scores (S) of evaluation will be obtained with the formula $S = 2 \times M$, where M is the total score for all four component estimates.

- The final evaluation criteria of the thematic seminar are:
- Critical assessment of information and its sources, maximum rating - 5 points;
- Conclusions and Results, Maximum Appraisal - 5 Points;
- Quality of survey conducted, maximum score - 5 points;
- Ability to present topic, maximum rating - 5 points.

Each thematic seminar of doctorate is rated at a maximum of 100 points, intermediate and final score points.

In case of positive evaluation of the seminar 1 (51 and more points), the doctoral student continues to study.

In case of negative evaluation of thematic seminar-1 (less than 51 points), the doctor will reiterate the work according to the existing rule.

The thematic Seminar 1 is the prerequisite to go through thematic seminar 2.

During the second year of study (in the third and fourth semesters) the PhD student prepares two theoretical / experimental research / colloquium for each 15 credits.

During the second year of study (in the third and fourth semesters) the PhD student prepares two theoretical / experimental research / colloquium for each 15 credits.

The work is to be a part of the thesis. Colloquium presents the presentation and presentation of the doctoral material related to the dissertation topic / part thereof.

The aim of colloquial is to systemize the doctorate knowledge, presentation of the work, presenting the doctorate's creative thinking, the ability to communicate with the scientific community; Colloquial should reflect the justified results of theoretical / experimental research.

In the colloquium, the doctorate should demonstrate the specific question (quality of research) of the volume and depth, from the results obtained based on the research carried out by the researches and to determine the further direction of the work. Display the expected results of the publication published in the prepared or refined journals for publication. Each member of the commission estimates the colony based on 6 criteria.

- The colloquial assessment criteria are:
- Comparison of the methods and direction of the research conducted at the given stage with the problem - maximum score 5 points;
- Quality of research conducted at this stage - maximum score of 5 points;
- Conclusion on the basis of the research conducted at the given stage - maximum score of 5 points;
- Determination of the further direction of the survey - maximum score of 5 points;
- Labor analysis prepared for publication - maximum score of 5 points;
- Ability to present topic - maximum score of 5 points.

The work is rated at a maximum of 100 points.

Assessment Scaled Score (S) is obtained by formula $S = 3.33 \times M$, where M is the total score for all six components evaluation. In case of each colloquy positive evaluation (51 and more points), the doctoral student continues to study.

In case of colloquial negative assessment (less than 51 points), the doctoral will reiterate the work according to the existing rule. Colloquium-1 is the prerequisite to go through the Colloquium - 2.

In the first semester of the third year of studding: Theoretical / Experimental Research / Colloquium - 3 - 30 credits.

After receiving a positive assessment with the supervisor, the results obtained at the given stage of the study will be submitted to the Academic Department in the form of Colloquium-3 for their presentation. The dean is formed by a chairperson of the academic department, comprising a group of 5-7 members comprising representatives of the field academic personnel. The composition of the Commission is approved by the Order of the Council. The work of the Commission should also be attended by the supervisor of Doctoral. The doctoral present to the Commission the results obtained at the given stage of the study. Each member of the commission estimates the colony based on 6 criteria.

- The colloquial assessment criteria are:
- Compliance of the methods and direction of the research conducted at the given stage with the problem - maximum score 5 points;

- Quality of the survey conducted at the given stage - maximum score of 5 points;
- Conclusion on the basis of the research conducted at the given stage - maximum score of 5 points;
- Determination of the further direction of the survey - maximum score of 5 points;
- Labor analysis prepared for published or publication - maximum score of 5 points;
- Ability to present topic - maximum score of 5 points.

The work is rated at a maximum of 100 points.

Assessment Scaled Score (S) is obtained by formula $S = 3.33 \times M$, where M is the total score for all six components evaluation. In case of colloquial positive assessment (51 and more points), doctoral continues to study. In case of colloquial negative assessment (less than 51 points), the doctoral will reiterate the work according to the existing rule. Colloquium-2 is the prerequisite for the Colloquium -3.

Second semester of the third year of studying: completion of dissertation, presentation - 30 credits.

Completion and presentation of the thesis is a major part of the research component. The completed thesis should be the result of independent doctoral research work. It should reflect the scientifically justified new results of the theoretical / experimental research conducted by the doctorate and / or solve the acute scientific problem. It should be characterized by scientific innovation and contributing to the field development. The work should be presented in the research in the scientific level, the research quality, scientific research results of the consistency and reliability of financial data (if any), the methods (methodology), the work of theoretical / practical value, humanitarian sectors thesis special feature of the new literary water Discoveries and their introduction in scientific circulation (e.g. epigraphic monuments; lexicographical studies; manuscripts and critical studies of their texts; archival data; field data of archaeological, ethnological and linguistic studies; newly established facts of collections of museum and savings institutions).

The doctorate's thesis can be deduced from the Dissertation Board (including 30% of the Dissertation Board) or the University Dissertation Board, which is comprised of 7-9 representatives of the PhD program relevant to the Doctoral Program:

Assessment of scientific-research component / component of Doctoral Education Program is evaluated simultaneously with the final assessment.

The assessment system of scientific-research component / component of Doctoral Education program is:

- a) Excellent (*summa cum laude*) – Excellent work
- b) Very good (*magna cum laude*) - result that exceeds the requirements in every way;
- c) Good (*cum laude*) - result that exceeds the requirements;
- d) Average (*bene*) - result that meets the requirements in every way;
- e) Satisfactory (*rite*) - a result that, despite the shortcomings, still meets the requirements;
- f) Unsatisfactory (*insufficient*) - a result that does not meet the requirements due to significant deficiencies;
- g) Completely unsatisfactory (*sub omni canone*) - a result that does not meet the requirements completely.

The nominees will be accepted by the relevant Commission / Collegiate / University Dissertation Board members according to established criteria, according to the average arithmetic of points (0-100) confidential. Namely:

- Appraisal " Excellent " will be accepted if the doctoral student collects 91-100 points;
- Appraisal "very good" will be accepted if the doctoral student collects 81-90 points;
- Appraisal "good" will be accepted if the doctoral student collects 71-80 points;
- Appraisal " Average " will be accepted if the doctoral student collects 61-70 points;
- Appraisal " Satisfactory " will be accepted if the doctoral student collects 51-60 points;
- Appraisal " Unsatisfactory " will be accepted if the doctoral student collects 41-50 points;
- Appraisal " Completely Unsatisfactory " will be accepted if the doctoral student collects 40 points and less.

In case of unsatisfactory (*insufficient*) assessment, the doctorate will be entitled to submit the dissertation thesis within one year, and in case of receiving a totally unsatisfactory (*sub omni canone*) assessment the doctor will lose the right to present the same dissertation work;

The nominations will be made according to the average arithmetic (0-100) points awarded by the members of the respective Collegiate / University Dissertation Board in accordance with the following criteria:

- Actuality of the Dissertation Community - Rate to 15 Points;
- News of the dissertation thesis - evaluation to 18 points;
- Theoretical / practical value of the dissertation thesis - evaluation to 18 points;
- Presentation of the problem in the dissertation work and its solution - evaluation to 25 points;
- Answers to questions - up to 18 points;
- Visual performance of the material - up to 6 points.

Doctoral student is obliged to publish at least three scientific articles and take part in a scientific conference (to make a personal report) before the doctoral studies are presented to the Dissertation Board. The articles should reflect the main findings of the scientific research performed by the doctorate on Dissertation.

Scientific articles should be published in the publications recognized by the Dissertation Board and the editorial-publishing board of the GTU, or in the field of scientific journals that are spread internationally and are referenced in one of the international referral journals. Doctorate is published as a publication if the relevant volume of the magazine is already printed or the work is on the official website of the magazine. All articles must be published in a single magazine issue.

Preliminary presentation of the Thesis:

The prerequisite for presenting the thesis, together with other requirements defined by the Doctoral Department of the Technical University, is the component - "Completion and Protection of Dissertation" Preliminary presentation of the Dissertation Work at the Extended Session of the Academic Department on which it is appropriate to invite qualified professionals of the respective field.

The doctorate will report the main provisions of his work and the results obtained, clearly articulates the actuality of the dissertation, scientific innovation, practical value, the problem presented in the dissertation work and ways of solving it. The doctoral student answers the questions asked by the participants. At the pre-presentation doctorate can use any type of audio / visual material; Preliminary presentation results are recorded in the protocol.

The Georgian Technical University's Dissertation Board and Doctoral Studies are available at the University website, at:

http://gtu.ge/Study-Dep/Files/Pdf/doqtorantura_debuleb_2014.10.14_SD.pdf

The procedure for approval of Scientific Leaders and Dissertation Issues is given at the University website:

http://gtu.ge/Learning/pdf/doqtoranturis_debuleb2017.pdf

Personal doctoral work plan is given on the following address:

http://gtu.ge/pdf/doqtor_deb_danarTebi2.pdf

The purpose of the programme

The purpose of Educational Program is to train highly qualified specialists in the field of underground artificial constructions, who will be able to carry out scientific researches in the field of construction of transportation facilities, namely: roads, railroads and subway, bridges, aerodromes, tunnels and facilities that provide services to their operations, also in the field of electrification of transportation buildings, airports' aboveground and underground structures and railways relying on the complexly explored basis of conjugation of connections that affect the formation of natural-technical systems considering modern attitudes and recent achievements in IT, efficient computing models and schemes, traditional and new construction materials and technologies. Also during research-search, designing, construction and operation procedures of engineering structures in parallel with technical progress on the basis of system approaches;

Training highly qualified personnel with the educational program in the field of road infrastructure.

Learning Outcomes and Competences (General and Sectoral)

-Knowledge and Understanding – The doctoral student will have the knowledge based on the latest achievements in the field of road infrastructure and underground artificial structures, namely: railroad, motor road, bridges, highway tunnels and other fields of linear communication of transportation in order to utilize high technologies in designing and construction processes.

-Ability to carry out longtime monitoring during operations selecting respective gauges (gauging points of deformities, distributed temperature, corner movements, vibration landslide identifier , etc.) and their installation on the constructions.

- **Ability to use knowledge into practice** – To independently plan, implement and supervise innovative research in the field of road infrastructure and underground artificial structures, namely: railroad, motor road, bridges, highway tunnels and other fields of linear communication of transportation; Developing modern research and analytical methods and approaches oriented towards acquiring a new piece of knowledge;

-Conclusion Making Skills

Ability to provide critical analysis synthesis and evaluations of new, complex and controversial ideas and approaches in the field of road infrastructure and underground artificial structures, namely: railroad, motor road, bridges, highway tunnels and other fields of linear communication of transportation, which facilitates development of new methodologies; Ability to independently make correct and effective decisions to solve problems; Substantiating the efficiency of engineering arrangements;

-Communication Skills – Ability to clearly communicate in combination of the new knowledge with the previous one, also ability to participate in thematic polemics with international academic and professional cycles in a foreign language;

-Learning Ability – Readiness to develop new ideas and processes during the process of learning and professional activities, among them during the research process in consideration of the knowledge of the latest developments in the field of road infrastructure and underground artificial structures, namely: railroad, motor road, bridges, highway tunnels and other fields of linear communication of transportation.

-Values – Exploring ways for establishing new values in the field of road infrastructure and underground artificial structures, namely: railroad, motor road, bridges, highway tunnels and other fields of linear communication of transportation and developing innovative methods for its establishing and making continuous efforts towards provision of comfortable and safe transportation and mitigating its impact on the environment.

Methods of achieving learning outcomes (teaching and learning)

Lecture Practical Seminar (work in group) Laboratory Scientific-Thematic Seminar
Independent Work Research component Consultation Design of Doctoral Thesis Doctoral Thesis

Based on the specific course of study in the learning process, the relevant below listed activities of the teaching-learning methods are used, which are reflected in the relevant training courses (syllabus):

(Discussion, debate, presentation, group work, etc.)

Teaching Methods:

One particular issue can not be studied in the teaching process by only one method. The teacher is in the process of teaching different methods, In many cases there is a mix of methods. Methods complement each other in the teaching process.

Below are the most common methods of teaching and learning and their explanations. The teacher will select the method required from them, from the specific goal and objective.

1. Discussion / debate– One of the most common methods of interactive teaching. Discussion process increases the quality and activity of student engagement. Discussions can be overcome in the debate and this process is not limited to the questions asked by the teacher. It develops a student's ability to reason and to justify his opinion.

2. Problem Based Learning (PBL)- The method, which uses a specific problem as the initial stage of the new knowledge and integration process.

3. Induction method – is such a form of transmitting any knowledge when the process of thinking in the course of the study is directed towards generalization, in other words when delivering the material the process is going from concrete to general.

4. Deduction method – is such a form of transmitting any knowledge, which based on general knowledge represents logical process of discovering new knowledge in other words, the process is going from general to concrete.

5. Analysis -helps us to divide the study material into constituent parts. This will simplify the detailed coverage of individual issues within a difficult problem.

6 The synthesis - implies the composition of one whole by grouping individual issues. This activity contributes to the development of the problem to be seen as a whole.

7. 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.

8. **Written method** implies the following forms of activity: copying, taking notes, composing theses, writing essays, etc.

9. **Presentation** -At work, the student uses the knowledge and skills acquired to solve the real problem. The project increases the motivation and responsibility of students. The work on the project includes planning, research, practical activities and results of the results presented in accordance with the selected question. The project will be implemented if its results are presented in a clear and convincing way. It can be performed individually, in couples or in groups; Also within one subject or within a few subjects, (Integration of subjects); After completion the project will be presented to a wide audience.

10. **Activity-oriented teaching** implies teachers' and students' active involvement in the teaching process, when practical interpretation of the theoretical material takes place.

11. **Explanatory method** is based on discussing a given issue. In the process of explaining the material the teacher brings concrete examples the detailed analysis of which is made in the framework of the given topic.

12. **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.

Student knowledge assessment system

Grading system is based on a 100-point scale

Assessment of the training component:

Positive grades:

- (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 / Component Assessment:

- a) Excellent (*summa cum laude*) - Excellent work
- b) Very good (*magna cum laude*) - result that exceeds the requirements in every way;
- c) Good (*cum laude*) - result that exceeds the requirements;
- d) Average (*bene*) - result that meets the requirements in every way;
- e) Satisfactory (*rite*) - a result that, despite the shortcomings, still meets the requirements;
- f) Unsatisfactory (*insufficient*) - a result that does not meet the requirements due to significant deficiencies;
- g) Completely unsatisfactory (*sub omni canone*) - a result that does not meet the requirements completely.

Field of employment

Educational, scientific research, design, construction organizations, institutions and firms, which are carrying out

Design, reconstruction, modernization, construction, exploitation, professional consultations, scientific and technical research and training of the transport linear communications (autos, railways, bridges, transport tunnels, etc.)

Human and material resources necessary for the implementation of the program

The program is provided with appropriate human and material resources.

Doctoral Program Implementing Academic Staff:

Professor Boris Maisuradze, Candidate of Technical Sciences (Bridges and Transport Tunnels);
 Professor Konstantine Mchedlishvili, Candidate of Technical Sciences (Roads and Aerodromes); Professor Nurzar Rurua, Candidate of Technical Sciences (Railways);
 Professor Tengiz Papuashvili, Candidate of Technical Sciences (Roads and Aerodromes);
 Professor Aleks Burduladze, Doctor of Technical Sciences (Roads and Aerodromes);
 Professor Manana Moistsrafishvili, Candidate of Technical Sciences (Railways);
 Professor Petre Nadirashvili, Candidate of Technical Sciences (Roads and Aerodromes);
 Professor Teimuraz Mekanarishvili, Candidate of Technical Sciences (Roads and Aerodromes);
 Associate Professor Marine Grdzlishvili, Candidate of Technical Sciences (Bridges and Transport Tunnels);
 Associate Professor Givi Datukishvili, Candidate of Technical Sciences (Bridges and Transport Tunnels);
 Associate Professor Guliver Kvantaliani, Candidate of Technical Sciences (Railways);
 Emeritus Enver Moistrapishvili, Candidate of Technical Sciences (Railways);
 Associate Professor Inga Lomadze, Candidate of Pedagogical Sciences (Pedagogy and Teaching Methods);

For more information see attached syllabus.

The program is attached with the Program Manager CV.

Doctoral research is provided by computer hardware, software required, Internet and laboratory, Equipped with a set of tools indicated in the table.

N	Title	Destination, description
1	Schmidt sclerometer	Determination of concrete strength by non-violent method
2	DIGI-SCHMIDT 2000	Measurement of concrete strength on compression, Discovering "Weak points" Send data to a personal computer or printer
3	PROFOMETER 5	Determine the location of reinforcement bar , Measure of concrete protection layer thickness. Determine the diameter of the reinforcement bar.
4	CANIN	Determination of concrete corrosion and determination of its quality.
	Ultrasonic device TICO	Ultrasonic measurement of concrete elements
5	TORENT	Concrete permeability measuring tool
6	pm-3	Measuring the deformation of the constructive element
7	Tensometer Hugenberger	The voltage measuring device in the constructive element
8	Dysta-1	Measurement-registration tool for dynamic parameters of the structure
9	Brunel Microscope	Determination of the opening of the cracks in the reinforced concrete structure
10	Pilettest	determinative of reinforced concrete piles integrity
11	PSU-10	Hydraulic pressure
12	P-50	Hydraulic pressure
13	VNC	Dial Scale
14	CKB-984	Tool phenometometer
15	20002-258	Tool Ductilometer
16	EN-461	Tool vacuum

17	KP-601/1	Strength indicator
18	4165-2	The device for determining the temperature of the bitumen
19	A-7829	Vibro table
20	Soiuzdornii	Vicas tool
21	KП-125	Phrase tool
22	LEICA T 407	Electric Tachograph
23	Deflectometer Inspector-2	Elasticity measuring (Deflectometer)

In addition, the doctorate will be able to assist the Georgian Technical University and the Georgian unit of the Ministry of Regional Development and Infrastructure between the Georgian Road Department, Georgian Technical University and Marabda-Kartsakhi LLC, Georgian Technical University and „IGH Institute“ (Croatia) the basis of the Memorandum for the implementation of practical classes of their subsections of organizations using a laboratory base.

Number of attached syllabus: 5

Program subject load

№	Training component	Precondition of admit	ECTS Credits						
			I Year		I Year		III year		
			Semester						
			I	II	III	IV	V	VI	
1	Academic writing and scientific research methods	N/A	5						
2	Teaching methods	N/A	5						
3	Professor's Assistant	N/A		5					
4	XXI Century Transportation Problems	N/A	5						
5	Main directions of development of railway infrastructure and actual problems.	N/A	5						
6	Main directions of improvement of structural elements of road infrastructure.	N/A		5					
7	First thematic seminar	N/A			15				
8	The second thematic seminar	First Thematic Seminar				15			
Research component									

1	Thesis Research Project / Prospectus - 1	N/A	10				
2	Thesis Research Project / Prospectus - 2	Thesis Research Project / Prospectus - 1		20			
3	Theoretical / Experimental research / Colloquium - 1	Thesis Research Project / Prospectus - 2			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	Thesis Completion, Presentation	Theoretical / Experimental research / Colloquium - 3					30
Total per year			60	60	60	60	
Total:			180				

Map of learning outcomes

№	Training component	Knowledge and understanding	Ability to use knowledge in practice	Making judgments	communication skill	ability to learn	Values
1	Academic writing and scientific research methods	x	x	x	x	x	x
2	Teaching methods	x	x	x			x
3	Professor's Assistant	x	x	x	x	x	x
4	XXI Century Transportation Problems	x	x	x		x	
5	Main directions of development of railway infrastructure and actual problems	x	x	x	x		
6	Main directions of improvement of structural elements of road infrastructure	x	x	x		x	
7	First thematic seminar	x	x	x	x	x	x
8	The second thematic seminar	x	x	x	x	x	x
Research Component:							
1	Thesis Research Project / Prospectus - 1	x	x	x	x	x	x
2	Thesis Research Project / 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	Thesis Completion, Presentation	x	x	x	x	x	x

Program curriculum

№	Subject code	Training component	ESTS credits / hours	Hour						
				Lecture	Seminar (work in the group)	Practical	Laboratory	Middle semester exam	Final exam	Independent work
1	HEL10712G1-L	Academic writing and scientific research methods	5/125	15	30	-	-	2	2	76
2	EDU10912G1-L	Teaching methods	5/125	15	30	-	-	2	2	76
3	AAC96801G1-L	XXI Century Transportation Problems	5/125	45	-	-	-	2	2	76
4	AAC96901G1-L	Main directions of development of railway infrastructure and actual problems	5/125	45	-	-	-	2	2	76
5	AAC96901G1-L	Main directions of improvement of structural elements of road infrastructure	5/125	45	-	-	-	2	2	76

Program manager

Boris Maisuradze

Faculty of Civil Engineering
Head of Quality Assurance Service

Marina Javakhishvili

Dean of the Faculty

David Gurenidze

Approved by

Faculty of Civil Engineering
At the meeting of Faculty Board
Protocol: N4 .04.07.2012 year

Agreed with

Quality Assurance Service of GTU

Irma Inashvili

Modified

Faculty of Civil Engineering
At the meeting of Faculty Board
N 25 30.03.2018
Chairman of the Faculty Board

David Gurgeniidze