ABET

Preliminary Self-Study Report

For the

BACHELOR OF SCIENCE

IN

ELECTRICAL ENGINEERING

At

GEORGIAN TECHNICAL UNIVERSITY

M. KOSTAVA ST. 77

TBILISI, GEORGIA

April 22, 2018

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APPENDIX

BACKGROUND INFORMATION

A. Contact Information

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B. Overview of Georgian Technical University

Georgian Technical University (GTU) is a four-year educational institution of higher learning that has consistently emphasized the institution was founded in 1922 as a Polytechnic Faculty of Tbilisi State University. In 1928 the Departments of the polytechnic faculty merged into an independent Institute and named Georgian Polytechnic Institute (GPI). The Institute consisted of 15 full-time and 13 part-time faculties. In 1985 – 1987 - for the volume of the advanced scientific researches and works carried out by the students, Polytechnic Institute took first place in the USSR higher educational institutions. During this period, the Institute became the largest higher educational institution in the Caucasian region for its students (total 40 000) and academic staff (total 5000). In 1990 Georgian Polytechnic Institute was granted the university status and named as the Georgian Technical University (GTU).
In 1995 due to reforms and restructuring of curriculum, GTU gradually began installation of new training standards introducing Credit System –120 of the UK credits.
In 2001 GTU became a full member of the European University Association – EUA.
In 2005 GTU joined Bologna process and introduced 60 ECTS credits.
In 2005 due to the reorganizations conducted at GTU, 8 Faculties were set up.
In 4 September 2012 GTU was authorized by the National Center for Educational Quality Enhancement (Decree # 272).
In 2016 due to the reorganizations conducted at GTU, 11 Faculties were set up.

Faculties:

- Faculty of Civil Engineering
- Faculty of Power Engineering and Telecommunications
- Faculty of Mining and Geology
- Faculty of Chemical Technology and Metallurgy
- Faculty of Transportation and Mechanical Engineering
- Faculty of Architecture, Urban Planning and Design
- Faculty of Informatics and Control Systems
- Faculty of Law and International Relations
- Faculty of Engineering Economics, Media Technologies and Social Sciences
- Faculty of Agricultural Sciences and Biosystems Engineering
- International Design School

C. History of Power Engineering and Telecommunications (PET) Faculty

The Faculty of PET was esteblished in 2005 in Georgian Technical University by combining two Faculties: Faculty of Energy (founded in 1930) and Communications (Founded in 1974). The faculty offers 4 bachelors, 4 master's (1 English language program) and 3 doctoral degree programs in Georgian as well as in Russian Language. 2 educational-scientific laboratories, 3 scientific research centers, 1 scientific-research institutes, and 1 educational (retraining) center operate at the faculty. The faculty is known for its outstanding scientific activities. Scientific directions comprise a wide range of research activities which are published in European and US Scientific papers such as: AEU International Journal of Electronics and Communications, IEEE Transactions on Information Theory, IEEE Transactions on Communications, IEEE Journal on Selected Areas in communications, IEEE Electronic Letters, IET Communications. The faculty undertakes a number of scientific projects funded by national and international foundations. 8 scientists and students received international and local scholarships during 2008-2011 academic years.

E. Options

Faculty offers Bachelor of Science degree program: "EE Engineering (EE)". Programs provide a general Electrical engineering degree at the undergraduate level with the option to focus on technical electives from offered discipline areas. These areas include: signal processing, automatic control, and communication, power systems, electric machine, power electronics engineering.

Program Features

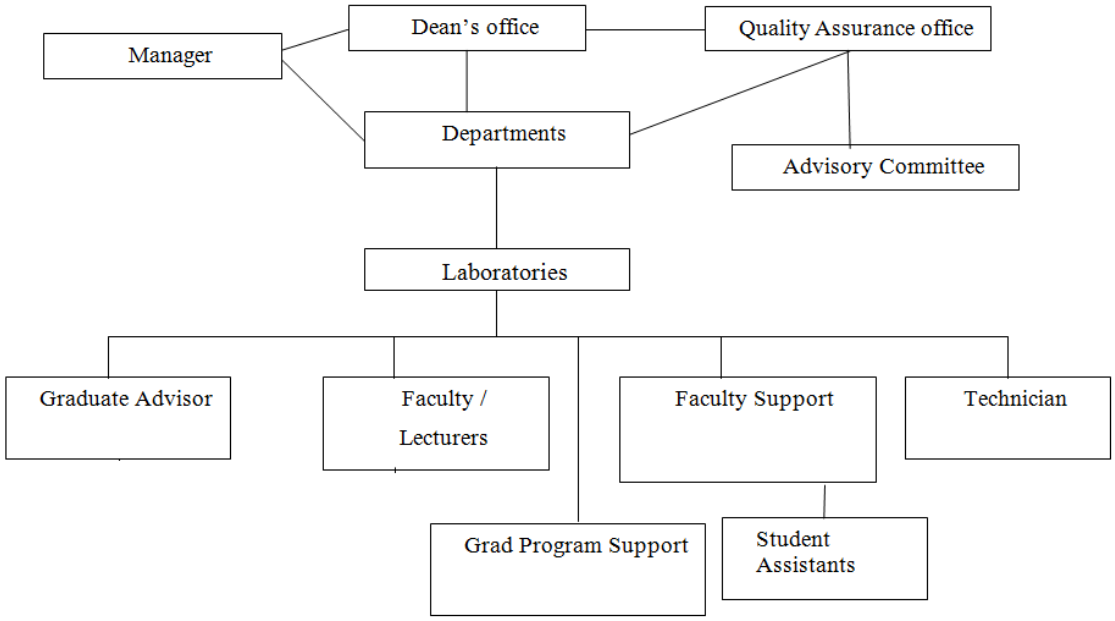
The program's volume is 240 credits which are distributed as follows: Mathematical and Natural Sciences - 64 credits (26.7%); General engineering subjects - 81 credits (33.75%); Special subjects - 55 credits (22.9%); Economic and managerial subjects related to specialty - 30 credits (2,5%); Humanitarian subjects - 9 credits (3.75%). Out of 240 credits, the components of free components are 26 credits - 10,8%. The first three years of teaching include the university, general engineering and specialty components. Their formation is logical and consistent. The content of the courses in the first semester develops from the introductory part to the more difficult issues. Production practices are provided for 15 hours in VI semester and 75 hours for the whole flow are distributed on 5 subjects. Subject to the task of manufacturing practice is determined by the syllabus of the relevant subject. That is why 1/5 of the total number of students entering the practice in the same semester takes on the tasks related to the subject, the subjects related to the subjects of the second one, the second subject, and so on. Under the course of the practice, the subject of the undergraduate work will be revealed and the student starts working from the seventh semester under the guidance of the corresponding professors of the first stage of the bachelor's work. In parallel with this, before the beginning of the VII semester the educational program offers 5 groups of special subjects related to telecommunication directions: «Next Generation Networks», "Optical Systems of Telecommunications", "Telecommunication Companies Management", "Radio Technique and Broadcasting" and "Digital Telecommunication". One of these groups of optional subjects is selected by a student who meets the optional topic of bachelor's work. 5 groups of elective subjects contain 60 items. In particular, the first group consists of 12 subjects, the second group - 16 subjects, the third group - 8 subjects, 4 groups - 16 subjects, and the fifth group - 8 subjects. Students selected from the selected group will select five 5 credits in VII semester, and in VIII semester - three 5-credit (40 credits). The student should stage a bachelor's degree in the course of VII and VIII semester. The I stage (VII semester) of the Bachelor's Degree will be undertaken to conduct the Operational Practice with the purpose of obtaining and measuring statistical data necessary in the relevant company of the undergraduate work of 15 hours. Submission of subjects and bachelor's work is evaluated by the methods and criteria obtained at Georgian Technical University.

Specifically, the student's knowledge of the semester is evaluated by 3 forms (current activity, mid-examination and final / additional exam). Each form and component of the evaluation from the general score of the assessment (100 points) is defined in the final assessment. Also, each form of assessment is defined by the minimum competence limit. Maximum score of current activity is 30 (minimum positive assessment is 15 points), maximum score of midterm tests 30 (minimum positive assessment is 7.5 points), maximum score for final / extra test score 40 (minimum positive assessment is 10 points). In order to get any student component of the educational program passed, he must have at least 51 points during the semester. "Electrical Engineering" is 120 credit, which consists from 1-2 year part (120 credits), modules (60 credits) and elective courses (60 credits). This program will be discussed below in detail.

The EE Engineering is 240 ESTC credit four-year program. Each academic year is divided into two semesters. Among these offerings, the engineering, mathematics and science courses required for the engineering degree are offered in the fall and spring semesters. Each semester covers 18-week period with 15 weeks for study days, two weeks for midterm examinations and the last week reserved for final exams. A lecture course is typically 1-semester units and meets for four 45 - minute periods each week. The laboratory courses are typically 1-semester unit and meet for one 90 or 125 minutes session each week.
The summer courses are offered in different formats for internship. The internship credits result from approved, suitable engineering content during the work experience according to set standards, as ensured by a close collaboration between the internship coordinator and a work supervisor at the industry partner.

F. Organizational Structure of the Faculty

PET Faculty has a rich and flexible academic organization (Appendix D). Highly qualified professors (147), teachers (21), and growing material-technical base create excellent grounds for training competent professionals. Currently, the faculty has 8 departments: Department of Radio and Broadcasting Engineering; Department of Telecommunication; Department of Heat and Energy Effective Engineering; Department of Power and Electromechanic**s** Engineering; Department of Electrical and Electronic Engineering; Department of Power consumption Technology; Department of Hydro-Engineering and Pipe line Systems; Department of Enterprise Innovations' and Operation Management.



Faculty of Power Engineering and Telecommunication Organization Chart

Dean:	Prof. Gia Arabidze g.arabidze@gtu.ge
Deputy of Dean	Prof. Lali Khuntsaria **Lali_khuntsaria@mail.ru**
Faculty Manager:	Prof. Vakhtang Sabakhtarishvili
Head of Quality Assurance Service:	Assoc. Prof. Nikoloz Abzianidze n.abzianidze@gtu.ge
Head of Construction Laboratory:	
ABET Committee:	Prof. Gia Arabidze Prof. Lali Khuntsaria Assos. Prof. Giorgi Gigineishvili Assos. Prof. Nikoloz Abzianidze

G. Program Delivery Modes

Instructions about Program Delivery Modes you can find in GTU's web-site:
http://www.gtu.ge/quality/axali/s*hefasebisforma.pdf. (in Georgian language)

There are three basic Program Delivery Modes:

Lectures: Verbal and written methods, cooperative teaching, case study, explanatory method, problem-based learning (PBL), demonstration method, induction, deduction, analysis and synthesis.

Seminars, Practical and Laboratory Teaching: verbal and written methods, book based method, laboratory and demonstration methods, activity-oriented teaching, practical methods, induction methods, analysis method and synthesis method, electronic attending (E-learning).

Team Projects: Verbal, PBL, E-learning, cooperative learning, collaborative work.

Generally, the classes are offered during days on campus. Sometime we offer one or two sections of a course that has multiple sections in evenings. The classes are lecture classes or lecture-lab classes.

H. Program Locations

The program is mainly offered in the VIII building of Georgian Technical University. Mathematics, Physics, Chemistry and Biology courses are offered at a number of locations on the GTU campus.

I. Public Disclosure

Program Educational objectives, Student outcomes, annual student enrollment and graduation data are available on our website:

http://gtu.ge/quality/Forms-And-Recomendations/Recomendations.php (in Georgian language)

J. Deficiencies, weaknesses or concerns from Previous Evaluation(s) and the Actions taken to address them.

The Self-study prepared for the initial ABET accreditation review.

CRITERION 1: STUDENTS

A. Student Admissions

New student admission is managed by a nationwide examination and admissions process. Credit for courses taken by transfer students at another institution is done by a central office. There is no credit given for work in lieu of courses. Graduation requirements are checked by advisors, by a commission at the faculty level, and by the central administration.
In order to be admitted to the Electrical Engineering program at Georgian Technical University, a student must pass Mathematics along with other exams organized by the National Assessment and Examinations Center (NAEC) through "Unified National Exams" and receive enough scores to be admitted to the Power Engineering and Telecommunications Faculty. "Unified National Exams" provided through Computer Adaptive Testing (CAT) created by the experts of NAEC. Alternatively, he/she has to pass Calculus Course

in another accredited high education institution equivalent to the Power Engineering and Telecommunications Engineering Calculus Course level.

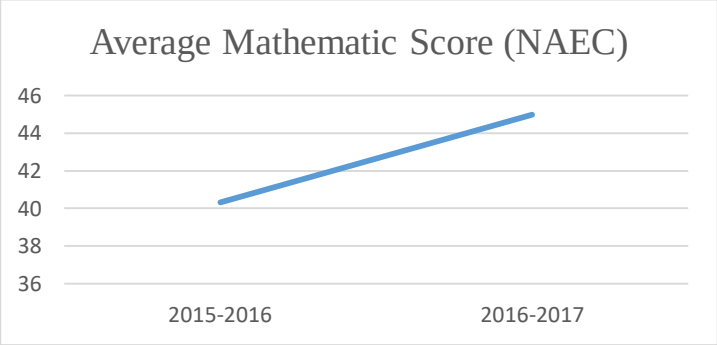


Figure 1.1: Admission Trends – Average Composite Mathematic Scores (NAEC) (max score 59)

Academic year	Freshmen	NAEC	Total Faculty Enrolment
2013-2014	502	715	1923
2014-2015	627	715	2190
2015-2016	643	715	2565
2016-2017	598	620	2819

Table 1.1. History of "Total Freshman Enrollment" over the Past 6 Years on extent EE Engineering program.

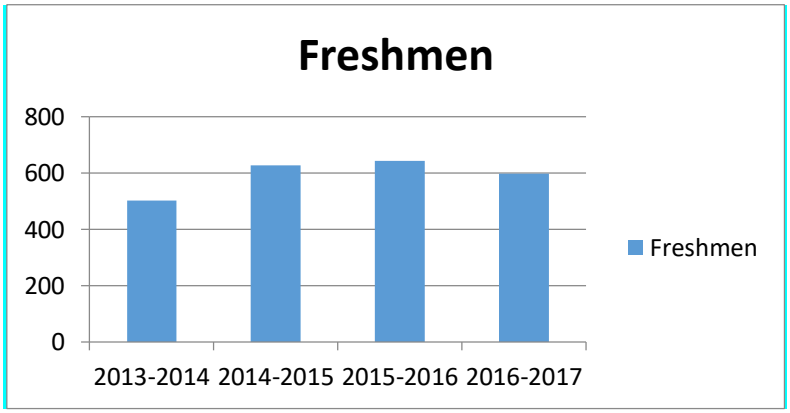


Figure 1.2. History of "Total Freshman Enrollment" over the Past 4 Years

The increase in students is due apparently to the fact that since 2013 Georgian Government pays tuition fee for students in the specialty "Energy and Electrical Engineering".

B. Evaluating Student Performance

Student Performance is evaluated a maximum of 100 points scores. 30 of which is every week assessment during 15 weeks (homework, quizzes, presentation in the class, team or individual projects). Midterm and final exams can be evaluated by tests, presentation in the class, team or individual projects. Forms of a midterm and final exam evaluation may vary for different subjects. Students' work and study success are evaluated according to the syllabus of each course, which is a combination of midterm and final exams.

Grading System of the EE Program is coherent with the GTU standard grading system:

Evaluation	Scores	GPA
A	91-100	4.0
B	81-90	3.25
C	71-80	2.50
D	61-60	1.75
E	51-60	1.00
F	0-50	0.00

Table 1.2: GTU Grading System

This grading system is according to EQE and need revision for ABET accreditation

Electronic Assessment Portal of Georgian Technical University.

Electronic assessment portal of Georgian Technical University is presented on Figure 1 (Appendix J).

C. Transfer Students and Transfer Courses

There are two types of Student Transfer in Georgia. A transfer from one higher education institution to another and a transfer from one program to another within the higher education institution (internal transfer).

First is centralized by the Legal Entity of Public Law (LEPL) – National Center for Educational Quality Enhancement (EQE). It is regulated by the Ministerial Order №120/N of 2010, 4th of December. Student transfer can take place twice a year during the fall and spring semesters.
For more information visit student transfer website www.students.eqe.ge.
The second type of student transfer is administered by the higher education institutions. Internal transfer in the Georgian Technical University is regulated by the Article 7 of the University Council Resolution N77/2011.
For internal transfer students can visit website: http://gtu.ge/Study-Dep/ (in Georgian language)

Academic Year	Fall	Spring
2014-2015	43	38

2013-2014	28	29
2012-2013	57	20
2011-2012	35	17

Table 1.4. Transfer students for past 5 Academic Years.

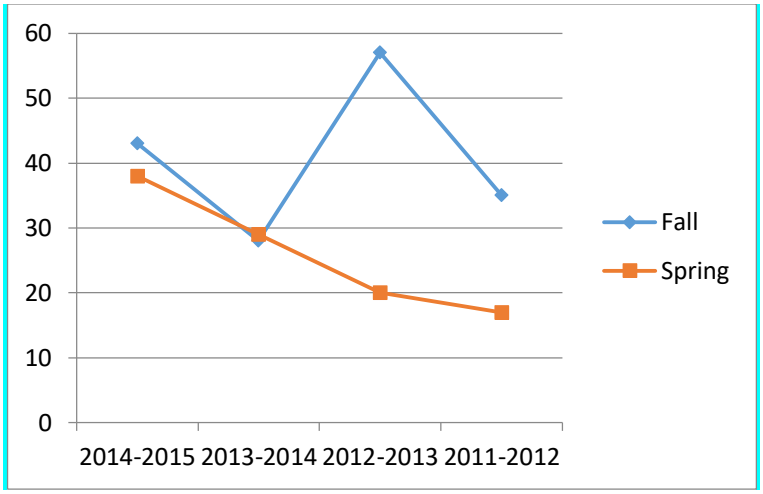


Figure 1.5. Transfer students for past four Academic Years

Validating Transfer Courses

Transfer students are admitted through a similar process as the case for freshman admission. Transfer courses will be validated according to the program objectives and the similarity of the course outcomes. The student must present a portfolio for the course including assignments and examinations.

D. Advising and Career Guidance

Students in Georgian Technical University will receive constant advising and career guidance by their professors. For career advice; students can visit professors during the open hours for any kind of career guidance.

Student advising is captured on paper in the form of an Advising Plan that every student submits during the first semester of his or her junior year. Students make a preliminary selection of their elective courses, discuss their selection with the faculty advisor and submit the entire program (except for specific general education courses) to the department for approval. Advising Plans are modified every year to reflect curriculum changes. The Advising Plan is checked for compliance with regulations by the administrative assistant to the undergraduate program and approved by the department chair. Copies of the Advising Plans are given in Appendix S.1 Advising Plan. This form is signed by the faculty advisor and submitted to the department for compliance evaluation.

Students wishing to amend a Advising Plan may file a petition for adjustment with the department office. Amendments are checked for compliance with regulations by a department secretary and reviewed by the department chair using the same guidelines indicated above (Appendix S.1). In addition to technical courses specified on the Advising Plan, a student must take General Education (GE) courses to obtain a degree. The GE requirements are somewhat complex. All GTU students must meet these requirements. Power

Engineering and telecommunications faculty advisors will handle GE questions. Some of the required courses listed on the Advising Plan are used to satisfy the GE requirements (Physics 195, 196 and 196L; and Mathematics 150 and 151). A General Education advising sheet for engineering majors is included in Appendix S.2.

E. Graduation Requirements

In order for a student to graduate, he/she should have a minimum of 120 credits (240 ESTC credits) including all the required courses.

120 credits (240 ECTS credits) are distributed accordingly:

Field	Credits	ESTC credits	%
General Education	22.5	45	18.8
Mathematics	15	30	12.5
Science	17	34	14.2
EE Core courses	12	24	10
Professional electives	11	22	9.2
Engineering Courses	31.5	63	26.3
EE Computer Applications	6	12	0.5
Capstone Design Project	5	10	4.2
SUM	120	240	100

Table 1.3. Distribution of credits

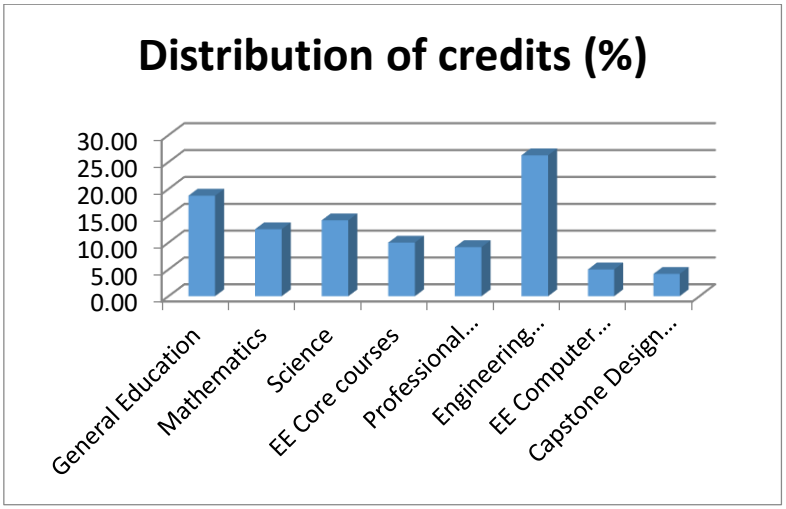


Figure 1.4. Distribution of credits for modified of EE Program

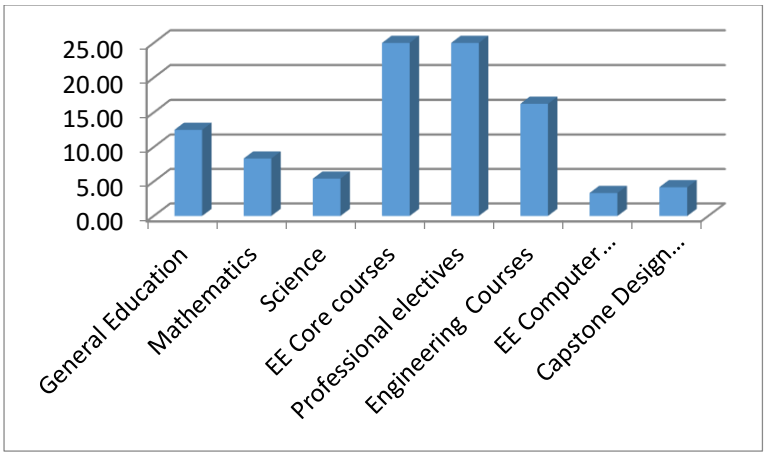


Figure 1.5. Distribution of credits before modification of EE Program

G. Transcripts of Recent Graduates

The Faculty will provide transcripts requested by the ABET team with any needed explanation of how the transcripts are to be interpreted (see Appendix E.).

CRITERION 2: PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

A1. University Mission Statement

Technical University of Georgia is a center, which developed engineering technologies and cultural values oriented on democratic and humanitarian ideals.
The mission of University is:

- Supporting innovation-based higher education and scientific research;
- Executive training competitive specialists with civic consciousness and the universal values;
- Teaching according to the laws of the market economy and a knowledge-based business development;
- Preparing specialists in engineering by teaching innovative technologies and the social, legal and humanities sciences;
- Providing acquisition to students of knowledge and competencies that will support their subsequent education and further enhance the socio-economic state.
- Prepare qualified researchers and creative engineers, thus contributing to the scientific aspects of Georgia and a worthy contribution to the world of social and economic progress.

This information can be obtained from GTU website http://gtu.ge/pdf/wesdeba_Eng.pdf

B. Program Educational Objectives

The Power Engineering and Telecommunication Faculty has determined that the educational objectives for the program are as follows:

Objective 1. PET students will develop into technically competent engineer capable of solving advanced, complex engineering problems.

Objective 2. Graduates will be hands on practitioners of engineering becoming effective collaborators, innovators and leaders.

Objective 3. PET Faculty graduates will be prepared to embrace the continuous learning necessary to practice engineering over their entire professional lifetimes through continuous education and graduate/professional studies in engineering or business.

The program provides students both theoretical and practical foundations needed to be successful through classroom and lab activities, opportunities for research, and early involvement in professional organizations, the Faculty seeks to educate a well-rounded professional capable of independent thinking.

B.1. Program Constituencies

The significant constituencies of the EE program include:

- Faculty members
- Alumni
- Business and industry (Advisory Committee)

These constituencies will actively involve in our continuous improvement process through surveys (see Appendix I.1 and I.2), steering committee meetings, and personal interactions. The feedback from these groups will utilize to gauge the relevance of our program educational objectives to their needs, help assess and evaluate the performance of our students, and improve the quality of our mission-driven program.

B.2. The proposed Process for Review of the Program Educational Objectives

The original program educational objectives (PEOs) will encapsulate the recommendation from several discussions among the industrial members of the Advisory Committee. The professional relevance of these objectives and their levels of achievement will periodically evaluate according to a structured process that involves our constituencies. Based on this recommendation, the eventual formal statements for these objectives will emerge from collegial discussion among all faculty members based on previously mentioned business and industry input. The relevance of these objectives will periodically establish according to the assessment and plane evaluation process illustrated in Figure 2.1.

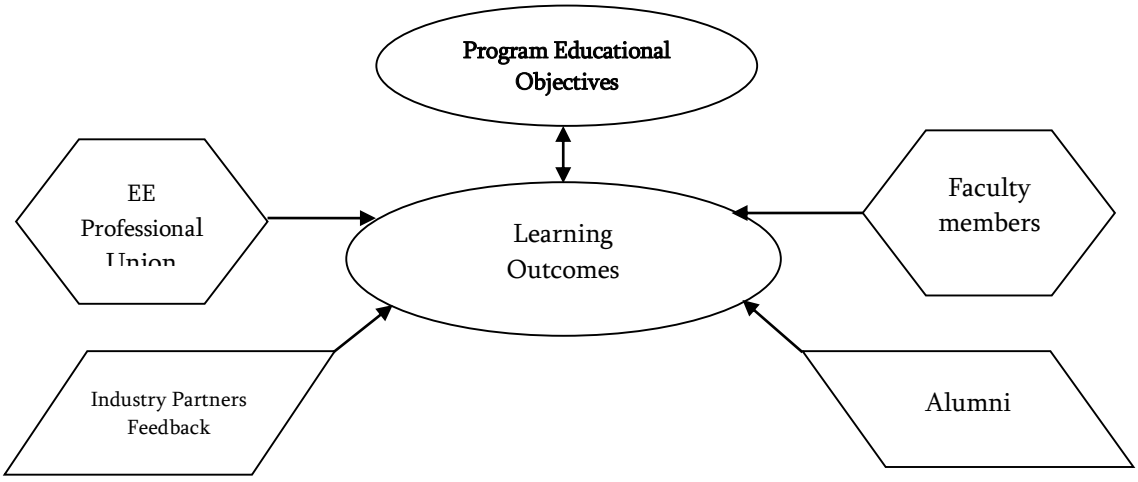


Figure 2.1. Process for establishing, assessing, and evaluation the program educational objectives

CRITERION 3: STUDENT OUTCOMES

A. Student Outcomes

Graduates of the EE program will have

a) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
b) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
c) an ability to communicate effectively with a range of audiences
d) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
e) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
f) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
g) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

B. Relationship of Student Outcomes to Program Educational Objectives

The relationship between the program objectives and the student outcomes is given in the following table.

Table 3.1. Mapping of student outcomes to program educational objectives (PEOs).

Program Educational Objectives	Strategy/Action in program	Student Outcomes
PEO_1: PET students will develop into technically competent engineer capable of solving advanced, complex engineering problems.	Provide a foundation in mathematics, science and engineering with a focus on electrical engineering core competencies	(a) (b) (f)
PEO_2: Graduates of PET Faculty will be hands on practitioners of engineering becoming effective collaborators, innovators and leaders.	Provide experiences that foster collaborative and leadership skills	(c) (e)
	Emphasize how Electrical engineering impacts the world around us	(d)

PEO_3: Faculty graduates will be prepared to embrace the continuous learning necessary to practice engineering over their entire professional lifetimes through continuous education and graduate/professional studies in engineering, business, law or medicine.	Communicate importance of inquisitiveness, self-directed learning and personal development	g

CRITERION 4. CONTINUOUS IMPROVEMENT

A. Student Outcomes

A.1. Assessment and Evaluation of Student Outcomes at Course Level

Introduction

The EE program at GTU is committed to improve its processes in evaluating student outcomes and will implement the recommendations obtained from assessments, evaluations and student feedback as of Fall 2018.

A.2. Assessment / Evaluation Tools Direct and Indirect Assessment

Learning assessments will be applied that are consistent with accreditation requirements of direct and indirect assessments, with appropriate measurement tools. For example, direct assessment includes the assessment of homework, examinations, class discussion and projects. Indirect Assessment includes qualitative Student exit survey, faculty.

Direct assessment

Direct assessment of student outcomes will **be** based on evaluation done by the EE Engineering faculty and includes the following items:

Instructor Course Evaluation Form (ICEF)

ICEF will be an online form that provides a summary evaluation of student outcomes by the instructor in a course by the spring of 2018. Instructors are encouraged to provide feedback on student performance and any logistical difficulties faced during the course in the comments sections. Sample folders for pilot courses will be delivered to the program coordinator at the end of Fall 2018 semester. Folders included cover page and a table of content to guide professors while filling them with the necessary course documents. Course portfolios with samples from homework, quizzes, tests, exams, projects reports, term papers etc. showing that the students possess the appropriate outcome attributes. Course portfolios will be prepared with appropriate evidence for all sections of senior level courses.

Four fundamental courses chosen for the pilot study during fall 2018. The courses selected for each outcome are the ones which have the most significant contribution to that outcome;

1. Circuit Analysis 1
2. The fundamentals of Engineering electronics
3. Signals and Systems
4. Electromagnetic Ecology

Table.1 Shows the relationship of the student outcomes, expected by graduation and the EE core curriculum and Professional l electives.

ABET student outcomes (a) through (k) Key to matrix entries (H) = topic of major importance in course. (M) = topic addressed by course in some manner, desired graduation, or technical elective course not completed by all students.	a) science, mathematics	b) design	c) communicate	d) ethical and professional responsibilities	e) team	f) experimentation, analyze	g) new knowledge
EE Core Courses							
Circuit Analysis 1	H					M	
Circuit theory 2	H	M				M	
The fundamentals of Engineering electronics	H	M			M		
Signals and Systems	H						M
Analysis and design of electrical circuits	M				M	M	
Feedback control systems	H						
Electric and Magnetic Fields	H	M					M
Electromagnetic Ecology		H	M	M			
Power Electronics	H						
Renewable Energy Sources	M		M	M			
Electro Technical Materials and Equipment	M	M					
EE Professional Elective Courses							
Analog and Digital Communication Systems	M	M	M				
Electromagnetic Ecology	M			M		M	
Technology of power consumption	M		M				M
Fiber-Optical Communication Systems	M						M
Power Supply Systems	M		M				
Optical transportation networks an systems		M			M		
Automated Electromechanical systems	M	M					
Embedded systems in electrical engineering		M			M		
Electrical machines	M					M	
Radio channels	M			M			

ABET student outcomes (a) through (k) Key to matrix entries (H) = topic of major importance in course. (M) = topic addressed by course in some manner, desired graduation, or technical elective course not completed by all students.	a) science, mathematics	b) design	c) communicate	d) ethical and professional responsibilities	e) team	f) experimentation, analyze	g) new knowledge
Optical transportation networks and systems		M	M				M

Table 2 shows the relationship between the EE pilot courses, instructors, discipline groups, student outcomes and actual assessment frequency plan. Some introductory courses will be assessed more often to gain information about students' performance at the entry level of the Program.

TABLE 2 Planed Summary of Assessment Methods and Frequency of EE pilot courses Outcomes

Core Courses	Major Student Outcomes Addressed	Other Student Outcomes Addressed	Method(s) of Assessment	Frequency
Circuit Analysis 1	(a)	(f)	a= exam question, e,g=homework and course/instructor evaluation report using competency-based rubric, review of pre-	
The fundamentals of Engineering electronics	(a)	(b),(e)	a= exam question, e,g=homework and course/instructor evaluation report using competency-based rubric, review of pre-	
Signals and Systems	(a)	(g)	targeted exam questions	
Electromagnetic Ecology	(b)	(c), (d)	b=laboratory exercise e=competency-based rubric with evaluation based on	

Performance Metrics

The ABET Committee has decided on a finalized rubric proposals describe in the

Indirect Assessment of Student Outcomes

Indirect assessment of student outcomes is done through the following surveys:

Student Surveys

Student surveys will be conducted at end of each semester, starting from Fall 2017. The information collected is used to adjust the effectiveness of class lectures, tutorials, quizzes and home works. The survey will assist in regulating the pace and focus of class lectures and homework, ensuring adequate progress and full compliance in learning outcomes for the students is attained.

Alumni survey (Appendix I.1)

Alumni surveys seek evaluations on various skills related to the program outcomes and ask the EE alumni to evaluate:

- Level of preparation they received in these skills/outcomes as students
- Importance of these in employment
- Three skills/outcomes they consider most important for employment.

Employer survey (I.2)

Employer surveys will conducted in the spring 2018 and will cover fields, including skills, abilities and

attributes that the program and college consider important for its graduates. They solicit employers' evaluations on these as well as their importance in Electrical Engineering practice.

Capstone Design Project

This course is important because it provides the student, an opportunity to practice design in a way that parallels what will be encountered in professional practice. Students are required to apply a systematic design process, incorporate engineering codes, standards, and realistic constraints that include economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political considerations in solving the design problem.

Introduction to Capstone Project

To prepare the senior year students for their capstone projects provides guidance with the selection of their project advisors, topics and teams. Students form their team, select project topic, and carry out a literature review, performing preliminary design and feasibility study of the project. Prepare schedule for project completion in capstone project. Lectures will be delivered by the faculty members on the topics such as teamwork, leadership, communication skills, and project reports, oral and written presentation. This process will initiate during the registration period of Fall 2017.

Capstone Project reports

Capstone Project represents the culmination of the four-year student learning. The capstone Project report succinctly sums up the attainment of nearly all student outcomes and in a way reflects on the overall achievement of student outcomes in the Faculty.

It includes an evaluation by attendees of the final oral project presentation and an evaluation by the faculty advisers. In addition to Student Outcomes assessment, the evaluation particularly evaluates student performance in verbal communication skills, teamwork, formulating, planning and implementing the assigned Capstone Design Project under several realistic design constraints.

Three Committee needs to be establish and their responsibilities during the 2017-2018 academic year.

1. Teaching Area Groups (TAGs)
2. Outcome Assessment Coordinator (OAC)
3. Undergraduate Program Committee (UPC)

Teaching Area Groups (TAGs)

Each TAG will comprise of all faculty members teaching in the particular area. The coordinator of each TAG is also member of the UPC. TAG s in the Power \engineering and Telecommunications Faculty are:

1. Heat Engineering
2. Hydro Engineering
3. Electrical Engineering
4. Telecommunication Engineering

Additionally, there are 4 coordinators for the common Faculty courses.

The mandate and specific tasks of the TAGs are as follows:

Course development

Review course objectives, outcomes and assessment methods/tools
Revise course descriptions based on review and assessment.

Course assessment

Analyze and evaluate assessment results from courses
Evaluate student performance in courses each semester in terms of student outcomes rated as H and M.
Provide feedback to UPC.

Outcome Assessment Coordinator

As a member of UPC, coordinates assessment activities with help from a secretary assigned mainly to assessment work. The mandate of the assessment coordinator is in general, focused on ABET Engineering Criterion 3, 4 and 5. This mandate includes the following specific tasks:

- Liaison with the Office of Quality Assurance Service of Electrical Engineering Faculty of GTU
- Outcome Assessment plan development and maintenance
- Assessment tools development and maintenance
- Coordination of course assessments through TAGs
- Analyses of results from TAGs and OAA on Student Exit Surveys, Faculty Surveys, Employer and Alumni Surveys
- Reports assessment results to UPC and Dean
- Prepares an annual report to be reviewed by UPC, Faculty Dean and OAA.

Undergraduate Program Committee (UPC)

The UPC consists of the chair of the committee assigned by the Faculty Dean, TAG coordinators, and the assessment coordinator. The secretary assigned to the assessment process assists the group as a whole.

The mandate of UPC covers all ABET Engineering Criteria.

1. Program Educational Objectives
2. Continuous Improvement
3. Professional Component
4. Facilities
5. Program Criteria

Specific task/responsibilities of UPC cover the following:

- Compiling information related to the above areas**;**
- Revision/upgrading of Electrical Engineering program curriculum, course contents and outcomes
- Overall responsibility for preparing the Electrical Engineering program for the ABET engineering criteria requirements
- Preparation of readiness report of the Faculty during the summer 2018
- Presentation of all material in the format required by ABET Self-Study Report
- Keeping a systematic log of UPC activities, including minutes of meetings, discussion, attendees, and communications with Power Engineering and Telecommunications Faculty Dean and Council.

CRITERION 5. CURRICULUM

A. Program Curriculum

Curriculum should be aligns with the student outcomes and corresponding educational objectives. Each major course should contribute to the development of learning toward the desired student learning outcomes.

The existing EE program was modified according to ABET requirement. The Mathematics and basic science courses were increased. A certain percentage was reached between Mathematics, Science, and Engineering and General Education courses. Engineering Courses were combined and arraigned into the Core and Elective Courses.

"Electrical Engineering" program

Science and mathematics

Mathematics

Students pursuing the BSEE degree are required to take the following Mathematics courses (30 hours):

Course		Semester Unit
MATH 150	Calculus I	12
MATH 121	Calculus II	7
	Calculus III	7
MATH 220	Differential Equations	5
MATH 170	Linear Algebra	5
STAT 280	Probability and Statistical Methods	5
		41

Science.

Students pursuing the BSEE degree are required to take the following courses

	Course	Semester Unit
PHYS 140	General Physics 1A	7
PHYS 150	General Physics 2A	6
CHEM 120	Chemistry	4
		17

Electrical Engineering Core Courses

	Course	Semester Unit
EE 210	Circuit Analysis 1	6
EE 220	Circuit Analysis 2	7
	Introduction in Electrical Engineering	3
	Descriptive Geometry	3
	Compiuter Engineering grafics	5
	Statistical and Computational Methods for Electrical Engineering	5
EE 225	Renewable Energy Sources	5
EE 330	Fundamentals of Engineering Electronics	5
EE 320	Embedded systems in electrical engineering	5
EE 325	Electric and Magnetic fields	5
EE 345	Electrical lighting	5
EE 230	Signal and Systems	5
EE 340	Analysis and Design of Electrical Circuits	5
EE 350	Power Electronics	5
EE410	Feedback control systems	5
EE 415	Electrotechnical Materials and Equipment	5
EE 420	Electromagnetic Waves	5
EE 430	Electromagnetic Ecology	5
EE 435	Production Operations Practice	3
		92

Area Electives 1 (5 Hours) **38+5 = 43**

Student must choose one of the following courses:

EE 314	Management of Telecommunication's companies	5
EE 315	Economics and management of Energy field	5

Area Electives 2 (5 Hours) **43+5 = 48**

Student must choose one of the following courses:

EE 314	The fundamentals of information theory	5

EE 315	Electrical machines	5

Area Electives 3 (5 Hours) **48+5 = 53**

Student must choose one of the following courses:

EE 324	Technology of Power Consumption	5
EE 325	Analog and Digital Communication Systems	5

Area Electives 4 (5 Hours) **53+5 = 58**

Student must choose one of the following courses:

EE 416	Fiber-Optical Telecommunication	5
EE 417	Cellular mobile Telecommunication Technology	5
EE 418	Radio Channels	5
EE 419	Power Supply Systems	5

Area Electives 5 (5Hours) **58 + 5 = 63**

Student must choose one of the following courses:

EE421	Optical transportation networks and systems	5
EE 422	Infocommunication networks	5
EE 423	Sound and Television broadcasting	5
EE 424	Automated Electromechanical systems	5

Area Electives 6 (5 Hours) **63 + 5 = 68**

Student must choose one of the following courses:

EE423	Design of Telecommunication Cable Systems and Networks	5
EE424	Fundamentals designing of mobile communication Networks	5
EE 425	Microwave equipment and systems	5
EE 426	Substation Power Supply Systems	5

University Electives 1 (3 hours)

Student must choose one of the following courses:

HIST 101	History of Georgia	3
HIST 102	American History Since the Civil War	3
PHIL 102	Introduction into Philosophy	3

PSYC 101	General Psychology	3
SOCI 103	Introductory Sociology	3
HUM 105	Technology and Society	3

University Electives 2 (3 hours)

Student must choose one of the following courses:

HHS 104	labor Safety and Emergency Management	3
CHM 101	Environment Protection and Ecology	3

University Electives 3 (3 hours)

Student must choose one of the following courses:

LEN 340	Oxford English for Electronics	3
LEN 350	English for Technical Specialties	3
LEN 360	English for Technical Specialties	
LEN 370	German for Technical Specialties	

Table 5.1. The plan of study for students in the Electrical Engineering major

Bachelor Program Program Electrical Engineering

(The plan of study)

Y/S	**Course** (Department, Number, Title) List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an S. [1]	Subject Area (Credit Hours)			
			MATH & Basic Science	Engineering Topics Check if Contains Significant Design ()	General Education	Other
1.1	Calculus 1	R	8			
1.1	General Physics 1A	R	7			
1.1	Fundamentals of Economics	R			6	
1.1	English –B1.1	R			5	
1.1	Introduction in Systems Engineering	R		4		
		30 ECTS	**15**	**4**	**11**	
1.2	Calculus 2	R	7			
1.2	General Physics 2A	R	6			
1.2	Fundamentals of Business Management	R			4	
1.2	English – B1.2	R			5	
1.2	Applied Informatics 1	R			5	
1.2	Introduction in Electrical Engineering	R		3		
		30 ECTS	**13**	**3**	**14**	
2.1	Calculus 3	R	7			
2.1	Linear algebra	R	5			
2.1	Chemistry	R	4			
2.1	Applied Informatics 2	R			5	
2.1	Circuit Analysis 1	R		6		
2.1	Descriptive Geometry	R		3		
		30 ECTS	**16**	**9**	**5**	
2.2	Probability theory and mathematical statistics	R	5			
2.2	Differential equations	R	5			
2.2	Circuit Analysis 2	R		7		
2.2	Computer Aided Engineering graphics	R		5		
2.2	Statistical and Computational Methods for Electrical Engineering	R		5		
2.2	University Elective 1:Georgian history	E			3	
		30 ECTS	**10**	**17**	**3**	

3.1	Renewable Energy Sources	R			3	
3.1	Area Elective 1:Manegement of Telecommunication /Economics and Management of Energy field	R			5	
3.1	The fundamentals of Engineering Electronics	R		5		
3.1	Electromagnetic Ecology	R		5		
3.1	Magnetic fields	R	4			
3.1	Electric fields	R	3			
3.1	Area Elective 2	E		5		
		30 ECTS	**7**	**18**	**5**	
3.2	Electrical lighting	R		5		
3.2	Signals and Systems	R		5		
3.2	Analyzes and Design of Electronic Circuits	R		5		
3.2	Power Electronics	R		5		
3.2	University Elective 2 :Professional English	UE			5	
3.2	Area Elective 3	E		5		
		30 ECTS	**0**	**25**	**5**	
4.1	Feedback control systems	R		5		
4.1	Electrotechnical materials	R		5		
4.1	Electromagnetic waves	R		5		
4.1	Area Elective 4	E		7		
4.1	Bachelor project 1	R		8		
		30 ECTS	**0**	**30**	**0**	
4.2	University Elective courses : Entrepreneurial Policy of UE, History of Georgian Architecture, Staff and quality management	UE			3	
4.2	Professional Ethics	E			5	
4.2	Area Elective 5	E		7		
4.2	Area Elective 6	E		5		
4.2	Bachelor project 2	R		10		
	Semester	**30 ECTS**	**0**	**22**	**8**	
	Total:	**240**	**61**	**125**	**54**	
		100%	25%	52%	23%	

Criterion 8 INSTITUTIONAL SUPPORT

Mission Statement of Georgian Technical University

Technical University of Georgia is a center, which developed engineering technologies and cultural values oriented on democratic and humanitarian ideals.

The mission of University is:

- Supporting innovation-based higher education and scientific research;
- Executive training competitive specialists with civic consciousness and the universal values;
- Teaching according to the laws of the market economy and a knowledge-based business development;
- Preparing specialists in engineering by teaching innovative technologies and the social, legal and humanities sciences;
- Providing acquisition to students of knowledge and competencies that will support their subsequent education and further enhance the socio-economic state.
- Prepare qualified researchers and creative engineers, thus contributing to the scientific aspects of Georgia and a worthy contribution to the world of social and economic progress.

Georgian Technical University students expand and deepen their interdisciplinary and general understanding of the world, enhance their critical skills, and take responsibility for a lifetime of learning, and as graduates become individuals who engage, enhance, and contribute to democratic society. The following are the institutional learning goals of GTU

Knowledge: Mastery of content and processes of inquiry

GTU graduates have a strong knowledge base in their academic major and can use powerful processes of inquiry in a range of disciplines. They engage contemporary and enduring questions with an understanding of the complexities of human cultures and the physical and natural world and are ready to put their knowledge into action to address contemporary issues.

Proficiency: Intellectual skills

GTU graduates are equipped to actively participate in democratic society. They are critical thinkers who make use of quantitative and qualitative reasoning. They have the ability to find, use, evaluate and process information in order to engage in complex decision making. They read critically, speak and write clearly and thoughtfully and communicate effectively.

Place and Community: Urban and global mission

GTU graduates are engaged individuals who have contributed to the multi-lingual and multiethnic communities that constitute Los Angeles and the world of the future. They are aware of how their actions impact society and the environment, and they strive to make socially responsible decisions. They are community builders sensitive to the needs of diverse individuals and groups and committed to renewing the communities in which they live.

Transformation: Integrative learning

GTU graduates integrate academic learning with life. They engage in community, professional, creative, research and scholarly projects that lead to changes in their sense of self and understanding of their worlds. Graduates integrate their knowledge, skills and experience to address complex and contemporary issues and act ethically as leaders for the 21st century.

Mission Statement of Power Engineering and Telecommunications Faculty

The mission of the Faculty of Power Engineering and Telecommunications is to provide a high quality undergraduate and graduate education in the Energy and telecommunications engineering areas as well as the advising and other support needed to ensure the students' academic success and preparation for a productive engineering career. In addition, through research and continuing professional development, the faculty produce, enhance and promote new developments within their areas of expertise for the benefit of society and the furtherance of their profession.

The objective of the program is to give the student a basic knowledge of Electrical (Electrical and Electronic) engineering, as well as the interdisciplinary background and skills to meaningfully participate in and contribute technical advances toward this profession. The program integrates technical aspects with studies in the social sciences and humanities to ensure appropriate sensitivity to socially related problems. Instruction is given both at the undergraduate level, leading to the bachelor's degree, and at the graduate level, leading to the master's or doctoral degrees. The undergraduate program builds upon concepts of mathematics, physics, chemistry and basic engineering with specialised study in power, communication and environmental engineering. Engineering design is emphasised, particularly in conjunction with computer utilisation and practical engineering problems. Aspects of safety and engineering ethics are woven throughout the program. Breadth and depth of social science and humanities studies is assured by Faculty approved courses. Completion of the under-graduate degree prepares the student for an entry-level professional position in addition to informal or formal graduate studies.

Academic Goals

GTU has adopted the following academic goals to sustain and strengthen our position as a leading university:

- To encourage the intellectual and creative development of a diverse group of students by helping them learn about themselves and others, their own and other cultural and social heritages, and their environment;

- To foster development of critical thinking, reading, oral communication, quantitative and qualitative analysis as well as a commitment to lifelong learning and international perspectives needed to contribute to communities and chosen fields of endeavor;

- To provide the basis for informed citizenship and democracy;

- To offer advanced undergraduate and graduate students professional training and preparation for further study in a broad range of disciplines, with a special emphasis on the preparation of teachers;

- To support faculty in developing specialised contributions to knowledge, including innovative curriculum and pedagogy responsive to intellectual and professional needs of undergraduates, master's and doctoral students;

- To support faculty in their professionally related community activities and informed exchanges with diverse professional and lay communities that strengthen the University's courses and scholarship;

- To encourage scholarship, including creative and performing arts, by students, faculty, and administrators from all areas of the University; and

- To continue our commitment to research, including the expansion of externally funded projects and doctoral programs where appropriate.

Shared Vision

Georgian Technical University pursues its mission and goals through shared vision, a community-wide conversation out of which goals were identified by a broad cross section of faculty, staff, students, administrators, alumni, parents, and community leaders:

- Academic excellence in all GTU's programs and offerings;

- Educational opportunities for the whole person, both inside and outside the classroom;
- The appreciation of diversity in its many manifestations and social justice within the University community;
- The wise use of our precious human and fiscal resources; and
- An international institution where pupils become global citizens.

4. Supporting Academic Departments

Physics

Chemistry

Mathematics

5. Institutional Support Units

Central Scientific Library of Georgian Technical University

Library of Power Engineering and Telecommunication's Faculty

University Computer Center,

Faculty Computer Center

Career Services,

Center for Teaching and Learning

Library

The central scientific library of the technical university of Georgia was founded in 1922. It's one of the largest libraries in Georgia, fund of which consists of 2224357 units. Among them are 16977590 books and 526767 periodical publications. Some unique publications (IX-XX cc) are stored only here.
The Library supports the curricular and research needs of the University community through the development of collections and the provision of services designed to facilitate access to information.

The Center for Teaching and Learning

The Center for Teaching and Learning in the Division of Undergraduate Studies is designed to address contemporary campus issues relating to teaching and student learning. Alone, and in cooperation with units throughout the campus, the Center offers programs for faculty, staff, and administrators on topics such as diversity in the classroom, technology and pedagogy, the scholarship of teaching, active and problem-based learning, and the integration of interdisciplinary values and practices into curricula. The Center holds orientations and other events for new tenure-track faculty and lecturers; it serves as a campus clearing house for gathering and disseminating information about teaching resources and events; it encourages systematic research into pedagogies and student learning; it awards grants to faculty attending off-campus conferences, and it works closely with other campus units to encourage discussions of teaching, learning, diversity in the classroom, non-academic factors and student achievement, and assessment.

6. Credit Unit

GTU is on the semester system. The definition of one semester credit hour conforms to the standard ESTC definition.

Signature Attesting to Compliance

By signing below, I attest to the following:

Civil Engineering Program (*Name of the program(s)*) has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual.*

Gia arabidzer
Dean's Name

Signature **22 May, 2018**