



განათლების ხარისხის განვითარების ეროვნული ცენტრი
NATIONAL CENTER FOR EDUCATIONAL QUALITY ENHANCEMENT

Accreditation Expert Group Report on Higher Education Programme

**PhD Mathematics
The University of Georgia**

Date(s) of Evaluation October 22, 2019

Report Submission Date November 29, 2019

Tbilisi
2019

HEI's Information Profile

Name of Institution Indicating its Organizational Legal Form	The University of Georgia LTD
HEI's Identification Code	205037137
Type of Institution	University

Higher Education Programme Information Profile

Name of the Programme	Mathematics
Level of Education	Doctoral
Qualification Granted Indicating Qualification Code	PhD of Mathematics 0541
Language of Instruction	Georgian
Number of Credits	180 ECTS
Programme Status (Authorized/ Accredited/New)	Accredited

Expert Panel Members

Chair (Name, Surname, University/organization/Country)	Mr. Prof. Dr. Malte Braack Christian-Albrechts-Universität Kiel, Germany
Member (Name, Surname, University/organization/Country)	Mr. Dr. Gorge Giorgibiani Georgian Technical University, Georgia
Member (Name, Surname, University/organization/Country)	Mrs. Ani Bilanishvili Ivane Javakhishvili Tbilisi State University, Georgia

Accreditation Report Executive Summary

▪ **General information on the education programme**

This PhD program is a successor of an existing one. While the existing one (since 2014) is a more general program for Exact, Natural Sciences and Computer Science, the PhD program under review is focused uniquely on mathematical research projects. The students of this PhD program should accomplish individual modules with 60 ECTS on mathematical and general topics and 120 ECTS due to their mathematical research work. The individual modules are extracted from the existing PhD program and mainly consist of lectures and reading courses. The dissertation itself (research project) forms the central part of this study and its outcome is the basis of the final grade. The duration of the thesis is designed for 3 years.

▪ **Brief overview of the accreditation site-visit**

The site visit gave the expert panel the possibility to get a first impression of the facilities as library, seminar room, lecture room, offices and computer pools. These facilities and their equipment is considered to have a relatively high standard so that there is no doubt that the PhD students of this PhD program will have access to sufficient infrastructure and technical equipment for accomplish their dissertations. The interviews showed that this PhD program benefits from enthusiastic colleagues and an ambitious university management which warrant their full support with respect to human resources and financial aid within the bounds in of their possibilities.

▪ **Summary of education programme's compliance with the standards**

This mathematical PhD program is in compliance with the NCEQE standards no. 1-5. We only find secondary points for improvement. We formulate two recommendations which can relatively easy be accomplished.

▪ **Summary of Recommendations**

1. In order to improve the expertise of the graduates for the labor market, the panel recommends to modify the curriculum so that typical content from Applied Mathematics (compulsory or optional) becomes included as well. Such courses can comprise methods in statistics, financial mathematics, numerical mathematics or programming. A suitable work load for such lectures / courses is about 10 ECTS. However, the upper limit of 60 ECTS for the entire curriculum should not be passed in order to leave enough time (120 ECTS) for the original research of the PhD students.
2. The library should augment the number of relevant mathematical textbooks with scientific content beyond Bachelor level. The focus of those new books should be oriented to the PhD lectures and the PhD topics in this PhD program.
3. The HEI should set up a transparent grading scheme for the assessment of the final grade. In particular, a weighting of the individual grades of the dissertation and of the defense (presentation, discussion) should be set up in order to have a fair and effective assessment of grading.

▪ **Summary of Suggestions**

1. It should be checked whether the name of the course on "Gunther Differential Operators" should be generalized to something like "Differential Operators on Manifolds", since this wording is more commonly used in the mathematical community (and the general academical community, as well). This would perhaps help to assess the high academical level of the curriculum. The names of the other courses should be chosen more specific to make the level of mathematical content more transparent, e.g. Algebra and Topology.
2. Staff members should foster the recruitment of students in order to increase the number of enrolled PhD students. The academic staff may broaden the present spectrum of PhD topics to more applied topics. In this context, collaboration with other departments (inside or outside this HEI) may be beneficial

- to amplify and identify possible new mathematical questions and topics
- to recruit talented students from related disciplines (physics, engineering etc.) with relevant mathematical background for appropriate projects.

Joint interdisciplinary PhD projects may also be a possibility to intensify exchange of ideas between PhD students and widen their spectrum of knowledge.

3. Prospective inclusion of personnel with scientific background in applied mathematics (numerics, statistics, stochastics or financial mathematics) would increase the attractiveness of the study program even more.
4. It should be checked if the course on “Management of Research Projects” with 10 ECTS can be reduced to 5 ECTS. This would give room for the additional course in the area of Applied Mathematics (see Recommendation no. 1 above).
5. A formal assignment of a co-supervisor inside or outside the HEI with the necessary expertise in the particular research field should be implemented on a regular basis.

- **Summary of best practices (If Applicable)**

- **In case of accredited programme, summary of significant accomplishments and/or progress (If Applicable)**

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 institution. Programme learning outcomes are assessed on a regular basis in order to improve the programme.

1.1 Programme Objectives

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

Descriptive summary and analysis of compliance with standard requirements

According to the SER of the institute, the objectives of this program consist in conducting scientific research, creating new knowledge and developing several abilities in research, as e.g. analytical thinking and management of scientific projects. The PhD students are trained to improve their skills with respect to these objectives. The program objectives are in accordance with the development of the scientific discipline (Mathematics).

According to the program description, successful PhD students must publish in refereed journals. That is the way how this program contributes to the development of the academic field and the society. These aspects are realistic and achievable. The enrolled students have the possibility to make scientific contributions and to sharpen their international recognition. The discussions during the site visit reveal that the academic staff involved in this program share the program objectives.

The academic labor market is fully considered within this program. In particular, the PhD program contains several activities to train teaching strategies of the students and to manage research projects. As a matter of fact, a PhD program in Mathematics is usually more oriented towards research and towards the academical world. Therefore, it is obvious that the non-academical labor market is less in the focus of this program and is only partially considered. Here, we see room for improvement. The program should provide the possibility to strengthen the mathematical knowledge especially suitable in applied sciences and in the non-academical labor market. This can be realized by offering additional moduls in Applied Mathematics/ Stochastics / Statistics. We refer to the Recommendation in § 2.2 for details.

The program objectives are accessible via the web-site of the HEI in Georgian language. The expert panel considers this to be sufficient, because the PhD program itself is in Georgian language only (although English language is required to be able to study the relevant publications).

Evidences/indicators

The assessment of the Expert Panel is based on the program description, the SER and the interviews.

Recommendations:

The aspects of labor market (outside academia) demands is not yet sufficiently addressed, see Recommendation in §2.2.

Suggestions for programme development:
Best Practices (if applicable):
In case of accredited programme, significant accomplishments and/or progress
Evaluation <ul style="list-style-type: none"> <input type="checkbox"/> Complies with requirements <input type="checkbox"/> Substantially complies with requirements <input type="checkbox"/> Partially complies with requirements <input type="checkbox"/> Does not comply with requirements

1.2. Programme Learning Outcomes
<ul style="list-style-type: none"> ➤ Programme learning outcomes describe knowledge, skills, and/or the sense of responsibility and autonomy, students gain upon completion of the programme; ➤ Programme learning outcomes assessment cycle consists of defining, collecting and analysing data; ➤ Programme learning outcomes assessment results are utilized for the improvement of the programme.
Descriptive summary and analysis of compliance with standard requirements <p>The development of this program takes advantage of the existing PhD program in Exact, Natural Sciences and Computer Science. This study program under revision/accreditation is its successor for students from Mathematics only.</p> <p>The learning outcomes (PhD defense) are periodically evaluated and the final doctoral thesis is assessed by more than one evaluator. During the studies, oral and written exams, as well as presentations, continuously conduct the students to their final goal. The Advisory Board takes care about the individual study progress and makes advice for further improvements. Nevertheless, the program description provides sufficiently freedom to conduct individual research and to create new knowledge. Individual necessities can be addressed due to the individual supervision and the work in small working groups.</p> <p>The program learning outcomes are described coherently. Knowledge, skills and competences are adequately addressed in the program. The expert panel come to the conclusion that the program learning outcomes are consistent with the usual standard of a PhD degree in Mathematics and corresponding employment demands on the (academical) labor market.</p>
Evidences/indicators <p>The assessment of the Expert Panel is based on the program description, the SER and the interviews.</p>

Recommendations:
Suggestions for programme development:
Best Practices (if applicable):
In case of accredited programme, significant accomplishments and/or progress
Evaluation <input type="checkbox"/> Complies with requirements <input type="checkbox"/> Substantially complies with requirements <input type="checkbox"/> Partially complies with requirements <input type="checkbox"/> Does not comply with requirements

Programme's Compliance with Standard

Standard	Complies with Requirements	Substantially complies with requirements	Partially Complies with Requirements	Does not Comply with Requirements
Educational programme objectives, learning outcomes and their compliance with the programme	X			

2. Teaching methodology and organization, adequate evaluation of programme mastering

Programme admission preconditions, programme structure, content, teaching and learning methods, and student assessment ensure the achievement of programme objectives and intended learning outcomes.

2.1 Programme Admission Preconditions
Higher education institution has relevant, transparent, fair, public and accessible programme admission preconditions.

Descriptive summary and analysis of compliance with standard requirements

The preconditions of admission are given in the description of the program. These include:

- a master degree in Mathematics (or equivalent),
- English level B2,
- a written research concept
- and an individual interview with the potential supervisor.

Possible research topics are previously described by the supervisors and approved by the Academic Board of the institute, so that the necessary scientific competence and its relevance is ensured. These topics are advertised via the web-page of the HEI and the Institute of Mathematics. The English language is necessary (although the program is in Georgian language), because most parts of the publications are only available in English. The B2 level is considered to be sufficient. A submission of a written research proposal is also necessary in order to check the compatibility with the advertised research topics. Candidates are invited to contact the supervisors and the head of the program prior to application.

All admission preconditions are considered to be sufficient to ensure that admitted students have relevant knowledge, skills and values for this PhD program.

The information on the admission is transparent and public available.

Evidences/indicators

The assessment of the Expert Panel is based on the program description, the official admission preconditions and the interviews.

Recommendations:**Suggestions for programme development:****Best Practices (if applicable):****In case of accredited programme, significant accomplishments and/or progress****Evaluation**

o Please mark the checkbox which mostly describes your position related to the programmes compliance with this specific component of the standard

- Complies with requirements**
- Substantially complies with requirements
- Partially complies with requirements
- Does not comply with requirements

2.2 Educational Programme Structure and Content

Programme is designed according to HEI's methodology for planning, designing and developing of educational programmes. Programme content takes programme admission preconditions and programme learning outcomes into account. Programme structure is consistent and logical. Programme content and structure ensure the achievement of programme learning outcomes. Qualification to be granted is consistent with programme content and learning outcomes.

Descriptive summary and analysis of compliance with standard requirements

The educational program contains some general (non-mathematical) courses and reading courses with content from Pure Mathematics with a total workload of 60 ECTS. The remaining 120 ECTS are reserved for the individual research. This balance is considered to be adequate for a PhD program in Mathematics.

The non-mathematical courses have a workload of 20 ECTS and comprise overarching topics which are relevant for most of the PhD students of the HEI regardless of their research field. The mathematical topics contain compulsory courses (20 ECTS) and two elective courses (20 ECTS) out of a small catalogue of different subjects (6 alternatives). The elective courses should be selected according to the individual PhD project.

During the interview with a stakeholder it was confirmed that graduates in Mathematics have good perspectives on the labor market due to their ability to analyze and solve (mathematical and non-mathematical) problems. Moreover, certain mathematical knowledge is highly wanted in several economical branches, as e.g. in finance, insurance, telecommunication, and consultant. PhD projects in this program can potentially address these methods. This is of great benefit for the graduates. However, the PhD program does not yet ensure that this knowledge is encouraged in each single PhD thesis although the flexibility of the reading courses gives the possibilities to do so. Taking further into account that the academical labor market in Georgia is not very huge and in order to improve the possibilities of graduates in Mathematics (in competition to those with business degrees), we see room for improvement. Small modifications of the curriculum in this PhD program would allow to include lectures on topics from Numerical Mathematics, Statistics, Stochastics or Financial Mathematics.

Evidences/indicators

The assessment of the Expert Panel is based on the side visit, the educational program, syllabi and the interviews.

Recommendations:

In order to improve the expertise of the graduates for the labor market, the panel recommends to modify the curriculum so that typical content from Applied Mathematics (compulsory or optional) becomes included as well. Such courses can comprise methods in statistics, financial mathematics, numerical mathematics or programming. A suitable work load for such lectures / courses is about 10 ECTS. However, the upper limit of 60 ECTS for the entire curriculum should not be passed in order to leave enough time (120 ECTS) for the original research of the PhD students.

Suggestions for programme development:
Best Practices (if applicable):
In case of accredited programme, significant accomplishments and/or progress
Evaluation <ul style="list-style-type: none"> <input type="checkbox"/> Complies with requirements <input type="checkbox"/> Substantially complies with requirements <input type="checkbox"/> Partially complies with requirements <input type="checkbox"/> Does not comply with requirements

2.3 Course
<ul style="list-style-type: none"> ➤ Student learning outcomes of each compulsory course are in line with programme learning outcomes; Moreover, each course content and number of credits correspond to course learning outcomes; ➤ Teaching materials listed in syllabi are based on the core achievements in the field and ensure the achievement of intended programme learning outcomes.
Descriptive summary and analysis of compliance with standard requirements <p>The non-mathematical courses of this PhD program are helpful for obtaining general key competences in academia, as teaching, management of research project, and translation of text. This may support the students in certain soft-skills relevant for the academic career. The course on “Management of Research Project” is counted for 10 ECTS which is relatively high. A work-load reduction of this particular course would give room for more specific mathematical courses relevant for the academical and the non-academical labor market which are not yet established within this program (see Suggestion no. 2 below).</p> <p>The mathematical courses in this PhD program are designed in such a way that they directly support the progress of the students towards their individual research project. Due to the small number of students (currently only 2 enrollments), these courses are of the format ‘Reading Course’. This can be considered to be appropriate. The content of the courses is mainly on graduate level, although this is not always reflected in the particular title of the course (e.g., ‘Algebra and Topology’ is very general and the title does not tell anything about the academic level). However, the expert panel considers the content of the mathematical courses to be sufficiently demanding for the PhD students.</p>
Evidences/indicators <p>The assessment of the Expert Panel is based on the side visit, the syllabi, the educational program and the interviews.</p>

Recommendations:
<p>Suggestions for programme development:</p> <p>1.) It should be checked whether the name of the course on “Gunther Differential Operators” should be generalized to something like “Differential Operators on Manifolds”, since this wording is more commonly used in the mathematical community (and the general academical community, as well). This would perhaps help to assess the high academical level of the curriculum. The names of the other courses should be chosen more specific to make the level of mathematical content more transparent, e.g. Algebra and Topology.</p> <p>2.) In view of the Recommendation in §2.2 (additional courses in Applied Mathematics), it should be checked if the course on “Management of Research Projects” with 10 ECTS can be reduced to 5 ECTS. This would give room for the additional course recommended in §2.2 in the area of Applied Mathematics.</p>
Best Practices (if applicable):
In case of accredited programme, significant accomplishments and/or progress
<p>Evaluation</p> <p>o Please mark the checkbox which mostly describes your position related to the programmes compliance with this specific component of the standard</p> <p><input type="checkbox"/> Complies with requirements</p> <p><input type="checkbox"/> Substantially complies with requirements</p> <p><input type="checkbox"/> Partially complies with requirements</p> <p><input type="checkbox"/> Does not comply with requirements</p>

2.4 The Development of practical, scientific/research/creative/performance and transferable skills
Programme ensures the development of students’ practical, scientific/research/creative/performance and transferable skills and/or their involvement in research projects, in accordance with the programme learning outcomes.
<p>Descriptive summary and analysis of compliance with standard requirements</p> <p>The content of the program is clearly designed to teach and educate the academical background and the relevant skills for future young mathematical academics. Beyond this, the program provides some non-mathematical courses to train transferable skills, as for instance academical writing and translation of text. Due to the condition to produce at least two publications in international journals, the graduates are trained towards the most important scientific merit. The students have a close contact to the supervisors and are involved in relevant mathematical research projects</p>

<p>corresponding to the level of education. Since the working groups and the number of PhD students are very small, the mutual exchange of research topics may become limited to a relatively small number of persons (mainly with the supervisor). Therefore, the institute should foster the recruitment of more PhD students (see Suggestion in §3.3), and the continuous endeavor of raise research grants should be maintained.</p>
<p>Evidences/indicators The assessment of the Expert Panel is based on the side visit, scientific papers published by the students, the SER and the interviews.</p>
<p>Recommendations:</p>
<p>Suggestions for programme development:</p>
<p>Best Practices (if applicable):</p>
<p>In case of accredited programme, significant accomplishments and/or progress</p>
<p>Evaluation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Complies with requirements <input type="checkbox"/> Substantially complies with requirements <input type="checkbox"/> Partially complies with requirements <input type="checkbox"/> Does not comply with requirements

<p>2.5 Teaching and learning methods</p>
<p>Program is implemented using student centered teaching and learning (SCL) methods. Teaching and learning methods correspond to the level of education, course content, student learning outcomes and ensure their achievement.</p>

Descriptive summary and analysis of compliance with standard requirements

The mathematical lectures are mainly given in form of Reading Courses due to the small number of students. This form of learning usually requires a tight communication between students and lecturers to get optimal learning progress. In this mathematical department, the precondition for this is indeed given due to the engagement of the staff and the strong will of the supervisors to conduct the PhD thesis to a successful completion. Moreover, this form of learning is appropriate for PhD students and it supports the scientific autonomy of the students to do research. The content of all mathematical courses within this program can be considered to be appropriate for students at this level of education.

The non-mathematical courses are given in larger groups and follow the more standard form of lectures. Moreover, the learning in courses is complemented by the preparation of reports, internal mathematical discussions, attending guest lectures, attending and giving seminars, and by writing academical papers. Hence, a large variety of learning methods are provided.

To conclude, the learning methods of this study program is comparable with the international standard of PhD projects.

Foreign students (from different countries) with their special needs for attendance and support are not yet present in this particular PhD program, because it is designed in Georgian language only. In the interviews, the students and alumni expressed their contentment with the lectures and their thematic content.

Evidences/indicators

The assessment of the Expert Panel is based on the provided information on teaching and learning methods, the SER and the interviews.

Recommendations:**Suggestions for programme development:****Best Practices (if applicable):****In case of accredited programme, significant accomplishments and/or progress****Evaluation**

- Complies with requirements**
- Substantially complies with requirements
- Partially complies with requirements
- Does not comply with requirements

2.6. Student Evaluation

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

Descriptive summary and analysis of compliance with standard requirements

The result of the courses during the first and second year (60 ECTS) are not relevant for the final grade; they only have to be passed. This procedure is compatible with the national law and is comparable to the usual international standard. The performance of students is evaluated on basis of the written thesis and the defense (presentation and discussion of questions). The weighting of these components are not determined and no grading scheme is available. There is a risk that the final grade is determined by an offhand assessment of the achievements of the student rather than by a transparent and balanced approved procedure.

Evidences/indicators

The assessment of the Expert Panel is based on the defence regulations, SER and the interviews.

Recommendations:

The HEI should set up a transparent grading scheme for the assessment of the final grade. In particular, a weighting of the individual grades of the dissertation and of the defense (presentation, discussion) should be set up in order to have a fair and effective assessment of grading.

Suggestions for programme development:

Best Practices (if applicable):

In case of accredited programme, significant accomplishments and/or progress

Evaluation

- Complies with requirements
- Substantially complies with requirements**
- Partially complies with requirements
- Does not comply with requirements

Programme's Compliance with Standard

Standard	Complies with Requirements	Substantially complies with requirements	Partially Complies with Requirements	Does not Comply with Requirements

Teaching methodology and organization, adequate evaluation of programme mastering		X		
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3. Student achievements and individual work with them

HEI creates student-centered environment by providing students with relevant services; programme staff ensures students' familiarity with the named services, organizes various events and fosters students' involvement in local and/or international projects.

3.1. Student support services
Students receive appropriate consultations and support regarding the planning of learning process, improvement of academic achievement, employment and professional development.
<p>Descriptive summary and analysis of compliance with standard requirements</p> <p>This program consists mainly of the individual PhD topic which gives enough time to consult and support the students in the advancement of their thesis. The supervisors have enough labor time to support the PhD students. Moreover, the Advisory Board of this program analyzes the progress of the students twice a year and give individual feedback for further development. This support of the PhD students is important to conduct the students in a proper way towards the completion of their thesis.</p> <p>An university-wide introduced information system (Online UG) is a modern instrument for administrative support.</p> <p>PhD students have to pay an annual subscription fee of GEL 3000. However, there is the possibility to get a financial reduction / reimbursement for individual expenses related to their research (as e.g. subscription fees, publication costs) of GEL 1000 per year.</p> <p>The financial status of the PhD students is further supported by offering employment at the University to interested students in terms of conducting exercises, lectures and seminars. The employment in research projects are possible upon availability.</p>
<p>Evidences/indicators,</p> <p>The assessment of the Expert Panel is based on the SER and the interviews.</p>
<p>Recommendations:</p>
<p>Suggestions for programme development:</p>

Best Practices (if applicable):
In case of accredited programme, significant accomplishments and/or progress
Evaluation <ul style="list-style-type: none"> <input type="checkbox"/> Complies with requirements <input type="checkbox"/> Substantially complies with requirements <input type="checkbox"/> Partially complies with requirements <input type="checkbox"/> Does not comply with requirements

3.2. Master's and Doctoral Student supervision
Master's and Doctoral students have qualified thesis supervisors.
Descriptive summary and analysis of compliance with standard requirements <p>In this study program an intense supervision is given due to the extremely good supervision-student ratio. The current PhD students are strongly supported by their supervisors. In particular, the supervisors are very keen in looking for temporary visits of the students abroad. This is a very important aspect of the studies and help the students to widen their academic view and build networks for their later career. Since the research topics are previously approved by the Academic Board of the School and since the PhD candidates must submit a written research concept prior to admission, a valuable preparation of the candidates and of the supervisors for the PhD project is ensured.</p> <p>The program does not require a formal co-supervisor with the necessary scientific expertise in the particular research field. However, the existing PhD projects benefit from a close collaboration with experts and colleagues inside or outside the HEI. A formal assignment of a co-supervisor which is also responsible for the progress of the dissertation and for scientific consultation would be strategically beneficial.</p> <p>This is even more important, because in the institute of the HEI, mutual exchange within PhD students are very limited due to the extreme small number of PhD students. This is a risk, because scientific progress benefits from discussion, debates, and exchange with expert and young scientists. Therefore, the staff members should foster the recruitment of students in order to increase the number of PhD students.</p>
Evidences/indicators <p>The assessment of the Expert Panel is based on the SER and the interviews.</p>
Recommendations:

Suggestions for programme development:

1. Staff members should foster the recruitment of students in order to increase the number of enrolled PhD students. The academic staff may broaden the present spectrum of PhD topics to more applied topics. In this context, collaboration with other departments (inside or outside this HEI) may be beneficial

- to amplify and identify possible new mathematical questions and topics
- to recruit talented students from related disciplines (physics, engineering etc.) with relevant mathematical background for appropriate projects.

Joint interdisciplinary PhD projects may also be a possibility to intensify exchange of ideas between PhD students and widen their spectrum of knowledge.

2. A formal assignment of a co-supervisor inside or outside the HEI with the necessary expertise in the particular research field should be implemented on a regular basis.

Best Practices (if applicable):**In case of accredited programme, significant accomplishments and/or progress****Evaluation**

- Complies with requirements**
- Substantially complies with requirements
- Partially complies with requirements
- Does not comply with requirements

Programme's Compliance with Standard

Standard	Complies with Requirements	Substantially complies with requirements	Partially Complies with Requirements	Does not Comply with Requirements
Student achievements and individual work with them	X			

4. Providing teaching resources

Programme human, material, information and financial resources ensure programme sustainability, its effective and efficient functioning, and achievement of intended objectives.

1. Human Resources

- Programme staff consists of qualified people who have necessary competences in order to help students achieve 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. Balance between academic and invited staff ensures programme sustainability;
- The Head of the Programme possesses necessary knowledge and experience required for programme elaboration. He/she is personally involved in programme implementation;
- Programme students are provided with an adequate number of administrative and support staff of appropriate competence.

Descriptive summary and analysis of compliance with standard requirements

The PhD program is conducted by an experienced Mathematician with international reputation. He is supported by several colleagues and experts from traditional pure mathematics. The accreditation panel has no doubt that the staff has the sufficient scientific potential to identify relevant research (PhD) projects, supervise their progress, and conduct them to a successful conclusion. The supervisors has international collaborations and use them for the progress of the PhD projects whenever valuable. The contact and communication between students and supervisors occur on a daily basis and can be considered as very intense. In parts, the PhD students and the corresponding supervisor even share the same office which has obvious advantages but also disadvantages. However, these facts exhibit a respectful and confiding atmosphere. The program leader is a senior researcher with decades of experience in many scientific projects. He is an international acknowledged scientist, is personally strongly involved in the program implementation, and he is also very active in relevant mathematical associations (e.g., as the president of the Georgian Mathematical Union). It is clear that the students may benefit scientifically but also personally from such experienced supervisors.

The workload of the staff does not harm the execution of this study program. The department also has regular scientific guest seminars which are beneficial (and necessary) for the scientific progress of the students. Moreover, the support of the students by the non-scientific personal can be considered as sufficient.

The panel sees the possibility for improving the scope of future PhD students towards methodological skills relevant for the non-academical labor market: The prospective inclusion of researchers with scientific background in applied mathematics (numerics, statistics, stochastics or financial mathematics) would increase the attractiveness of the study program even more.

<p>Evidences/indicators</p> <p>The assessment of the Expert Panel is based on the publication record of the supervisors, their CVs, the SER and the interviews.</p>
<p>Recommendations:</p>
<p>Suggestions for programme development:</p> <p>Prospective inclusion of personnel with scientific background in applied mathematics (numerics, statistics, stochastics or financial mathematics) would increase the attractiveness of the study program even more.</p>
<p>Best Practices (if applicable):</p>
<p>In case of accredited programme, significant accomplishments and/or progress</p>
<p>Evaluation</p> <p><input type="checkbox"/> Complies with requirements</p> <p><input type="checkbox"/> Substantially complies with requirements</p> <p><input type="checkbox"/> Partially complies with requirements</p> <p><input type="checkbox"/> Does not comply with requirements</p>

<p>4.2 Professional development of academic, scientific and invited staff</p>
<ul style="list-style-type: none"> ➤ HEI conducts the evaluation of programme academic, scientific and invited staff and analysis evaluation results on a regular basis; ➤ HEI fosters professional development of the academic, scientific and invited staff. Moreover, it fosters their scientific and research work.
<p>Descriptive summary and analysis of compliance with standard requirements</p> <p>The evaluation of educational courses are usually conducted by the HEI on a regular basis (each semester). However, in the presence, the mathematical lectures of this program have the form of ‘ Reading Courses’ due to the small amount of PhD students. Therefore, an evaluation is not really applicable (and not necessary). Those lectures for a wider auditorium (e.g., <i>Teaching Modern Strategies of Evaluation in Higher Education, References and translation of text</i>) are evaluated on a regular basis via the electronic platform “My-UG” as mentioned above.</p> <p>The HEI encourages scientific activities by providing the necessary scientific infrastructure and by giving financial incentives for scientific publications. The attendance of the academic personal at scientific conferences and workshops is supported and financed by the institute. Participation in international research projects are encouraged by the HEI and is implemented by the academic staff according to their possibilities.</p>

<p>Evidences/indicators</p> <p>The assessment is based on the SER and the interviews with the academic staff.</p>
<p>Recommendations:</p>
<p>Suggestions for programme development:</p>
<p>Best Practices (if applicable):</p>
<p>In case of accredited programme, significant accomplishments and/or progress</p>
<p>Evaluation</p> <p><input type="checkbox"/> Complies with requirements</p> <p><input type="checkbox"/> Substantially complies with requirements</p> <p><input type="checkbox"/> Partially complies with requirements</p> <p><input type="checkbox"/> Does not comply with requirements</p>

<p>4.3. Material Resources</p>
<p>Programme is provided by necessary infrastructure and technical equipment required for achieving programme learning outcomes.</p>
<p>Descriptive summary and analysis of compliance with standard requirements</p> <p>The program provides office space (in limited quantity) for the PhD students, access to many electronic journals (although not for all relevant journals such as SIAM) free of charge, and computer facilities. The university provides well-equipped auditoriums for groups of different sizes. The office space for PhD students are at immediate vicinity of the supervisor’s offices. However, the mathematical book catalogue of the library is still in his infancy. In particular, text books beyond the Bachelor level are missing. This is partially compensated by some electronic text books. Hence, the necessary infrastructure for this PhD program is available, but an augmentation of books in the library would be highly appreciated for new generations of PhD students. The current PhD projects do not rely on particular scientific software. To which extend this will be necessary in the future when projects of more applied character are in progress, must be observed. Currently there is no need for action to this regard.</p> <p>In summary, the infrastructure of the Mathematical Department of the University of Georgia can be considered as very good in comparison to the national standard.</p>
<p>Evidences/indicators</p>

The assessment of the Expert Panel is based on the site visit to the library, computer pools, offices and lecture rooms. The interviews with the staff indicated that there is a partial contentment with the access to literature.

Recommendations:

The library should augment the number of relevant mathematical textbooks with scientific content beyond Bachelor level. The focus of those new books should be oriented to the PhD lectures and the PhD topics in this PhD program.

Suggestions for programme development:

Best Practices (if applicable):

In case of accredited programme, significant accomplishments and/or progress

Evaluation

- Complies with requirements
- Substantially complies with requirements**
- Partially complies with requirements
- Does not comply with requirements

4.4. Programme/faculty/school budget and programme financial sustainability

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

Descriptive summary and analysis of compliance with standard requirements

It seems that the HEI has enough financial resources to offer a highly attractive PhD program to the potential candidates. The faculty members are very keen in offering temporary exchange possibilities to the students. This is a very important aspect of the studies and helps the students to widen their academic horizon and build networks for their later career. Since the PhD program is still very small, there is no financial risk for the HEI in the near future to carry this program onward. Furthermore, the HEI is aware of the fact that PhD programs are important for the national and international visibility, and hence they are crucial for the attractiveness of the Bachelor and Master study programs of the HEI, and also for the attractiveness for the academic personnel.

Evidences/indicators

The assessment of the Expert Panel is based on the interviews and the SER.

Recommendations:
Suggestions for programme development:
Best Practices (if applicable):
In case of accredited programme, significant accomplishments and/or progress
Evaluation <ul style="list-style-type: none"> <input type="checkbox"/> Complies with requirements <input type="checkbox"/> Substantially complies with requirements <input type="checkbox"/> Partially complies with requirements <input type="checkbox"/> Does not comply with requirements

Programme's Compliance with Standard

Standard	Complies with Requirement s	Substantially complies with requirements	Partially Complies with Requirements	Does not Comply with Requirements
Providing teaching resources	X			

5. Teaching quality enhancement opportunities

In order to enhance teaching quality, programme utilizes 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 on a regular basis.

1. Internal quality
Programme staff collaborates with internal quality assurance service(s) available at the higher education institution when planning the process of programme quality assurance, creating assessment instruments, and analysing assessment results. Programme staff utilizes quality assurance results for programme improvement.

Descriptive summary and analysis of compliance with standard requirements

A quality assurance system for PhD programs is hard to implement, because the major part of this formation consists of doing own original research. The accompanying learning modules in this study program are a minor part (60 ECTS) and most of them are 'Reading Courses'. However, the HEI provides its own Quality Assurance Service which carries out continuous evaluation procedures of the lectures. The analysis is based on the students evaluations, comparisons with the achievements of the program outcomes, and the conclusions of mentors of the educational courses. Surveys of student satisfaction are conducted on regular basis (each semester).

The expert panel is confident that this service has the experience and the capacity to control the teaching quality and to comply the standard.

Evidences/indicators

The assessment of the Expert Panel is based on the interviews and the SER.

Recommendations:**Suggestions for programme development:****Best Practices (if applicable):****In case of accredited programme, significant accomplishments and/or progress****Evaluation**

- Complies with requirements**
- Substantially complies with requirements
- Partially complies with requirements
- Does not comply with requirements

2. External quality

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

Descriptive summary and analysis of compliance with standard requirements

According to the SER, the institute evaluates the graduate employment index periodically. However, due to the low number of students, statistical evaluations are not necessarily representative. Further, the institute makes comparative analysis with similar programs with the purpose of continuous improvement of the program. Moreover, the institute maintains the contact to alumni and stakeholders in economy for further development of the program.

However, the external quality assurance is mainly addressed by the obligation to accomplish the thesis by publishing at least two papers (or accepted for publication) in international journals in Scopus or Thomas Reuters reference journals. This international quality control is highly appreciated by the expert panel because it ensures the international standard and it helps the students to distribute their achievements in the scientific community. This is definitely a strength of this program.

Evidences/indicators

The assessment of the Expert Panel is based on the interviews and the SER.

Recommendations:

Suggestions for programme development:

Best Practices (if applicable):

In case of accredited programme, significant accomplishments and/or progress

Evaluation

- Complies with requirements**
- Substantially complies with requirements
- Partially complies with requirements
- Does not comply with requirements

5.3. Programme monitoring and periodic review

Programme monitoring and periodic review is conducted with the involvement of academic, scientific, invited, administrative staff, students, graduates, employers and other stakeholders through systematically collecting and analysing information. Assessment results are utilized for programme improvement.

<p>Descriptive summary and analysis of compliance with standard requirements</p> <p>The HEI provides quality evaluation instructions which are also used in this program. The evaluations are conducted regularly. On this basis, satisfaction surveys of students, academic staff, potential employers and graduates are analyzed and can be used for further development of this study program. The online platform “My-UG” are usable for the students to express their experiences, opinions and report on problems about the courses. The academic and administrative staff is integrated in this evaluation and analysis. The program itself is flexible enough to make modifications and improvements in order to maintain the state of the art.</p>
<p>Evidences/indicators</p> <p>The assessment of the Expert Panel is based on the interviews and the SER.</p>
<p>Recommendations:</p>
<p>Suggestions for programme development:</p>
<p>Best Practices (if applicable):</p>
<p>In case of accredited programme, significant accomplishments and/or progress</p>
<p>Evaluation</p> <p><input type="checkbox"/> Complies with requirements</p> <p><input type="checkbox"/> Substantially complies with requirements</p> <p><input type="checkbox"/> Partially complies with requirements</p> <p><input type="checkbox"/> Does not comply with requirements</p>

Programme’s Compliance with Standard

Standard	Complies with Requirements	Substantially complies with requirements	Partially Complies with Requirements	Does not Comply with Requirements
Teaching quality enhancement opportunities	X			

Enclosed Documentation (If Applicable)

HEI's Name: The University of Georgia

Higher Education Programme Name: PhD Mathematics

Number of Pages of the Report: 27

Programme's Compliance with the Standard

Standard	Complies with Requirements	Substantially complies with requirements	Partially Complies with Requirements	Does not Comply Requirements
1. Programme objectives are clearly defined and achievable; they are consistent with the mission of the HEI and take into consideration labour market demands	X			
2. Teaching methodology and organization, adequate evaluation of programme mastering		X		
3. Student achievements and individual work with them	X			
4. Providing teaching resources	X			
5. Teaching quality enhancement opportunities	X			

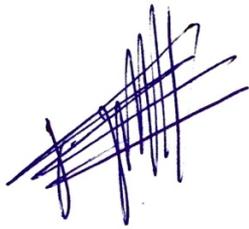
Expert Panel Chair's

Malte Braack (signature)

A handwritten signature in blue ink that reads "M. Braack". The signature is written in a cursive style with a large initial "M" and a long horizontal stroke.

Expert Panel Members'

George Giorbiani (signature)

A handwritten signature in blue ink consisting of several overlapping, slanted lines that form a dense, scribbled pattern.

Ani Bilanishvili (signature)

A handwritten signature in blue ink that reads "A. Bilanishvili". The signature is written in a cursive style with a large initial "A" and a long horizontal stroke that loops back under the name.