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Bachelor's Educational Program

Title of the Program

ელექტრული და ელექტრონული ინჟინერია

Electrical and Electronic Engineering

Faculty

ენერგეტიკის

Power Engineering

Program Supervisor/ Supervisors

Professor Simon Nemsadze

Professor Giorgi Arziani

Qualification to be Awarded, and the Number of Credits in the Program

Bachelor of Science in Electrical and Electronic Engineering

The bachelor's qualification is awarded by combining at least 234 credits of study courses and at least 6 credits of free components corresponding to the main field of study.

Teaching Language

Georgian

Admission Prerequisites to the Program

The right to study at the undergraduate educational program "Electrical and Electronic Engineering" is only available to the holder of a state certificate confirming complete general education or a person equivalent to it, who is enrolled in accordance with the procedure established by the legislation of Georgia.

An additional prerequisite for admission to the program is knowledge of the English language at the

B1 level, or the applicant must have an internationally recognized certificate confirming the knowledge of the English language at least at the B1 level.

Program Description

Electrical and electronic engineering is an integrated field of engineering. The program deals with the technological aspects of electricity, especially the analysis and application of circuits, electrical and electronic devices. It also covers the concept of electricity production, distribution and management. The mentioned engineering field focuses on the research and analysis of the above-mentioned concept of electricity, which can be achieved by a thorough study of the exact and natural sciences presented in the program in a rather large volume.

Electrical and electronic engineering is offered through various branch courses, it combines broad knowledge in the main disciplines of the field of activity such as microprocessor control systems, microcontrollers, electrical energy conversion (electric machines), power electronics, electrical system dynamics, electrical system analysis, modeling, electrical and electronic devices Technical diagnostics. It should be noted that these courses cover a wide variety of topics, ranging from semiconductors, analog electronics and power systems, to transmission lines, digital electronics, DC and AC electrical machines, and control systems. All of the above adds more relevance to the baccalaureate educational program.

The idea of implementing an undergraduate Georgian-language educational program "Electrical and Electronic Engineering" at the Faculty of Energy was laid at the end of 2017, which was preceded by a 3-year mutual cooperation with San Diego State University-Georgia, supported by an international project implemented by the "Millennium Challenge Fund - Georgia" (MCA-Georgia) Within the framework of the second compact.

Based on the Memorandum of Cooperation between Georgia Technical University and San Diego State University-Georgia, since 2015 English language program "Electrical Engineering" has been implemented jointly. Experts from the Accreditation Board for Engineering and Technology (ABET) of the United States of America visited the Faculty of Energy during periodic consultations. From their side, familiarization/consultation of documents, appendices, self-evaluation report prepared according to ABET standards, monitoring of laboratories, periodical training of academic staff at San Diego State University is underway.

It is also worth noting that in the Department of Electrical Engineering and Electronics, with the financial assistance of San Diego State University, a modern laboratory of electrical engineering and electronics was organized, which will allow us to conduct various types of laboratory work for the subjects within the scope of this program, namely: circuit analysis 1, circuit analysis 2, electrical and electronic measurement, Electrical energy conversion (electrical machines), technical diagnostics of electrical and electronic devices.

Similar ABET accredited undergraduate programs at the following US universities were studied and analyzed during the program modification process:

1. San Diego State University,

<https://www.sandiego.edu/engineering/programs/electrical-engineering/>

2. Boston University,

<https://www.bu.edu/academics/eng/programs/electrical-engineering/bs/>

And similar programs in the following universities:

3. Norfolk State University, USA, <https://www.nsu.edu/>

4. Kaslik University of the Holy Spirit, Lebanon, www.usek.edu.lb

5. Bilkent University, Turkey, <https://catalog.bilkent.edu.tr/dep/d12.html>

6. Anna University, India, <https://www.annauniv.edu>

Program Objective

The purpose of the undergraduate educational program is to:

- In accordance with the requirements of the labor market, prepare students for a successful career in the electrical and electronic industry and encourage them to complete their higher education; provide them with broad knowledge in natural sciences and mathematics, which are necessary for the formulation, solution and analysis of electrical and electronic problems;
- To ensure the awareness of students to adhere to the norms of professional ethics in the process of acquiring knowledge and professional activity, to develop the skills of identifying complex engineering problems, finding ways to solve them, and ensuring the effective functioning of electrical devices, using modern technologies.

Learning Outcomes/Competences (general and professional)

1. Based on extensive knowledge gained in engineering, exact and natural sciences, identifies, formulates and solves complex engineering problems in electrical and electronic engineering;
2. Describes the operating principles of electrical and electronic devices and systems and participates in the development of solutions related to the safety/health and well-being needs of society, taking into account global, cultural, social, environmental and economic factors;
3. Communicates effectively with a wide range of audiences to identify complex interactions and their impacts within engineering systems;
4. Has the ability to recognize ethical and professional responsibilities in engineering situations and make informed decisions that must take into account the impact of engineering decisions in global, economic, environmental, and social contexts;
5. Has the ability to function effectively in a team, where members collectively provide leadership, create a collaborative and inclusive environment, plan tasks, and set and achieve goals;
6. Participates in the development and conduct of appropriate experiments to identify and solve clearly defined problems characteristic of the field of electrical and electronic engineering; based on data analysis, draws appropriate conclusions to improve the technical condition, performance, operating parameters, and technical characteristics of electrical equipment, networks, and systems;
7. Consistently and comprehensively evaluates and plans the process of deepening professional knowledge focused on development, taking into account global technological achievements and using appropriate learning strategies.

Methods of Achieving Learning Outcomes (Teaching - Learning)

Lecture Seminar (working in groups) Practical class Laboratory Practice
 Course work/project Consultation Independent work

In the learning process, depending on the specifics of a specific study course, teaching-learning methods and activities are used, which are reflected in the programs (syllabi) of the relevant study course: discussion/debate, cooperative learning, group work, case study, mental Brain storming, role-playing and situational games, demonstration, induction, deduction, analysis, synthesis, written work, explanation, action-oriented learning, project development and presentation.

Student Knowledge Assessment System

Grading system is based on a 100-point scale.

Positive grades:

- (A) - Excellent - grades between 91-100 points;
- (B) – Very good - grades between 81-90 points
- (C) - Good - grades between 71-80 points
- (D) - Satisfactory - grades between 61-70 points
- (E) - Pass - the rating of 51-60 points

Negative grades:

- (FX) - Did not pass - grades between 41-50 points, which means that the student is required to work more to pass and is given the right, after independent work, to take one extra exam;
- (F) – Failed - 40 points and less, which means that the work carried out by the student did not bring any results and he/she has to learn the subject from the beginning.

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 number of points obtained in the final assessment is not added to the grade received by the student in the additional exam.

The grade obtained on the additional exam is the final grade and is reflected in the final grade of the educational program component.

In case of receiving 0-50 points in the final evaluation of the educational component, or if the student fails to overcome the minimum competence limit in the final/additional exam, the student will be assigned a grade of F-0.

Assessment of the level of achievement of student learning outcomes in each component of the program includes mid-term and final assessment. The mid-term assessment in turn includes the ongoing activity and the mid-semester exam.

Each evaluation form and component has a specific share in the final evaluation from the total evaluation score (100 points). In particular, the maximum score of the intermediate assessment is 60, and the maximum score of the final exam is 40. Each form of assessment has a minimum competence limit, which is reflected in the program (syllabi) of each study course.

The right to pass the final exam is granted to a student who has accumulated at least a minimum positive grade in the component(s) of the intermediate evaluations in accordance with the program of the study course, and has completed and submitted on time the minimum amount of work defined by the program in the form of documentary material.

Detailed information is provided at the following email address: "Instructions for managing the educational process at the Technical University of Georgia" <https://gtu.ge/Study-Dep/Forms/Forms.php>

Sphere of Employment

Electrical systems; installation, distribution and distribution companies; Innovative and engineering development companies. Diagnostic centers for electrotechnical equipment, natural gas supply systems, service centers; Electrotechnical equipment installation, repair, construction and manufacturing factories, firms and bureaus, sectoral design organizations.

Potential for Further Education

Master's Educational Programs

Human and Material Resources Required to Implement the Program

The program is provided with appropriate human and material resources. Additional information is provided in the attached syllabus

Number of Attached Syllabuses: 55

Courses in the Program

№	Learning Course	Course prerequisite	ECTS Credits							
			Year I		Year II		Year III		Year IV	
			Semester							
			I	II	III	IV	V	VI	VII	VIII
I. Compulsory courses of content relevant to the main field of study										
1	Calculus T1	does not have	8							
2	General Physics 1A	does not have	7							
3	State language special course	does not have	5							
4	Foreign Language (English) – B2.1	does not have	5							
5	Introduction to Electrical and Electronic Engineering	does not have	4							
6	Calculus T2	Calculus T1	7							
7	General Physics 2B	General Physics 1A	6							
8	Fundamentals of Business Management	does not have	4							
9	Foreign Language (English) – B2.2	Foreign Language (English) – B2.1	5							
10	Applied Informatics	does not have	5							
11	General Chemistry A	does not have	4							
12	Calculus T3	Calculus T2	7							
13	Linear algebra TLA	does not have	5							
14	Applied Physics - Electromagnetism	General Physics 2B	8							
15	Circuit Analysis 1	General Physics 2B	5							
16	Professional English - electrical and electronic engineering	Foreign Language (English) – B2.2	5							
17	Probability theory and mathematical statistics TPS	Calculus T2					5			
18	Ordinary differential equations TDE	Calculus T3					5			
Compulsory elective courses of content corresponding to the main field of study										
19.1	Circuit Analysis 2 (GEO)	Circuit Analysis 1								
19.2	Circuit Analysis 2 (Eng)	Circuit Analysis 1;					5			

№	Learning Course	Course prerequisite	ECTS Credits							
			Year I		Year II		Year III		Year IV	
			Semester							
			I	II	III	IV	V	VI	VII	VIII
		Professional English - electrical and electronic engineering								
Compulsory courses of content relevant to the main field of study										
20	Energy SCADA Systems	Applied Informatics				5				
21	Fundamentals of Engineering Electronics	Circuit Analysis 1				5				
22	Bases of programming (based on C++)	does not have				5				
Compulsory elective courses of content corresponding to the main field of study										
23.1	Electrical Energy Conversion (Electrical Machines) (GEO)	General Physics 2B								
23.2	Electrical Energy Conversion (Electrical Machines) (Eng)	General Physics 2B; Professional English - electrical and electronic engineering							5	
Compulsory courses of content relevant to the main field of study										
24	Power Systems	Circuit Analysis 2				5				
25	Electric and Magnetic Fields in Electrical Engineering	Circuit Analysis 2				4				
26	Energy Electronics	Fundamentals of Engineering Electronics				5				
27	Introduction in Systems Engineering	does not have				4				
28	Professional Ethics	Introduction to Electrical and Electronic Engineering				4				
29	Basis for labor protection	does not have				3				
Compulsory elective courses of content corresponding to the main field of study										
30.1	Power System Modeling and Simulation (GEO)	Power Systems								
30.2	Power System Modeling and Simulation (Eng)	Power Systems; Professional English - electrical and electronic engineering							5	
Compulsory courses of content relevant to the main field of study										

№	Learning Course	Course prerequisite	ECTS Credits							
			Year I		Year II		Year III		Year IV	
			Semester							
			I	II	III	IV	V	VI	VII	VIII
31	Analysis and Design of Electronic Circuits	Fundamentals of Engineering Electronics					5			
32	Power systems cybersecurity	Energy SCADA Systems; Bases of programming (based on C++)					5			
33	Analisis of electrical equipment by Applied software packages LabVIEW, MULTISIM, Matlab	does not have					5			
34	Renewable Sources of Energy	General Physics 2B					3			
35	Electromagnetic Ecology	does not have					5			
	Free Elective components	does not have					3			
36	Power System Analysis	Power System Modeling and Simulation						5		
37	Engineering Projects Management	Introduction to the Bachelor Project						5		
	Compulsory elective courses of content corresponding to the main field of study									
38.1	Power System Protective Relaying (GEO)	Power Systems								
38.2	Power System Protective Relaying (Eng)	Power Systems; Professional English - electrical and electronic engineering							5	
39.1	Power System Planning (GEO)	Power Systems								
39.2	Power System Planning (Eng)	Power Systems; Professional English - electrical and electronic engineering							5	
	Compulsory courses of content relevant to the main field of study									
40	Application of microcontrollers in electrical engineering	Fundamentals of Engineering Electronics						5		
41	Introduction to the Bachelor Project	Analisis of electrical equipment by Applied software packages LabVIEW, MULTISIM, Matlab; Energy Electronics; Electrical Energy Conversion (Electrical Machines)							5	

№	Learning Course	Course prerequisite	ECTS Credits							
			Year I		Year II		Year III		Year IV	
			Semester							
			I	II	III	IV	V	VI	VII	VIII
42	Power System Dynamics	Power System Analysis								6
43	Operating microprocessor systems	Application of microcontrollers in electrical engineering								5
44	Technical Diagnostics of Electrical and Electronic devices	Electrical Energy Conversion (Electrical Machines); Energy Electronics								6
45	Bachelor Project	Introduction to the Bachelor Project; Application of microcontrollers in electrical engineering; Power System Analysis								10
	Free Elective components	does not have								3
			Per Semester	29	31	30	30	30	30	30
			Per Year	60		60		60		60
			Total					240		

Free components (Elective)

№	Learning Course	Course prerequisite	ECTS Credits
f.1	History of Georgia	does not have	3
f.2	Introduction to Psychology	does not have	3
f.3	Introduction to Sociology	does not have	3
f.4	The basics of philosophy	does not have	3
f.5	Environment Protection and Ecology	does not have	3

Program Curriculum

Nº	Course Identification Code	Learning Course	ECTS Credit/Hours	Hours								
				Lecture	Seminar (work in the group)	Practical classes	Laboratory	Practice	Course work/project	Mid-semester exam	Final exam	Independent work
	I. Compulsory courses of content relevant to the main field of study											
1	MAS19208G1-LP	Calculus T1	8/200	26	-	39	-	-	-	2	2	131
2	PHS51908G1-LPB	General Physics 1A	7/175	13	-	13	26	-	-	1	2	120
3	LEH15512G4-LP	State language special course	5/125	26	-	26	-	-	-	2	2	69
4	LEH10412G1-P	Foreign Language (English) – B2.1	5/125	-	-	39	-	-	-	1	1	84
5	EET45302G4-LS	Introduction to Electrical and Electronic Engineering	4/100	13	13	-	-	-	-	1	1	72
6	MAS19308G1-LP	Calculus T2	7/175	26	-	26	-	-	-	2	3	118
7	PHS52008G1-LPB	General Physics 2B	6/150	13	-	13	26	-	-	1	2	95
8	BUA40602G2-LS	Fundamentals of Business Management	4/100	13	13	-	-	-	-	1	1	72
9	LEH10512G1-P	Foreign Language (English) – B2.2	5/125	-	-	39	-	-	-	1	1	84
10	ICT11608G1-LB	Applied Informatics	5/125	13	-	-	26	-	-	1	2	83
11	PHS11704G2-LB	General Chemistry A	4/100	13	-	-	13	-	-	1	1	72
12	MAS19408G1-LP	Calculus T3	7/175	26	-	26	-	-	-	2	3	118
13	MAS19608G1-LP	Linear algebra TLA	5/125	13	-	26	-	-	-	2	3	81
14	EET48108G4-LPB	Applied Physics - Electromagnetism	8/200	26	-	26	13	-	-	1	2	132
15	EET45402G4-LB	Circuit Analysis 1	5/125	13	-	-	26	-	-	1	2	83
16	LEH11812G4-LP	Professional English - electrical and electronic engineering	5/125	13	-	26	-	-	-	2	2	82
17	MAS19108G1-LP	Probability theory and mathematical statistics TPS	5/125	13	-	26	-	-	-	2	2	82
18	MAS19508G1-LP	Ordinary differential equations TDE	5/125	13	-	26	-	-	-	2	2	82
	Compulsory elective courses of content corresponding to the main field of study											
19.1	EET45602G4-LB	Circuit Analysis 2 (GEO)	5/125	26	-	-	13	-	-	1	1	84
19.2	EET45502E4-LB	Circuit Analysis 2 (Eng)	5/125	26	-	-	13	-	-	1	1	84
	Compulsory courses of content relevant to the main field of study											
20	ICT14408G2-LPB	Energy SCADA Systems	5/125	13	-	13	11	-	-	1	2	85
21	EET48202G3-LPB	Fundamentals of Engineering	5/125	13	-	13	13	-	-	1	1	84

		Electronics											
22	ICT10408G1-LP	Bases of programming (based on C++)	5/125	26	-	13	-	-	-	1	2	83	
		Compulsory elective courses of content corresponding to the main field of study											
23.1	EET46502G4-LB	Electrical Energy Conversion (Electrical Machines) (GEO)	5/125	13	-	-	26	-	-	1	2	83	
23.2	EET46402E4-LB	Electrical Energy Conversion (Electrical Machines) (Eng)	5/125	13	-	-	26	-	-	1	2	83	
		Compulsory courses of content relevant to the main field of study											
24	EET45902G4-LP	Power Systems	5/125	13	-	26	-	-	-	1	2	83	
25	EET68602G2-LP	Electric and Magnetic Fields in Electrical Engineering	4/100	13	-	13	-	-	-	1	1	72	
26	EET45902G2-LBK	Energy Electronics	5/125	13	-	-	13	-	13	1	1	84	
27	EET47702G3-LB	Introduction in Systems Engineering	4/100	13	-	-	13	-	-	1	1	72	
28	SOS32302G1-LS	Professional Ethics	4/100	13	13	-	-	-	-	1	1	72	
29	HHS20303G1-LB	Basis for labor protection	3/75	13	-	-	13	-	-	1	1	47	
		Compulsory elective courses of content corresponding to the main field of study											
30.1	EET46302G4-LB	Power System Modeling and Simulation (GEO)	5/125	13	-	-	26	-	-	1	2	83	
30.2	EET46202E4-LB	Power System Modeling and Simulation (Eng)	5/125	13	-	-	26	-	-	1	2	83	
		Compulsory courses of content relevant to the main field of study											
31	EET48402G3-LK	Analysis and Design of Electronic Circuits	5/125	13	-	-	-	-	26	1	2	83	
32	EET46602G4-LPB	Power systems cybersecurity	4/100	13	-	13	13	-	-	2	2	57	
33	EET45702G4-LB	Analisis of electrical equipment by Applied software packages LabVIEW, MULTISIM, Matlab	5/125	13	-	-	26	-	-	1	1	83	
34	EET42402G1-LB	Renewable Sources of Energy	3/75	13	-	-	13	-	-	1	1	47	
35	EET55408G2-LBK	Electromagnetic Ecology	5/125	13	-	-	13	-	13	1	1	84	
36	EET46702G4-LB	Power System Analysis	5/125	13	-	-	26	-	-	1	2	83	
37	EET47402G4-LBK	Engineering Projects Management	5/125	13	-	-	16	-	10	1	2	83	
		Compulsory elective courses of content corresponding to the main field of study											
38.1	EET47002G4-LB	Power System Protective Relaying (GEO)	5/125	13	-	-	26	-	-	1	2	83	
38.2	EET46902E4-LB	Power System Protective Relaying (Eng)	5/125	13	-	-	26	-	-	1	2	83	
39.1	EET47202G4-LP	Power System Planning (GEO)	5/125	13	-	26	-	-	-	1	2	83	
39.2	EET47102E4-LP	Power System Planning (Eng)	5/125	13	-	26	-	-	-	1	2	83	
		Compulsory courses of content relevant to the											

		main field of study												
40	EET48602G3-LP	Application of microcontrollers in electrical engineering	5/125	26	-	13	-	-	-	1	1	84		
41	EET47302G4-KR	Introduction to the Bachelor Project	5/125	-	-	-	-	15	26	2	2	80		
42	EET46802G4-LB	Power System Dynamics	6/150	26	-	-	26	-	-	1	2	95		
43	EET67202G2-LB	Operating microprocessor systems	5/125	26	-	-	13	-	-	1	1	84		
44	EET47502G4-LPB	Technical Diagnostics of Electrical and Electronic devices	6/150	26	-	13	13	-	-	1	1	96		
45	EET47602G4-K	Bachelor Project	10/250	-	-	-	-	-	65	2	2	181		
II. free components														
f.1	HEL20212G1-LS	History of Georgia	3/75	13	13	-	-	-	-	1	1	47		
f.2	SOS30312G1-LS	Introduction to Psychology	3/75	13	13	-	-	-	-	1	1	47		
f.3	SOS40312G1-LS	Introduction to Sociology	3/75	13	13	-	-	-	-	1	1	47		
f.4	HEL30212G1-LS	The basics of philosophy	3/75	13	13	-	-	-	-	1	1	47		
f.5	EET20704G1-LB	Environment Protection and Ecology	3/75	13	13	-	-	-	-	1	1	47		

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Faculty of Power Engineering
At the Session of the Faculty Council
8.07.2019

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Quality Assurance Service of GTU

Ivane Jagodnishvili

Modified by

Faculty of Power Engineering
At the Session of the Faculty Council
16.09.2025

Chairman of the Faculty Council

Ketevan Kutateladze