Annex No. 1

NATIONAL CENTER FOR EDUCATIONAL QUALITY ENHANCEMENT

Accreditation Expert Group Report on Higher Education Programme

Control Systems, Automation and Test-Engineering, PhD

Georgian Technical University

23.02.2023

27.03.2023

Tbilisi

Contents

Information about a Higher Education Institution [1]

Name of Institution Indicating its Organizational Legal Form	Georgian Technical University Public law legal entity
Identification Code of Institution	211349192
Type of the Institution	University

Expert Panel Members

Chair (Name, Surname, HEI/Organisation, Country)	Axel Hunger, University of Duisburg-Essen, Germany
Member (Name, Surname, HEI/Organisation, Country)	Avtandil Tavkhelidze, Ilia State University, Georgia
Member (Name, Surname, HEI/Organisation, Country)	Giga Khositashvili, Ilia State University, Georgia
Member (Name, Surname, HEI/Organisation, Country)	Mariami Aleksidze, Caucasus University, Georgia
Member (Name, Surname, HEI/Organisation, Country)	

[1] In the case of joint education programme: Please indicate the HEIs that carry out the programme. The indication of an identification code and type of institution is not obligatory if a HEI is recognised in accordance with the legislation of a foreign country.

I. Information on the education programme

Name of Higher Education Programme (in Georgian)	მართვის სისტემები, ავტომატიზაცია და ტესტ-ინჟინერინგი
Name of Higher Education Programme (in English)	Control Systems, Automation and Test-Engineering
Level of Higher Education	PhD
Qualification to be Awarded[2]	Level 8
Name and Code of the Detailed Field	Electronics and Automation, 0714
Indication of the right to provide the teaching of subject/subjects/group of subjects of the relevant cycle of the general education[3]	Ph.D. in Instrumentation, Automation and Control Systems Engineering
Language of Instruction	Georgian
Number of ECTS credits	50
Programme Status (Accredited/ Non-accredited/ Conditionally accredited/new/International accreditation) Indicating Relevant Decision (number, date)	Conditionally accredited №331110 06/04/2021
Additional requirements for the programme admission (in the case of an art-creative and/or sports educational programme, passing a creative tour/internal competition, or in the case of another programme, specific requirements for admission to the programme/implementation of the programme)	-

[2] In case of implementing a joint higher education programme with a higher education institution recognized in accordance with the legislation of a foreign country, if the title of the qualification to be awarded differs, it shall be indicated separately for each institution.

[3] In case of Integrated Bachelor's-Master's Teacher Training Educational Programme and Teacher Training Educational Programme

II. Accreditation Report Executive Summary

- **General Information on Education Pogramme[4]**

  Educational programme is leading to the degree of PhD (doctoral degree). It is set up by courses of 50 credits, consisting of 30 credits for general courses and soft skills as well as 20 credits as foundations in technical fields. For the PhD research, there are no credits given. Duration of entire programme is 3 years.

- **Overview of the Accreditation Site Visit**

  Site visit took place on 23.02.2023. The agenda for this day has been prepared by the National Center for Educational Quality Enhancement. All meetings and visits took place according to the agenda. Language of discussion was Georgian; a translator was active for the Chair of Accreditation Expert Panel. All discussions were done in a very friendly and positive atmosphere.

- **Brief Overview of Education Programme Compliance with the Standards**

  There have been sample explanations on the compliance with the standards, as well in the self-evaluation report as in documents in attachments. Therefore, compliance was explained in all details. Discussions did support this impression.

- **Recommendations**

  Some recommendations have been given along with the subchapters of this report. These should be seen as positive hints, they do not endanger the overall positive impression which was given by the programme. These recommendations are:

  1.1 - The phrase "Test Engineer" should be removed from the name of the educational program. It should be replaced by something around metrology.

  1.3 - Documents on implementing the programme, assessing the results etc. should be available in English and easy to access via internet from faculty home page.

  2.2 - Supervisors shall pay more attention to proper ways of citation. Preferred are citation from textbooks, journals and transactions. Only in exceptional cases, citations from internet are acceptable, and only if these citations are detailed, e.g. showing on which day web page was visited.

- **Suggestions for Programme Development**

[4] When providing general information related to the programme, it is appropriate to also present the quantitative data analysis of the educational programme.

Some suggestions have been given along with the subchapters of this report. These are not binding at all and should be seen as positive hints, they do not endanger the overall positive impression which was given by the programme. These suggestions are:

1.1 –

a) The study programme shall be offered with a volume of 180 ECTS as this is the only real application of ECTS.
b) Considerations about the nature of the PhD programme, whether it needs more freedom and independent work or can go on as a strictly regulated programme.

1.3 - Please make clear how consequences from results of questionnaires are taken and improvements are implemented. This could have done by cases of best practise.

2.1 –

a) Admission pre-condition for candidates from other faculties of GTU and other universities should be restricted to the field of studies in given PhD programme in order to guarantee that these candidates can perform in PhD as expected.

b) A minimal mark for the graduation from Master program for candidates from other faculties of GTU or other universities should be considered.

2.2 –

a) Activities in international relations are very fruitful. They should be extended within the next years.

b) Checks for plagiarism should be applied more often. Already the fact that these checks are applied will increase attention for this amongst students.

3.1 - Participated in international conferences or international mobility could be increased by numbers within the next years.

4.1 - GTU shall talk with employers about financial contribution to the university in order to offer more interesting conditions for new, younger academic staff.

4.4 - It is advised, the library staff enhance the collaboration with the faculty members to further promote access to academic databases within the PhD students.

- **Brief Overview of the Best Practices (if applicable)**

Best practice is the high amount of details in documentation, which made it easy to understand the programme and its execution.

- **Information on Sharing or Not Sharing the Argumentative Position of the HEI**

  If position of the HEI could not been shared, this was mostly the fact due to regulations which are valid in Georgia. Academic question could be discussed in good accordance.

- **In case of re-accreditation, it is important to provide a brief overview of the achievements and/or the progress (if applicable)**

  This was not the case.

Expert Team's position to the university argumentations on the report

According to the university's position they agree on the recommendations given by the experts in the standard 1. Moreover, the institution declares they already started to plan activities accordingly. Thus, the expert team believes those recommendations should not be changed.

As for the fourth recommendation given in the 2nd standard, the institution declares that there is a defined regulation regarding the citation rules. During the site visit expert team had chance to have a look into the PhD thesis and conduct the interview with students, based on this it was seen that the institution needs to enhance communication with this regard, thus the recommendation remains as it was given.

III. Compliance of the Programme with Accreditation Standards

1. Educational Programme Objectives, Learning Outcomes and their Compliance with the Programme

A programme has clearly established objectives and learning outcomes, which are logically connected to each other. Programme objectives are consistent with the mission, objectives and strategic plan of the HEI. Programme learning outcomes are assessed on a regular basis to improve the programme. The content and consistent structure of the programme ensure the achievement of the set goals and expected learning outcomes.

1.1 Programme Objectives

Programme objectives consider the specificity of the field of study, level and educational programme, and define the set of knowledge, skills and competences a programme aims to develop in graduate students. They also illustrate the contribution of the programme to the development of the field and society.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Engineering of Instrumentation, Automation and Control Systems has a very wide spread application in peoples´ live; it opens chances for many different jobs. It has relevance to research and solution of problems in production processes, communication and transport systems, military production facilities, economic and medical fields: application can also be found in more human centered fields. The use of modern automated control systems, measuring-diagnostic equipment and mathematical methods makes it much easier for deal with many fields in applications, allowing humans to spend more time in their self-development and private lives.

The goal of doctoral program is to prepare the specialist, complying with the requirements of the labor market, with in-depth knowledge of theoretical aspects and research methods, engineering activities, made independent decisions for designing and construction of control and automation systems and be competitive on labor market. Special features of graduates are that they manage methods of identification of systems, analysis and synthesis of optimal systems, linear and non-linear dynamic systems, analysis and application of applied numeric methods, technical means of automation for modern computer technologies and engineering computations. This allows them to make independent proper and scientifically justified decisions. This allows them to solve complex problems in engineering, economic, social and other spheres.

The five goals of the doctoral educational program “Control Systems, Automation and Test-Engineering” as given in the self-evaluation report are

- Prepare highly qualified professionals in the sphere of Control Systems, Automation and Test-Engineering for the scientific-research and pedagogical activities, able to:
- Understand modern control computer equipment and the most recent achievements in information technologies;
- Develop research and analytical methods and approaches oriented towards generation of the new knowledge;
- Independently design, implement and supervise innovative researches;
- Independently plan and realize the learning process.

These goals are fully in line with a PhD programme.

It is said that the program is oriented towards local and international labor market. For this, the newly introduced entry requirement of B2 in English is a good move. The program allows the graduated to continue their career in governmental or private structures, but there is a growing gap between the industry and Universities in Georgia. This fact is background that the academic staff at GTU is old in average because not enough younger academics join the

university. Recently, feedback showed that some PhD students canceled their studies and went for better paid jobs in industry.

From this, there is a growing demand in the labor market. More students want to study this program. And the employers give the clear feedback in the related session of the Programme Accreditation that they need the graduates of this program as they bring the relevant skill to act independent and with high scientific skills. In fact, the employers even want to support GTU, also financially, to educate more graduates of this programme.

There is a discrepancy between the degree conferred "Ph.D. in Instrumentation, Automation and Control Systems Engineering" and the name of the doctoral educational program "Control Systems, Automation and Test-Engineering". It is acceptable to have different names, but the part "Test-Engineering" in the name of the educational programme is misleading. As Test Engineer, it is normally understood that somebody is responsible for determining the best way a test of a product can be executed whether the product meets defined functions and can be performed in order to achieve adequate test coverage. Here, in this program, "Test Engineering" is meaning work in metrology, which is quite different from the test of a product according to its functional definition.

The programme ahs 50 credits, according to the ECTS (European Credit Transfer System). There is a discrepancy, as the Georgian National Qualification Framework says "A doctoral educational programme covers at least 180 credits." There may be a change from older value (180) to new version of 50 credits. As this seems to according to the rules in Georgia, there is nothing to complain.

But in fact, the ECTS system defines workload for all kinds of academic activities, and so also for research, and Bachelor and Master theses are well defined by their workload (15 and 30 ECTS). As ECTS is defined as work in hours per week, this gives clear and exact time frames for delivering such works.

Now, for a PhD study programme which contains lecture work of 50 ECTS and a significant amount of research work, this research work must also be clearly described, otherwise workloads can differ between the students significantly, with no chance to measure it and intervene.

The implementation of the programme with a study load of 50 credits is correct due to the rules in Georgia, so totally correct. But GTU may consider to define the study programme with 180 credits, either to convince the Board of National Qualification Framework or to give this 180 ECTS as an unofficial guideline in order to allow students to have better understanding what they are heading for.

While studies in Bachelor and Master are more of less standardized around the world, PhD studies can be very different by ideology and implementation. Even within the western world, there are many differences to be found. In the European system, part of the programme is introduced as academic workload by lectures, very much as the system in Georgia is.

Without going into much details, we do have a wide spread spectrum of PhD studies, from highly organized and managed (as in Georgia) to absolutely liberal "pure" research (in Germany). Without making any proposal, it should be considered that PhD is the highest academic rank, with the highest degree of independence and freedom. If it is like this, there must be more freedom and control, more independence academic work. Especially if this programme has international reach, such considerations should be done during next years.

Evidences/Indicators

1. The self-evaluation report;
2. Doctoral educational program "Control Systems, Automation and Test-Engineering ";
3. Results from discussion with employers in the frame oft he Programme Accreditation:
4. Employment rate of graduates;
5. Surveys of students, alumni and teachers.

Recommendations:

- The phrase "Test Engineer" should be removed from the name of the educational program. It should be replaced by something around metrology.

Suggestions for the Programme Development

- The study programme shall be offered with a volume of 180 ECTS as this is the only real application of ECTS.
- Considerations about the nature of the PhD programme, whether it needs more freedom and independent work or can go on as a strictly regulated programme.

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
1.1 Programme Objectives	☐	×	☐	☐

1.2 Programme Learning Outcomes

➢The learning outcomes of the programme are logically related to the programme objectives and the specifics of the study field.

➢ Programme learning outcomes describe knowledge, skills, and/or the responsibility and autonomy that students gain upon completion of the programme.

Description and analysis of the educational programme

The learning results of the program follow the "National Qualifications' Framework and Learning Spheres' Classifier" as well as "The Procedure of Planning, Elaboration, Assessment and Development of Educational Program", both dated from 2019.

The list of competencies of the program includes the basic knowledge and skills, envisaged by the content of the program. Employment is guaranteed, and the learning results have been designed following the form for this as approved by GTU.

Within the self-evaluation report, a list of 10 learning outcomes is given which are slightly modified compared to the older ones. This modification was done as consequence of the recommendations given in the decision of the Council of Accreditation of Educational Programs.

By this, the overall goal of the program and learning results is not affected. Respective changes were made to the curriculum of the program and the map of learning results and goals.

During next years, these modifications shall be observed and registered whether these changes work properly. This is especially important as times are changing faster and faster these days.

Especially for the research component, a special scheme is set up:

- from the 2nd semester and its sequential stages are:
- project/prospectus;
- colloquium 1;
- colloquium 2;
- colloquium 3;
- preliminary defence of thesis;
- finalization and defence of thesis.

This scheme is very bureaucratic. It leads candidates to the final result of a thesis and its defence, but this goes via a number of steps with observation and control. Looking into the statistics, it shows that nearly all candidates in the history did finish in exactly 3 years, what is very unusual, especially in Germany – as nobody knows how long a PhD thesis will take from the beginning, as the result is unknown.

It should be considered whether this strict scheme is appropriate for a PhD studies within the next years.

Evidences/Indicators

1. The self-evaluation report
2. Doctoral educational program "Control Systems, Automation and Test-Engineering ";
3. Surveys of students, alumni and teachers.

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for Programme Development

- Non-binding suggestions for the programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
1.2 Programme Learning Outcomes	×	☐	☐	☐

1.3 Evaluation Mechanism of the Programme Learning Outcomes

- Evaluation mechanisms of the programme learning outcomes are defined; the programme learning outcomes evaluation cycle consists of defining, collecting and analyzing data necessary to measure learning outcomes;
- Programme learning outcomes assessment results are utilized for the improvement of the programme.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

The mechanisms of assessment of learning results of the doctoral educational program “Control Systems, Automation and Test-Engineering” were developed based on related document of GTU Academic Council from 2019.

For the assessment of learning results, direct and indirect assessment methods are used.

The program identifies **direct assessment** plan of learning results, which implies:

- Development of methodology of assessment of learning based on assessment of doctoral paper;
- Assessment of learning results at the end of academic year, after defense of doctoral paper;
- Establishment of procedures of learning assessment.

Assessment mechanism of learning results include assessment of doctoral paper according to the following criteria:

- Relevance of the topic of thesis;
- Novelty of thesis paper;
- Theoretical/ practical values of thesis paper;
- Demonstration of problems and their resolution in the thesis paper;
- Answers to the asked questions;
- Visual presentation of material.

It is written that each learning result of the program is measurable and clearly provides realistic ways of achievements of each learning result. This is more or less easy for "Answers to the asked questions" and the "Visual presentation of material". For other points, as relevance of the topic of thesis, novelty of thesis paper theoretical/ practical values of thesis paper, the measurement of related mark is not easy. Even amongst professors, some of these questions can be judged differently.

Although the basic of marking according to learning results is not really easy, normal distribution of assessments is used with a range of scores as:

10% „A "- Excellent;
25% "B"- Very good;
30% "C" - Good;
25% "D" – Satisfactory;
10% "E" – Sufficient.

Studies of their scientific activities and participation have been carried out. Papers, published by them, participation in grants and conferences and other activities were anallyzed. But to map these results onto the given marking scheme seeems more or less difficult.

It is definitely correct, that the value of the graduates is very high, as the majority of the course graduates is employed according to their specialty, and some of them are teachers at various higher educational institutions. In fact, this would also be understandable due to the fact that GTU has highly experienced academic staff and status of GTU is best in its field in Georgia.

Here a posite statement: There are many documents describing handling of the studyprogram and especially the marking. Although these detailed regulations may not be necessary, it is is extremly good which high effort GTU gives to such regulations. They demonstrate a very good organisation ot the PhD study programme.

For the purpose of ensuring of **indirect assessment** of educational program, involvement of all stakeholders the set up and conduction of the programme is implemented.

Feedback from shareholders is taken by questionnaires, developed by the faculty. Within faculty, there are two institutions evaluating the results and making suggestions for improvements continuously.

Same checking is done by asking all students for feedback regarding the courses of all teachers. This is done by by Quality Assurance Service of GTU. Similar is feedback from graduates/alumni of the programme.

During the interviews, university representatives could not manage to clearly explain how the results to the questions are used. There are several instances collecting the questionaires, also publication of results is partly clear. But which are the results to be taken? Who does the decisiosn and who does implement improvements?

As very important step, discussion with employers is done regularly. Besides this process done by Faculty and GTU, the discussion with employers within the accreditation visit needs to be emphasised: Employers are very satisfied with the graduates they have hired and they are demanding more of them. They are very open to support GTU with the PhD study programme.

A lot of cooperations of GTU with international partner organisations show the high value which is given to discussion with the aim aof improvements and innovations.

A little shaddow falls on the many good documents on implementation and assessing results of the programme: Many are only in Georgian language, which is not positive for an internationally oriented programme. Even more, not all documents are available on the internet of Faculty / GTU. This situation should be improved.

Evidences/Indicators

1. Doctoral educational program "Control Systems, Automation and Test-Engineering ";
2. Development of methodology of assessment of learning based on assessment of doctoral paper;
3. Assessment of learning results at the end of academic year, after defence of doctoral paper;
4. Establishment of procedures of learning assessment.
5. Discussion with employers during accreditation visit
6. Alumni Survey Results;
7. The results of the survey of employers;
8. Student Survey Results;
9. Employment rate of graduates ;
10. Achievements of students and graduates;

Recommendations:

- Documents on implementing the programme, assessing the results etc. should be available in English and easy to access via internet from faculty home page.

Suggestions for the Programme Development

- Please make clear how consequences from results of questionnaires are taken and improvements are implemented. This could have done by cases of best practise.

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
1.3 Evaluation Mechanism of the Programme Learning Outcomes	☐	×	☐	☐

1.4. Structure and Content of Education Programme

- The Programme is designed according to HEI's methodology for planning, designing and developing of education programmes.
- The Programme structure is consistent and logical. The content and structure of the programme ensure the achievement of programme learning outcomes. The qualification to be granted is consistent with the content and learning outcomes of the programme.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

The doctoral educational program “Control Systems, Automation and Test-Engineering” is set up according to the methods applied for such at GTU. The program is compiled according to the European system of transfer and accumulation of credits (ECTS).

It is well structured with

- a mandatory study phase of 30 ECTS with non-technical subjects supporting soft skills and personal development,
- an optional study phase of 20 ECTS with technical subjects, mainly allowing candidates from outside the faculty or university to learn minimal standards of the field of the PhD programme,
- the research phase, no credits are given for this.

There are many documents describing set up of the programme. This is a positive aspect with regard to the students.

Evidences/Indicators

1. Self-evaluation report
2. Doctoral educational program "Control Systems, Automation and Test-Engineering ";

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for the programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
1.4 Structure and Content of Educational Programme	×	☐	☐	☐

1.5. Academic Course/Subject

➢ The content of the academic course / subject and the number of credits ensure the achievement of the learning outcomes defined by this course / subject.
➢ The content and the learning outcomes of the academic course/subject of the main field of study ensure the achievement of the learning outcomes of the programme.
➢ The study materials indicated in the syllabus ensure the achievement of the learning outcomes of the programme.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Correspondence of learning outcomes and course contents are given. Goals of the study programme can be reached by this. All stakeholders have been engaged in setting up curriculum and are permanently active with feedbacks on actual developments. Especially employers have close link to GTU and show high interest in the development of the study programme.

For the courses, various learning/ teaching methods are used. Workload is given by ECTS, for contact hours and independent work. Educational material is adequate.

All assessments of learning results are well specified and documented.

For the PhD educational programme “Control Systems, Automation and Test-Engineering”, basic and additional literature is offered in Georgian and English languages. This literature is available for students and permanently updated.

Evidences/Indicators

1. Self-evaluation report;
2. Discussions during accreditation visit:
3. Checking of examples of theses:
4. Doctoral educational program "Control Systems, Automation and Test-Engineering ";

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
1.5. Academic Course/Subject	×	☐	☐	☐

Compliance of the Programme with the Standard

1. Educational programme objectives, learning outcomes and their compliance with the programme	Complies with requirements	☐
	Substantially complies with requirements	×
	Partially complies with requirements	☐
	Does not comply with requirements	☐

2. Methodology and Organisation of Teaching, Adecuacy of Evaluation of Programme Mastering

Prerequisites for admission to the programme, teaching-learning methods and student assessment consider the specificity of the study field, level requirements, student needs, and ensure the achievement of the objectives and expected learning outcomes of the programme.

2.1 Programme Admission Preconditions

The HEI has relevant, transparent, fair, public and accessible programme admission preconditions and procedures that ensure the engagement of individuals with relevant knowledge and skills in the programme to achieve learning outcomes.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

In the process of preparation for the accreditation of the program, the following modifications were made:

- The pre-condition of knowledge of English language and submission of B2 level certificate is required;
- In the case of absence of this document, the applicant, instead of interview in foreign language, will undergo test in English language in Testing Center of GTU;
- Research project was added;
- Minor change was made to the results of learning, consequently, the map of learning results and goals was changed;
- Assessment of research components became single-time and the stages of research component were formed more clearly.

These changes are seen positive and increase the academic value of the programme.

Students of this PhD programme can be admitted from other faculties or even universities, meaning from different field of studies. There are courses (amongst the courses of 20 EACTS) giving basic knowledge of the students. This is a critical fact as it is questionable whether this small amount of technical knowledge is good enough to perform high ranking PhD research in the field of this programme.

There is also no minimal mark for graduates from Master degree courses to enter the given PhD programme. In Germany, we also do not have this, acceptance is made based on the personal understanding between candidates and professors. But in Georgia, you have so many detailed procedures that is hard to understand that this point is missing. In case of Master students of same field from GTU, it could be acceptable that no minimal mark is demanded. But for candidates from other faculties of GTU and from other universities, a minimal mark would be wise as the general quality and technical fitness for the PhD programme is unclear.

Evidences/Indicators

- self-evaluation report
- discussion at accreditation visit

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development:

- Admission pre-condition for candidates from other faculties of GTU and other universities should be restricted to the field of studies in given PhD programme in order to guarantee that these candidates can perform in PhD as expected.

- A minimal mark for the graduation from Master program for candidates from other faculties of GTU or other universities should be considered.

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
2.1 Programme Admission Preconditions	×	☐	☐	☐

2.2. The Development of Practical, Scientific/Research/Creative/Performing and Transferable Skills

Programme ensures the development of students' practical, scientific/research/creative/performing and transferable skills and/or their involvement in research projects, in accordance with the programme learning outcomes.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

The educational Program and its components ensure development of practical and transferal skills of students in compliance with learning results as it is explained in this text above.

Most training courses of the program include practical and research learning. For this, specially equipped laboratories are offered.

On top of the teaching labs, advanced labs are offered for PhD research. These labs have better equipment allowing to execute more sophisticated experiments. While educational labs are concentrated, research labs are spread around the campus, depending on the location of the institutes they belong to.

Above the faculty, GTU supports students' creative development. Students have chances to participate in courses on university level, international scientific conferences; various competitions, international mobility, etc. Mentors in faculty support the students in these matters.

PhD students have the opportunity to use GTU Central Library. There is especially international electronic access to several international data bases of scientific literature.

International mobility is supported since 2015 by the EC-funded exchange programs Erasmus+ - International Credit Mobility (ICM). Further programmes are available through GTU web services.

Under Covid 19 pandemic circumstances, in connection with exchange programs, weekly online meetings were held for the students and members of staff, wishing to participate in exchange programs. The persons, wishing to participate in the contest, can join the group on the web page, via GTU International Relations Department and offers by faculty.

In ICS faculty, a new position was established by the position of Dean's Assistant in the Issues of Science and International Relations. This is a very positive step showing the importance given to international activities by the faculty. Several events prove these activities, especially a virtual exhibition organized by DAAD (German Academic Exchange Service) demonstrating chances for higher education and research institutions of Germany.

Participation of students from PhD program show high interest in these offers. Also pandemic resulted in a mall step down, but now, activities are up gain.

Through checking theses it became obvious that students do not use literature to high extend, they prefer citations from internet. In discussion with GTU and students, it was obvious that extensive access to "real" literature is given through licenses and internet access. But students do not use theses sources in an adequate manner as expected for a PhD study programme.

Further observation was that checks for plagiarism are not used consequently. GTU does comment that software for this purpose does exist, but the use seems to be limited.

Evidences/Indicators

1. Discussions during accreditation visit
2. Self-evaluation report
3. Information about various achievements of doctoral students;
4. GTU's internationalization policy and strategy;

Recommendations:

- Supervisors shall pay more attention to proper ways of citation. Preferred are citation from textbooks, journals and transactions. Only in exceptional cases, citations from internet are acceptable, and only if these citations are detailed, e.g. showing on which day web page was visited.

Suggestions for the programme development

- Activities in international relations are very fruitful. They should be extended within the next years.

- Checks for plagiarism should be applied more often. Already the fact that these checks are applied will increase attention for this amongst students.

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
2.2.The Development of practical, scientific/research/creative/performing and transferable skills	☐	×	☐	☐

2.3. Teaching and Learning Methods

The programme is implemented by use student-oriented teaching and learning methods. Teaching and learning methods correspond to the level of education, course/subject content, learning outcomes, and ensure their achievement.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

The educational courses of the doctoral educational program "Control Systems, Automation and Test-Engineering" can be separated into two categories: The courses of 50 ECTS as preparation for PhD research and the guided research itself.

Within the preparative courses of 50 ECTS, we have student-oriented teaching and learning. Learning outcomes are well defined and documented. Assessment also is clearly documented.

Within the phase PhD research, there is a clearly defined procedure of presentations to be followed. Although this is no conventional teaching, procedures and also assessment are well defined and support the academic development of the candidates in an appropriate way.

Within the PhD educational programme "Control Systems, Automation and Test-Engineering", following activities of teaching/learning methods are used:

- Discussion/debate
- Cooperative learning
- Collaborative work
- Problem based learning
- Case study
- Brain storming with many facets
- Role and situational games
- Implication
- Induction
- Deduction
- Analysis
- Synthesis
- Verbal or orally transmision
- Setting up a script
- Explanation
- Action-oriented training
- Project planning and presentation.

This list is quite long in spite of the limited number of credits offered by courses. But of course, some of the points can be applied in combination in one course. Also the different teachers will have different preferences, either for specific subjects or by their own opinion.

During the guided research phase for PhD, a further variety of methods will be applied, depending from subject of research and stage in the development of theses.

Evidences/Indicators

1. Doctoral educational program "Control Systems, Automation and Test-Engineering ";
2. Self-evaluation report;

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for the programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
2.3. Teaching and learning methods	×	☐	☐	☐

2.4. Student Evaluation

Student evaluation is conducted in accordance with the established procedures. It is transparent, reliable and complies with existing legislation.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

An extensive system for the assessment is set up to determine the student's learning outcomes in relation to the goals of the academic program. This system makes all learning outcomes measurable, transparent and compliant with legislation.

Training courses are evaluated using a 100-point system with two components:

- intermediate assessment (maximum 60 points);
- Final exam (maximum 40 points).

The grading system is based on a 100-point scale with assessments according to:

Positive grades:

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

Negative grades:

- **(FX)** - Did not pass - 41-50 points of rating, student needs more work to pass and is given the right to take the exam once more;
- **(F)** – Failed - 40 points and less, which means that the work carried out by the student is not enough and he /she has to learn the subject from the beginning.

There are procedures for appealing the examination results.

The research component is assessed only once through the final assessment during defending the thesis.

The evaluation system for the scientific-research component(s) of the PhD education program is:

a) Excellent (summa cum laude) – excellent work;
b) Very good (magna cum laude) – a result that exceeds the requirements in every aspect;
c) Good (cum laude) – a result that exceeds the requirements;
d) Average (bene) - average-level paperwork that meets the basic requirements;
e) Satisfactory (rite) - the result, which, despite the shortcomings, still meets the requirements;
f) Unsatisfactory (insufficient) – work of an unsatisfactory level, which cannot meet the set requirements;
g) Completely unsatisfactory (sub omni canone) – a result that does not fully meet the requirements.

In case of receiving an (insufficient) evaluation, the doctoral student is allowed to submit a revised dissertation within one year, and in case of receiving a completely unsatisfactory (sub omni canone) evaluation, the doctoral student loses the right to submit the same dissertation.

Students can trace their results via their own profile in a database. In particular, the student's personal data, grades, educational program, etc. are given there. As this web page, as many others, in only in Georgian language, it is hard to read. But overall impression is positive.

Evidences/Indicators

1. Self-evaluation report;

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
2.4. Student evaluation	×	☐	☐	☐

Compliance with the programme standards

2. Methodology and Organisation of Teaching, Adequacy of Evaluation of Programme Mastering	Complies with requirements	×
	Substantially complies with requirements	☐
	Partly complies with requirements	☐
	Does not comply with requirements	☐

3. Student Achievements, Individual Work with Them

The programme ensures the creation of a student-centered environment by providing students with relevant services; promotes maximum student awareness, implements a variety of activities and facilitates student involvement in local and/or international projects; proper quality of scientific guidance is provided for master's and doctoral students.

3.1 Student Consulting and Support Services

Students receive consultation and support regarding the planning of learning process, improvement of academic achievement, and career development from the people involved in the programme and/or structural units of the HEI. A student has an opportunity to have a diverse learning process and receive relevant information and recommendations from those involved in the programme.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

In order to plan the educational process and improve the achievements, the student can get the necessary information and consultation about their academic achievements from the website of GTU and the faculty, departments of Control systems and Automation, Microprocessor and Measurement Systems. Electronic services for informing students are offered by the university. This applies for the courses as well the research phase.

Specific hours allocated for student consultations are offered by all staff engaged in consultation for different matters. Also, tools for electronic communication are provided. Learning material is also spread via electronic means. All students and academic staff have unique university E-mail addresses, which allow to spread information and material either by broadcast or personal communications.

All these tools have not only worked during pandemic, they are valuable means to maintain good information between the partners in the educational process.

Over the years, some students participated in conferences or international mobility. But number of these students was relatively low. For a PhD programme, numbers should be increased.

Participation in local and international scientific conferences and publications in local and international journals for the years of 2021-2022 was relatively good.

Evidences/Indicators

1. Self-evaluation report;
2. Achievements of students and graduates;
3. Students International mobility;

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for Programme Development

- Participated in international conferences or international mobility could be increased by numbers within the next years.

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
3.1 Student Consulting and Support Services	×	☐	☐	☐

3.2. Master's and Doctoral Student Supervision

- A scientific supervisor provides proper support to master's and doctoral students to perform the scientific-research component successfully.
- Within master's and doctoral programmes, ration of students and supervisors enables to perform scientific supervision properly.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

The HEI has elaborated the regulatory documents of the rights and duties of the supervisor and co-supervisor (if any) of MA/Doctoral student and of regulating the process of appointing, changing of them and also the process of the supervision/co-supervision.

The HEI has developed a methodology for the ratio of the number of supervisors of MA/Doctoral theses to the number of Master's and Doctoral students of the MA and Doctoral programmes; the methodology ensures effective management of the supervision. During interview, it was mentioned that a regulation exists that supervisors are not allowed to accept more than 3 candidates. But number of supervisors is sufficient, all interested students will find a supervisor. Positive for this fact is that candidates have to start the process of PhD studies with a research project by themselves, then, heads of departments discuss with them and find a suitable supervisor for their topics.

The scientific supervisor of the PhD student can be a professor or an associate professor of the faculty, a chief/senior research worker of an independent scientific research unit (institute, center) of GTU who holds the academic degree of doctor.

A supervisor conducts consultation with Master's and Doctoral students on a regular basis. The frequency of the consultations is relevant to the specificity of the programme and research topic. The supervisor advises the student in the research process on the following issues: research design and project management, research methodology, professional development, writing of thesis/scientific-research paper/dissertation.

The co-supervisor (if any) supports the Master / Doctoral student in the implementation of the scientific-research component based on mutual agreement with the supervisor and the Master / Doctoral student.

The HEI has developed mechanisms for evaluating the quality of the activities of the supervisor and co-supervisor of MA/doctoral theses, which ensure the effective implementation and development of the supervision/ co-supervision process.

This process is transparent and in line with regarding regulations.

The scientific supervisor participates in all steps of the PhD process.

Data related to the supervision of master's/ doctoral students	
Quantity of master/PhD theses	**33**
Number of master's/doctoral students	**64**
Ratio	**52 %**

Evidences/Indicators

1. Self-evaluation report
2. CV of academic staff;
3. Discussions during accreditation visit
4. Student Survey Results;
5. Alumni survey results.

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for the programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
3.2. Master's and Doctoral Students Supervision	×	☐	☐	☐

Compliance with the programme standards

3. Students Achievements, Individual Work with them	Complies with requirements	×
	Substantially complies with requirements	☐
	Partly complies with requirements	☐
	Does not comply with requirements	☐

4. Providing Teaching Resources

Human, material, information and financial resources of educational programme ensure sustainable, stable, efficient and effective functioning of the programme and the achievement of the defined objectives.

4.1 Human Resources

➢ Programme staff consists of qualified persons, who have necessary competences in order to help students to achieve the programme learning outcomes.
➢ The number and workload of programme academic/scientific and invited staff ensures the sustainable running of the educational process and also, proper execution of their research/creative/performance activities and other assigned duties. Quantitative indicators related to academic/scientific/invited staff ensure programme sustainability.
➢ The Head of the Programme possesses necessary knowledge and experience required for programme elaboration, and also the appropriate competences in the field of study of the programme. He/she is personally involved in programme implementation.
➢ Programme students are provided with an adequate number of administrative and support staff of appropriate competence.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

The program involves qualified academic personnel. Their total number is 30, including 17 professors, 12 associated professors and one senior research worker. The number of academic personnel is adequate to the number of students. The academic personnel involved in the program has signed an affiliated agreement with the University. The personnel implementing the program are involved as well in the consulting and program development processes.

Both departments – Control Systems and Automation and Microprocessor and Measurement System – implementing the program have many years of experience and have always been at the forefront of the development of the field. In particular, Control Systems Department has nearly 65-year history and Microprocessor and Measurement Systems Department 55-year history. The qualification of academic/scientific staff is proved by scientific papers written during the past 5 years. Their scientific works have been published in local and international journals; they are participating in research projects; are involved in local and international grants; they have been trained; they are taking part in local and international conferences.

The program supervisor has extensive experience and knowledge in developing education programs (since 2012 he/she has been the head of the accredited Mater's education program – "Control Systems, Automation and Test-Engineering") and since 2020 up until now he is the head of the similar Ph.D. education program.

In 2001 program head of the programme successfully defended his thesis for a Doctor's Degree on the issues of identification of continuous stationery and non-stationary dynamic systems

at the Technical University of Georgia. He has taken part in the scientific-research projects of the Georgian Technical University, Institute of Cybernetics, Institute of Control Systems as well as in the grant projects of the TUG the Academy of Sciences of Georgia. In 2009-2011 he was an Academic Advisor of the state scientific grant project (financed by the Shota Rustaveli National Science Foundation). His scientific research is mainly connected with one of the key directions of the Control Theory – identification of systems. His works have been published in international periodicals and reported at the international conferences.

He has published about 140 scientific works including one monography and eleven guides, auxiliary guides, lecture courses and methodical references.

The head of the programme constantly participates in top local and international conferences (7 local and 33 international conferences). He has been invited to deliver reports at the conferences of the International Federation of Automatic Control (IFAC) – (Troyes, France) - 2016; Berlin -2019), at the symposiums (Beijing – 1998; Budapest - 1991) and at the congresses (Milan – 2011; Berlin - 2020). He was also a member of the program and organizational committees of the international scientific conferences as well as a reviewer of the international scientific conferences and journals. Lots of theses for Ph.D.'s and Master's Degrees are defended under his supervision.

Indicators of scientific productivity of the head of the programme established by the Techinform Institute of the Technical University of Georgia in 2020 are as follows:

- Scopus: citation index: 16; H-index: 3;
- Web of science: citation index: 26, H-index: 3;
- Google scholar: citation index: 39, H-index: 4.

Number of the staff involved in the programme (including academic, scientific, and invited staff)	**Number of Programme Staff**	**Including the staff with sectoral expertise[5]**	**Including the staff holding PhD degree in the sectoral direction[6]**	**Among them, the affiliated staff**
Total number of academic staff	**30**	**27**	**27**	**30**
- Professor	17	17	17	17
- Associate Professor	12	12	12	12
- Assistant-Professor	1	1	1	1
- Assistant				
Visiting Staff				_
Scientific Staff				_

The head of the programme is a professor at the Georgian Technical University, Department of Informatics and Control Systems; since 2019 up until now he is a member of the

[5] Staff implementing the relevant components of the main field of study

[6] Staff with relevant doctoral degrees implementing the components of the main field of study

Academic Council of the Technical University of Georgia. Besides, he is a head of the department of Institute of Control Systems, Systems Identification and Optimal Control of the Georgian Technical University; as well as a member of the Scientific Council and the collection of the works of the same institute – deputy editor-in-chief. In 2011, the head of the programme became a real member of the Engineering Academy of Georgia – an academician.

Students of the program are provided with administrative and support staff of appropriate competence. They were selected for the respective positions on the basis of the university open contest.

Supervisors of the doctoral students are highly qualified with research experiences. They have published good number of papers and act as members of editorial boards and reviewers of international journals.

23 doctoral dissertations have been defended their theses and a large number of graduates have been employed.

Although the number of teaching staff is sufficient to operate the programme, the distribution of ages of staff needs special notice:

Distribution of ages of academic staff

a) Dept. of Control Systems and Automation:

7 persons: 65 plus – 70%

3 persons: below 65

b) Dept. of Microprocessor and Measurement

3 persons: 65 plus – 33%

6 persons: below 65

These facts given clear impression that staff is, especially in Dept. of Control Systems and Automation very old, to say – too old. Only younger staff can guarantee that education is taking into account actual developments. E.g. in Germany, PhD committees allows supervising PhD theses only for two years after retirement, which is around 65.

Arguments were mentioned that salaries in industry are much higher and nobody would stay at university (GTU). But this cannot seen as real arguments, as

1) status of Engineer is relatively low in Georgia, but status of a professor is high,
2) although the salary at GTU is not high (about GEL 1.700,00), compared to industry, further conditions for professors at GTU are brilliant: So, they can execute research projects acquired from outside GTU inside GTU and gain 70% of the income as addition private income,
3) and employers were highly interested to get more graduates from the PhD programme and they even showed interest to offer financial contribution to GTU, either for individual candidates or also for a graduate school with a number of candidates.

Obviously, there is a high discrepancy between the perception from GTU and employers. But it seems that GTU can have profit from the employers in order to hire more younger staff. It only seems necessary that somebody has to make first move.

Evidences/Indicators

- Component evidences/indicators, including the relevant documents and interview results
- Discussions during accreditation visit with employers
- Self-evaluation report
- Program implementation staff;
- CV of academic staff;
- Competition materials: https://gtu.ge/News/15095/
- Competition conditions: https://gtu.ge/AboutStu/competition_2021/gancxadebis_pirobebi.php ;
- Academic staff contract form;
- Affiliate Agreement Form;
- Contract form for guest personnel;
- The status of the head of the program, the decision of the Academic Council No. 2092;
- Consultation schedule.
-

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for Programme Development

- GTU shall talk with employers about financial contribution to the university in order to offer more attractive offers to hire new, younger academic staff.

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
4.1 Human Resources	X	☐	☐	☐

4.2 Qualification of Supervisors of Master's and Doctoral Students

The Master's and Doctoral students have qualified supervisor/supervisors and, if necessary, co-supervisor/co-supervisors who have relevant scientific-research experience in the field of research.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

Ph.D. students have experienced professional supervisors that is evidenced by their many years' experience in scientific activities and research. Number of PhD supervisors is 21. They are members of the Georgian Academy of Science in various fields; members of the editorial board of international magazines, reviewers; they are involved in the work of organization committees of international scientific conferences. The responsibilities of the program supervisor include the participation in the discussion of the thesis topics presented by the prospective supervisor of the Ph.D. candidate of the relevant department; participation in department temporary commission, seminar/colloquium commissions, sectoral, dissertation defense boards (selectively, by the decision of a chairperson); reviewing/preparing proposals for modifying Ph.D. program.

Supervisors of Ph.D. provide students with consultations during conducting research or writing scientific paper, they contribute to their integration into local and international scientific circles. In the process of research, supervisors advise students to prepare articles for publishing in peer-reviewed journals as well as participate in various scientific-research conferences. Ph.D. students are informed by their supervisors about scientific bases, exchange programs, scientific grants of various types and they receive relevant consultations regarding the proper management for the research project.

While Ph.D. students are conducting some kind of research there might emerge the need of carrying out a new research, therefore, at the Georgian Technical University it is possible to change supervisor or add a co-supervisor for a Ph.D. student as well as change or correct the title of the topic. Since 2012 up until now under the Ph.D. Education Program 33 Ph.D. candidates defended their thesis. The number of students enrolled in the program has been stable over the years. Most Ph.D. graduates based on their qualification are employed in leading positions.

Number of supervisors of Master's/Doctoral theses	Thesis supervisors	Including the supervisors holding PhD degree in the sectoral direction	Among them, the affiliated staff
Number of supervisors of Master's/Doctoral thesis	**21**	**21**	**20**
- Professor	15	15	15
- Associate Professor	5	5	5
- Assistant-Professor			
Visiting personnel			_
Scientific Staff	1	1	_

Evidences/Indicators

- Component evidences/indicators, including the relevant documents and interview results
- Program implementation staff;
- CV of academic staff ;
- Supervisors of doctoral students;
- List of defended dissertations.
- Instructions for managing the educational process at the Georgian Technical University.
  Link : https://gtu.ge/Study-Dep/Files/Pdf/sasw_proc_marTvis_inst_1407_22_SD.pdf .
- GTU doctoral regulations, link: https://gtu.ge/Learning/doq_debuleba.php ;
- Student Survey Results;
- Alumni Survey Results.

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
4.2 Qualification of Supervisors of Master's and Doctoral Students	X	☐	☐	☐

4.3 Professional Development of Academic, Scientific and Invited Staff

➢ The HEI conducts the evaluation of programme staff and analyses evaluation results on a regular basis.
➢ The HEI fosters professional development of the academic, scientific and invited staff. Moreover, it fosters their scientific and research work.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

University supports professional development of academic, scientific and invited personnel as well as promotes their scientific-research activities. University conducts evaluation and satisfaction survey of the academic staff involved in the implementation of the program on a regular basis.

Assessment of professional activities:

Academic activities (max 40% of the total evaluation);

Science activities (research, innovations, scientific publications, etc., max 40% of the total evaluation)

Other important activities (max 20% of the total evaluation).

Each person involved in the academic activities fills out a questionnaire which contains: Scientific-research projects carried out according to the last year's plan financed from the state budget of Georgia; Research projects financed from the budget of the University with the state grant from the National Science Foundation of Georgia; research papers published in Georgia and/or aboard; participation in scientific forums, seminars, symposiums and conferences in Georgia and/or aboard; Participation in scientific/research/expert works.

During the implementation of the program, the academic staff of the departments of Control Systems and Microprocessor and Measurement Systems have received trainings at the Professional Development Center of the Georgian Technical University. The courses about "modern technologies of learning and teaching in university education" are conducted jointly by "the Center of Excellence in Teaching and Learning" (CETL) of the Iowa University in the United States of America and the Professional Development Center of the Georgian Technical University using latest training programs. Topics of the trainings include career planning; modern methodologies of learning and teaching; learning outcomes and their assessment; communication and cognition; Bloom's Taxonomy, etc.

An open contest for occupying an academic position at university is announced every four years. Members of the contest committee are distinguished by high professionalism conditions, rules and other details are available for contestants on the website of the Georgian Technical University as well as in the press. As part of the staff reshuffle carried out in 2021 at the Georgian Technical University, a contest for administrative and supportive personnel was held and as a result, best employees were selected.

Evidences/Indicators

- Component evidences/indicators, including the relevant documents and interview results
-
- CV of academic staff;
- Annual scientific reports of academic staff;
- GTU's internationalization policy;
- GTU's strategic development plan 2018-2024. Link: https://gtu.ge/AboutStu/strategic-plan.php ;
- Program implementation staff;
- Academic staff survey results (internationalization);
- Academic staff training;
- Academic staff survey results;
-

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
4.3 Professional development of academic, scientific and invited staff	X	☐	☐	☐

4.4. Material Resources

Programme is provided by necessary infrastructure, information resources relevant to the field of study and technical equipment required for achieving programme learning outcomes.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

During the site visit experts visited the facilities at the university. The classrooms are recently renovated, including the computer equipment. The university owns different labs that are accessible for both students and faculty members of this program. The labs cover Metrology, Artificial Intelligence, Cleve Med Lab Systems and few more. Expert panel had a chance to visit to all those labs including those that are used for research activities not only for teaching and learning.

The library reading halls are accessible for students at the university. The readings halls are divided in two part for individual and group work. All of the literature indicated in the course syllabuses are accessible at the library, however the majority are in electronic format. The expert panel asked what were the measures from the library to guarantee the copy rights are not damaged. As per institutions explanation, those electronic eBooks are accessible via university accounts only, moreover they do have permission/confirmation from the authors to use the eBooks.

The library has an access to academic databases. Currently the university is subscribed to almost 10 different databases out which several (Science Direct and Scopus) are good selection for students of this study program. The self-evaluation report says Web of Science is also accessible for students, however neither the web-page, nor the library staff members confirmed it. As it was explained the library is providing trainings in using databases, in addition to the meetings with students during the orientation week. There is a remote access to the databases, as per library staff highlighted. The library staff is actively engaged with providing sufficient service to staff and students, the user guides and manuals are accessible via the university webpage. The expert panel double checked the student's awareness about the databases and library services. During the interviews students mention that they have information and some of them even attended an information session about the usage of databases, but the majority

mentioned that they use it rarely, as there is no such need into there research projects. The expert panel advises the institution to actively promote the usage of the academic databases within the students to further support the quality of teaching/learning, and research activities.

The expert panel tried to identify what was the procedure of purchasing library resources and to what extend students were engaged in this. According to the procedures academic staff are the people who initiates the process and after getting confirmation from the faculty administration the library is purchasing resources.

Evidences/Indicators

- The self-evaluation report
- The site visit at the university
- Interviews during the site-visit
- Agreement with the providers of the academic databases
- University web-page

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- It is advised, the library staff enhance the collaboration with the faculty members to further promote access to academic databases within the PhD students.

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
4.4 Material Resources	X	☐	☐	☐

4.5 Programme/Faculty/School Budget and Programme Financial Sustainability

The allocation of financial resources stipulated in the programme/faculty/school budget is economically feasible and corresponds to the programme needs.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

Describe, analyse and evaluate the compliance of the education programme with the requirements of the component of the standard, based on the information collected through the self-evaluation report (SER), the enclosed documents and site-visit.

Budget of the educational program Approved by the University Senate. At this point, the educational program is equipped with the highly technological training-research laboratory, auditoria, well-stocked library and other infrastructures.

The program is basically funded by the tuition fees paid by the students. Program is sustainable, with respect of funding, its budget provides funding of the required resources, costs for the personnel, literature updating and other relevant expenses related to program implementation, as stated in the budget of the Faculty of Informatics and Control Systems.

Evidences/Indicators

- Component evidences/indicators, including the relevant documents and interview results
-
- GTU budget 2021 link: https://gtu.ge/AboutStu/stu-budget.php https://gtu.ge/pdf/biujeti/2021_wlis_biujeti_damtkicebuli.pdf ;
- Faculty Budget;
- Doctoral educational program "Canagement systems, automation and test-engineering" 2021 budget .

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for the programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
4.5. Programme/ Faculty/School Budget and Programme Financial Sustainability	X	☐	☐	☐

Compliance with the programme standard

4. Providing Teaching Resources	Complies with requirements	X
	Substantially complies with requirements	☐
	Partly complies with requirements	☐
	Does not comply with requirements	☐

5. Teaching Quality Enhancement Opportunities

In order to enhance teaching quality, programme utilises internal and external quality assurance services and also, periodically conducts programme monitoring and programme review. Relevant data is collected, analysed and utilized for informed decision making and programme development.

5.1 Internal Quality Evaluation

Programme staff collaborates with internal quality assurance department(s)/staff available at the HEI when planning the process of programme quality assurance, developing assessment instruments, and implementing assessment process. Programme staff utilizes quality assurance results for programme improvement.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

According to the submitted documentation, it was determined that the standard approaches of internal quality assurance are used in case of this educational program. In particular, the mentioned process works like - "Plan, Implement, Evaluate, Develop" cycle. This process includes both staff evaluations and analysis of student survey forms. Based on the obtained results, the internal quality assurance office submits recommendations to the heads of the programs and the governing body of the university, based on which interventions are planned if necessary.

The Programs Self-Evaluation teams include both academic and administrative staff at the faculty level and from different structural units providing university services. The expert panel had the opportunity to meet the staff involved in the self-evaluation process, as a result of which it was identified that they actively participate in the process of program implementation and development, the roles are distributed according to their competencies.

The expert team asked few questions to find out how the outcomes of the academic staff evaluation is communicated to them. As it turned out during the interviews, the quality assurance office is providing the outcomes of the evaluation to each faculty member, if there is a need they communicate together with the head of the program. As expert panel noted due to the reason, that the number of the students is not that high on the given study programme, the direct communication with academic staff and faculty administration is also an active

mechanism. Quite often, students are giving feedback directly to the faculty members as well as faculty administration, this was confirmed by both students and academic staff during the interviews. This path of feedback is normally not documented.

Evidences/Indicators

- Self-evaluation report
- The mechanisms of Internal Quality Assurance
- The methodology of Planning and Implementing the Education Program
- The mechanism for evaluation the learning outcomes
- The survey forms created by the quality assurance team
- The outcomes of the interviews
- University web-page

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for the programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
5.1 Internal quality evaluation	X	☐	☐	☐

5.2 External Quality Evaluation

Programme utilises the results of external quality assurance on a regular basis.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

As it was determined during the site visit that the university is working in two major dimensions when it comes to external quality evaluation of the given study program. The first is working on the recommendations the program was given during the accreditation process.

According to the submitted documents, this study program had almost 10 recommendations and few suggestions in the last accreditation process. Although the self-evaluation report described how those recommendations were considered, still the expert panel asked few questions with different groups included in the interviews to clearly capture the process. As it was explained, the self-evaluation team was responsible to make sure that the changes have been made in accordance to the recommendations. In some cases, there was a need to change the inter university regulations (procedures to get new students; to proceed with the PhD thesis, etc.), while in another cases the team met with the relevant administrative and academic person and adjusted all the recommendations and few suggestions.

The second dimension of the external quality assurance are the external reviewers included in the assessment process. As it is described in the self-evaluation report, the study program was sent to local research institute in order to review its content. Overall the outcomes of the review were positive, as the area and the filed seems to be a competitive in Georgia, therefor the external reviewers mostly find the content of the program helpful and support its development.

Evidences/Indicators

- The Self-evaluation reports
- The mechanisms of external Quality Assurance
- The previous accreditation reports of the four programs given in the cluster
- Interview outcomes
- University web-page

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for the programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
5.2. External Quality Evaluation	X	☐	☐	☐

5.3 Programme Monitoring and Periodic Review

Programme monitoring and periodic evaluation is conducted with the involvement of academic, scientific, invited, administrative, supporting staff, students, graduates, employers and other stakeholders through systematic data collection, study and analysis. Evaluation results are applied for the programme improvement.

Summary and Analysis of the Education Programme's Compliance with the Requirements of the Component of the Standard

According to the submitted documentation, the monitoring and periodic evaluation of the given program is carried out in accordance with the rules and procedures existed at the university. Namely, academic and administrative staff, as well as students, graduates and employers are involved in this process. Based on meetings with them, the needs are identified, which are discussed in the program self-evaluation group, then at the faculty council, and if changes are needed, they are submitted to the academic council for approval.

The group team was interested in how all interested parties are involved in above mentioned process. As a result of the interviews, it was identified that students and graduates mostly fill out questionnaires sent via email. The content of the questionnaire covers specific study courses, as well as university services.

During the interview, the employers noted that program mostly cover the regional needs. They state that the university is in contact with them and trying to determine their needs through the personal interviews. The expert panel met quite a number of the employers and it was confirmed that the university is closely collaborating with them.

The PhD students are assessing their supervisors in addition to the forms they are filling. As the university administrative staff mentions, the outcomes of the assessment are used to further improve the program.

The university has implemented the principle of collegial evaluation (peer-assessment), in particular, the quality assurance office of the faculty and the Head of the Program at the beginning of each semester establish a list of academic staff whose lectures should be attended. The expert panel asked, whether the program was compared to an international or local analog. As it was explained and later documented – there were few programs from the developed countries that the university compered this given PhD program.

Evidences/Indicators

- Self-evaluation report
- The mechanisms of Internal Quality Assurance
- The methodology of Planning and Implementing the Education Program
- The mechanism for evaluation the learning outcomes
- The survey forms created by the quality assurance team
- The outcomes of the interviews
- University web-page

Recommendations:

- Proposal (s), which should be considered by the HEI, the programme to meet the requirements of the standard

Suggestions for the programme development

- Non-binding suggestions for the programme development

Evaluation

Please, evaluate the compliance of the programme with the component

Component	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
5.3. Programme monitoring and periodic review	X	☐	☐	☐

Compliance with the programme standards

5. Teaching Quality Enhancement Opportunities	Complies with requirements	X
	Substantially complies with requirements	☐
	Partially complies with requirements	☐
	Does not comply with requirements	☐

Attached documentation (if applicable):

Name of the Higher Education Institution:
Georgian Technical University

Name of Higher Education Programme, Level:
Control Systems, Automation and Test-Engineering, PhD

Compliance with the Programme Standards

Evaluation / Standards	Complies with requirements	Substantially complies with requirements	Partially complies with requirements	Does not comply with requirements
1. Education Programme Objectives, Learning Outcomes and their Compliance with the Programme	☐	×	☐	☐
2. Teaching Methodology and Organisation, Adequacy Evaluation of Programme Mastering	×	☐	☐	☐
3. Student Achievements, Individual Work with them	×	☐	☐	☐
4. Providing Teaching Resources	×	☐	☐	☐
5. Teaching Quality Enhancement Opportunities	×	☐	☐	☐

Signatures:

Chair of Accreditation Expert Panel

Full name, signature Axel Hunger -

Accreditation Expert Panel Members

Full name, signature Giga Khositashvi

Full name, signature Avtandil Tavkhelidz

Full name, signature Mariam Aleksidze