**ABET**

**Preliminary Self-Study Report**

**For the**

*Bachelor Electrical and Electronics Engineering*

*At*

*Tbilisi State University*

**Tchavchavadze ave. 3**

**Tbilisi, georgia**

**November 27, 2016**

Content

[BACKGROUND INFORMATION 4](#_Toc468027966)

[A. Contact Information 4](#_Toc468027967)

[B. Faculty History 4](#_Toc468027968)

[Organizational Structure of the Department 5](#_Toc468027969)

[DEPARTMENT OF COMPUTER SCIENSE 5](#_Toc468027970)

[ummaa 5](file:///C%3A%5CUsers%5Cnika-pc%5CDesktop%5CABET%5CSelf%20Study%20Report%5CDeadline%201%5CPreliminary%20SSR%20CS.docx#_Toc468027971)

[D. Program Delivery Modes 6](#_Toc468027972)

[E. Program Locations 6](#_Toc468027973)

[F. Public Disclosure 6](#_Toc468027974)

[G. Deficiencies, weaknesses or concerns from Previous Evaluation(s) and the Actions taken to address them. 6](#_Toc468027975)

[CRITERION 1: STUDENTS 7](#_Toc468027976)

[A. Student Admissions 7](#_Toc468027977)

[B. Evaluating Student Performance 8](#_Toc468027978)

[C. Transfer Students and Transfer Courses 9](#_Toc468027979)

[D. Advising and Career Guidance 9](#_Toc468027980)

[F. Graduation Requirements 9](#_Toc468027981)

[G. Transcripts of Recent Graduates 9](#_Toc468027982)

[CRITERION 2: PROGRAM EDUCATIONAL OBJECTIVES 10](#_Toc468027983)

[A. Mission Statement 10](#_Toc468027984)

[2. Program Educational Objectives 11](#_Toc468027985)

[CRITERION 3: STUDENT OUTCOMES 12](#_Toc468027986)

[A. Student Outcomes 12](#_Toc468027987)

[B. Relationship of Student Outcomes to Program Educational Objectives 12](#_Toc468027988)

[CRITERION 4: CONTINUOUS IMPROVEMENT 12](#_Toc468027989)

[A. Student Outcomes 12](#_Toc468027990)

[A.1 Relationship of Courses in the Curriculum to Student Outcomes 12](#_Toc468027991)

[A.2. Achievement of Student Outcomes 12](#_Toc468027992)

[A.3 Course Outcomes Assessment 12](#_Toc468027993)

[A.4 Results of Student Outcomes Assessment 12](#_Toc468027994)

[B. Continuous Improvement 12](#_Toc468027995)

[B.1. Actions to Improve the Program 12](#_Toc468027996)

[B.2 Curriculum changes 12](#_Toc468027997)

[B.3 Prerequisites, title changes and/or course descriptions 12](#_Toc468027998)

[B.4 Changes in Course Delivery 12](#_Toc468027999)

[C. Additional Documentation 12](#_Toc468028000)

[CRITERION 5. Curriculum 13](#_Toc468028001)

[A. Program Curriculum 13](#_Toc468028002)

[B. Course Syllabi 13](#_Toc468028003)

[D. Advisory Committee 13](#_Toc468028004)

[PLEASE INSERT YOUR UPDATED TABLE 15](#_Toc468028005)

# BACKGROUND INFORMATION

## A. Contact Information

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Tel. /Fax: +995 32 2 222-473

## B. Faculty History

The Faculty of Exact and Natural Sciences has a rich and flexible academic organization. Highly qualified professors, teachers, and growing material-technical base create excellent grounds for training competent professionals. Currently, the faculty has 8 departments: departments of mathematics, physics, chemistry, geography, computer sciences, biology, geology, electrical and electronics engineering. 11 bachelor’s, 18 master’s and 10 doctoral degree programs operate at the faculty. A part of the programs has been developed based on the recommendations from foreign experts, while some programs are implemented with the direct involvement of foreign professors. Bachelor degree program ‘’Computer Sciences (French Georgian)’’ issues 2 diplomas – diplomas of Tbilisi State University and University of Paris8.; successful graduates of master’s program ‘’Medical Molecular Biology’’ also get two diplomas – diplomas of the Tbilisi State University and the University of Westminster; some of the doctoral programs are joint and are implemented through the collaboration with foreign universities. 32 educational-scientific laboratories, 18 scientific-research institutes, and 3 educational (retraining) centers operate at the faculty. The faculty is known for its outstanding scientific activities. 39 scientific directions comprise a wide range of research activities. The faculty undertakes a number of scientific projects funded by national and international foundations. 20 scientists and students received international and local scholarships during 2008-2011 academic years. Every year, nearly 80 scientific works are published in journals with higher impact factor. Many scientific-technological innovations are patented. The faculty systematically organizes international and local scientific conferences, scientific seminars with the participation of the faculty employees and Ph.D. students. The faculty employees publish own textbooks and monographs. The faculty provides its students with the updated course of lectures through online learning system. The faculty students systematically participate in international Olympiads and competitions in mathematics and information science and achieve serious success. Students of all the three stages of the faculty are actively involved in scientific activities. The faculty students take part in exchange programs, undertake scientific and educational activities at foreign universities and scientific centers. Every year the faculty organizes students’ scientific conferences. The faculty also manages to reward successful students and finance their tuition and trips from the Gifted Students’ Encouragement Foundation. The Unijunior, which aims at enhancing young learners’ interest in science, systematically operates at the faculty. Young learners have an opportunity to attend popular public lectures, to undertake practical and laboratory studies, to have field practices and excursions, to participate in Olympiads and quizzes. In addition, the faculty organizes summer schools for the young learners during summer holidays. The faculty infrastructure is improving every year; necessary equipment has been purchased with the help of the university, national and international foundations. The computer classrooms and laboratories have been equipped with modern technologies.

## Organizational Structure of the Department

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

**ORGANIZATION CHART**

Department Chair

**Giorgi Ghvedashvili**

# ummaa

Faculty / Lecturers

Giorgi Ghvedashvili

David Kakulia

Tsisana Gavasheli

Lev Geonjian

Levan Shoshiashvili

Technician

Graduate Advisor

Tsisana Gavasheli

Department Support

David Kakulia

Grad Program Support

Student Assistants

TA, GA and

Post Docs

## D. Program Delivery Modes

The Electrical and Electronics Engineering program is offered as an on-campus day program. Our academic year is divided into two semesters. Each semester (Fall and Spring) is 15 weeks of instruction, with the sixteenth week used for final examinations. A lecture course is typically 1-semester units and meets for two 130- minute periods each week. The laboratory courses are typically 1-semester unit and meet for one 160-minute session each week.

Required Electrical and Electronics Engineering courses are offered every semester, and most electives are offered at least once a year. Most undergraduate courses are offered during the day.

**There are three basic Program Delivery Modes:**

**Lectures**: Verbal, problem-based learning (PBL), demonstration method, induction, deduction, analysis and synthesis.

**Seminars, Practical and Laboratory Teaching:** Verbal, book based method, laboratory and demonstration methods, practical methods, induction methods, analysis method, and synthesis method, electronic attending (E-learning).

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

## E. Program Locations

The program is offered in the Tbilisi State University buildings.

## F. Public Disclosure

Program Educational objectives, Student outcomes, annual student enrollment and graduation data are available on our website: <https://www.tsu.ge/en/faculties/science>.

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

Our main deficiencies is laboratory facilities, which was noted in ABET Preliminary evaluation, because several laboratory works and seminars based on the facility of laboratories of the local engineering company (spin-off company TSU) as well as on their software products: EMC Studio; PCB Vlab; MTEC Vlab; Antenna VLab; EMC Expert and Harness Studio.

Now we are in the process of updating of our facilities, as well as of curriculum.

# CRITERION 1: STUDENTS

## 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 and Electronics Engineering program at Tbilisi State University, a student should pass Mathematics along with other exams organized by the National Assessment and Examinations Center (NAEC) and receive enough scores to be admitted to the Exact and Natural Sciences Faculty. Alternatively, he/she has to pass Calculus Course in another accredited high education institution equivalent to the Exact and Natural Sciences Calculus Course level.

**Table 1: History of Total Freshman Enrollment over the Past 6 Years**

**Figure 1.1: Admission Trends – Average Composite Mathematic Scores (NAEC)**

## Evaluating Student Performance

Student Performance is evaluated a maximum of 100 scores. 40 of which is the final exam of the subject. Students’ work and study success are evaluated according to the syllabus of each course, which is a combination of midterm and final exams. Midterm can be evaluated by test, presentation in the class, team or individual projects. Forms of a midterm evaluation may vary for different subjects.

**Grading System of the CS Program is coherent with the TSU standard grading system:**

|  |  |  |
| --- | --- | --- |
| Evaluation  | Scores | GPA |
| A | 91-100 | 4.0 |
| B | 81-90 | 3.0 |
| C | 71-80 | 2.0 |
| D | 61-60 | 1.0 |
| E | 51-60 | 0.5 |
| F-FX | 0-50 | 0.0 |

**Table 2: TSU Grading System**

## 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. It is regulated by the Ministerial Order №10/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](http://www.students.eqe.ge).

The second type of student transfer is administered by the higher education institutions. Internal transfer in the Tbilisi State University is regulated by the Article 7 of the University Council Resolution N77/2011.

Internal Transfer can only be done after completion of the first semester. Students cannot transfer during their additional semesters.

For internal transfer students can visit websites:

Bachelor: <http://sms.tsu.ge/StudMobiloba/>

Master: <http://lms.tsu.ge/>

**Validating Transfer Courses**

Transfer courses will be validated according to the program objectives and the similarity of the course outcomes.

## D. Advising and Career Guidance

Students in Tbilisi State University receive constant advising and career guidance by their professors. Even though there is no centralized administration for career advice, students can visit professors during the open hours for any kind of career guidance.

## F. Graduation Requirements

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

## G. Transcripts of Recent Graduates

The department will provide transcripts requested by the ABET team with any needed explanation of how the transcripts are to be interpreted.

Table 1-2. External Transfer Students for Past Five Academic Years

|  |  |
| --- | --- |
| Academic Year | Number of External Transfer Students Enrolled |
| 2012 | 1 |
| 2013 | 3 |
| 2014 | 3 |
| 2015 | 0 |
| 2016 | 0 |

Table 1-3. External Transfer Students for Past Five Academic Years

|  |  |
| --- | --- |
| Academic Year | Number of Internal Transfer Students Enrolled |
| 2013 | 0 |
| 2014 | 2 |
| 2015 | 0 |
| 2016 | 0 |
| 2017 | 2 |

Table 1-4. Graduate Students for Past Five Academic Years

|  |  |
| --- | --- |
| Academic Year | Number of Graduate Students |
| 2009 | 0 |
| 2010 | 1 |
| 2011 | 3 |
| 2012 | 1 |
| 2013 | 12 |
| 2014 | 7 |
| 2015 | 8 |
| 2016 | 1 |

Table 1-5. Enrollment Trends for Past Seven Academic Years

# CRITERION 2: PROGRAM EDUCATIONAL OBJECTIVES

## A. Mission Statement

**1. University Mission Statement**

The Ivane Javakhishvili Tbilisi State University (TSU) is a spiritual and intellectual successor of multi-century Georgian culture, humanistic traditions and old Georgian educational, scientific and cultural centers.

The mission of this first Georgian university is:

* To establish national and universal values;
* To promote the intellectual, moral, cultural and socio-economic development of the society;
* To develop the university traditions through innovative research and learning;
* To protect academic freedom;
* To take care of personal and professional development of students and professors;
* To create, maintain and transfer knowledge;
* To develop basic and applied research studies;
* To promote student-centered learning and to train competitive staff;
* To promote continuing education;
* To develop international academic and scientific collaboration;
* To provide honorary membership of the free global university society.

**2. Faculty Mission**

The faculty of exact and natural sciences collectively involves students in an academic experience of the highest quality based on the following principles:

* To provide an excellent learning environment wherein all students may refine the knowledge and skills essential to cultivate their ability to think critically, communicate effectively, and advance their appreciation of artistic and scientific inquiry;
* To provide a contemporary education through the integration of information technology into the study of disciplines traditionally associated with the arts and sciences; and
* To stress the importance of lifelong learning through community outreach, service, research and creative endeavors.

## 2. Program Educational Objectives

By the end of the program, a student:

* Shall have a systemic understanding of the discipline. A student should acquire general understanding of Electrical and Electronics Engineering as an applied science field, which is based on a theoretical and empirical knowledge of physics, mathematics and computer science through creating and using products of modern technology.
* Shall have a set of skills for practical appliance of the theoretical knowledge in Electrical and Electronics Engineering. Graduates shall know the theoretical bases of Electrical and Electronics Engineering. They shell be able to solve relevant engineering problems using fundamental engineering principals.
* Shall possess a comprehensive knowledge of contemporary methods of Electrical and Electronics Engineering. Electrical and Electronics Engineering technologies are introduced in every field of contemporary functions of society, such as autonomous mobile technologies, air-cosmic and military devices, measuring devices, biomedical hardware, management of chemical technologies, scientific and research facilities and etc. A graduate of bachelor program of Electrical and Electronics Engineering shall be able to familiarize with principal schemes of any electrical product, during the process he/she shall be able to generalize a specific knowledge while dealing with a narrow issue or specify a general knowledge if necessary.
* Shall have enhanced team-working skills. Electrical and Electronics Engineering is a fast developing discipline of tomorrow, where problems/projects, as usual, demand team work and cooperation; alumnus should have ability to work with good coordination in cases of horizontal or vertical fragmentation of tasks. This way he/she will resolve a problem in an effective way. The same time he/she shall be able to see a complete picture of a problem while working on its fragment.
* Shall gain a necessary knowledge for academic and professional growth. The final objective of the program is to prepare a student for the next step of the higher education or to become employed in a relative field. The program also aims to prepare student to plan and implement self-developing and further learning in a rapidly changing environment.

# CRITERION 3: STUDENT OUTCOMES

## A. Student Outcomes

Student outcomes a-k described below to be Electrical and Electronics Engineering Degree student outcomes.

a) An ability to apply knowledge of mathematics, science and engineering

b) An ability to design and conduct experiments, as well as to analyze and interpret data

c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d) An ability to function in multidisciplinary teams

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

g) An ability to communicate effectively

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in lifelong learning

j) A knowledge of contemporary issues

k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

## 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.

# CRITERION 4: CONTINUOUS IMPROVEMENT

## A. Student Outcomes

### **A.1 Relationship of Courses in the Curriculum to Student Outcomes**

### **A.2. Achievement of Student Outcomes**

### **A.3 Course Outcomes Assessment**

### **A.4 Results of Student Outcomes Assessment**

## B. Continuous Improvement

### **B.1. Actions to Improve the Program**

### **B.2 Curriculum changes**

### **B.3 Prerequisites, title changes and/or course descriptions**

### **B.4 Changes in Course Delivery**

## C. Additional Documentation

**CRITERION 5. Curriculum**

**A. Program Curriculum**

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

**B. Course Syllabi**

The syllabi are displayed in Appendix A**.**

1. **Advisory Committee**

The Industrial Advisory Board expectation; Example TSU Electrical and Electronics Engineering graduates to be not only technically competent and effective in communication skills, but to be able to perform problem solving at these higher levels.

1. Giorgi Ghvedashvili – Head of Department of Electrical and Electronics Engineering (TSU)
2. David Kakulia - Associate Professor of Department of Electrical and Electronics Engineering (TSU)
3. Tsisana Gavasheli – Assistant Professor of Department of Electrical and Electronics Engineering (TSU)
4. Revaz Zaridze – Emeritus Professor of TSU
5. Roman Jobava - Managing Director at EMCoS
6. Fridon Shubitidze - Associate Professor of Thayer School of Engineering, [Dartmouth College](https://scholar.google.com/citations?view_op=view_org&hl=en&org=18229439179148490080) (USA)
7. Goga Bit-Babik - Chief Technology Office, Motorola Solutions, Inc.Fort Lauderdale, Florida, USA

**C. Advisory Committee Industrial Advisory Board Meeting Agenda Friday; April ??, 201?; 9:00 am – 1:00 pm**

**Attendees:**

Affan Badar; Todd Alberts; Mehran Shahhosseini – MET Faculty/ISU Jianren Rong – Program Chair, Design Tech - Ivy Tech Community College Mak Koie – Emeritus Professor of ISU Tom Newsom – Sony DADC Greg stewart – Unison Engine Components Gary Oxford – Bemis Marc Ponsot – A P Machine & Tool Inc. Mary McCarter – Kellogg Justin Bargo – Watchfire Signs Larry Parvin – Great Dane Trailers Michael Westerfield – Taghleef Industries

**Agenda:**

* **Chair’s welcome State of the Computer Science program**
* **Update on ABET Accreditation Assessment status of the EEE program Recommendations**

**MET Industrial Advisory Board Members**

**Academia:**

Dr. A. Mehran

Dr. M. Affan

**Industry:**

Marc Ponsot (our alumni) Manager - A P Machine & Tool Inc.

Sony DADC Tom Newsom (graduate),

**b. One year of science and mathematics**

**i. Mathematics.**

Students pursuing the BSEEE degree are required to take the following Mathematics courses (21 hours):

MATH 2305 Discrete Mathematics

MATH 3328 Linear Algebra I

MATH 2413 Calculus and Analytic Geometry I

MATH 2414 Calculus and Analytic Geometry II

MATH 3435 Calculus and Analytic Geometry III

MATH 3370 Introduction to the Theory of Statistical Inference

**ii. Science.**

Students pursuing the BSCS degree are required to **take three** of these courses from the following Lab Science courses (12 hours), in no particular sequence:

BIOL 1406 General Biology I

BIOL 1407 General Biology II

CHEM 1411 General Chemistry I

CHEM 1412 General Chemistry II

 PHYS 2425 Calculus-based Physics I

PHYS 2426 Calculus-based Physics II

**iii. Program structure:**

* **Prerequisite structure path diagram**
* **Capstone team project; final year project**
* **TSU Career Center is fully engaged in developing and overseeing internship opportunities ; (example) EEE – Cooperative Industrial Practice**

**Table 5-1** describes the plan of study for students in the Electrical and Electronics Engineering major, along with average section enrollments over the two years

PLEASE INSERT YOUR UPDATED TABLE