



საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

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#733 of GTU Academic
Council in July 6, 2012
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Educational Program Faculty for Doctoral Degree

Program

Engineering Safety and Risk Management

Faculty

Mining and Geology Faculty

Head of the Program

Professor Nana Machavariani

Qualification to be applied

(Doctor in Engineering)
Degree will be applied in case of having not less than 180 credits during study program

Study Language

Georgian

Prerequisite for Accessing the Program

Master's degree or equivalent. Candidate must have: Scientific publications/research; participation in scientific conferences; other documents and certificates linked with research/study (Certificates, Charter, etc.). Interview with the temporary group of faculty members.

Program Description

The program is developed by ECTS System, 1 credit equals to 25 hours that coincides face to face lectures and independent work hours. Distribution of credits are presented in study plan.

Duration of the program – 3 years (6 semesters), that equals to 180 Credits.

Study component – 60 credits (including 15 credits of compulsory topics of study component, 15 credits of Special topics of the program, 30 credits of thematic seminar), research component – 120 credits; Colloquium (I, II & III)- 60 Credits; Dissertation – 30 credits, theses defense – 30 credits

Study Process: semester includes 20 weeks that coincides 16 weeks of study process, XVII week is for preparation for final exam, XVII-XIX weeks are for final exam. XX week is for additional exam in case of need.

First Semester includes two of mandatory study components (5 & 5 credits), Special topic of the program (10 credits), first (1) research topic – 10 credits

Second Semester includes one mandatory study component (5 credits), Special topic of the program (5 credits), second(2) research topics – 20 credits

Third Semester includes first thematic seminar – 15 credits, Mandatory element of the research component of study program: first (1) theoretic/experimental research/colloquium (15 credits)

Fourth Semester includes second thematic seminar – 15 credits, Mandatory element of the research component of study program: second (2) theoretic/experimental research/colloquium (15 credits)

Fifth Semester includes Mandatory element of the research component of study program: three (3) theoretic/experimental research/colloquium (30 credits)

Sixth Semester includes Mandatory element of the research component of study program: conclusion of dissertation and thesis defense (30 credits)

Doctoral student develops two thematic/scientific research within the scheduled period of study program.

Dean is organizing the seminar for presentation of thematic research. Special commission of 5-9 members are evaluating the presented research. The commission is created by dean based on recommendation of the academic department head. Members of the commission are defined by the faculty order.

Doctoral student is responsible to develop colloquiums on the bases of theoretical/experimental research for the third, fourth and fifth semesters.

Finalization of dissertation and thesis defense is the main component of the research. It describes the scientifically justified new results of the theoretical / experimental research conducted by the doctoral student and / or resolves the topical scientific problem. Doctoral student presents dissertation to the commission of 7-9 members of appropriate study program.

Goal of the Program

High level of usage of technical tools, robotic systems, and high-production machines is common for modern society. Modern technologies are more automated and need more energy supply. Nowadays the most important element in industry is human being, who is responsible to serve, manage, and control the technical systems and technological processes. Currently work environment at various industries are under technological change. Despite the progress, safety, health and work conditions still remain number one problem because of high production risk.

As per analysis of the production breakdown, trauma, accident and occupational diseases, the main reason of their origin and development is unfeasibility of safety measures, neglect of industrial risks, technological danger and tools and methods how to avoid them. In the most cases, human being is the reason for danger. The program is designed to study and resolve the problems connected to the above mentioned. It fully includes safety

engineering and risk evaluation component. The goal of the program is to equip doctoral student with the knowledge presented below:

- Main technological dangers, their characteristics, impact level on the society and safety tools;
- Identify of the danger of industrial environment, risk evaluation, selection of effective protection mechanisms, create comfortable work environment;
- Legal acts of safety, work hygiene, industrial sanitation, fire-explosive safety, radiation, electrical security and safety technical regulations;

Academic Doctor, prepared by the above program has to have:

- Understanding of safety measures, risk oriented thinking, when safe work environment, environmental protection and health issues are priority
- In-depth knowledge of risk development and problem identification to provide safe environment and act appropriately while danger.
- Be ready to apply professional knowledge for minimizing of negative ecological consequences, guarantee industrial safety and improve work conditions

Study Results/Competencies (general and sectoral)

- **Knowledge and understanding** –knowledge based on the modern achievements of safety, that gives the opportunity to expansion of existing knowledge or usage of innovative methods. Understanding and evaluation of the knowledge.
- **Ability to use knowledge in practice** - independently plan, implement and supervise innovative research. Develop new research and analytical methods and strategies that are oriented on creating new knowledge and will be reflected in international publications; as per the situation, analyze the potential industrial risks and factors; to be able to analyze the safety and emergency management methods, natural disasters, large industrial structures and disasters and set up preventive measures;
- **Ability of getting the conclusion** -Establishing grounded conclusions based on critical analysis of complex and incomplete information (including recent research)
- **Communication skill** – ability to develop document that will be easy to understand and grammatically correct. Preparation of a detailed written report on ideas, current problems and solutions; ability to prepare presentations and informative documents;
- **Ability and knowledge of native and foreign languages;** ability to share the information on native and foreign languages. Presentation skill and ability to discuss complex topics
- **Learning ability**–ability to study independently, readiness to develop new ideas or processes, based on the latest achievements or learning activity, including research;
- **Values** - Research of the ways of establishing values and developing innovative methods to establish them. Protection of professional values, ethics and morals;

Methods and Ways of Reaching Results of Study

Lecture Seminar (Group Work) Practics laboratory works Scientific-Theatrical seminar
Individual work Consultancy Research Dissertation Thesis defense

One particular issue cannot be studied in the teaching process by only one method. The Lecturer applies different methods while teaching process; In many cases there is a mix of different methodologies. Different methods complement each other while teaching process. We offer the most common methods of teaching and learning and their explanations. The teacher is eligible to identify the appropriate method based on the specific goal and objective.

1. **Discussions/debates**- 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 develop and justify his/her opinion.

2. **Case Study** - The teacher discusses concrete cases with students and they are able to study the case thoroughly. For example, in the safety of engineering, it can be a case of a particular accident or disaster; In political sciences –analysis of Karabakh problem (Armenia-Azerbaijani Conflict), etc.

3. **Brain Storming** – to promote different ideas, even radical ones about the concrete issue/problem and encouragement of idea expression. This method presents the development of the creative approach to the problem. The use of the method is effective for students' groups and consists of several main stages:

- To identify the issue/problem in creative way
- Make notes of the ideas expressed by students
- Determine the evaluation criteria to identify the compliance of goal of the research and idea
- Evaluate selected ideas based on pre-defined criteria's
- Identifying most relevant ideas of the topic
- Identifying the idea, that have most relevant evaluation and reflects the best ways of problem solution

4. **Method of Demonstration** - This method implies visual representation of information. In terms of achieving the result it is quite effective. In many cases, it is best to provide the materials simultaneously with audio and visuals. The study material can be demonstrated by both the teacher and 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 issue / problem. Demonstration may be in a very simple way.

5. **Deduction Method** - Determines the form of any knowledge transfer, which is a logical process of discovering new knowledge based on general knowledge; the process is going from general to concrete.

6. **Analysis Method**–Supports to dissolve the learning material as part of one whole component. This will simplify detailed coverage of individual issues within a difficult problem.

7. **Synthesis method** - involves the creation of one whole group by grouping individual issues. This method promotes the development of the problem as a whole.

8. **Verbal/Oral Method**

9. **Writing work method** - which implies the following types of actions: making extensions and records, concealing material, composing abstracts or essays, and so forth.

10. **The explanatory method** is based on a discussion on the issue. The teacher provides a concrete example of the content of the material, which is discussed in details

11. **Action-oriented teaching** - requires active involvement of the teacher and student in the teaching process, where the practical interpretation of the theoretical material takes on a special role.

12. **Design and presentation of the project** - When working on the project, the student uses the acquired knowledge and skills to solve the real problem. This method increases motivation and responsibility of the student. The work on the project involves planning, research, practical activity and the levels of the results in accordance with the selected issue. 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; As well as within a subject or within a few subjects (integration of the subjects); After completion, the project will be presented to a wide audience.

Student Evaluation System

100 grade evaluation system

Evaluation of study components

Positive Evaluation:

- **(A)**–Excellent- evaluation grade 91-100;
- **(B)**–Very Good–evaluation grade 81-90;

- (C) - Good– evaluation grade 71-80;
- (D)–Satisfactory- evaluation grade 61-70;
- (E)–Minimum pass- evaluatuon grade 51-60.

Negative Evaluation:

- (FX) - Fail–evaluation grade 41-50- it means, that student needs more work to pass and is given the right to pass one more extra exam;
- (F) - Fail–evaluation grade 40 and less, it means, that the work performed by the student is not enough and he has to learn the subject from the beginning.

Research component evaluation:

- A) Excellent (summa cum laude) – Great research
- B) Very good (magna cum laude) – the result is above expectation
- C) Good (cum laude) – the result is above expectation;
- D) Average (bene) – average research, that satisfies the basic requirements;
- E) Satisfactory (rite) – satisfactory result with minor discrepancies;
- F) Unsatisfactory (insufficient) – the research doesn’t satisfies the requirements because of numerous discrepancies;
- G) Completely unsatisfactory (sub omni canone) – the result, that doesn’t satisfy any of the requirements

Field of Employment

Any industry (energy, machine building, consumer goods industry, transport, mining, geological, chemical and food technology, metallurgy, communications and telecoms, informatics and management systems, construction, hydraulics, petrol) enterprises, Ministry of Internal Affairs, Ministry of Defense, Research Organizations, Scientific-Research organizations, government structures, such as supervisory agencies and labor inspectorates. Higher education institutions, colleges.

Needed Human Capital and Material Resources for Implementation of the Program

Laboratory works to be done	Maintenance Supply	Place of implementation	comments
1. Research of the meteorological conditions of industrial warehouse 2. Determination of air drain 3. Evaluation of industrial vibrations 4. Evaluation of acoustic characteristics of work place 5. Research of natural lighting 6. Research of artificial lighting 7. Research of safety at	Different type of anemometers; Dry(ordinary) and moisturized thermometers; In-patient and aspirational psychrometers; Barometer; Equipment to measure air dusting level; Respirator; Equipment to evaluate level of vibration; Equipment to measure level of noise; Equipment for isolating noise;	GTU III building სტუ. III კორპუსი. Labor Safety and Emergency Management Direction Laboratories207, 208. Lecture Hall 209.	

1000 V voltage tripling isolated neutral networks	Lux meter;		
8. 1000 V voltage trials for electrical safety parameters in neutral networks.	Equipment for lightening research;		
9. Evaluation of the effectiveness of protective layers.	Electrostation isolation in the networks and electron networks for electrocution parameters;		
10. Determination of effectiveness of nullification.	Equipment to research the effectiveness of protective layers and folds		
11. Compensation of power tensile compiler while grounding.	Radiometer/X-Ray “DP-5a”		
12. Protection from ionizing radiation.	Respirators, gas pumps and other individual protection tools; fire extinguisher;		
13. Determination of gas level at industrial environment	Sprinkles and drenchers;		
14. Study of individual protection tools	Automatic fire detection system using water;		
15. Study of automatic fire extinguishers.	Auto Automatic fire detection system at adjustable fluid reservoirs		

2. Professors working at the program: TeimuraKuntchulia, LutsindaChkheidze, Nino Jvarelia, Nino Razmadze, Nino Ratiani, Nana Machavariani, Omar Lanchava, TemurJagodnishvili

3. CV for program supervisor is attached to the program

Number of Syllabus attached: 4

Program Subjects

№	Study Component	Prerequisite for Requisition	ECTS Credits						
			I Year		II Year		III Year		
			Semester						
			I	II	III	IV	V	VI	
1	Academic Writing and Science Research Methods	Doesn't have	5						
2	The methods of study	Doesn't have	5						
3	Assistant to professor	Doesn't have		5					
4	Safety of Plants and Processes	Doesn't have	10						
5	Safety of live	Doesn't have		5					
6	First thematic seminar	Doesn't have			15				

7	Second thematic seminar	First thematic seminar				15		
Research Component								
1	Research project/prospectus for dissertation -1	does not have	10					
2	Research project/prospectus for dissertation -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	Finalization of dissertation/thesis defense	All the necessary training and research components						30
Total throughout the year			60		60		60	
Total:					180			

Learning Outcomes schedule

Nº	Study Component	Knowledge and Learning	Ability to use knowledge in practice	Skill to make conclusion	Communication skill	Learning ability	Values
1	Academic writing and research methods	X	X	X	X	X	X
2	Study methodology	X	X	X	X	X	X
3	Assistant to professor	X	X	X	X	X	X
4	Safety of Plants and Processes		X	X	X		
5	Safety of live	X	X		X		
6	First thematic seminar	X	X	X	X	X	X
7	Second thematic seminar	X	X	X	X	X	X
Research Component							
1	Research project/prospectus for dissertation -1	X	X	X	X	X	X
2	Research project/prospectus for dissertation -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	Finalization of dissertation/thesis defense	X	X	X	X	X	X
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Program Study Schedule

№	Subject Code	Study Component	ESTS Credits/Hours	hours						
				Lecture	Seminar (Group Work)	Practice	Laboratory work	Mid-semester exam	Final exam	Individual wrk
1	HEL10712G1	Academic writing and research methods	5/125	45	-	-	-	2	2	76
2	EDU10912G1	Study methodology	5/125	45	-	-	-	2	2	76
3	HHS27203G1	Safety of Plants and Processes	10/250	75	-	-	-	1	1	173
4	HHS27103G1	Safety of live	5/125	45	-	-	-	1	1	78

Program Supervisor

Nana Machavariani

Mining and Geology Faculty
Head of Quality Assurance Department

Shalva Keleptrishvili

Faculty Dean

Anzor Abshilava

Is agreed with

Quality Assurance Department of GTU

Irma Inashvili

Received

Mining and Geology Faculty
Faculty Council Meeting
30.03.2018
Head of Faculty Council

Anzor Abshilava