ABET

Preliminary Self-Study Report

For the

BACHELOR OF

CIVIL ENGINEERING

At

GEORGIAN TECHNICAL UNIVERSITY

M. KOSTAVA ST. 68

TBILISI, GEORGIA

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Content

BACKGROUND 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 emphasised practical career-oriented education programs, responsive to the work-force needs.

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 reorganisations conducted at GTU, 8 Faculties were set up.

In 2007 GTU was awarded accreditation by the National Center for Educational Accreditation.

In 2016 due to the reorganisations conducted at GTU, 11 Faculties were set up.

Faculties:

- Faculty of Civil Engineering
- Faculty of Power Engineering and Telecommunication
- 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 Civil Engineering Faculty

The Faculty of Civil Engineering was esteblished in 1922 in Georgian Technical University as the Department of Polytechnic faculty. In 1928 founded Georgian State Polytechnic Institute, which includes Faculty of Civil Engineering and in 1990 – University renamed as the Technical University of Georgia. The Faculty of Civil Engineering was esteblished in 1922 in Georgian Technical University as the Department of Polytechnic faculty. In 1928 was established Georgian State Polytechnic Institute, which includes Faculty of Civil Engineering and in 1990 Georgian Polytechnic Institute was granted the University status and named as the Georgian Technical University (GTU).

D. Program History

Initially Civil engineering Faculty provides programs, which were developed in former USSR. In 2005 GTU joined Bologna process and has developed Program "Civil Engineering" which was autorised in 2007 by National Center for Educational Quality Enhancement of Georgia as a part of a differentiation strategy of offering degree programs that were not offered by other universities in the region yet were needed by area industry.

"Civil Engineering" is 240 ESTC credit program, 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.

Besides this, faculty offers 4 bachelor's, 6 master's (include 2 English language program) and 7 doctoral (include 1 English language program) degree programs. 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. The Master's program "Water Engineering" is the joint project and developed through the collaboration with BOKU University (Vienna, Austria).

3 educational-scientific laboratories, 1 scientific-research institutes, and 4 educational (retraining) centers operate at the faculty. The faculty is known for its outstanding scientific activities. 21 scientific directions comprise a wide range of research activities. 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.

The ABET Foundation has a contract with MCA-Georgia to provide information relative to the readiness of STEM programs at public Georgian universities for a review by ABET for possible program accreditation.

Specifically, in Task 1 the contract calls for the ABET Foundation to select five programs at Georgian public universities among the disciplines of agricultural engineering, civil engineering, computer engineering, computer science, and electrical engineering for an intensive review to evaluate the actions that would be needed to prepare the programs for an ABET review. Task 2 calls for an intensive review of the five selected programs to determine the changes that would be needed to prepare each of the five programs for an accreditation review by ABET.

Civil Engineering program was reviewed during an onsite visit by two members of the ABET Foundation team. Prior to the visit, the programs provided course syllabi, CVs of faculty staff, and information on laboratories to the team. During the visit the team members conducted interviews with faculty members and administrators, and inspected

the classroom, laboratory, and library facilities for the program. A workshop of about four hours in duration was conducted for faculty members and administrators.
According report current curriculum "Civil Engineering" needs strengthening relative to ABET requirements. Some options may need to be reworked or eliminated. It appears that the program has at most 2/3 of the basic mathematics and science needed. Some of the options appear to have enough engineering science and design topics to satisfy ABET requirements. There does not appear to be a major design or "capstone" experience that is based on earlier course work.
The proposed new curriculum developed according ABET recommendations and appears to provide a good basis on which to develop a program for ABET review (program will be discussed below in detail).

E. Options

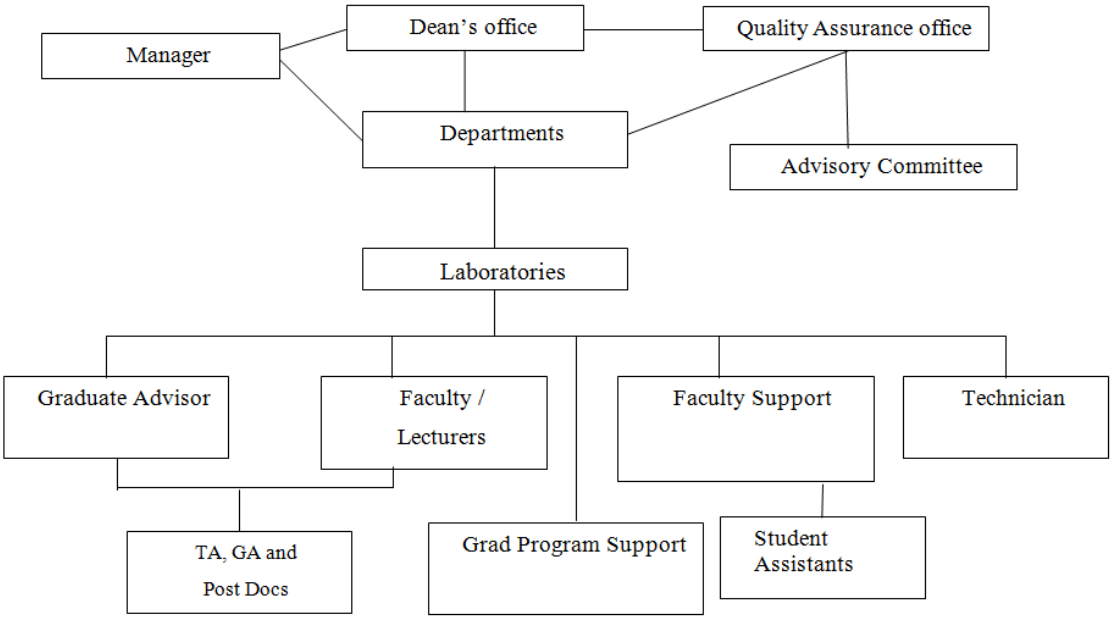
Faculty offers two new Bachelor of Science degree programs: "Civil Engineering (CIVE)" and "Construction Engineering (CONE)". Programs provide a general civil and construction engineering degree at the undergraduate level with the option to focus on technical electives from offered discipline areas. These areas include: constructions, water engineering, HVAC, hydraulic engineering, transportation engineering and architectural engineering.
In this preliminary self-study report we consider the "Civil Engineering" program.

Program Features

The CIVE 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. Organisational Structure of the Faculty

Civil Engineering Faculty has a rich and flexible academic organisation. Highly qualified professors (147), teachers (21), and growing material-technical base create excellent grounds for training competent professionals. Currently, the faculty has 9 departments: Department of Civil and Industrial Engineering; Department of Engineering Mechanics and Technical Examination of Constructions; Department of Civil and Industrial Construction Technologies and Building Materials; Department of Computer-Aided Construction Design, Department of Highway Construction; Department of Water Supply, Sewerage, Hit-Air supply and Engineering Facilities of Buildings; Department of Hydro-Engineering; Department of Construction Economics and Management and Department of Building Machinery.



Faculty of Civil Engineering Organisation Chart

G. Program Delivery Modes

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.
There are also plans to develop future on-line content for select courses in the undergraduate curriculum

H. Program Locations

The program is mainly offered in the first 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.edu.ge

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

The deficiencies, weaknesses or concerns pointed out during the process held by the Georgian Accreditation are:

- It should be defined prerequisites of some courses
- It should be replaced the lecture content of some syllabuses
- It should be foreseeing a specific field for a number of courses
- It should be corrected the name of some courses
- It should be modernised laboratories and supplemented with modern equipment
- It should be clearly marked in the program Employer Organisations
- It should be added courses to the elective block
- It should be renewed reference textbooks in some syllabuses

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 CIVE or CONE program at Georgian Technical University, a student should pass Mathematics along with other exams organised by the National Assessment and Examinations Center (NAEC) through "Unified National Exams" and receive enough scores to be admitted to the Civil Engineering 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 Civil Engineering Calculus Course level.

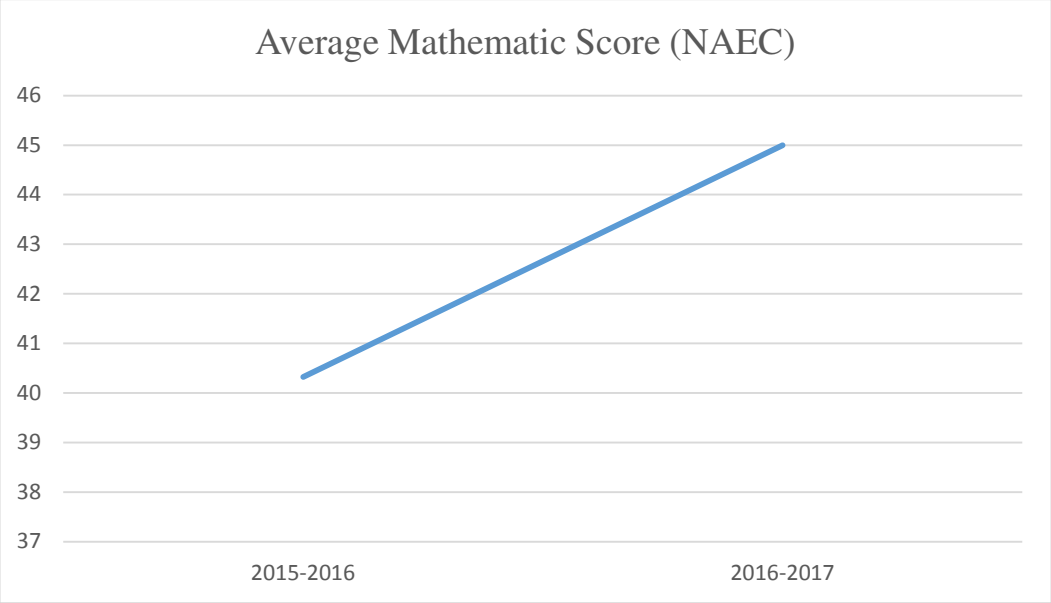


Figure 1.1: Admission Trends – Average Composite Mathematic Scores (NAEC) (max score 59)

Academic year	Freshmen	Qount NAEC	Total Faculty Enrolment
2011-2012	236	500	645
2012-2013	218	500	607
2013-2014	498	500	761
2014-2015	498	500	876
2015-2016	499	500	1157
2016-2017	495	500	1492

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

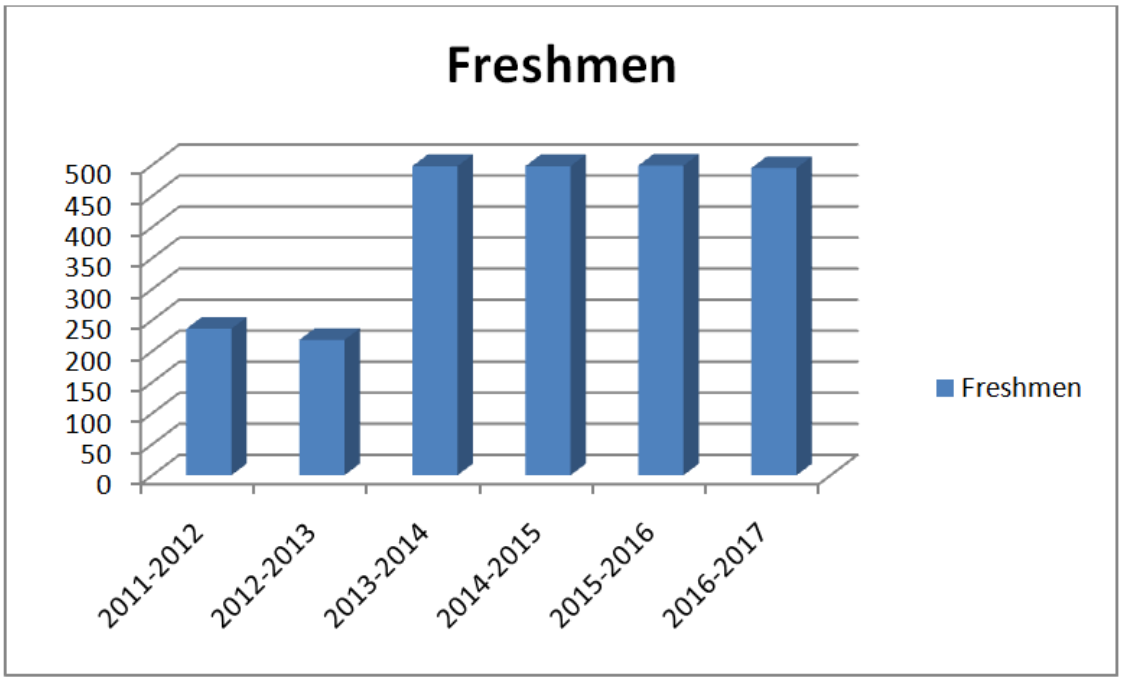


Figure 1.2. History of "Total Freshman Enrollment" over the Past 6 Years on extent Civil Engineering program

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

B. Evaluating Student Performance

Student Performance is evaluated a maximum of 100 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 CIVE Program is coherent with the GTU 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 1.2: GTU Grading System

Electronic Assessment Portal of Georgian Technical University

Electronic assessment portal of Georgian Technical University is presented on Figure 1.3. Studying process consists from 18 weeks: 15weeks for classes, 2 midterm and Final Exam.
Initially all windows are blocked (Yellow windows).
In the end of each week window will open (green windows) and professor must assess student in this window (0, 1 or 2 points) before next Monday. After this, window is blocked and professor cannot change any value.

Group: 121654, Semester I. **Leading professor:** ***Alexander Davitashvili***
Course: "Environmental Engineering"

Name	The learning process															I Midterm	II Midterm	Sum	Final Exam	Final score	
	I	II	III	IV	V	VI	VIII	IX	X	XI	XII	XIII	XV	XVI	XVII	VII	XIV		XVIII		
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20	20	70	30		
1 Beqa Burjanadze	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20	20	70	29	99	A
2 Marina Natroshvili	2	2	2	1	2	2	1	2	2	2	2	2	1	2	2	17	14	58	21	79	C
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐	☐	

Educational Schedule of First semester of 2016–2017 Academic Year

I	10 - 15 October	Class days
II	17 - 22 October	
III	24 - 29 October	
IV	31 October - 05 November	
V	07 - 12 November	
VI	14 - 19 November	
VII	21 - 26 November	I Midterm exam
VIII	28 November - 03 December	Class days
IX	05 - 10 December	
X	12 - 17 December	
XI	19 - 24 December	
XII	26 - 31 December	
-	01 - 08 January	Christmas holidays
XIII	09 - 14 January	Class days
XIV	16 - 21 January	II Midterm exam
XV	23 - 28 January	Class days
XVI	30 January - 04 February	
XVII	06 - 11 February	
XVIII	13 - 18 February	Final examinations

Figure 1.3. Electronic assessment portal of Georgian Technical University

In the VII and XIV weeks will open window of midterm exam (green window) and professor must assess student in this window (maximum 20 points).
After the end of midterm exam week, the window will block and professor cannot change any value.
In the end of semester will open Final Exam window (green window) and professor must assess student in this window (maximum 30 points).
After the end of Final exam week, the window will block and professor cannot change any value.
Assessment value consists from 100 points:
15 weeks (maximum 30 points) + two midterm exam (maximum 20+20=40 points) + Final Exam (maximum 30 points) = 100 points
The passing grade of subject is minimum 51 points.
If student do not pay tuition fee, all windows will be blocked.

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 centralised by the Legal Entity of Public Law (LEPL) – National Center for Educational Quality Enhancement (EQE). 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.
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.
Internal Transfer can only be done after completion of the first course. Students cannot transfer during their additional semesters.

For internal transfer students can visit websites:

Bachelor: http://gtu.edu.ge

Academic Year	Fall	Spring
2014-2015	21	26
2013-2014	39	33
2012-2013	70	12
2011-2012	27	10
2010-2011	39	15

Table 1.4. Transfer students for past 6 Academic Years.

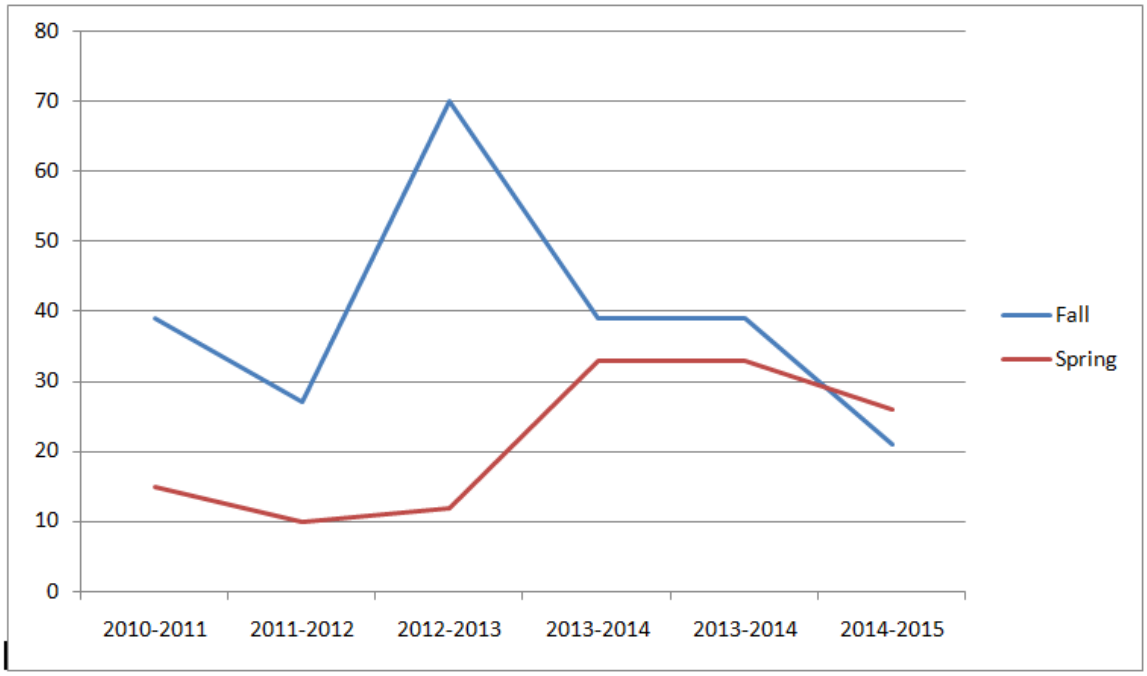


Figure 1.5. Transfer students for past six Academic Years

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

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	33	66	27,5
Mathematics	17	34	14
Science	15	30	12,5
Applied Mechanics	9	18	7,5

CIVE Core courses	22	44	18
CIVE Computer Applications	3	6	2,5
Professional electives	16	32	13,5
Senior Design Project with Introduction	5	10	4,5
SUM	120	240	100

Table 1.3. Distribution of credits

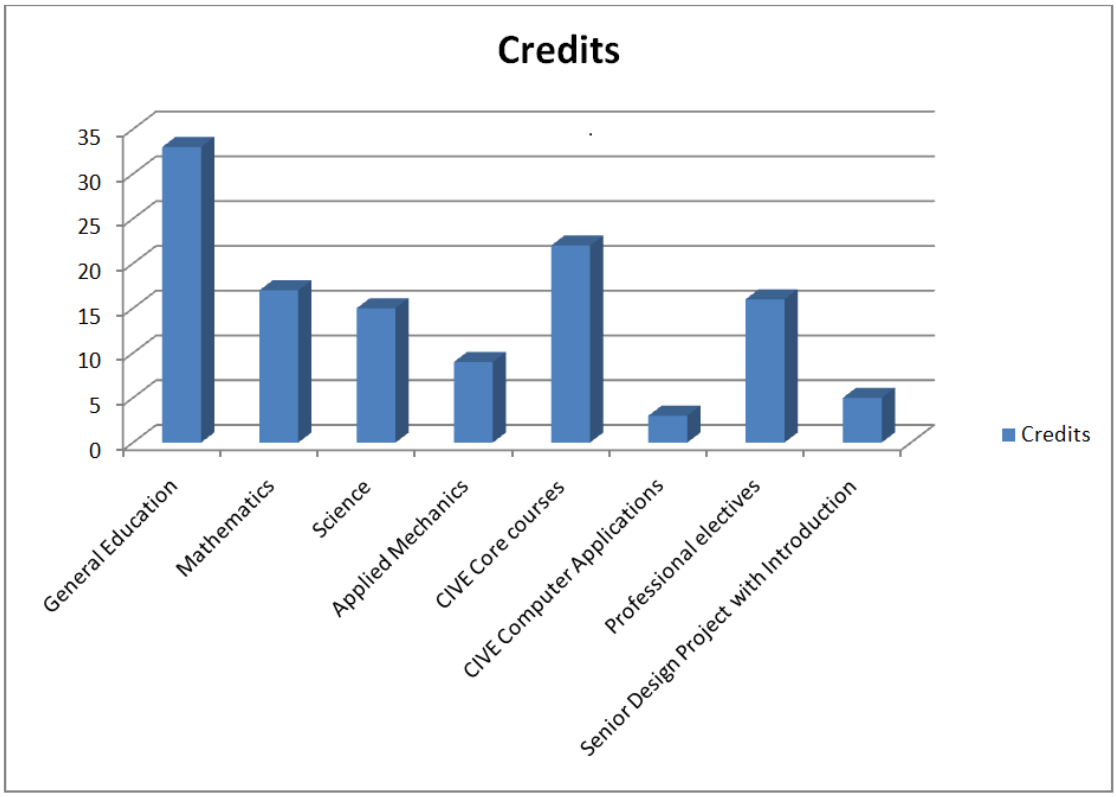


Figure 1.4. Distribution of credits

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 1).

CRITERION 2: PROGRAM EDUCATIONAL OBJECTIVES

Glossary of Terms:

Program Educational Objectives (PEOs) – Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation. Program educational objectives are based on the needs of the program's constituencies.
Student Outcomes (SOs) – Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program.

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.

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.

A.2. Faculty Mission

The mission of the Faculty of Civil Engineering is to provide a high quality undergraduate and graduate education in the civil and construction 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 civil and construction 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 civil, construction, 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.

A.3. Mission of Civil Engineering Program

The Civil Engineering program serves the technological needs of society, especially with regards to the constructed environment in Georgia.

The mission of program is:

- To produce a diverse population of engineers, each possessing a superior technical foundation and a well-rounded liberal education. We thrive to create new opportunities for the communities and public and private industries of Georgia
- To create an academic environment within and outside of classroom that supports individual and group success through constant improvement. Our faculty focuses on learning, research and service – our core competencies. Our students are active learners, motivated to serve society. Our faculty administrators and staff are stewards of our self-governance, our roles within the university, and our support processes.
- To contribute to our group success through individual dedication. We value critical thinking, innovation, individual responsibility, teamwork, and leadership.

B. Program Educational Objectives

The Civil Engineering Faculty (CEF) of GTU has determined that the educational objectives for the program are as follows:

Civil Engineering Faculty Educational Objectives

Objective 1. *CEF will develop technically competent engineers.*

CEF graduates will be recognised for their civil engineering skills. This will be demonstrated by their ability to systematically apply the fundamental principles of

science and mathematics to solve engineering problems and the ability and motivation to continually adopt and appropriately apply the latest tools and technology.

Objective 2. *Graduates of CEF will be hands on practitioners of engineering.*

The hands on nature of the engineering education at CEF will prepare graduates to immediately assume entry-level civil engineering positions. They will be exposed to standard processes, systems and guidelines.

Objective 3*. CEF graduates will possess basic business understanding and strong communications skills.*

CEF engineering graduates will possess communication skills and basic knowledge of business operations that will enable them to cooperate effectively with professionals with a variety of backgrounds. The development of these skills will help them to incorporate diverse constraints and tradeoffs, within appropriate ethical and professional boundaries, in specific application areas such as construction and software engineering.

Objective 4. *CEF graduates will be prepared to embrace the continuous learning necessary to practice engineering over their entire professional lifetimes.*

CEF Civil Engineering program will impart in its graduates current engineering expertise as well as lifelong learning skills enabling them to effectively adapt to both the present and future needs in their workplace and in society. This lifelong learning will take place in both formal and informal educational settings.

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 organisations, including programming competitions, the Faculty of Civil Engineering seeks to educate a well-rounded professional capable of independent thinking.
Graduates of the Civil Engineering program will be able to demonstrate skills in problem-solving and sufficient technical expertise to begin either immediate employment or advanced study in Civil Engineering specialty.
The educational objective will be demonstrated by the following skills outcomes, which are assessed upon student graduation:

1. An ability to identify, formulate, and solve civil engineering problems (ABET e)
2. An ability to plan and design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, constructability, and sustainability (ABET c)
3. An ability to work individually and in multidisciplinary teams (ABET d)
4. An ability to communicate effectively orally (ABET g)
5. An ability to communicate effectively in written reports (ABET g)
6. An ability to design and conduct experiments as well as to analyze and interpret data (ABET b)
7. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice including computer tools and information technology (ABET k)
8. An ability to manage time.

Attitudes: After 3 to 5 years, graduates of the Civil Engineering program will maintain ethical standards in practice, with a positive attitude towards working in cross-cultural

settings and toward lifelong professional development through continuing education and professional registration. They will also have an appreciation that their engineering education was a worthwhile endeavor.
The educational objective will be demonstrated by the following skills outcomes, which are assessed upon student graduation:

1. A positive outlook on life
2. A desire to work in cross-culture setting
3. An understanding of professional and ethical responsibility (ABET f)
4. A willingness to adapt to professional and societal changes
5. A recognition of the need for and an ability to engage in lifelong learning (ABET i)
6. A desire to be successful in Fundamentals of Engineering Examination and become a registered professional civil engineer
7. An appreciation of the role of professional engineering societies on practice of civil engineering.
8. An understanding of principles of project management
9. An understanding of civil engineering professional practice issue
10. To have laboratory experience which enable students to measure variables and make technical inferences about the processes.

B.1. Program Constituencies

The significant constituencies of the Civil Engineering program include:

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

These constituencies will actively involve in our continuous improvement process through surveys, steering committee meetings, and personal interactions. The feedback from these groups will utilise 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. Process for Review of the Program Educational Objectives

The original program educational objectives (PEOs) 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.

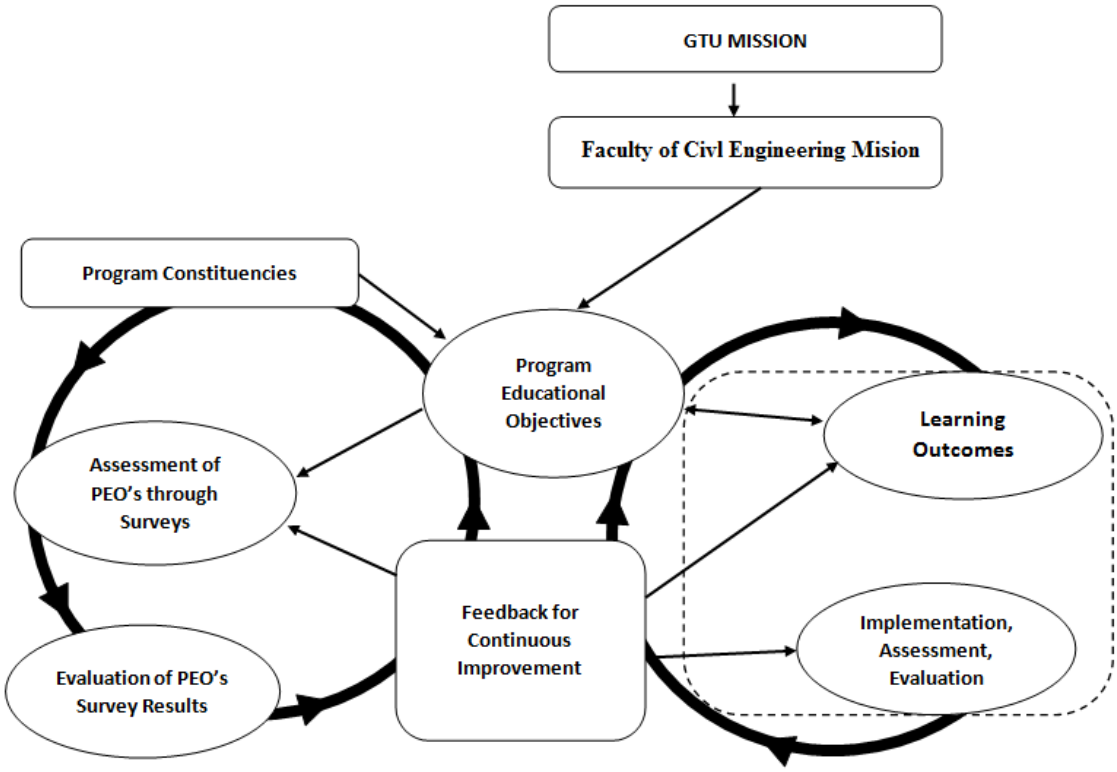


Figure 2.1. Process for establishing, assessing, and evaluation the program educational objectives

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 evaluation process illustrated in Figure 2.1.

CRITERION 3: STUDENT OUTCOMES

A. Student Outcomes

Graduates of the Civil Engineering program will have

(a) an ability to apply knowledge of mathematics, science, and engineering;
(b) an ability to design and conduct experiments as well as 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 on multi-disciplinary 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 life-long learning;
(j) knowledge of contemporary issues;
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Civil Engineering Specific Outcomes

(CV1) Graduates are able to design civil engineering systems through the analysis, synthesis and control, using statistical and calculus based methods.
(CV2) Graduates have proficiency in constructing materials and constructing processes and understand the behavior and properties of materials as they are altered and influenced by processing in civil engineering.
(CV3) Graduates have proficiency in process of civil engineering and understand the design of constructions and the equipment, tooling, and environment necessary for their production.
(CV4) Graduates appreciate the necessity for construction competitiveness and understand how to create competitive advantage through manufacturing planning, strategy and control.
(CV5) Graduates have had laboratory experiences which enable them to measure construction variables and make technical inferences about the processes.

According Accreditation Standards of National Center for Educational Quality Enhancement of Georgia Graduates of the Civil Engineering program will have:

(a) Knowledge and Understanding

- Has a fundamental and systematic knowledge of basic concepts, theories and principles of construction and design processes;
- Has a basic knowledge to perform construction works a safe and environmentally friendly way;
- Has skills and knowledge of relevant mathematical methods and fundamentals of natural sciences;
- Has a basic knowledge of management principles relevant to construction engineering;
- Has a fundamental knowledge and skills to understand construction norms, rules, and other complex construction issues;

(b) Applying knowledge

- Has skills to perform construction works in compliance with the relevant construction norms, rules and other requirements;
- Has ability to construct basic components of civil and industrial structures;
- Has skills to select, assess and use modern construction equipment and machinery;
- Have skills to identify, formulate and solve general problems in construction process.

(c) Making judgments

- Able to formulate well-founded conclusions based on a critical analysis of complex and incomplete information (including the latest research) and provide an innovative synthesis based on the latest information.
- Able to search complex and incomplete information from research literature and Internet; to make conclusions based on the critical analysis.
- Able to correctly understand and assess risk factors as well as to make decisions based on the critical analysis in design, construction, and operation of water supply and sewerage systems.

(d) Communication skills

- Able to communicate conclusions, argumentation and research methods with academia and professional community in Georgian and the elected foreign language.
- Able to independently provide information related to the existing problems, ideas and solution ways in writing (detailed report) and verbally, in Georgian and foreign languages, to academia and professional community, when necessary applying ICT tools.
- Has ability to participate in discussions with sector specialists. Able to communicate, clearly and in details, his/her conclusions and applied research methods.
- Able to independently develop official documentation using construction terminology.

(e) Learning skills

- Has ability to strategically plan his/her study and to make comprehensive evaluations.
- Able to study independently and to continue studies at further stage by application of the knowledge gained.
- Able to critically assess his/her knowledge and further develop professional skills

(f) Values

- Has ability to strategically plan his/her study and to make comprehensive evaluations.
- Able to study independently and to continue studies at further stage by application of the knowledge gained.
- Able to critically assess his/her knowledge and further develop professional skills.

It can be noticed, the Students Outcomes recommended by ABET describe the Outcomes more in detail, than the proposed by National Center for Educational Quality Enhancement of Georgia.

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: Graduates will have utilized a foundation in engineering and science to improve lives and livelihoods through a successful career in civil engineering or other fields.	Provide a foundation in mathematics, science and engineering with a focus on civil engineering core competencies	(a), (b), (c), (e), (k)
PEO_2: Graduates will have become effective collaborators and innovators, leading or participating in efforts to address social, technical and business challenges.	Provide experiences that foster collaborative and leadership skills	(d), (g)
	Emphasise how Civil engineering impacts the world around us	(h), (j)
PEO_3: Graduates will have engaged in life-long learning and professional development through self-study, continuing education or graduate and professional studies in engineering, business, law or medicine.	Communicate importance of inquisitiveness, self-directed learning and personal development	(f), (i)

CRITERION 4. CONTINUOUS IMPROVEMENT

Glossary of Terms:

Assessment – Assessment is one or more processes that identify, collect, and prepare data to evaluate the attainment of student outcomes. Effective assessment uses relevant direct, indirect, quantitative and qualitative measures as appropriate to the outcome being measured. Appropriate sampling methods may be used as part of an assessment process.

Evaluation – Evaluation is one or more processes for interpreting the data and evidence accumulated through assessment processes. Evaluation determines the extent to which student outcomes are being attained. Evaluation results in decisions and actions regarding program improvement.

A. Student Outcomes

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

Introduction

The CIVE program will continues to improve its processes in evaluating student outcomes and implementing recommendations obtained from assessments, evaluations and student feedback. There is a continuing effort to make assessments more standardised and quantitative across the discipline groups within CIVE so that year-to-year trends will be identified and evaluated in a systematic manner.

A.2. Assessment / Evaluation Tools

A variety of methodologies have been employed as internal mechanisms to assess and continuously improve the Program. These are summarised below:

1. Course examinations and problems. Specific course problem sets and exams are relatively easy to link to student outcomes (e.g., outcome A, application of basic math and science knowledge) is relatively easy for quantitatively-oriented courses such as those focused on engineering mechanics.

2. Informal examination of students. This methodology involves the instructor establishing a metric for a particular student outcome, for instance, achieving 80% correct response about a particular contemporary, social or ethical issue.

3. Student memos. Students are asked to write memos based on seminars on some of the "soft" topics associated with certain outcome. These are graded assignments by the clear instructors or course teaching assistants. Students are assessed on their communication skills by the instructional team, faculty visitors, and external advisors. Student work is assessed and the reporting and work products are found in the course folders.

4. Student projects. Extended student projects are a critical feature of certain courses in the curriculum, particularly in the capstone design course. Student work from this course will be made available during the site visit.

5. Student feedback on questionnaires. At the end of each course, students provide feedback to the course instructor regarding the administration and delivery of the course. These questionnaires are compiled by the University and given to the instructor to evaluate and make recommendations for improvement.

6. Student exit interviews. The chair of CIVE conducts exit interviews with all graduating seniors. Part of the format of the resulting document is oriented toward assessing student outcomes.

A.3. Assessment / Evaluation Process

The assessment of student outcomes will primarily do at the course-level by the respective instructor with participation from the discipline groups. The instructor with assistance from the respective discipline group is responsible for: determining the assessment method for each course, gathering the data, performing an assessment, completing the course evaluation, documenting any recommended changes, bringing recommendations to the undergraduate committee for discussion and possible action, and

following up on the implementation plan of the recommendation or change, if approved by the faculty body.

The student outcome assessments and course evaluations will documented in course folders (i.e., ABET binders). In addition to this information, each course will receive a web-based course and instructor feedback evaluation will complete by the students, which is later compiled by the University and provided to the instructor. These are also will reviewed by the instructor for suggestions for potential improvements to the teaching methodology, class administration, etc. These assessments and evaluations typically contain: course information, a table showing relationship of student outcomes to the learning objectives of the course, outcome assessment indicating the method of assessment, assessment data, student/instructor course evaluations, and instructor comments on potential improvements to the course. The assessment data will be collected by the instructors varies, but may include: exam, quiz or homework questions, student work products (e.g., senior project reports, term reports, laboratory reports, essays, etc.) and oral exams. These materials found in the ABET course folders will be available to the reviewers during their visit.

CIVE will adopt Bloom's Taxonomy as a tool to define the expected level of achievement for each outcome at the time of graduation from the Program. Table 4-1 shows the relationship of the student outcomes, Bloom's Taxonomy level expected by graduation, and the CIVE core curriculum and design technical electives. In order of increasing cognitive development, the levels of achievement are: a) knowledge, b) comprehension, c) application, d) analysis, e) synthesis, and f) evaluation.

The core courses shown in Table 4-1 are required of all CIVE students. In addition, listed in this table are the CIVE professional electives containing significant design content.

CIVE students are required to complete at least five of these courses as part of their program of study. The relationship of the courses to student outcomes is presented in Table 4-1 to show the progression and cognitive development of the student outcome topic(s) throughout the curriculum. Those course marked with an (●) indicate courses where the outcome is of major importance in the course. Those courses marked with (○) signify courses where the outcome is dealt with in some manner, but the subject matter may not be at the cognitive level (i.e., Bloom's taxonomy level) desired at the time of graduation, or because the course is a technical elective not required of all CIVE students.

ABET student outcomes (a) through (k) and ASCE outcome (l) with the expected Bloom's Taxonomy[1] for level of achievement by graduation: (Co = comprehension, Ap = application, An = analysis, Sy = synthesis). Key to matrix entries (●) = topic of major importance in course. (○) = topic addressed by course in some manner, but not at the Bloom's taxonomy level desired graduation, or technical elective course not completed by all students.	(a) math, sci. engr. (Ap)	(b) experimentation (Sy)	(c) design (Sy)	(d) teams (Ap)	(e) engr. problems (Ap)	(f) prof. & ethical (Co)	(g) communications (An)	(h) impact of solutions (Co)	(i) life-long learning (Ap)	(j) contemporary issues (Co)	(k) engr. tools (Ap)	(l) mang. business, policy, leadership (Co)
CIVE Mechanics Courses												
MECE 200 Statics	○				○		○					

MECE 220 Dynamics	○				○		○					
MECE 340 Fluid Mechanics	●	●	○		○		○				○	
CIVE 231 Soil Mechanics	○	●			●		○					
CIVE Core Courses												
CIVE 100 Introduction to Civil Engineering				○	○	●	○	○	○	●		○
CIVE 218 Surveying for Civil Engineering	○	●		○	●		○					
CIVE 240 Introduction to Construction Materials	○	○		○	●		○			○	●	
STAT 250 Statistical Principles and Practices	○	○									○	
CIVE 462 Geotechnical Engineering	○	●			●		○					
CIVE 481 Transportation Engineering	○	○	●		○		○	●	○		○	
CIVE 344 Applied Hydraulics	●	●	○		○		○				○	
ENVE 355 Environmental Engineering	○		○		○			●	●		○	
CONE 330 Principles of Engineering Economy	○	○									○	
COMM 103 Oral Communication				○			●		○	○		
CIVE Professional Elective Courses												
CIVE 431 Pipe Flow and Water Distribution			○		○							
ENVE 441 Water Treatment Engineering			○		○							
ENVE 442 Wastewater Treatment			○		○							
CIVE 453 Traffic Engineering Design			○		○							
CIVE 420 Highway Engineering			○		○							
CIVE 464 Integrated Highway Bridge			○		○							
CIVE 468 Airport Engineering			○		○							
CIVE 470 Railroad Transportation			○		○							
MECE 452 Principles of Heat Transfer			○		○							
MECE 453 Heating, Ventilating, and Air-Conditioning			○		○							

(original work: Taxonomy of Educational Objectives: The Classification of Educational Goals, pp. 201-207; B. S. Bloom (Ed.) Susan Fauer Company, Inc. 1956) as given in the ASCE Commentary on the ABET Engineering Criteria for Civil and Similarly Named Programs in the Context of Civil Engineering Body of Knowledge, Version 3.4, May 10, 2007.
Program Approved by Academic Council of GTU on 14 May 2014 Decree # 1161

Table 4.1. Student Outcomes and CIVE Curriculum Map for Core and professional Elective Courses

Table 4-2 shows the relationship between the CIVE courses, instructors, discipline groups, student outcomes and actual assessment frequency (i.e., semesters when an assessment was performed). In general, CIVE has the policy to perform assessments on outcomes having a (●) symbol found in Table 4-1 on a biennial basis. Some introductory courses have been assessed more often to gain information about students' performance at the entry level of the Program.
Additional outcomes marked with a (○) symbol may be assessed at the instructor's discretion. The assessment of these latter outcomes is optional because: often the coverage of the outcome may not be at the Bloom's Taxonomy level desired at

graduation, or the coverage of the outcome is not in-depth and assessment data is not routinely collected, or the course is a technical elective not required for enrollment by all CIVE students.

Core Courses	Discipline Group	Major Student Outcomes Addressed	Other Student Outcomes Addressed	Method(s) of Assessment	Assessment Frequency
CIVE Mechanics Courses					
MECE 200 Statics	Infrastructure		a,e,g	a= exam question, e,g=homework and course/instructor evaluation report using competency- based rubric, review of pre-requisite knowledge	Sp11, Sp13, F14, Sp15
MECE 220 Dynamics	Infrastructure		a,e,g	a= exam question, e,g=homework and course/instructor evaluation report using competency- based rubric, review of pre-requisite knowledge	Sp11, Sp13, F14, Sp15
MECE 340 Fluid Mechanics	Infrastructure / Water	a,b	e,k	targeted exam questions	F12, F14
CIVE 231 Soil Mechanics	Infrastructure	b,e	a	b=laboratory exercise e=competency-based rubric with evaluation based on	Sp11, Sp13, Sp15
CIVE Core Courses					
CIVE 100 Introduction to Civil Engineering	Infrastructure	f,j	d,e,g,h,i,j	Presentations, writing assignments, course/instructor evaluation report; competency-based rubric; review of pre-requisite knowledge,	F10, F11, F13, F14
CIVE 218 Surveying for Civil Engineering Construction	Infrastructure	b,e	a	b=laboratory exercise e=competency-based rubric with evaluation based on	Sp11, Sp13, Sp15
CIVE 240 Introduction to Construction Materials	Infrastructure	b,d (Sp 11) b,d,k (Sp 12, F12) e (F14)	a,b,c,d,f,g,h,i	b=laboratory reports, c=team leadership, g=group project, k=laboratory exercise	Sp 11, Sp12, F12, F14

STAT 250 Statistical Principles and Practices	Infrastructure / Water		a,b,k		
CIVE 462 Geotechnical Engineering	Infrastructure	b,e	a	b=laboratory exercise e=competency-based rubric with evaluation based on	Sp11, Sp13, Sp15
CIVE 481 Transportation Engineering	Transportation	c,h	a,b,e,g,i,k		F13, F14
CIVE 344 Applied Hydraulics	Water	a,b	e,k	Targeted exam questions	F12, F14
ENVE 355 Environmental Engineering	Water	h,i	a,c,e,k		F11
CONE 330 Principles of Engineering Economy	Infrastructure		a,b,k		
COMM 103 Oral Communication		d,g	f,h,i,j,k,l	Course/instructor evaluation report	F10, F11, F12, Sp12, F14, Sp15
CIVE Professional Elective Courses					
CIVE 431 Pipe Flow and Water Distribution Systems	Water	c,e	a,d	Design assignment and homework	Sp13
ENVE 441 Water Treatment Engineering	Water	c,e	a,d	Design assignment and homework	Sp13
ENVE 442 Wastewater Treatment Engineering	Water	c,e	a,d	Design assignment and homework	Sp13
CIVE 453 Traffic Engineering Design	Transportation	c,e	a,d	Design assignment and homework	Sp13
CIVE 420 Highway Engineering	Transportation	c,e	a,d	Design assignment and homework	Sp13
CIVE 464 Integrated Highway Bridge	Transportation	c,e	a,d	Design assignment and homework	Sp13
CIVE 468 Airport	Transportation	c,e	a,d	Design assignment and homework	Sp13

CIVE 470 Railroad Transportation	Transportation	c,e	a,d	Design assignment and homework	Sp13
MECE 452 Principles of Heat Transfer	VHAC	c,e	a,d	Design assignment and homework	Sp13
MECE 453 Heating, Ventilating, and	VHAC	c,e	a,d	Design assignment and homework	Sp13

Table 4.2. Summary of Assessment Methods and Frequency of CIVE Outcomes

A.4. Assessment of Outcomes from Exit Interview Questionnaires

In addition to individual course assessments summarized above, CIVE uses exit interviews to gain information for continuous improvement. These interviews are generally completed by all graduates and consist of a written questionnaire. In this interview, feedback is sought regarding students' satisfaction regarding course work, instruction, laboratories and faculty advising. Students' suggestions for improvements are reviewed and summarised annually. The questionnaire can be found in figure 4.1.

This survey is prepared for the ABET 2017 study and aims to improve the quality of education based on senior student's academic experiences. Careful completion of the survey will aid in accomplishing the aim of this study. We thank you very much for your time.

Your Present CGPA: **Please cross (X) the most appropriate choice.**					
	Strongly Agree	**Agree**	**Disagree**	**Strongly**	**No Opinion**
1. **Evaluate how the education you received at GTU has contributed to your knowledge:**					
a) I gained the ability to apply the knowledge of mathematics in tackling engineering problems.	10	29	7	4	0
b) I gained the ability to apply the knowledge of basic science in tackling engineering problems	9	32	6	2	1
c) I have learned basic engineering approaches.	14	26	4	2	0

2. Evaluate the improvement in your skills due to your engineering education					
a) My ability to arrange, design and conduct experiments has improved.	12	26	6	2	4
b) My ability to analyze and interpret experimental data has improved.	11	24	9	3	3
c) I gained the ability to identify, formulate and solve engineering problems.	9	23	10	4	4
d) I became aware of the impacts of engineering on the environment including social, political, and economical aspects of our life.	14	21	9	4	2
e) I have understood the importance of team work and have gained the necessary skills to work in a group.	20	24	4	2	0
f) I became conscious of professional and ethical responsibility.	15	27	5	2	1
g) I have gained the ability to present results of technical studies orally.	9	29	8	2	2
h) I have gained the ability of writing technical reports.	10	23	6	1	1
i) I have understood the importance and the need for life-long learning	13	27	7	2	1
j) I have gained the ability to design an engineering system.	11	25	8	3	3
k) I have learned the culture of contemporary approaches, investigations and learning techniques	12	26	7	2	3
l) I gained ability to use the techniques, skills and modern engineering tools necessary for engineering practice	10	23	11	4	2
3. Your opinion about the graduation project.					
a) The graduation project increased my interest in Civil Engineering subjects	14	29	4	2	1
b) I recognized the importance of team work.	15	27	3	3	2
c) I have learned research techniques.	11	25	8	4	2
d) I have understood that design is made up of several steps	12	29	4	2	3
e) I have learned that engineering design requires economic analysis	9	23	12	4	2
f) The project improved my oral and written communication ability	16	28	3	2	1
g) I have gained the ability to establish relationships between theory and practice.	15	27	5	3	0
4. Evaluate the academic environment within the department.					
a) I was satisfied with my academic advising during the registration period and afterwards.	8	22	9	5	6
b) Faculty were fair and unbiased in their treatment of individual students	17	26	4	1	2
c) I was satisfied with the laboratory facilities	11	26	8	2	3
d) I was satisfied with the computer laboratory facilities	16	28	4	2	0
5. Evaluate the University facilities.					
a) I was satisfied with the professional and scientific seminars I have attended at the university	15	28	4	2	1
b) I was satisfied with the services of the university's health center	9	22	8	5	6

c) I was satisfied with the Library's services	16	26	5	1	2
d) I was satisfied with the social, sports and cultural activities at the university	18	28	3	1	0

Figure 4.1 Georgian Technical University, Civil Engineering Faculty.
Student Exit Survey (50 students from 91), 2016-2017 sprıng

You may add your comments/opinions in the space given below:

1. To devote more time to writing technical reports.
2. More information to how apply the knowledge of basic science in eengineering problems.
3. Improve teaching modern engineering tools necessary for engineering practice.
4. To encrease the laboratory facilities
5. Improve the system of academic advising.

The exit interview questionnaire requests that students rank the overall CIVE curriculum in terms of how it addresses each student outcome.
Based on this information it is clear that, on average, CIVE students believe that the curriculum is covering the student outcomes in an adequate manner.

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.

The alignment of the Program educational objectives, student outcomes and CIVE curriculum is shown below (see also Table 4-1). This table shows how the student outcomes support the overall program objectives and how the CIVE curriculum is structured to support the attainment of the student outcomes.

A.1. Relationship between program objectives, student outcomes and curriculum

Program Educational Objectives	Student Outcomes	CIVE CURRICULUM Supporting Student Outcomes
CIVE graduates will be prepared for the profession of civil	(a) an ability to apply knowledge of mathematics,	(a) **Application of mathematics:** MATH 150 Calculus I

engineering, or related fields, and to apply their knowledge in engineering practice or research	science, and engineering	MATH 151 Calculus II MATH 254 Introduction to Linear Algebra MECE 280 Methods of Analysis **Application of Science:** PHYS 195 Principles of Physics with Laboratory PHYS 196 Principles of Physics with Laboratory CHEM 100 Introduction to General Chemistry BIOL 100 General Biology **Application of Engineering:** MECE 200 Statics MECE 220 Dynamics MECE 340 Fluid Mechanics CIVE 218 Surveying for Civil Engineering CIVE 240 Introduction to Construction Materials CIVE 231 Soil Mechanics CIVE 462 Geotechnical Engineering CIVE 481 Transportation Engineering CIVE 344 Applied Hydraulics ENVE 355 Environmental Engineering
	(b) an ability to design and conduct experiments, as well as to analyze and interpret data	(b) **Experimentation:** CIVE 240 Introduction to Construction Materials CIVE 462 Geotechnical Engineering CIVE 481 Transportation Engineering CIVE 344 Applied Hydraulics CIVE 365 Soil mechanics ENVE 441 Water Treatment Engineering ENVE 442 Wastewater Treatment Engineering MECE 452 Principles of Heat Transfer
	(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	(c) **Design:** CIVE 100 Introduction to Civil Engineering CIVE 344 Applied Hydraulics ENVE 355 Environmental Engineering CIVE 481 Transportation Engineering CIVE 453 Traffic Engineering Design CIVE 431 Pipe Flow and Water Distribution Systems CIVE 420 Highway Engineering CIVE 464 Integrated Highway Bridge Design CIVE 468 Airport Engineering CIVE 470 Railroad Transportation Engineering (Prof. Practice and Design)

	(d) an ability to function on multidisciplinary teams	(d) **Multidisciplinary Teams:** COMM 103 Oral Communication (Prof. Practice and Design)
	(e) an ability to identify, formulate, and solve engineering problems	(e) **Engineering Problems:** All of CIVE courses except for COMM 103 Oral Communication
	(g) an ability to communicate effectively	(g) **Communications:** COMM 103 Oral Communication CIVE 100 Introduction to Civil Engineering MECE 200 Statics MECE 220 Dynamics MECE 340 Fluid Mechanics CIVE 481 Transportation Engineering (Prof. Practice and Design)
	(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	(k) **Engineering tools:** STAT 250 Statistical Principles and Practices CONE 330 Principles of Engineering Economy CIVE 344 Applied Hydraulics CIVE 240 Introduction to Construction Materials CIVE 231 Soil Mechanics CIVE 462 Geotechnical Engineering CIVE 481 Transportation Engineering CIVE 344 Applied Hydraulics ENVE 355 Environmental Engineering (Prof. Practice and Design)
CIVE graduates are encouraged to seek professional licensure, when appropriate, and to be active in professional organisations, seek opportunities for life-long learning and participate in the betterment of their profession.	(f) an understanding of professional and ethical responsibility	(f) **Professional and Ethical:** CIVE 100 Introduction to Civil Engineering CONE 201 Construction Ethics, Law, and Contracts (Prof. Practice and Design)
	(i) a recognition of the need for, and an ability to engage in life-long learning	(i) **Life-long Learning CIVE:** CIVE 100 Introduction to Civil Engineering CIVE 481 Transportation Engineering ENVE 355 Environmental Engineering (Prof. Practice and Design)
	(l) explain the importance of professional licensure	(l) **Professional Licensure:** CIVE 100 Introduction to Civil Engineering (Prof. Practice and Design)
CIVE graduates are encouraged to seek leadership roles and to be advocates for their profession in solving complex societal issues for the broader good of the community.	(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	(h) **Impact of Solutions:** COMM 103 Oral Communication CIVE 100 Introduction to Civil Engineering CIVE 481 Transportation Engineering ENVE 355 Environmental Engineering

		(Prof. Practice and Design)
	(j) a knowledge of contemporary issues	(j) **Contemporary Issues:**

Table 5.1. Relationship between program objectives, student outcomes and curriculum

A.1. Program Outcomes and Assessment

Program Outcomes

Three classifications of Outcomes resulted from this process, which we labeled:

- ABET Derived Outcomes
- Civil Engineering Specific Outcomes (CV)

The ABET Derived Outcomes were developed directly from the ABET (a) through (k) outcomes.
Civil Engineering Specific Outcomes were developed within the BS Engineering Degree and for the ABET Program Criteria for the BS Civil Engineering Degree.

The ABET Derived Outcomes and Specific Outcomes for Civil Engineering are presented on Tables 5.2 and 5.3. Specific Civil Engineering Outcomes are designated as CV1 through CV5.

ABET Derived Outcomes	1.	Graduates have an ability to apply knowledge of mathematics, science, and engineering.
	2.	Graduates have an ability to design and conduct experiments, as well as to analyze and interpret data.
	3.	Graduates have and ability to design a system, component, or process to meet desired needs.
	4.	Graduates have an ability to function on multi-disciplinary teams.
	5.	Graduates have an ability to identify, formulate, and solve engineering problems.
	6.	Graduates have an understanding of professional and ethical responsibility.
	7.	Graduates have an ability to communicate effectively.
	8.	Graduates have the broad education necessary to understand the impact of engineering solutions in a global and societal context.
	9.	Graduates have recognition of the need for, and an ability to engage in life-long learning.
	10.	Graduates have knowledge of contemporary issues.
	11.	Graduates have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Civil Engineering Specific Outcomes	(CV1)	Graduates are able to design civil engineering systems through the analysis, synthesis and control, using statistical and calculus based methods.
	(CV2)	Graduates have proficiency in constructing materials and constructing processes and understand the behavior and properties of materials as they are altered and influenced by processing in civil engineering.
	(CV3)	Graduates have proficiency in process of civil engineering and understand the design of constructions and the equipment, tooling, and environment necessary for their production.
	(CV4)	Graduates appreciate the necessity for construction competitiveness and understand how to create competitive advantage through manufacturing planning, strategy and control.
	(CV5)	Graduates have had laboratory experiences which enable them to measure construction variables and make technical inferences about the processes.

Table 5.2: ABET and GTU Civil Engineering Outcomes

Relation of CIF Program Outcomes to Curriculum

The primary process used to assure achievement of Program Outcomes is the development of a curriculum, which exposes students to the engineering skills and knowledge necessary to achieve the outcomes and the enforcement of curricular requirements prior to graduation.
Table 5.3. shows the relationship between all the courses in the curriculum and the ABET Derived and Civil Engineering Specific Outcomes.

	(1) an ability to apply knowledge of mathematics, science and engineering.	(2) an ability to design and conduct experiments, as well as to analyze and interpret data.	(3) an ability to design a system, component, or process to meet desired needs.	(4) an ability to function on multi-disciplinary teams.	(5) an ability to identify, formulate, and solve engineering problems.	(6) an understanding of professional and ethical responsibilities.	(7) an ability to communicate effectively.	(8) the broad education necessary to understand the impact of engineering solutions in a global and societal context.	(9) a recognition of the need for, and an ability to engage in life-long learning.	(10) a knowledge of contemporary issues.	(11) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	(CV1) are able to design civil engineering systems through the analysis, synthesis and control, using statistical and calculus based methods.	(CV2) have proficiency in constructing materials and constructing processes and understand the behavior and properties of materials as they are altered and influenced by processing in civil engineering.	(CV3) have proficiency in process of civil engineering and understand the design of constructions and the equipment, tooling, and environment necessary for their production.	(CV4) appreciate the necessity for construction competitiveness and understand how to create competitive advantage through manufacturing planning, strategy and control.	(CV5) have had laboratory experiences which enable them to measure construction variables and make technical inferences about the processes.
Communication																
COMM 103 Oral Communication							X	X			X					
Communications Elective							X	X								
Social Sciences Elective								X		X						
History or PolySci Elective								X		X						
Mathematics																
MATH 150 Calculus I	X															
MATH 151 Calculus II	X															
STAT 250 Statistical Principles and Practices	X	X		X	X		X			X						

MATH 254 Introduction to Linear Algebra	X															
MECE 280 Methods of Analysis	X															
Science																
PHYS 195 Principles of Physics with Laboratory	X	X			X		X									
PHYS 196 Principles of Physics with Laboratory	X	X			X		X									
CHEM 100 Introduction to General Chemistry	X	X			X		X									
BIOL 100 General Biology	X	X			X		X									
Mechanics																
MECE 200 Statics	X		X		X				X		X	X				
MECE 220 Dynamics	X				X		X		X		X	X				
MECE 340 Fluid Mechanics	X		X		X				X		X					
CIVE 231 Soil Mechanics	X	X		X	X						X	X	X		X	X
Civil Engineering Core											X					
CIVE 100 Introduction to Civil Engineering	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
CIVE 218 Surveying for Civil Engineering Construction	X			X	X				X		X	X	X	X		X
CIVE 240 Introduction to Construction Materials	X	X		X	X		X				X	X	X		X	X
CIVE 462 Geotechnical engineering	X	X		X	X						X	X	X		X	X
CIVE 481 Transportation Engineering	X			X	X	X			X		X	X				X
CIVE 344 Applied Hydraulics	X	X		X	X						X	X		X	X	X
ENVE 355 Environmental Engineering	X			X	X	X			X		X	X		X		X
Business																
CONE 330 Principles of Engineering Economy								X		X		X	X	X	X	X
Computer Applications																
CIVE 121 Computer Graphics	X		X	X	X	X	X					X				
CIVE 320 Civil Engineering Computer Applications	X		X	X	X	X	X					X				
Professional Electives																
MECE 452 Principles of Heat Transfer	X		X		X						X			X		X
CIVE 453 Traffic Engineering Design	X		X	X	X	X					X	X		X	X	X
CIVE 431 Pipe Flow and Water Distribution Systems	X	X	X	X	X	X					X	X		X	X	X
CIVE 420 Highway Engineering	X	X	X	X	X	X					X	X	X	X	X	X
ENVE 441 Water Treatment Engineering	X	X	X	X	X	X					X	X	X	X	X	X
CIVE 464 Integrated Highway Bridge Design	X	X	X	X	X	X					X	X	X	X	X	X
ENVE 442 Wastewater Treatment Engineering	X	X	X	X	X	X					X	X	X	X	X	X
CIVE 468 Airport Engineering	X	X	X	X	X	X					X	X	X	X	X	X

MECE 453 Heating, Ventilating, and Air-Conditioning	x	x	x	x	x	x					x	x		x	x	x
CIVE 470 Railroad Transportation Engineering	x	x	x	x	x	x					x	x	x	x	x	x

Table 5.3. Expected Outcomes by Course: Outcomes 1-11 and CV1-CV5

A simple means to analyse how our curriculum supports the attainment of the outcomes is to count the numbers of courses that are intended to support each outcome and rank order the outcomes using this metric. Looking first at the ABET Derived Outcomes in Table 5.3, we can translate the information to the following rank ordered list shown in Table 5.4.

Rank Order	ABET Derived Outcome	Supporting Courses
1.	(1) An ability to apply knowledge of mathematics, science and engineering.	32
2.	(5) An ability to identify, formulate and solve engineering problems.	28
3.	(11) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	22
4.	(4) An ability to function on multi-disciplined teams.	20
5.	(2) An ability to design, and conduct experiments, as well as to analyze and interpret data.	17
6.	(3) An ability to design a system, component or process to meet desired needs.	15
7.	(6) An understanding of professional and ethical responsibilities.	14
8.	(7) An ability to communicate effectively.	12
9.	(8) The broad education necessary to understand the impact of engineering solutions in a global and societal context.	7
10.	(9) A recognition of the need for, and an ability to engage in life-long learning.	7
11.	(10) A knowledge of contemporary issues.	5

Table 5.4 Rank Ordering of ABET Derived Outcomes by Supporting Course

Looking at the ABET Derived Outcomes in Table 5.3, we can translate the information to the following rank ordered list shown in Table 5.4.

Outcomes 1, and 5 and (Rank order 1, 2) are supported by about two thirds of the courses available to our students. These outcomes are focused on the application of mathematics, science, and engineering knowledge, tools and techniques and an ability ability to identify, formulate and solve engineering problems.
The second highest level of support is given to Outcomes 11, 4 and 2 (Rank order 3, 4 and 5) where almost half of our courses treat these outcomes. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice, an ability to function on multi-disciplined teams and an ability to design, and conduct experiments, as well as to analyse and interpret data.
A third classification of attention to outcomes is seen with Outcomes 3, 6 and 7 (Rank order 6, 7 and 8) where about one third of our courses provide support. These outcomes deal with an ability to design a system, component or process to meet desired needs, an understanding of professional and ethical responsibilities and an ability to communicate effectively.
The fourth level of support is given to ABET Derived Outcomes 8, 9, and 10 (Rank order 6, 7 and 8). They deal with broad education necessary to understand the impact of engineering solutions in a global and societal context, recognition of the need for, and an ability to engage in life-long learning and knowledge of contemporary issues.

Looking at the Civil Engineering Deriving Specific Outcomes in Table 5.3, we can translate the information to the following rank ordered list shown in Table 5.5.

1	(CV1) Graduates are able to design civil engineering systems through the analysis, synthesis and control, using statistical and calculus based methods.	22
2	(CV5) Graduates have had laboratory experiences which enable them to measure construction variables and make technical inferences about the processes.	20
3	(CV4) Graduates appreciate the necessity for construction competitiveness and understand how to create competitive advantage through manufacturing planning, strategy and control.	15
4	(CV3) Graduates have proficiency in process of civil engineering and understand the design of constructions and the equipment, tooling, and environment necessary for their production.	14
5	(CV2) Graduates have proficiency in constructing materials and constructing processes and understand the behavior and properties of materials as they are altered and influenced by processing in civil engineering.	12

Table5.5. Rank Ordering of GTU Civil Engineering Deriving Specific Outcomes by Supporting Courses

Outcomes CV1 and CV5 (Rank order 1, 2) are supported by about two thirds of the courses available to our students. These outcomes are focused on the design civil engineering systems through the analysis, synthesis and control, using statistical and calculus based methods and having laboratory experiences which enable them to measure construction variables and make technical inferences about the processes.
Outcomes CV4, CV3 and CV2 (Rank order 3, 4, 5) are also supported by about two thirds of the courses available to our students. These outcomes are focused on the appreciation of necessity for construction competitiveness and understanding how to create competitive advantage through planning, strategy and control of constructing

processes, having proficiency in process of civil engineering and understanding the design of constructions and the equipment, tooling, and environment necessary for their production and having proficiency in constructing materials and constructing processes and understanding the behavior and properties of materials as they are altered and influenced by processing in civil engineering.

A.2. Assessment Processes

At this date the Civil Engineering Program at Civil Engineering Faculty of GTU is only started. Accordingly, many of the traditional assessment techniques that rely on surveys or interviews with engineering graduates at different points of their careers and discussions with civil engineering employers of CEF graduates are not available.

As a result, we have structured our Assessment Process to be phased in over a period of time. Current methods of assessment will rely on evaluation of course work, internships, and graduate exit interviews. Future processes will incorporate standardised testing using the Fundamentals of Engineering Exam, Alumni surveys and Employer surveys. The Initial Assessment Processes and the Future Assessment Processes are summarised below

Future Assessment Processes

As the program matures, as graduates enter the workforce and as Accreditation is achieved we plan to expand the assessment processes. Current plans for additional assessment tools include the use of the Fundamentals of Engineering Exam, Alumni Surveys and Employer Surveys:

Fundamentals of Engineering Exam: Students will be expected to take the Fundamentals of Engineering Exam during their final year at Civil Engineering Faculty. Their overall passing rate will be tracked to determine how well we are meeting our expected outcomes and their scores on individual sections of the test will be used to adjust the curriculum for the benefit of future classes.

Alumni Surveys: The graduating student exit interviews are currently being used to assess the degree to which students perceive their achievement of program outcomes, their expected career direction and to measure their level of satisfaction with the program at Civil Engineering Faculty. We will develop an alumni survey instrument this survey will be taken approximately one year after graduation and will focus on soliciting suggested improvements to our program based upon the graduates' working experiences in the field.

Employer Surveys: In addition to the initial Alumni Survey document, we expect to survey employers of our initial graduates. We hope to learn whether employers are satisfied with the preparation GTU civil engineers have received and to solicit how skill set and knowledge requirements are changing in the workplace. These survey results over time will be used to adjust our expected outcomes and to modify our program to fit the needs of the employer community.

B. Course Syllabi

The examples of syllabuses are displayed in Appendix 2.

C. Advisory Committee

The Industrial Advisory Board expectation; GTU Civil 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.

Advisory Committee Industrial Advisory Board Meeting

Agenda

Monday; March 6, 2017; 10:00 am – 1:00 pm

Attendees:

David Gurgenidze - Dean of Civil Engineering Faculty
Marina Javakhishvili – Head of Quality Assurance Cervice of the Faculty
Alexander Davitashvili – professor of GTU
Irma Inashvili – professor of GTU
Mamuli Grdzelishvili – professor of GTU
Majid Hashemipour – advisor of GTU/SDSU
Rusudan Sanikidze - GWP (Georgian Water & Power Company)
Tamaz Shalikadze - Institute of Scientific Research and Production Technology of Highway Construction
Nino Chkhaidze - Georgian Railway

Agenda:

Chair's welcome
State of the CIVE program
Update on ABET Accreditation
Assessment status of the CIVE program
Recommendations
Other topics
Industry news/information exchange among board members
Adjournment

Industrial Advisory Board Members:

Rusudan Sanikidze
GWP (Georgian Water & Power Company)
Head of Department of Human Resources Development

Tamaz Shalikadze
Institute of Scientific Research and Production Technology of Highway Construction
General Director

Nino Chkhaidze
Georgian Railway
Head of Department of Human Resources Development

Existent Educational Program of Civil Engineering in GTU

Existent Civil Engineering program consists from:

1. General program (Minors - 120 credits)
2. A few Optional programs (Majors -60 credits)
3. Elective courses (Majors – 60 credits)

Year; Semester	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 SE. [1]	Subject Area (ESTC Credits)			
			MATH & Basic Science	Engineering Topics Check if Contains Significant Design (☑)	General Education	Other
1;1	Foreign Language Elective				3	
	MAT0108 Mathematics I		5			
	PHY0108 Physics I		4			
	CHE0104 Chemistry		3			
	BSINF01 Basics of Informatics				5	
	DGEOM05 Descriptive Geometry		3			
	CEDRA05 Civil Engineering Drawing			3		
	GDS0103 Surveying for Civil Engineering			3		
1;2	Foreign Language Elective				3	
	MAT0208 Mathematics II		5			
	PHY0208 Physics II		4			

	CEGRA05 Computer Graphics				3	
	BSPRO01 Basics of Programming				3	
	GDS0203 Surveying for Civil Engineering			3		
	TMEC101 Theoretical Mechanics I			3		
	EGASM01 Engineering Geology and Mechanics **4**			4		
	University Elective				3	

2;1	TMEC201 Theoretical Mechanics II			4		
	STMA101 Strength of Materials I			3		
	BUMA101 Construction Materials I			3		
	HYDRA01 Hydraulics			4		
	INARC06 Introduction to Architecture				3	
	MAT0308 Mathematics III		5			
	ENPRE04 Environment Defense and Ecology				3	
	WSS0301 Water Supply and Sewerage			3		
	HSUVN01 Air Heating and Ventilation Systems			3		

2;2	STMA201 Strength of Materials II			3		

	BUMA201 Construction Materials II			3		
	BULME01 Construction Mechanics			5		
	FBLPR01 Basics of Construction Industry			3		
	IHTCC01 Introduction to Hydrotechnical Construction			3		
	IRCN101 Introduction to Transportation Construction			3		
	BULCI01 Construction Structures			4		
	Basics of Management in Construction Industry			3		
	Labor Safety and Emergency Management In Construction			3		

Example: Option I (Number of credits - 60).

"Design of Construction Structures of Civil and Industrial Buildings"

3.1	FOUND01 Soil Mechanics and Foundations			3		
	ARCBL06 Architecture of Buildings			3		
	SSCAA01 Seismic Stability of Construction Structures			4		
	METSC01 Fundamentals of Estimations for Metal Structures			4		
	SRCS101 Basics of Estimations of Reinforced Concrete Structures			5		
	COPRT01 Construction Industry			3		

	Technologies					
	CIOMA01 Organisation and Management of Construction Industry			3		
	WEPLC01 Wooden and Plastic Structures			5		
3.2	BBSTS01 Survey and Testing of Buildings/Structures			3		
	TBBMS01 Metal Structures Design			4		
	BWRCS01 Fundamentals of Design of Reinforced Concrete and Stone Structures			4		
	SECCD01 Fundamentals of Design of Reinforced Concrete Structures of Special Purpose			3		
	RERSB01 Reinforcement and Restoration of Buildings/Structures			5		
	BCDCO01 Design, Construction and Maintenance of Buildings/Structures in Seismically Active Zones			3		
	EXPER01 Technical Expertise in Construction			5		
	TECSC01 Technical Supervision in Construction			3		

Elective courses (Number of credits - 60).						
4.1	BCACR01 The basis of calculation of building construction reliability			5		
	BRURM01 The basis of rupture of reinforce mechanics			5		
	COSTR01 Constricting construction by using the compositions			5		
	BRUMB02 Construction and environment			5		
	THRCS01 Theoretical study of pre-reinforced concrete structures			3		
	LCATE01 Laminated construction and arrangement of the technology's effectiveness			4		
	DAMAG 01 Damage diagnostics of building construction			3		
4.2						
	TRBSE01 The roofs of buildings and structures coverings and methods of their equipment			4		
	TYOCO01 Technology of Building Industry			5		
	ASOLR01 Artificial soil reinforcement			3		
	HTCDE 01 Thermal, and capillary dephectoscopy			5		
	EE1001 Electrical Engineering			3		
	BPQWR01 Capstone project			10		

TOTALS-ABET BASIC-LEVEL REQUIREMENTS					
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM = 130		29 13%	185 77%	26 10 %	
Must satisfy one set	Minimum semester credit hours	64 (ESTC)	96 (ESTC)		
	Minimum percentage	25.0%	37.5%		

Existent program does not satisfy ABET criteria:

1. The ratio between subjects areas (13% / 77% / 10%) is not satisfied ABET criteria
2. The program has only about 2/3 of the mathematics and science needed
3. There is no quite enough general education components

Conclusion:

The Civil Engineering program must be modified to satisfy the ABET curriculum requirement with respect to the basic sciences and mathematics and general education component.

Now offered two programs:

1. "Civil Engineering".
2. "Construction Engineering"

In this Self-Study Report considered "Civil Engineering" program

Programs based on:

- ABET review
- Industrial Advisory board recommendations
- Faculty members recommendations
- Graduant's recommendations

"Civil Engineering" program

Science and mathematics

Mathematics

Students pursuing the BSCE degree are required to take the following Mathematics courses (17 hours):

MATH 150	Calculus I	4 hrs
MATH 151	Calculus II	4 hrs

STAT 250	Statistical Principles and Practices	3 hrs
MATH 254	Introduction to Linear Algebra	3 hrs
MECE 280	Methods of Analysis	3 hrs

Science.

Students pursuing the BSCE degree are required to take three of these courses from the following Lab Science courses (15 hours), in no particular sequence:

PHYS 195	Principles of Physics with Laboratory	4 hrs
PHYS 196	Principles of Physics with Laboratory	4 hrs
CHEM 100	Introduction to General Chemistry	4 hrs
BIOL 100	General Biology	3 hrs

Mechanics (9 hours)

MECE 200	Statics	3 hrs
MECE 220	Dynamics	3 hrs
MECE 340	Fluid Mechanics	3 hrs
CIVE 231	Soil Mechanics	3 hrs

Civil engineering Core courses (28 hours)

CIVE 100	Introduction to Civil Engineering	1 hr
CIVE 218	Surveying for Civil Engineering	3 hrs
CIVE 240	Introduction to Construction Materials	3 hrs
CIVE 462	Geotechnical Engineering	3 hrs
CIVE 481	Transportation Engineering	3 hrs
CIVE 344	Applied Hydraulics	3 hrs
ENVE 355	Environmental Engineering	3 hrs

Computer Applications

CIVE 320	Civil Engineering Computer Applications	3 hrs

Professional Electives

Elective course choices must consist of at least 5 courses from three areas:

1. Water - Pipe Flow and Water Distribution Systems CIVE 431, Water Treatment Engineering ENVE 441, Wastewater Treatment Engineering ENVE 442.

2. Transportation - Traffic Engineering Design CIVE 453, Highway Engineering CIVE 420, Integrated Highway Bridge Design CIVE 464, Airport Engineering CIVE 468, Railroad Transportation Engineering CIVE 470

3. Heating, Ventilating, and Air-Conditioning (HVAC) - Principles of Heat Transfer MECE 452, Heating, Ventilating, and Air-Conditioning MECE 453.

Professional Electives 1 (3 Hours)

Student must choose one of the following courses:

MECE 452	Principles of Heat Transfer	3 hrs
CIVE 453	Traffic Engineering Design	3 hrs

Professional Electives 2 (3 Hours)

Student must choose one of the following courses:

CIVE 431	Pipe Flow and Water Distribution Systems	3 hrs
CIVE 420	Highway Engineering	3 hrs

Professional Electives 3 (3 Hours)

Student must choose one of the following courses:

ENVE 441	Water Treatment Engineering	3 hrs
CIVE 464	Integrated Highway Bridge Design	3 hrs

Professional Electives 4 (3 Hours)

Student must choose one of the following courses:

ENVE 442	Wastewater Treatment Engineering	3 hrs
CIVE 468	Airport Engineering	3 hrs

Professional Electives 5 (3 Hours)

Student must choose one of the following courses:

MECE 453	Heating, Ventilating, and Air-Conditioning	3 hrs
CIVE 470	Railroad Transportation Engineering	3 hrs

University Electives 1 (3 hours)

Student must choose one of the following courses:

HIST 101	History of Georgia	3 hrs
PHIL 102	Introduction to Philosophy	3 hrs
PSYC 101	Introductory Psychology	3 hrs

University Electives 2 (3 hours)

Student must choose one of the following courses:

POLS 104	Global Politics	3 hrs
CONE 101	Construction and Culture	3 hrs
COMM 245	Interpersonal Communication	3 hrs

University Electives 3 (3 hours)

Student must choose one of the following courses:

HIST 101	World History	3 hrs
CIVE 301	Civil Engineering and Society	3 hrs
COMM 307	Communication in Professional Settings	3 hrs

University Electives 4 (3 hours)

Student must choose one of the following courses:

HIST 408	Modern Europe	3 hrs
SOCI 101	Introductory Sociology	3 hrs
COMM 415	Nonverbal Communication	3 hrs

University Electives 5 (3 hours)

Student must choose one of the following courses:

HIST 110	American History Since the Civil War	3 hrs
RELS 101	World Religions	3 hrs
COMM 485	Communicating Leadership	3 hrs

Table 5-1 describes the plan of study for students in the Civil Engineering major

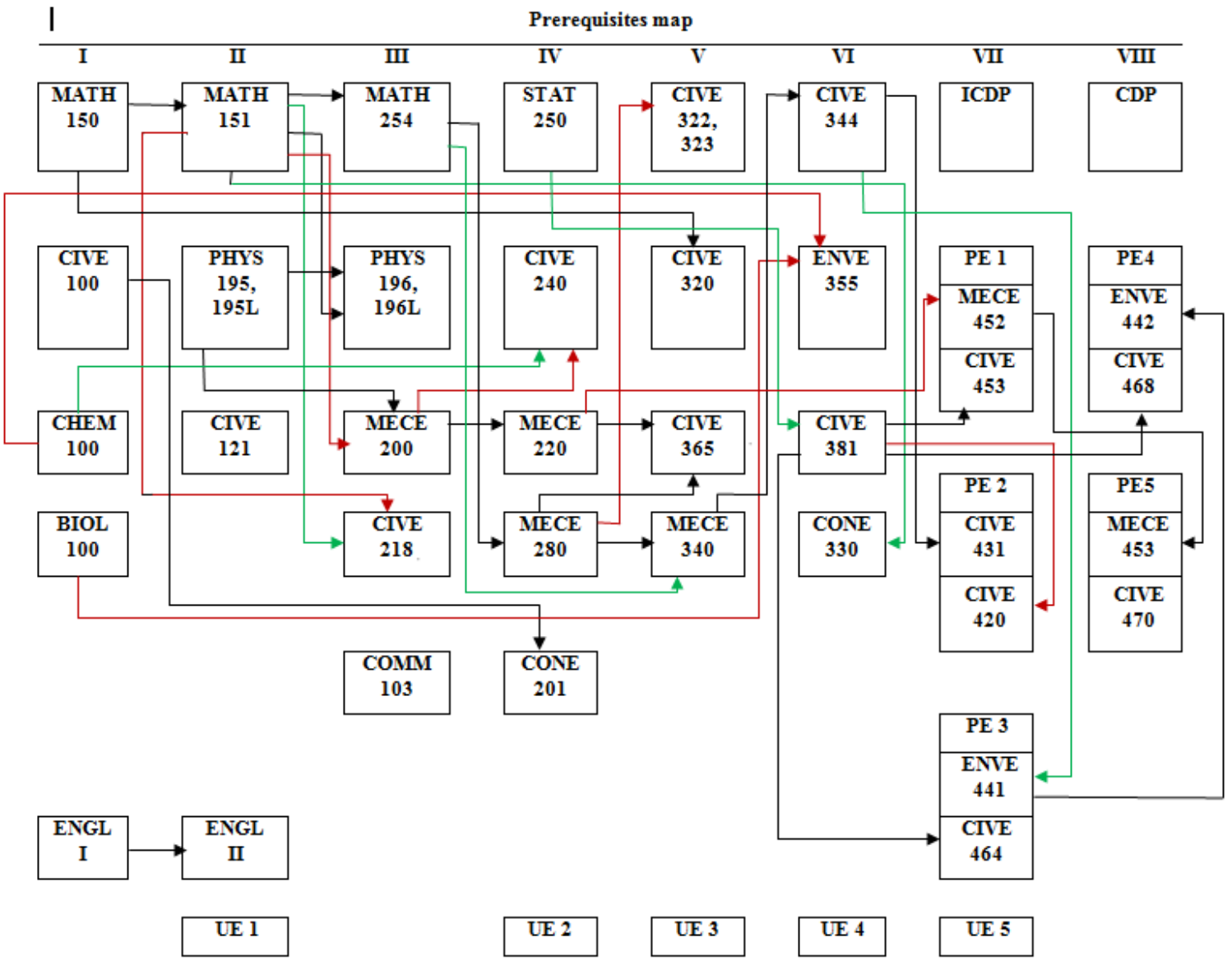
Year; Semester	Course (Department, Number, Title) List all courses in the program by term starting with the first term of the first year and ending with the last term of the	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE. [1]	Subject Area (Credit Hours)			
			MATH & Basic Science	Engineering Topics Check if Contains Significant Design (☑)	General Education	Other

	final year					
1;1	MATH 150 Calculus I	R	4			
	ENGL English I	R			3	
	CIVE 100 Introduction to Civil Engineering	R		1		
	CHEM 100 Introduction to General Chemistry with Laboratory	R	4			
	BIOL 100 General Biology	R	3			
1;2	MATH 151 Calculus II	R	4			
	PHYS 195, 195L Principles of Physics with Laboratory	R	4			
	ENGL English II	R			3	
	CIVE 121 Computer Graphics	R				3
	University Elective 1	SE			3	
2;;1	CIVE 218 Surveying for Civil Engineering and Construction	R		3 (√)		
	COMM 103 Oral Communication	R			3	
	PHYS 196, 196L Principles of Physics with Laboratory	R	4			
	MECE 200 Statics	R		3		
	MATH 254 Introduction to Linear Algebra	R	3			
2;2	STAT 250 Statistical Principles and Practices	R	3			
	MECE 280 Methods of Analysis	R	3			

	CIVE 240 Introduction to Construction Materials	R		3 (√)		
	MECE 220 Dynamics	R		3 (√)		
	CONE 201 Construction Ethics, Law, and Contracts	R			3	
	University Electives 2	SE			3	
3;1	CIVE 322, CIVE 323 Geotechnical Engineering with Laboratory	R		3 (√)		
	CIVE 320 Civil Engineering Computer Applications	R		3 (√)		
	AE 340 Fluid Mechanics	R		3		
	CIVE 365 Soil mechanics	R		3 (√)		
	University Electives 3	SE			3	
3;2	ENVE 355 Environmental Engineering	R		3		
	CIVE 381 Transportation Engineering	R		3		
	CONE 330 Principles of Engineering Economy	R			3	
	CIVE 344 Applied Hydraulics	R		3		
	University Electives 4	SE			3	
4;1	Introduction to Capstone Design Project	R		1		
	Professional Electives 1	SE		3		
	Professional Elective Labs	SE		1 (√)		
	Professional Electives 2	SE		3		
	Professional Electives 3	SE		3 (√)		
4;2	Professional Electives 4	SE		3 (√)		

	Professional Electives 5	SE		3		
	University Electives 5	SE			3	
	Senior Design Project	R		4 (√)		
TOTALS-ABET BASIC-LEVEL REQUIREMENTS						
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM = 120			32 26,6%	55 45,8%	30 25%	3 2,5%
Must satisfy one set	Minimum semester credit hours		32	48		
	Minimum percentage		25.0%	37.5%		

iii Program structure


Prerequisites map
I
II
III
IV
V
VI
VII
VIII
MATH 150
MATH 151
MATH 254
STAT 250
CIVE 322, 323
CIVE 344
ICDP
CDP
CIVE 100
PHYS 195, 195L
PHYS 196, 196L
CIVE 240
CIVE 320
ENVE 355
PE 1
MECE 452
CIVE 453
PE4
ENVE 442
CIVE 468
CHEM 100
CIVE 121
MECE 200
MECE 220
CIVE 365
CIVE 381
PE 2
CIVE 431
CIVE 420
PE5
MECE 453
CIVE 470
BIOL 100
CIVE 218
MECE 280
MECE 340
CONE 330
COMM 103
CONE 201
PE 3
ENVE 441
CIVE 464
ENGL I
ENGL II
UE 1
UE 2
UE 3
UE 4
UE 5

The short description of courses

Code	Course	Description
MATH 150	Calculus I (R-4)	Prerequisites: Knowledge of algebra, geometry, and trigonometry as demonstrated by either (1) satisfactory completion of Mathematics 141 with a grade of C (2.0) or above; or (2) satisfaction of the Entry-Level Mathematics requirement and qualification on the Mathematics Departmental Precalculus Proficiency Examination. Proof of completion of prerequisites required. Algebraic and transcendental functions. Continuity and limits. The derivative and its applications. The integral and the fundamental theorem of calculus.
ENGL	English I (R-3)	
CIVE 100	Introduction to Civil Engineering (R-1)	Introduction to diverse field of civil and environmental engineering to include structural, geotechnical, water resources, transportation, construction engineering and management, and environmental engineering. Legal, ethical, and international dimensions of the profession.
CHEM 100	Introduction to General Chemistry with Laboratory (R-4)	Elementary principles of chemistry used to illustrate nature and development of modern scientific thought.
BIOL 100	General Biology (R-3)	A beginning course in biology stressing processes common to living organisms.

MATH 151	Calculus II (R-4)	Prerequisite: Mathematics 150 with minimum grade of C. Proof of completion of prerequisite required Techniques and applications of integration. Improper integrals. Differential equations. Infinite series. Conic sections. Curves in parametric form, polar coordinates.
PHYS 195, 195L	Principles of Physics with Laboratory (R-4)	Prerequisites: High school physics or Physics 180A. Mathematics 150 with a minimum grade of C. Fundamental principles of physics in areas of mechanics and oscillatory motion. Designed for students requiring calculus-based physics. Laboratory. Prerequisite: Credit or concurrent registration in Physics 195. Experiments in mechanics, wave motion, resonance phenomena using precision air tracks.
ENGL	English II (R-3)	
CIVE 121	Computer Graphics (R-3)	Computer aided design for civil engineering applications (AutoCAD).
	University Electives 1 (E-3)	
HIST 101	History of Georgia	The people of the ancient, medieval, and modern history of the New etnogenetic, political, socio - economic and cultural processes of the main features and trends.

		The historical and cultural values in the context of the history and the history of Georgian culture.
PHIL 102	Introduction to Philosophy	Introduction to philosophical inquiry with emphasis on problems of knowledge and reality. Students are encouraged to think independently and formulate their own tentative conclusions.
PSYC 101	Introductory Psychology	Facts, principles, and concepts which are basic to understanding human behavior.

CIVE 218	Surveying for Civil Engineering and Construction (R-3)	Prerequisite: Mathematics 151. Principles of plane surveying. Measurement of horizontal distance, difference in elevation, and angles. Traverse surveys and computations. Horizontal and vertical curves. Principles of stadia. Topographic surveys. Earthwork.
COMM 103	Oral Communication	Training in fundamental processes of oral expression; method of obtaining and organising material; outlining; principles of attention and delivery; practice in construction and delivery of various forms of speeches.
PHYS 196, PHYS 196L	Principles of Physics (R-4) with Laboratory	Prerequisites: Physics 195 and Mathematics 151. Fundamental principles of physics in areas of electricity and magnetism. Designed for students requiring calculus-based physics. Three hours of laboratory. Prerequisite: Credit or concurrent registration in Physics 196. Experiments in DC circuits, AC circuits, electrical resonance, oscilloscope measurement techniques, and electric and magnetic fields.
MECE 200	Statics (R-3)	Prerequisites: Physics 195 and credit or concurrent registration in Mathematics 151. Proof of completion of prerequisites required: Copy of transcript or registration confirmation. Force systems, equilibrium, structures, distributed forces, friction, virtual work, moments of inertia, vector algebra.
MATH 254	Introduction to Linear Algebra	Prerequisite: Mathematics 151 with a grade of C (2.0) or better. Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors.

STAT 250	Statistical Principles and Practices (R-3)	Prerequisite: Satisfaction of the Entry-Level Mathematics requirement. Descriptive statistics, data displays, measures of central tendency and variability, random variables, sampling distribution. Estimation and hypothesis tests for means and proportions, linear regression and correlation.
MECE 280	Methods of Analysis (R-3)	Prerequisite: Mathematics 151, 254 with minimum grade of C. Selected topics from ordinary differential equations, the Laplace transform, Fourier series, and linear algebra, with engineering applications.
CIVE 240	Introduction to Construction Materials (E-3)	Prerequisites: Chemistry 100 and credit or concurrent registration in Mechanical Engineering 200. Proof of completion of prerequisites required: Copy of transcript and evidence of concurrent registration in Mechanical Engineering 200 . Atomic and molecular structure of materials utilised in

		engineering. Analysis of the relationships between structure of materials and their mechanical, thermal, electrical, corrosion, and radiation properties. Examples of material structure relevant to civil, electrical, aerospace, and mechanical engineering applications.
MECE 220	Dynamics (E-3)	Prerequisites: Mechanical Engineering 200 with a grade of C or better. Proof of completion of prerequisite required: Copy of transcript. Kinetics of a particle; central force motion; systems of particles; work and energy; impulse and momentum; moments and products of inertia; Euler's equations of motion; vibration and time response; engineering applications.
CONE 201	Construction Ethics, Law, and Contracts (E-3)	Prerequisites: Introduction to Civil Engineering 100. Legal and ethical environment of construction. Study of documents and common procedures in construction administration and their legal and ethical contexts for general contractors and subcontractors. Contract documentation, claim in various construction delivery methods.
	University Electives 2	
POLS 104	Global Politics (E-3)	Basic concepts, terms, and institutions of global politics. Explores power and inequality in the global system in a variety of issue areas, such as war and diplomacy, human rights, migration, the global economy, development, and the environment.
CONE 101	Construction and Culture (E-3)	Cultural context of construction, emphasising its centrality in evolution and expansion of built environments as expressions of ethical and historical value systems. Relationship between culture, geography, construction materials, and built expressions of cultural legacy. Interdependence of built environment and society.
COMM 245	Interpersonal Communication (E-3)	Theory and practice of interpersonal communication focuses on the role of communication in initiating, developing, and transitioning through everyday relationships. Emphasis on verbal and nonverbal messages, contexts, and challenges of managing interpersonal communication.
CIVE 322, CIVE 323L	Geotechnical Engineering with Laboratory (R-3)	Prerequisite: Mechanical Engineering 280. Mechanics of soils as they apply to engineering problems, soil classification, compaction, swelling, consolidation, strength and permeability. Applications to geotechnical and environmental engineering problems. Laboratory. Prerequisite: Credit or concurrent registration in Civil Engineering 322. Laboratory procedures of soil testing for geotechnical and environ-mental engineering problems.
CIVE 320	Civil and Environmental Engineering Computer Applications (R-3)	Prerequisite: Mathematics 150. Graphical information systems (GIS), specialised civil engineering software, advanced problem solving.
MECE 340	Fluid Mechanics (R-3)	Prerequisites: Mathematics 254, Mechanical Engineering 280; Fluid statics. Laminar and turbulent flow of liquids and gases in pipes, nozzles, and channels. Dimensional analysis and

		modeling. Drag forces on moving or immersed objects.
CIVE 365	Soil mechanics (R-3)	Prerequisite: Mechanical Engineering 220, 280 Soil mechanics theories applied to design of shallow and deep foundations; lateral pressure of soils, design of retaining walls.
	University Electives 3	
HIST 101	World History (E-3)	Modern history from a global perspective, 1500 to present.
CIVE 301	Civil Engineering and Society (E-3)	Role of civil engineers in society. Historical, political, esthetic, and philosophical perspectives on civil engineering. Contemporary issues involving civil engineering.
COMM 307	Communication in Professional Settings (E-3)	Communication principles in professional contexts including interviewing and technical and nontechnical oral presentations. Skill in meeting management.

ENVE 355	Environmental Engineering (R-3)	Prerequisites: Chemistry 100, Biology 100 Approved upper division engineering major, minor, or another major approved by the College of Engineering. Proof of completion of prerequisites required: Change of major form or other evidence of acceptable major code. Causes and effects of environmental problems and engineering methods to control them.
CIVE 381	Transportation Engineering (R-3)	Prerequisites: Statistical Principles and Practices 250 Physical design of transportation facilities, traffic analysis and control for different modes, planning and demand analysis, introduction to environmental impacts of transportation systems and intelligent transportation systems.
CONE 330	Principles of Engineering Economy (R-3)	Prerequisite: Mathematics 151. Mathematics of finance applied to engineering and managerial decision making. Framework for cost management in engineering and construction.
CIVE 344	Applied Hydraulics (R-3)	Prerequisite: Mechanical Engineering 340. Review of fluid statics. Forces on submerged surfaces. Close conduit flow. Pumps and turbines. Open-channel flow. Dams and reservoirs. Flood control.
	University Electives 4	
HIST 408	Modern Europe (E-3)	Prerequisite: Completion of the General Education requirement in Foundations of Learning II.C., Humanities required for nonmajors. Modern Europe from French Revolution to present. Social, cultural, economic, political, and intellectual trends, development of nation states, and sources of continental conflict.
SOCI 101	Introductory Sociology (E-3)	This course is prerequisite to all upper division courses in sociology. Major ideas, concepts, and methods in the study of society to include socialisation, culture, social structure, social stratification, deviance, social control, and social change.
COMM 415	Nonverbal Communication	Prerequisites: Communication 300 and 350. Admission to a major or minor in the School of Communication. Theory and

	(E-3)	research on nonverbal aspects of communication, with emphasis on codes and functions.

CIVE 490	Introduction to Capstone Design Project (R-3)	To prepare the senior year students for their capstone design 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, project reports, oral and written presentation.
	Professional Electives 1	
MECE 452	Principles of Heat Transfer (SE-3)	Prerequisites: Mechanical Engineering 220 Analytical and numerical solutions of steady and transient one- and two-dimensional conduction problems, forced and natural convection in external and internal fl ows, and thermal radiation. Applications.
CIVE 453	Traffic Engineering Design (SE-3)	Prerequisite: Civil Engineering 381. Sizing and configuration of highway facilities based on capacity analysis. Traffic signal design, impact and mitigation studies, parking, safety design.
	Professional Electives 2	
CIVE 431	Pipe Flow and Water Distribution Systems (SE-3)	Prerequisite: Civil Engineering 344. Principles of pressurised pipe flow. Estimation and management of water demand and water supply systems. Analysis of network distribution elements and network modeling. Design of distribution systems, their operation and maintenance, asset management, and financial appraisal.
CIVE 420	Highway Engineering (SE-3)	Prerequisite: Civil Engineering 381. Highway design, facility sizing, geometric design, drainage, earthwork, pavement design, traffic control devices, safety and environmental considerations.

	Professional Electives 3	
ENVE 441	Water Treatment Engineering (SE-3)	Prerequisites: Environmental Engineering 355, Civil Engineering 444. Basic water chemistry; water quality criteria and standards; residential, industrial and commercial water usage; principles of physical and chemical processes employed in water treatment; design of selected water treatment units; new and emerging water treatment technologies; and water distribution systems.
CIVE 464	Integrated Highway Bridge Design (SE-3)	Prerequisite(s): Transportation Engineering 381, Soil Mechanics 465. Methods for the integrated design of components typically found in transportation structures including bridge super- and sub-structures, retaining walls, pavements, highway geometrics, traffic, drainage, etc.

	Professional Electives 4	
ENVE 442	Wastewater Treatment Engineering (SE-3)	Prerequisite: Environmental Engineering 441. Wastewater collection, influent wastewater characteristics; effluent discharge requirements; principles of physical, biological, and chemical processes employed in wastewater treatment; design of selected wastewater treatment units; new and emerging wastewater treatment technologies; advanced treatment process; recycled water.
CIVE 468	Airport Engineering (SE-3)	Prerequisites: Transportation Engineering 381 Basic principles of airport facilities design to include aircraft operational characteristics, noise, site selection, land use compatibility, operational area, ground access and egress, terminals, ground service areas, airport capacity, and special types of airports.
	Professional Electives 5	
MECE 453	Heating, Ventilating, and Air-Conditioning (SE-3)	Prerequisites: Principles of Heat Transfer 452 Fundamentals of air conditioning processes, psychrometrics, and building cooling load calculations. Design and analysis of HVAC systems. Equipment selection. Design codes and standards. Computerised cooling load calculations.
CIVE 470	Railroad Transportation Engineering (SE-3)	This course includes an introduction to highway-rail grade crossings and railroad track system design, components, roadbeds, and maintenance. This is followed by consideration of railroad rolling stock design, running gear and other mechanical components, train braking system design, function and dynamics, and locomotive design, operation and function. Quantitative analysis of train resistance and consequent power and train energy requirements including effects of aerodynamics, grade and curvature are covered. The course concludes with consideration of train speed, power, acceleration and an introduction to railway traffic control and signaling. There will be field trips to railroad facilities to observe infrastructure, equipment and operation.
	University Electives 4	
HIST 110	American History Since the Civil War (E-3)	United States history since the Civil War. Development of U.S. economy, urbanisation, social and cultural change, emergence of U.S. as a world power, struggles over American identities and institutions. Satisfies the American Institutions requirement in American history
RELS 101	World Religions (E-3)	Major world and selected tribal traditions from primal times to present. Broad historical development and philosophical overview including founders, teachings, beliefs, practices, and interactions with culture, such as art, literature, politics.
COMM 485	Communicating Leadership (E-3)	Prerequisites: Communication 103 and 307. Admission to a major or minor in the School of Communication. Current theory and research in leadership and communication.

		Understanding yourself, role of leadership, and selection of appropriate communication strategies for leadership.
CIVE 495	Senior Design Project (R-4)	Prerequisites: For civil engineering majors: Credit or concurrent registration in Civil Engineering 444, 481, and Environmental Engineering 355. At least three of these courses must be completed prior to enrolling in this course. For environmental engineering majors: Construction Engineering 330 and credit or concurrent registration in Environmental Engineering 441, 442. At least three of these courses must be completed prior to enrolling in this course. Application of engineering principles and design techniques to the design of civil engineering projects.

This Diploma Supplement follows the model developed by the European Commission. Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international "transparency" and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

Appendix 1

BDN№003807 THE DIPLOMA SUPPLEMENT

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1. Family name(s): Kekelidze

1.2. Given name(s): Giorgi

1.3. Date of birth (day/month/year): 24/05/1994

1.4. Student identification number or code (if available): Personal #61010019797

2. INFORMATION IDENTIFYING THE QUALIFICATION

2.1.Name of qualification and (if exists) title conferred (in original language): the academic degree of the bachelor of Engineering with major in construction. /Inzhineriis bakalavris akademiuri khariskhi msheneblobashi.

2.2. Main field(s) of study for the qualification: Construction.

2.3. Name and status of awarding institution (in original language): Georgian Technical University, the state university recognized in accordance with the legislation of Georgia / Saqartvelos teqnikuri universiteti, saqartvelos kanonmdeblobis shesabamisad aghiarebuli sakhelmtsifo universiteti/.

2.4. Name and status of institution (if different from 2.3.) administering studies (in original language): This does not differ from 2.3.

2.5.Language(s) of instruction/examination: Georgian

3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

3.1. Level of qualification: The first step of higher academic education, Bachelor.

3.2. Official length of programme: 4 years, 240 ECTS credits

3.3.Access requirements(s): A certificate of full general education.

4. INFORMATION ON THE CONTENTS AND RESULTS GAINED

4.1. The form of study: Full-time study.

4.2. Programme reguirements:

The results of study taken into consideration by the programme.

Knowledge and awareness:

- ✓ Theoretical and practical knowledge of building sphere and its multilateral and specialized technological processes, which are based on the identification of the building site, engineering training, the transportation of building loads, soil, the arrangement of the soil and foundation, stone, concrete and reinforeced concrete, the decision of the constructive-planning of buildings and certainly the acquisition of professional activity;
- ✓ The knowledge of the basic concepts theories and principles of building and design;
- ✓ The awareness of the ethic and professional responsibility of the branch specialist, the knowledge of safe and secure management of building works;
- ✓ The awereness of the relationships between technical and environmental issues;
- ✓ The corresponding knowledge of the mathematical methods and the basics of natural science for the saving of engineering problenis;
- ✓ Branch management and the knowledge of the elements of the project.
- ✓ The definition of lifelong learning skills.

The usage of skills in the knowledge:

- ✓ Active decision of abstractive problems in the sphere of technology and design the usage of the broad spectrum of scientific and practical skills, on the basis of knowledge of multilateral and specialized theoretical and ptactical skills;
- ✓ Taking into consideration the working management skills on the ground of building norms and rules protection;
- ✓ The skills of civil and industrial building with the help of simple elements;
- ✓ The skills of estimation and usage, the selection of modern building machines and mechanisms;
- ✓ The skill of building governing management using the modern techniques and technologies.

The skill of the conclusion:

- ✓ The identification of highlighted problems, the comparison of situations, their analysis with standart methods and creation of the documental decision in the building sphere;
- ✓ The skills of searching the information from the scientific – technical literature and internet, their analysis and conclusions;
- ✓ Taking participation in the building of different kinds of constructions: civil, hydrau – technical, road, transport and railway.

The skills of communication:

- ✓ The skills of successive transmission of the proper idea or the given information about building sphere for the specialists and nonspecialists;
- ✓ The preparation of detail written report of the ideas of existing problems and the methods of their solving in Georgian and foreign languages, the skills of oral rendering of the information for specialists and nonspecialists in the informational branch.

Knowledge and awareness:

- ✓ The skill of taking participation in detail discussions on different subjects with branch specialists;
- ✓ The skills of making up the business documents using the building terms;
- ✓ The formation of the ideas and views in written form and skills of making arguments for and against different views.

The skills of study:

- ✓ The determination of the direction of education, taking into consideration the environment and priorities, created under the unforeseen sircumstances;
- ✓ The skills of ordinal and multirateral estimation of the proper educational process;
- ✓ After the graduation of the curriculum programme, the graduate will be able to manage the educational process independently, with the help of given knowledge will be able to continue the process of independent education on the second level (post-graduate/master).

The Values:

- ✓ The knowledge estimation and sharing with others the principles and values of building branch activities;
- ✓ The graduate has the protection skills of the basic laws of ethics, professional and ethical responsibility of a builder for the health and security of society and also for aesthetic values;
- ✓ Combines the obligations of the respectability of the ecological system with the protection of the environment;
- ✓ Has the skills of protection of the professional values (accuracy, punctuality, objectivity, organization and etc).

4.3. Program details: (e.g. modules or units studied), and the individual grades/marks/credits obtained: (if this information is available on an official transcript this should be used here)

#	subject/module	Semesters	Sum credits	Estimation	Conditional Evatuation (GPA)
1.	Mathematics	I, II, III	15	82	3,25
2.	Physics	I, II	8	71	2,50
3.	Fundamentals of Informatics	I	5	96	4,00
4.	Geodesy	I, II	6	89	3,25
5.	Descriptive Geometry	I	3	81	3,25
6.	Civil Engineering Drawing	I	3	93	4,00
7.	Chemistry	I	3	90	3,25
8.	Foreign Language (English)	I, II	6	63	1,75
9.	Programming Fundamentals	II	3	81	3,25
10.	Computer Engineering Drawing	II	3	98	4,00
11.	Theoretical Mechanics	II, III	7	79	2,50
12.	Optional (History of Georgia)	II	3	83	3,25
13.	Engineering Geology and Soil Mechanics	II	4	98	4,00
14.	Strength of Materials	III, IV	6	96	4,00
15.	Bilding Materials	III, IV	6	95	4,00

16.	Introduction in Architecture	III	3	97	4,00
17.	Hydraulics	III	4	98	4,00
18.	Environment Protection and Ecology	III	3	95	4,00
19.	Water Supply and Severage	III	3	91	4,00
20.	Heatair Supply and Ventilation	III	3	98	4,00
21.	Structural Mechanics	IV	5	98	4,00
22.	Fundamentals of Building Producing	IV	3	100	4,00
23.	Introduction to Hydro Technical Construction	IV	3	94	4,00
24.	Introduction of Road Construction	IV	3	100	4,00
25.	Building Constructions	IV	4	100	4,00
26.	Construction Management Fundamentals	IV	3	100	4,00
27.	Construction Labor Safety and Emergency Management	IV	3	99	4,00
28.	Foundations	V	3	91	4,00
29.	Architecture of Buildings and Structures	V	3	97	4,00
30.	Earthquake Engineering	V	4	92	4,00
31.	Design Fundamentals of Steel Structures	V	4	98	4,00
32.	Design Fundamentals of Concrete Structures	V	5	98	4,00
33.	Construction Production Technology	V	3	100	4,00
34.	Construction Industry Organization and Management	V	3	98	4,00
35.	Timber and Plastic Structures	V	5	97	4,00
36.	Survey and Test of Buildings and Structures	VI	3	100	4,00
37.	The Building – Building Material Structure Desing	VI	4	100	4,00
38.	Concrete and Masonry Design of Buildings and Structures	VI	4	100	4,00
39.	Design Fundamentals of Special Concrete Structures	VI	3	100	4,00
40.	Retrofitting and Reinforcement of Buildings and Structures	VI	5	92	4,00
41.	Building Construction Design, Construction and Operation of a Seismically Active Regions	VI	3	100	4,00
42.	Building Technical Expertise	VI	5	100	4,00
43.	Technical Supervision of Construction	VI	3	98	4,00
44.	Construction Economics	VII	3	100	4,00
45.	Construction Industry Planning	VII	3	96	4,00
46.	Construction Management	VII	3	98	4,00
47.	Program Package “Mathematica”	VII	3	98	4,00
48.	Computer Aided Design System “Lira”	VII	6	100	4,00
49.	Principals of Construction of CAD Systems	VII	3	100	4,00
50.	Financing Management	VII	3	98	4,00
51.	The Investment Business in Building	VII	3	96	4,00
52.	Accounting and Audit	VII	3	98	4,00
53.	Economic and Organization of Building Proect	VIII	3	100	4,00
54.	The Innovations in Building	VII	3	100	4,00
55.	Special Course in Construction Economics and Organization	VIII	3	93	4,00
56.	The Roofs of Buildings and Structures (burulebis) Coverings and Methods of Their Equipment	VIII	4	98	4,00
57.	Marketing in Building	VII	3	100	4,00
58.	Technical Economic Analysis of the Building Production Industry	VIII	3	100	4,00
59.	Qualification Work	VIII	10	100	4,00
60.	Total Credits (ECTS)	-	240	-	-
61.	Average Weighted Score	-	-	93	-
62.	Grade Point Average (GPA)	-	-	-	3,72

4.4. Grading scheme and, if available, grade distribution guidance:

It is possible for the student to receive/accumulate the credits only after achieving syllabus prescribed study results. Training course evaluation is a maximum 100% (points). In each course

the assessment of student achievement is determined by the sum of weekly evaluations during the full academic semester, the mid-term exams evaluations and final exam evaluation. Evaluation system provides for five types of positive and for two types negative evaluation:

Positive Evaluation:

- (A) - excellent - 91% and more of the highest grade;
- (B) - very good - 81-90% of the highest grade;
- (C) - good - 71-80% of the highest grade;
- (D) - satisfactory - 61-70% of the highest grade;
- (E) - enough - 51-60% of the highest grade;

Negative evaluation:

- (FX) - not passed - 41-50% of the highest grades. It means that a student needs more individaul work to cover material, and is given one more possibility of make up;
- (F) - failed - 40% and less of the highest grade. It means that work done by the student was not enough and the subject should be learnt again;

According to the results of studies, after accumulating 240 credits the graduate will receive the Bachelor's diploma or Bachelor's diploma with honours. To receive diploma with honours the weighted average score for all courses must be 91 or more.

4.5. Overall classification of the qualification (in original language): Bachelor's diploma with honours /Bakalavris tsarchinebis diplomi.

5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1 Access to further study: He has the right to continue studies at higher education level of the second cycle - at Master's Programme.

5.2. Professional status (if such exists): There is no information.

6. ADDITIONAL INFORMATION

6.1. Additional information: In 2016 **Kekelidze Giorgi** has graduated from Georgian Technical University (the order no.2655/05).

On the basis of resolution N 411 of the Georgian government on November 4, 2011, the legal entity of public law- Georgian Technical University was reorganized into the non-profil (non-commercial) legal entity - Georgian Technical University and on the basis of resolution N 190 on July 29, 2013 of the Georgian goverment it was reorganized again as the legal entity of public law – Georgian Technical University.

6.2. Further information sources: Additional information can be obtained at the Technical University website www.gtu.ge and at the Faculty of Civil engineering website: www.gtu.ge/index_samsh.php

Address: #68 M. Kostava str. 0175, Tbilisi, Georgia Tel: (+99032) 236-43-28

7. CERTIFICATION OF THE SUPPLEMENT

7.1. Date: 29/09/2016

7.2. Signature: . . . . . Levan Klimiashvili

7.3. Capacity: Vice-Rector

7.4. Official stamp or seal:

8. INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

8.1. Access and admission to a higher education institution:

Georgia has the three-cycle higher education system.

- The right to be admitted to the first cycle of higher education (Bachelor's degree programmes) at a higher education institution can be enjoyed only by a holder of general education state certificate (starting from 2008-2009 academic year the study period is 12 years) or a person equalised thereto. The precondition for the admission to a Bachelor programme is successful taking of the unified national examinations (starting from 2005).
- The right to be admitted to the second cycle of higher education (Master's degree programme) at a higher education institution can be enjoyed by a person having, at least, Bachelor's or equalised thereto academic degree. The admission precondition is successful taking of Master's examination.
- The right to be admitted to the third cycle of higher education (Doctorate) at a higher education institution can be enjoyed by a person having, at least, Master's or equalised thereto the academic degree. The admission preconditions are generally set by the higher institution.

8.2. Higher Education institutions

Since 2009 there are the following types of higher education institutions in Georgia:

College – **Higher education institution that offers only the first cycle – Bachelor's degree programmes.**

Teaching University – **Higher Education institution that offers higher education programme/programmes (except for doctorate). A teaching university is obliged to provide the second cycle – Master's degree programme/programmes.**

University – Higher Education institution that offers the higher education programmes of all three cycles and carries out research activities.

A higher education can be a legal entity of both public and private law.

8.3. Qualifications

In 2005 the three-cycle academic higher education system was introduced in Georgia. Since 2007-2008 academic year all the higher education institutions of Georgia are committed to this system. It is necessary to accumulate the respective amount of credits for the accomplishment of each cycle of higher education.

The first cycle – Bachelor's degree programme – at least 240 ECTS credits

From 2007 until 2010 there was a certified specialist's educational programme (vocational higher education) within the framework of higher education, which covered 120-180 ECTS credits. The students were admitted to these programmes commensurate with the procedure, envisaged by Georgian law, against a general education certificate. In the case of enrolment of a certified specialist for a Bachelor, Medical Doctor's/ Doctor in Dentistry educational programmes the higher education institution is entitled to recognise the ECTS credits, accumulated by the certified specialist concerned, for the purposes of acquisition of the Bachelor's, Medical Doctor's/ Doctor in Dentistry Degrees.

A higher education institution is entitled to award an interim qualification to a student in the case of taking only a part of the educational programme (in the case of accumulation of ECTS credits envisaged for the short cycle within the first cycle educational programme). An interim qualification can be awarded after the attainment of the learning outcomes envisaged for a part of the respective educational programme, which cannot be less than the half of the net amount of ECTS credits envisaged for the educational programme concerned (from 1 September 2010).

The second cycle: Master's degree Programme – at least, 120 ECTS credits

The third cycle: Doctorate – at least, 180 ECTS credits

Medical/Dental education programme is a one-cycle higher education programme. A successful graduate of the programme is awarded the Medical Doctor's/ Doctor in Dentistry academic degree. The academic degree awarded after the accomplishment of 360-credit Medical Doctor's or 300-credit Doctor in Dentistry educational programme is equalised to Master's degree.

This Diploma Supplement follows the model developed by the European Commission. Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international "transparency" and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

The higher education institutions admitted students to Veterinary Education Programme inclusive 2011-2012 academic year. This is a one-cycle educational programme covering 300 ECTS credits and leading to awarding the Doctor in Veterinary academic degree. The Doctor in Veterinary academic degree is equalised to Master's degree.

8.4 Grading System

Starting from 2007 all the higher education institutions of Georgia use the European Credit Transfer and Accumulation System (ECTS). The attainment of the learning outcomes by a student, envisaged by the educational programme is evaluated according to 100-point grading scale.

8.5 Quality Assurance System

Educational quality is enhanced through internal and external mechanisms. The internal mechanisms of educational quality enhancement are implemented by an educational institution in accordance with the procedure, envisaged by law. The external mechanisms of educational quality enhancement are the authorisation and accreditation – the procedures, implemented by the Legal Entity of Public Law – National Centre for Educational Quality Enhancement.

Authorisation is the procedure of acquisition of the status of an educational institution, which aims at ensuring the meeting of standards, necessary for an educational institution to carry out educational activities for the issuance of the state-recognised educational document.

Accreditation is the procedure of establishment of the compatibility of an educational programme with accreditation standards, which procedure aims at the introduction of regular self-evaluation for the improvement of educational quality and promotion of the enhancement of quality assurance mechanisms. Allocation of state funding and the implementation of regulated (law, medical, pedagogical) programmes is also related to this process.

The authorisation and authorisation is granted for a period of 5 years. After the expiry or withdrawal of authorisation the accreditation is also withdrawn.

8.6 The national source of information:

Ministry of Education and Science of Georgia
Address: 52 Uznadze street, Tbilisi, 0102
www.mes.gov.ge
E-mail: pr@mes.gov.ge
LEPL National Centre for Educational Quality Enhancement
Address: 1 Aleksidze street, Tbilisi 0193
www.eqe.ge
E-mail: info@eqe.ge

BDN№003758 THE DIPLOMA SUPPLEMENT

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1. Family name(s): Melikidze

1.2. Given name(s): Nukri

1.3. Date of birth (day/month/year): 22/10/1994

1.4. Student identification number or code (if available): Personal #47001041556

2. INFORMATION IDENTIFYING THE QUALIFICATION

2.1.**Name of qualification and (if exists) title conferred (in original language**): the academic degree of the bachelor of Engineering with major in construction. /Inzhineriis bakalavris akademiuri khariskhi msheneblobashi.

2.2. Main field(s) of study for the qualification: Construction.

2.3. Name and status of awarding institution (in original language): Georgian Technical University, the state university recognized in accordance with the legislation of Georgia / Saqartvelos teqnikuri universiteti, saqartvelos kanonmdeblobis shesabamisad aghiarebuli sakhelmtsifo universiteti/.

2.4. Name and status of institution (if different from 2.3.) administering studies (in original language): This does not differ from 2.3.

2.5.Language(s) of instruction/examination: Georgian

3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

3.1. Level of qualification: The first step of higher academic education, Bachelor.

3.2. Official length of programme: 4 years, 240 ECTS credits

3.3.Access requirements(s): A certificate of full general education.

4. INFORMATION ON THE CONTENTS AND RESULTS GAINED

4.1. The form of study: Full-time study.

4.2. Programme reguirements:

The results of study taken into consideration by the programme.

Knowledge and awareness:

- ✓ Theoretical and practical knowledge of building sphere and its multilateral and specialized technological processes, which are based on the identification of the building site, engineering training, the transportation of building loads, soil, the arrangement of the soil and foundation, stone, concrete and reinforeced concrete, the decision of the constructive-planning of buildings and certainly the acquisition of professional activity;
- ✓ The knowledge of the basic concepts theories and principles of building and design;
- ✓ The awareness of the ethic and professional responsibility of the branch specialist, the knowledge of safe and secure management of building works;
- ✓ The awereness of the relationships between technical and environmental issues;
- ✓ The corresponding knowledge of the mathematical methods and the basics of natural science for the saving of engineering problenis;
- ✓ Branch management and the knowledge of the elements of the project.
- ✓ The definition of lifelong learning skills.

The usage of skills in the knowledge:

- ✓ Active decision of abstractive problems in the sphere of technology and design the usage of the broad spectrum of scientific and practical skills, on the basis of knowledge of multilateral and specialized theoretical and ptactical skills;
- ✓ Taking into consideration the working management skills on the ground of building norms and rules protection;
- ✓ The skills of civil and industrial building with the help of simple elements;
- ✓ The skills of estimation and usage, the selection of modern building machines and mechanisms;
- ✓ The skill of building governing management using the modern techniques and technologies.

The skill of the conclusion:
- ✓ The identification of highlighted problems, the comparison of situations, their analysis with standart methods and creation of the documental decision in the building sphere;
- ✓ The skills of searching the information from the scientific – technical literature and internet, their analysis and conclusions;
- ✓ Taking participation in the building of different kinds of constructions: civil, hydrau – technical, road, transport and railway.

The skills of communication:
- ✓ The skills of successive transmission of the proper idea or the given information about building sphere for the specialists and nonspecialists;
- ✓ The preparation of detail written report of the ideas of existing problems and the methods of their solving in Georgian and foreign languages, the skills of oral rendering of the information for specialists and nonspecialists in the informational branch.

Knowledge and awareness:
- ✓ The skill of taking participation in detail discussions on different subjects with branch specialists;
- ✓ The skills of making up the business documents using the building terms;
- ✓ The formation of the ideas and views in written form and skills of making arguments for and against different views.

The skills of study:
- ✓ The determination of the direction of education, taking into consideration the environment and priorities, created under the unforeseen sircumstances;
- ✓ The skills of ordinal and multirateral estimation of the proper educational process;
- ✓ After the graduation of the curriculum programme, the graduate will be able to manage the educational process independently, with the help of given knowledge will be able to continue the process of independent education on the second level (post-graduate/master).

The Values:
- ✓ The knowledge estimation and sharing with others the principles and values of building branch activities;
- ✓ The graduate has the protection skills of the basic laws of ethics, professional and ethical responsibility of a builder for the health and security of society and also for aesthetic values;
- ✓ Combines the obligations of the respectability of the ecological system with the protection of the environment;
- ✓ Has the skills of protection of the professional values (accuracy, punctuality, objectivity, organization and etc).

4.3. Program details: (e.g. modules or units studied), and the individual grades/marks/credits obtained: (if this information is available on an official transcript this should be used here)

#	subject/module	Semesters	Sum credits	Estimation	Conditional Evatuation (GPA)
1.	Mathematics	I, II, III	15	68	1,75
2.	Physics	I, II	8	62	1,75
3.	Fundamentals of Informatics	I	5	69	1,75
4.	Geodesy	I, II	6	77	2,50
5.	Descriptive Geometry	I	3	64	1,75
6.	Civil Engineering Drawing	I	3	78	2,50
7.	Chemistry	I	3	65	1,75
8.	Foreign Language (English)	I, II	6	65	1,75
9.	Programming Fundamentals	II	3	59	1,00
10.	Computer Engineering Drawing	II	3	65	1,75
11.	Theoretical Mechanics	II, III	7	59	1,00
12.	Optional (History of Georgia)	II	3	63	1,75
13.	Engineering Geology and Soil Mechanics	II	4	73	2,50
14.	Strength of Materials	III, IV	6	83	3,25
15.	Bilding Materials	III, IV	6	86	3,25
16.	Introduction in Architecture	III	3	74	2,50
17.	Hydraulics	III	4	81	3,25
18.	Environment Protection and Ecology	III	3	74	2,50
19.	Water Supply and Severage	III	3	63	1,75
20.	Heatair Supply and Ventilation	III	3	58	1,00
21.	Structural Mechanics	IV	5	90	3,25
22.	Fundamentals of Building Producing	IV	3	89	3,25
23.	Introduction to Hydro Technical Construction	IV	3	99	4,00
24.	Introduction of Road Construction	IV	3	96	4,00
25.	Building Constructions	IV	4	98	4,00
26.	Construction Management Fundamentals	IV	3	91	4,00
27.	Construction Labor Safety and Emergency Management	IV	3	98	4,00
28.	Foundations	V	3	71	2,50

29.	Architecture of Buildings and Structures	V	3	92	4,00
30.	Earthquake Engineering	V	4	80	2,50
31.	Design Fundamentals of Steel Structures	V	4	95	4,00
32.	Design Fundamentals of Concrete Structures	V	5	62	1,75
33.	Construction Production Technology	V	3	66	1,75
34.	Construction Industry Organization and Management	V	3	95	4,00
35.	Timber and Plastic Structures	V	5	89	3,25
36.	Survey and Test of Buildings and Structures	VI	3	77	2,50
37.	The Building – Building Material Structure Desing	VI	4	93	4,00
38.	Concrete and Masonry Design of Buildings and Structures	VI	4	66	1,75
39.	Design Fundamentals of Special Concrete Structures	VI	3	84	3,25
40.	Retrofitting and Reinforcement of Buildings and Structures	VI	5	81	3,25
41.	Building Construction Design, Construction and Operation of a Seismically Active Regions	VI	3	90	3,25
42.	Building Technical Expertise	VI	5	96	4,00
43.	Technical Supervision of Construction	VI	3	77	2,50
44.	Discrete Mathematics	VII	3	61	1,75
45.	Operation Systems	VII	3	91	4,00
46.	Computer Aided System AutoCAD	VII	3	92	4,00
47.	Imperative Programming	VII	3	72	2,50
48.	Program Package “Mathematica”	VII	3	79	2,50
49.	Computer Aided Design System “Lira”	VII	6	92	4,00
50.	Civil and Industrial Structures Building Technology	VII	3	91	4,00
51.	Reliability Design Fundamentals of Building Structures	VII	5	100	4,00
52.	Computer Aided Design of Building Constructions	VIII	3	61	1,75
53.	Computer Architecture	VIII	3	85	3,25
54.	Data Bases	VIII	3	70	1,75
55.	Computer Design System ArchiCAD	VIII	6	75	2,50
56.	Sructural Programming	VIII	6	71	2,50
57.	Qualification Work	VIII	10	91	4,00
58.	Total Credits (ECTS)	-	241	-	-

59.	Average Weighted Score	-	-	78	-
60.	Grade Point Average (GPA)	-	-	-	2,74

4.4. Grading scheme and, if available, grade distribution guidance:

It is possible for the student to receive/accumulate the credits only after achieving syllabus prescribed study results. Training course evaluation is a maximum 100% (points). In each course the assessment of student achievement is determined by the sum of weekly evaluations during the full academic semester, the mid-term exams evaluations and final exam evaluation. Evaluation system provides for five types of positive and for two types negative evaluation:

Positive Evaluation:

- (A) - excellent - 91% and more of the highest grade;
- (B) - very good - 81-90% of the highest grade;
- (C) - good - 71-80% of the highest grade;
- (D) - satisfactory - 61-70% of the highest grade;
- (E) - enough - 51-60% of the highest grade;

Negative evaluation:

- (FX) - not passed - 41-50% of the highest grades. It means that a student needs more individaul work to cover material, and is given one more possibility of make up;
- (F) - failed - 40% and less of the highest grade. It means that work done by the student was not enough and the subject should be learnt again;

According to the results of studies, after accumulating 240 credits the graduate will receive the Bachelor's diploma or Bachelor's diploma with honours. To receive diploma with honours the weighted average score for all courses must be 91 or more.

4.5. Overall classification of the qualification (in original language): Bachelor's diploma/Bakalavris diplomi.

5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1 Access to further study: He has the right to continue studies at higher education level of the second cycle - at Master's Programme.

5.2. Professional status (if such exists): There is no information.

6. ADDITIONAL INFORMATION

6.1. Additional information: In 2016 **Melikidze Nukri** has graduated from Georgian Technical University (the order no.2655/05).

On the basis of resolution N 411 of the Georgian government on November 4, 2011, the legal entity of public law- Georgian Technical University was reorganized into the non-profil (non-commercial) legal entity - Georgian Technical University and on the basis of resolution N 190 on July 29, 2013 of the Georgian goverment it was reorganized again as the legal entity of public law – Georgian Technical University.

6.2. Further information sources: Additional information can be obtained at the Technical University website www.gtu.ge and at the Faculty of Civil engineering website: www.gtu.ge/index_samsh.php

Address: #68 M. Kostava str. 0175, Tbilisi, Georgia Tel: (+99032) 236-43-28

7. CERTIFICATION OF THE SUPPLEMENT

7.1. Date: 29/09/2016

7.2. Signature: . . . . . Levan Klimiashvili

7.3. Capacity: Vice-Rector

7.4. **Official stamp or seal:**

8. INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

8.1. Access and admission to a higher education institution:

Georgia has the three-cycle higher education system.

- The right to be admitted to the first cycle of higher education (Bachelor's degree programmes) at a higher education institution can be enjoyed only by a holder of general education state certificate (starting from 2008-2009 academic year the study period is 12 years) or a person equalised thereto. The precondition for the admission to a Bachelor programme is successful taking of the unified national examinations (starting from 2005).
- The right to be admitted to the second cycle of higher education (Master's degree programme) at a higher education institution can be enjoyed by a person having, at least, Bachelor's or equalised thereto academic degree. The admission precondition is successful taking of Master's examination.
- The right to be admitted to the third cycle of higher education (Doctorate) at a higher education institution can be enjoyed by a person having, at least, Master's or equalised thereto the academic degree. The admission preconditions are generally set by the higher institution.

8.2. Higher Education institutions

Since 2009 there are the following types of higher education institutions in Georgia:

College – **Higher education institution that offers only the first cycle – Bachelor's degree programmes.**

Teaching University – **Higher Education institution that offers higher education programme/programmes (except for doctorate). A teaching university is obliged to provide the second cycle – Master's degree programme/programmes.**

University – Higher Education institution that offers the higher education programmes of all three cycles and carries out research activities.

A higher education can be a legal entity of both public and private law.

8.3. Qualifications

In 2005 the three-cycle academic higher education system was introduced in Georgia. Since 2007-2008 academic year all the higher education institutions of Georgia are committed to this system. It is necessary to accumulate the respective amount of credits for the accomplishment of each cycle of higher education.

The first cycle – Bachelor's degree programme – at least 240 ECTS credits

From 2007 until 2010 there was a certified specialist's educational programme (vocational higher education) within the framework of higher education, which covered 120-180 ECTS credits. The students were admitted to these programmes commensurate with the procedure, envisaged by Georgian law, against a general education certificate. In the case of enrolment of a certified specialist for a Bachelor, Medical Doctor's/ Doctor in Dentistry educational programmes the higher education institution is entitled to recognise the ECTS credits, accumulated by the certified specialist concerned, for the purposes of acquisition of the Bachelor's, Medical Doctor's/ Doctor in Dentistry Degrees.

A higher education institution is entitled to award an interim qualification to a student in the case of taking only a part of the educational programme (in the case of accumulation of ECTS credits

envisaged for the short cycle within the first cycle educational programme). An interim qualification can be awarded after the attainment of the learning outcomes envisaged for a part of the respective educational programme, which cannot be less than the half of the net amount of ECTS credits envisaged for the educational programme concerned (from 1 September 2010).
The second cycle: Master's degree Programme – at least, 120 ECTS credits
The third cycle: Doctorate – at least, 180 ECTS credits
Medical/Dental education programme is a one-cycle higher education programme. A successful graduate of the programme is awarded the Medical Doctor's/ Doctor in Dentistry academic degree. The academic degree awarded after the accomplishment of 360-credit Medical Doctor's or 300-credit Doctor in Dentistry educational programme is equalised to Master's degree.
The higher education institutions admitted students to Veterinary Education Programme inclusive 2011-2012 academic year. This is a one-cycle educational programme covering 300 ECTS credits and leading to awarding the Doctor in Veterinary academic degree. The Doctor in Veterinary academic degree is equalised to Master's degree.

8.4 Grading System

Starting from 2007 all the higher education institutions of Georgia use the European Credit Transfer and Accumulation System (ECTS). The attainment of the learning outcomes by a student, envisaged by the educational programme is evaluated according to 100-point grading scale.

8.5 Quality Assurance System

Educational quality is enhanced through internal and external mechanisms. The internal mechanisms of educational quality enhancement are implemented by an educational institution in accordance with the procedure, envisaged by law. The external mechanisms of educational quality enhancement are the authorisation and accreditation – the procedures, implemented by the Legal Entity of Public Law – National Centre for Educational Quality Enhancement.
Authorisation is the procedure of acquisition of the status of an educational institution, which aims at ensuring the meeting of standards, necessary for an educational institution to carry out educational activities for the issuance of the state-recognised educational document.
Accreditation is the procedure of establishment of the compatibility of an educational programme with accreditation standards, which procedure aims at the introduction of regular self-evaluation for the improvement of educational quality and promotion of the enhancement of quality assurance mechanisms. Allocation of state funding and the implementation of regulated (law, medical, pedagogical) programmes is also related to this process.
The authorisation and authorisation is granted for a period of 5 years. After the expiry or withdrawal of authorisation the accreditation is also withdrawn.

8.6 The national source of information:

Ministry of Education and Science of Georgia
Address: 52 Uznadze street, Tbilisi, 0102
www.mes.gov.ge
E-mail: pr@mes.gov.ge
LEPL National Centre for Educational Quality Enhancement
Address: 1 Aleksidze street, Tbilisi 0193
www.eqe.ge
E-mail: info@eqe.ge

BD№003784 THE DIPLOMA SUPPLEMENT

This Diploma Supplement follows the model developed by the European Commission. Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international "transparency" and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1. Family name(s): Tsitskishvili

1.2. Given name(s): Nodari

1.3. Date of birth (day/month/year): 19/07/1994

1.4. Student identification number or code (if available): Personal #01027078045

2. INFORMATION IDENTIFYING THE QUALIFICATION

2.1.Name of qualification and (if exists) title conferred (in original language): the academic degree of the bachelor of Engineering with major in construction. /Inzhineriis bakalavris akademiuri khariskhi msheneblobashi.

2.2. Main field(s) of study for the qualification: Construction.

2.3. Name and status of awarding institution (in original language): Georgian Technical University, the state university recognized in accordance with the legislation of Georgia / Saqartvelos teqnikuri universiteti, saqartvelos kanonmdeblobis shesabamisad aghiarebuli sakhelmtsifo universiteti/.

2.4. Name and status of institution (if different from 2.3.) administering studies (in original language): This does not differ from 2.3.

2.5.Language(s) of instruction/examination: Georgian

3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

3.1. Level of qualification: The first step of higher academic education, Bachelor.

3.2. Official length of programme: 4 years, 240 ECTS credits

3.3.Access requirements(s): A certificate of full general education.

4. INFORMATION ON THE CONTENTS AND RESULTS GAINED

4.1. The form of study: Full-time study.

4.2. Programme reguirements:

The results of study taken into consideration by the programme.

Knowledge and awareness:

- ✓ Theoretical and practical knowledge of building sphere and its multilateral and specialized technological processes, which are based on the identification of the building site, engineering training, the transportation of building loads, soil, the arrangement of the soil

and foundation, stone, concrete and reinforeced concrete, the decision of the constructive-planning of buildings and certainly the acquisition of professional activity;

- ✓ The knowledge of the basic concepts theories and principles of building and design;
- ✓ The awareness of the ethic and professional responsibility of the branch specialist, the knowledge of safe and secure management of building works;
- ✓ The awereness of the relationships between technical and environmental issues;
- ✓ The corresponding knowledge of the mathematical methods and the basics of natural science for the saving of engineering problenis;
- ✓ Branch management and the knowledge of the elements of the project.
- ✓ The definition of lifelong learning skills.

The usage of skills in the knowledge:

- ✓ Active decision of abstractive problems in the sphere of technology and design the usage of the broad spectrum of scientific and practical skills, on the basis of knowledge of multilateral and specialized theoretical and ptactical skills;
- ✓ Taking into consideration the working management skills on the ground of building norms and rules protection;
- ✓ The skills of civil and industrial building with the help of simple elements;
- ✓ The skills of estimation and usage, the selection of modern building machines and mechanisms;
- ✓ The skill of building governing management using the modern techniques and technologies.

The skill of the conclusion:

- ✓ The identification of highlighted problems, the comparison of situations, their analysis with standart methods and creation of the documental decision in the building sphere;
- ✓ The skills of searching the information from the scientific – technical literature and internet, their analysis and conclusions;
- ✓ Taking participation in the building of different kinds of constructions: civil, hydrau – technical, road, transport and railway.

The skills of communication:

- ✓ The skills of successive transmission of the proper idea or the given information about building sphere for the specialists and nonspecialists;
- ✓ The preparation of detail written report of the ideas of existing problems and the methods of their solving in Georgian and foreign languages, the skills of oral rendering of the information for specialists and nonspecialists in the informational branch.

Knowledge and awareness:

- ✓ The skill of taking participation in detail discussions on different subjects with branch specialists;
- ✓ The skills of making up the business documents using the building terms;
- ✓ The formation of the ideas and views in written form and skills of making arguments for and against different views.

The skills of study:

- ✓ The determination of the direction of education, taking into consideration the environment and priorities, created under the unforeseen sircumstances;
- ✓ The skills of ordinal and multirateral estimation of the proper educational process;
- ✓ After the graduation of the curriculum programme, the graduate will be able to manage the educational process independently, with the help of given knowledge will be able to continue the process of independent education on the second level (post-graduate/master).

The Values:

- ✓ The knowledge estimation and sharing with others the principles and values of building branch activities;
- ✓ The graduate has the protection skills of the basic laws of ethics, professional and ethical responsibility of a builder for the health and security of society and also for aesthetic values;
- ✓ Combines the obligations of the respectability of the ecological system with the protection of the environment;
- ✓ Has the skills of protection of the professional values (accuracy, punctuality, objectivity, organization and etc).

4.3. Program details: (e.g. modules or units studied), and the individual grades/marks/credits obtained: (if this information is available on an official transcript this should be used here)

#	subject/module	Semesters	Sum credits	Estimation	Conditional Evatuation (GPA)
1.	Mathematics	I, II, III	15	57	1,00
2.	Physics	I, II	8	55	1,00
3.	Fundamentals of Informatics	I	5	51	1,00
4.	Geodesy	I, II	6	57	1,00
5.	Chemistry	I	3	53	1,00
6.	Descriptive Geometry	I	3	56	1,00
7.	Civil Engineering Drawing	I	3	51	1,00
8.	Foreign Language (English)	I, II	6	55	1,00
9.	Programming Fundamentals	II	3	51	1,00
10.	Computer Engineering Drawing	II	3	58	1,00
11.	Theoretical Mechanics	II, III	7	53	1,00
12.	Optional (History of Georgia)	II	3	58	1,00
13.	Engineering Geology and Soil Mechanics	II	4	59	1,00
14.	Strength of Materials	III, IV	6	56	1,00
15.	Bilding Materials	III, IV	6	57	1,00
16.	Introduction in Architecture	III	3	68	1,75
17.	Hydraulics	III	4	51	1,00
18.	Water Supply and Severage	III	3	63	1,75
19.	Heatair Supply and Ventilation	III	3	51	1,00
20.	Environment Protection and Ecology	III	3	57	1,00
21.	Structural Mechanics	IV	5	52	1,00

22.	Fundamentals of Building Producing	IV	3	54	1,00
23.	Introduction to Hydro Technical Construction	IV	3	68	1,75
24.	Introduction of Road Construction	IV	3	86	2,50
25.	Building Constructions	IV	4	74	2,50
26.	Construction Management Fundamentals	IV	3	68	1,75
27.	Construction Labor Safety and Emergency Management	IV	3	59	1,00
28.	Reinforced Concrete Constructions	V	6	56	1,00
29.	Discrete Mathematics	V	3	51	1,00
30.	Operation Systems	V	3	51	1,00
31.	Computer Aided System AutoCAD	V	3	53	1,00
32.	Imperative Programming	V	3	51	1,00
33.	Program Package “Mathematica”	V	3	51	1,00
34.	Computer Aided Design System “Lira”	V	6	61	1,00
35.	Civil and Industrial Structures Building Technology	V	3	53	1,00
36.	Numerical Methods of Resolution of Construction Problems	VI	3	54	1,00
37.	Computer Aided Design of Building Constructions	VI	3	52	1,00
38.	Architecture of Buildings and Structures	VI	3	51	1,00
39.	Computer Architecture	VI	3	51	1,00
40.	Data Bases	VI	3	52	1,00
41.	The construction Industry Organizations	VI	3	53	1,00
42.	Computer Design System ArchiCAD	VI	6	52	1,00
43.	Sructural Programming	VI	6	51	1,00
44.	Construction of Railway Track	VII	6	66	1,75
45.	Device Railway Track	VII	3	72	
46.	Railway's Roadbed	VII	3	54	1,00
47.	Survey and Design of New Railways	VII	6	55	1,00
48.	Railway Construction	VII	6	67	1,75
49.	Production Processes of Track Work	VII	6	54	1,00
50.	Compound and The Intersection of Railway Tracks	VIII	4	63	1,75
51.	The Second Track Design	VIII	3	78	2,50

52.	Reconstruction of The Railways	VIII	5	80	2,50
53.	Structure and Management Systems to Track Facilities	VIII	4	65	1,75
54.	Practice	VIII	5	56	1,00
55.	Qualification Work	VIII	10	58	1,00
56.	Total Credits (ECTS)	-	242	-	-
57.	Average Weighted Score	-	-	58	-
58.	Grade Point Average (GPA)	-	-	-	1,25

4.4. Grading scheme and, if available, grade distribution guidance:

It is possible for the student to receive/accumulate the credits only after achieving syllabus prescribed study results. Training course evaluation is a maximum 100% (points). In each course the assessment of student achievement is determined by the sum of weekly evaluations during the full academic semester, the mid-term exams evaluations and final exam evaluation. Evaluation system provides for five types of positive and for two types negative evaluation:

Positive Evaluation:

- (A) - excellent - 91% and more of the highest grade;
- (B) - very good - 81-90% of the highest grade;
- (C) - good - 71-80% of the highest grade;
- (D) - satisfactory - 61-70% of the highest grade;
- (E) - enough - 51-60% of the highest grade;

Negative evaluation:

- (FX) - not passed - 41-50% of the highest grades. It means that a student needs more individaul work to cover material, and is given one more possibility of make up;
- (F) - failed - 40% and less of the highest grade. It means that work done by the student was not enough and the subject should be learnt again;

According to the results of studies, after accumulating 240 credits the graduate will receive the Bachelor's diploma or Bachelor's diploma with honours. To receive diploma with honours the weighted average score for all courses must be 91 or more.

4.5. Overall classification of the qualification (in original language): Bachelor's diploma/Bakalavris diplomi.

5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1 Access to further study: He has the right to continue studies at higher education level of the second cycle - at Master's Programme.

5.2. Professional status (if such exists): There is no information.

6. ADDITIONAL INFORMATION

6.1. Additional information: In 2016 **Tsitskishvili Nodari** has graduated from Georgian Technical University (the order no.2655/05).

On the basis of resolution N 411 of the Georgian government on November 4, 2011, the legal entity of public law- Georgian Technical University was reorganized into the non-profil (non-commercial) legal entity - Georgian Technical University and on the basis of resolution N 190 on July 29, 2013 of the Georgian goverment it was reorganized again as the legal entity of public law – Georgian Technical University.**6.2. Further information sources:** Additional

information can be obtained at the Technical University website www.gtu.ge and at the Faculty of Civil engineering website: www.gtu.ge/index_samsh.php
Address: #68 M. Kostava str. 0175, Tbilisi, Georgia Tel: (+99032) 236-43-28

7. CERTIFICATION OF THE SUPPLEMENT

7.1. Date: 29/09/2016

7.2. Signature: . . . . . Levan Klimiashvili

7.3. Capacity: Vice-Rector

7.4. **Official stamp or seal:**

8. INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

8.1. Access and admission to a higher education institution:

Georgia has the three-cycle higher education system.

- The right to be admitted to the first cycle of higher education (Bachelor's degree programmes) at a higher education institution can be enjoyed only by a holder of general education state certificate (starting from 2008-2009 academic year the study period is 12 years) or a person equalised thereto. The precondition for the admission to a Bachelor programme is successful taking of the unified national examinations (starting from 2005).
- The right to be admitted to the second cycle of higher education (Master's degree programme) at a higher education institution can be enjoyed by a person having, at least, Bachelor's or equalised thereto academic degree. The admission precondition is successful taking of Master's examination.
- The right to be admitted to the third cycle of higher education (Doctorate) at a higher education institution can be enjoyed by a person having, at least, Master's or equalised thereto the academic degree. The admission preconditions are generally set by the higher institution.

8.2. Higher Education institutions

Since 2009 there are the following types of higher education institutions in Georgia:

College – **Higher education institution that offers only the first cycle – Bachelor's degree programmes.**

Teaching University – **Higher Education institution that offers higher education programme/programmes (except for doctorate). A teaching university is obliged to provide the second cycle – Master's degree programme/programmes.**

University – Higher Education institution that offers the higher education programmes of all three cycles and carries out research activities.

A higher education can be a legal entity of both public and private law.

8.3. Qualifications

In 2005 the three-cycle academic higher education system was introduced in Georgia. Since 2007-2008 academic year all the higher education institutions of Georgia are committed to this system. It is necessary to accumulate the respective amount of credits for the accomplishment of each cycle of higher education.

The first cycle – Bachelor's degree programme – at least 240 ECTS credits

From 2007 until 2010 there was a certified specialist's educational programme (vocational higher education) within the framework of higher education, which covered 120-180 ECTS credits. The students were admitted to these programmes commensurate with the procedure, envisaged by Georgian law, against a general education certificate. In the case of enrolment of a certified specialist for a Bachelor, Medical Doctor's/ Doctor in Dentistry educational programmes the higher education institution is entitled to recognise the ECTS credits, accumulated by the certified specialist concerned, for the purposes of acquisition of the Bachelor's, Medical Doctor's/ Doctor in Dentistry Degrees.

Appendix 2

Course Syllabuses (examples)

<table>
<tr><td colspan="3">ENVE 355 - Environmental Engineering</td></tr>
<tr><td colspan="3">Faculty:
Civil Engineering</td></tr>
<tr><td colspan="2">Program Name:
Civil Engineering</td><td>Program Code: #</td></tr>
<tr><td>Course Number:
ENVE 355</td><td>Credits:
3 Cr (6 ESTC Cr)</td><td>Year/Semester:
2017-2018 Spring</td></tr>
<tr><td colspan="3">☒ Required Course ☐ Elective Course</td></tr>
<tr><td colspan="3">Prerequisite(s):
N/A</td></tr>
<tr><td colspan="3">Catalog Description:
Civil Engineering; Public Health; Ethics; Ecology. Assessing Environmental Impact. Water Pollution. Measurement of Water Quality. Water Supply. Collection of Wastewater. Sludge Treatment and Disposal. Nonpoint Source Water Pollution. Solid Waste. Solid and Hazardous Waste Law. Hazardous Waste. Radioactive Waste. Meteorology and Air Pollution. Air Pollution Control. Air Pollution Law.</td></tr>
<tr><td colspan="3">Course Web Page: http://gtu.edu.ge...</td></tr>
<tr><td colspan="3">Textbook(s):
Environmental Engineering, Fourth Edition. Ruth E Weiner, Robin A. Matthews. Butterworth-Heineman. 2003, pp. 510.</td></tr>
<tr><td colspan="3">Topics Covered and Class Schedule:
(3 hours of lectures per week)
Weeks 1 Environmental Engineering
Civil Engineering; Public Health; Ethics; Ecology.
Weeks Assessing Environmental Impact
Environmental Impact; Use of Risk Analysis in Environmental Assessment; Socioeconomic Impact Assessment; Conclusion; Problems. RiskAnalysis
Risk; Assessment of Risk; Probability.
Week 3 Water Pollution
Sources of Water Pollution; Elements of Aquatic Ecology; Biodegradation; Aerobic and Anaerobi; c Decomposition; Effect of Pollution on Streams; Effect of Pollution on Lakes; Effect of Pollution Groundwater; Effect of Pollution on Oceans.
Week 4 Measurement of Water Quality
Sampling; Dissolved Oxygen; Biochemical Oxygen Demand; Chemical Oxygen Demand; Total Organic Carbon; Turbidity; Color, Taste, and Odor.
Week 5 Water Supply
The Hydrologic Cycle and Water Availability; Groundwater Supplies; Surface Water Supplies.
Week 6 Collection of Wastewater
Estimating Wastewater Quantities; System Layout; Sewer Hydraulics;
Wastewater Treatment. Wastewater Characteristics; On-site Wastewater Treatment; Central Wastewater Treatment.</td></tr>
</table>

Week 7	**Mid-Term Examination #1**
Week 8	**Sludge Treatment and Disposal** Sources of Sludge; Characteristics of Sludges.
Weeks 9	**Nonpoint Source Water Pollution** Sediment Erosion and the Pollutant Transport Process.
Week 10	**Solid Waste** Quantities and Characteristics of Municipal Solid Waste; Collection; Disposal Options; Litter; Solid Waste Disposal.
Week 11	**Solid and Hazardous Waste Law** Nonhazardous Solid Waste; Hazardous Waste.
Week 12	**Hazardous Waste** Magnitude of the Problem; Waste Processing and Handling; Transportation of Hazardous Wastes.
Week 13	**Radioactive Waste** Radiation; Health Effects; Sources of Radioactive Waste; Movement of Radionuclides Through the Environment.
Week 14	**Mid-Term Examination #2**
Week 15	**Meteorology and Air Pollution** Basic Meteorology; Horizontal Dispersion of Pollutants; Vertical Dispersion of Pollutants; Atmospheric Dispersion; Cleansing the Atmosphere. Measurement of Air Quality.
Week 16	**Air Pollution Control** Source Correction; Collection of Pollutants; Treatment; Control of Gaseous Pollutants; Control of Moving Sources; Noise Pollution; The Concept of Sound.
Week 17	**Air Pollution Law** Air Quality and Common Law; Statutory Law.
Week 18	**Final Examination**

Course Learning Outcomes:

At the end of the course, student must be able to:

(1). Solve problems in mathematics through differential equations, calculus-based physics, and one additional area of science. (e.g. The current global natural gas consumption is 14.7 gigatons/year and has grown at a rate of 3% over the past 10 years. Assuming that the growth rate remains at 3% over the next 10 years, what is the expected mass of CO_2 that will be released to the atmosphere from the combustion of natural gas over the next 10 years?)

(2). Drawing from a broad education, determine the global, economic, environmental, and societal impacts of a specific, relatively constrained engineering solution. (e.g. What are 2 global benefits and 2 global consequences of using corn-based ethanol as an alternative fuel source?)

(3). Explain how contemporary issues affect the identification, formulation, and solution of engineering problems. (e.g. What is "Cap-and-trade" and does it allow for economic growth in areas with poor air quality?)

(4). Solve well-defined engineering problems related to environmental engineering. (e.g. If a drinking water treatment plant has an intake flow of 10 MGD, what size clarifier is needed to remove all sediment down to 10 μm in diameter with an average density of 1.4 g/mL?)

(5). Organize and deliver effective verbal, written and graphical communications. (e.g. Draw a diagram outlining both a wastewater and drinking water treatment plant. Identify each section and explain what it does.)

(6) Analyze a complex situation involving multiple conflicting professional and ethical interests to determine an appropriate course of action. (e.g. What are 2 global benefits and 2 global consequences of using corn-based ethanol as an alternative fuel source? How can ethanol still be used as an alternative fuel source but not have the negative consequences associated with corn-based ethanol?)

	Method	No	Percentage
Assessment	Midterm Exam	2	50% (25% + 25%)
	Assignments	Minimum 2	5%

	Quizzes	2 out of 3	10%
	Attendance		5%
	Final Examination	1	30%

Contribution of Course to Criterion 5
Credit Hours for:
Mathematics & Basic Science :
Engineering Sciences and Design : 3
General Education : 0

Relationship of Course to Program Outcomes
The course has been designed to contribute to the following program outcomes:
(a) apply knowledge of mathematics, science, and engineering
(d) ability to function on multidisciplinary teams.
(e) identify, formulate, and solve engineering problems
(g) to communicate effectively
(i) need for,and an ability to engage in a life –long learning.
(k) use the techniques, skills, and modern engineering tools necessary for engineering practice

Prepared by: Prof. Alexander Davitashvili	Date Prepared: 03 March, 2013

Course Number and Name	BIOL 211. Principles of Biology.
Credits	3 credits
Teaching method(s)	Lecture
Contact Hours	3 hours lecture per week (2 meetings of 1.5 hours each per week)
Course Purpose (Catalog Description)	This course is an introduction to the study of life on Earth. We will discuss the diversity of life, the basis of heredity and evolution, and the principles of ecology. Concurrent enrollment in laboratory is strongly recommended.
Textbook and supplemental materials	Biology, by Brooker. ISBN 9780077551452
Specific Outcomes	Upon completion of Biology 211, a student should be able to: 1) Understand, and properly use, the basic language of biological diversity, genetics, evolution, and ecology 2) Recognize, compare, and contrast many of the major groups of organisms on Planet Earth 3) Describe the basic principles of inheritance 4) Describe the theory of evolution, the evidence supporting evolution, and the mechanisms of evolution 5) Describe ecological principles that apply at population through ecosystem levels 6) Use relevant terms and concepts to formulate questions about biology 7) Have an increased understanding of some of the local biological diversity and ecological issues 8) Work together in a group to effectively discuss issues in biology making use of appropriate terms and concepts
Assessment/Grading (if available)	Example grading scheme 62% – Unit exams (8 of them, online) 15% - In-class quizzes (unannounced) 15% - In-class activities (unannounced) 16% - Assignments
Topics	Meeting Topic Text Chapter(s) 1 Introduction; History of Life on Earth 1, 25 2 The Tree of Life 1, 26 3 Prokaryotes 27 4 Prokaryotes, Protists 27, 28 5 Protists 28 6 Protists and Kingdom Plantae 28, 29 7 Bryophytes 29 8 Seedless Vascular Plants 29

	9	Gymnosperms	30	
	10	Angiosperms	30	
	11	Fungi: Chytridiomycota, Zygomycota, Glomeromycota	31	
	12	Fungi: Basidiomycota, Ascomycota		31
	13	Kingdom Animalia	32	
	14	Sponges and Cnidarians	33	
	15	Lophotrochozoans	33	
	16	Lophotrochozoans and Ecdysozoans	33	
	17	Ecdysozoans	33	
	18	Deuterstomes and Vertebrates	34	
	19	The Nature of Science; Mitosis	1, 12	
	20	Meiosis; Mendel	13, 14	
	21	Mendelian Genetics	14	
	22	Darwin and the Theory of Evolution	22	
	23	Evolution of Populations and Speciation	23, 24	
	24	Speciation and Primate Evolution	24, 34	
	25	Population Ecology	52	
	26	Population Ecology	52, 56	
	27	Community Ecology	53	
	28	Community Ecology	53	
	29	Ecosystem Ecology	54	
	30	Biomes	50	
Prepared by: Prof. Alexander Davitashvili	Date Prepared: 03 March, 2017			