



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

**ŠIAULIŲ UNIVERSITETO  
PROGRAMOS *MATEMATIKA* (621G10006)  
VERTINIMO IŠVADOS**

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**EVALUATION REPORT  
OF *MATHEMATICS* (621G10006)  
STUDY PROGRAMME  
AT SIAULIAI UNIVERSITY**

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## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	Matematika
Valstybinis kodas	621G10006
Studijų sritis	Fiziniai mokslai
Studijų kryptis	Matematika
Studijų programos rūšis	Universitetinės
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2)
Studijų programos apimtis kreditais	120 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Matematikos magistras
Studijų programos įregistravimo data	2001-08-02

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## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	Mathematics
State code	621G10006
Study area	Physical sciences
Study field	Mathematics
Kind of the study programme	University studies
Study Cycle	Second
Study mode (length in years)	Full-time (2)
Volume of the study programme in credits	120 ECTS
Degree and (or) professional qualifications awarded	Master of Mathematics
Date of registration of the study programme	2001-08-02

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## I. INTRODUCTION

This report summarizes the observations of the expert team (Team) based on the analysis of documents prepared by the self-assessment group consisting of seven experts of ŠIAULIAI UNIVERSITY (SU) and the information obtained from the interviews during the visit at the SU on October 11, 2012.

### Schedule for the visit:

The members of the Team acquainted themselves with and assessed the documentation and annexes provided by the Lithuanian Centre for Quality Assessment in Higher Education (CQAHE) in Vilnius.

On October 08, 2012, an introductory meeting at CQAHE was arranged and the following topics were presented:

1. Brief overview of CQAHE
2. Higher Education Evaluation System in Lithuania
3. Study Programmes Evaluation and Accreditation
4. Methodological Guidelines. Visits. Final Reports

The following schedule for the visit at SU has been prepared and executed:

Tuesday, October 11, 2012	
09.00 – 09.30	Meeting with administration staff
09.30 – 10.30	Meeting with staff responsible for the preparation of the Self-Assessment Report (SAR)
10.30 – 10.45	<i>Coffee break</i>
10.45 – 11.30	Meeting teaching staff
11.30 – 12.15	Meeting with students
12.15 - 13.15	<i>Lunch</i>
13.15 – 14.00	Visiting auditoriums, libraries, other facilities (studios, teaching spaces, computer services etc.)
14.00 – 15.00	Review of students' course and final papers (thesis)
15.00 – 15.30	Meeting with alumni
15.30 – 16.00	Meeting with employers and social partners
16.00 – 16.30	Experts private discussion and finalization of the visit
16.30 – 16.50	Introduction of general remarks of the visit to Šiauliai University community

The Team would like to thank the authorities of SU for their friendly welcome and hospitality. We also want to express our appreciation to the various representatives of SU who actively participated in the meetings and considerably contributed by their open discussions to a good overview of the institution.

Last but not least we want to thank Mrs. Agnė Tamošiūnaite from CQAHE for her friendly way of maintaining contact with us, for preparing the visit so well and assisting us during our stay in Lithuania.

## **II. PROGRAMME ANALYSIS**

**Šiauliai University (SU)** was founded in 1997 by a merger of the **Šiauliai Pedagogical Institute** and the **Šiauliai Polytechnical Faculty** of the Kaunas University of Technology. The latter had been a branch of the former Kaunas Polytechnical Institute branch since 1959. SU is a public institution of great importance in the north of Lithuania and has a decisive social impact on the region.

The University has eight faculties: education, natural sciences, humanities, mathematics and informatics, arts, social sciences, social welfare and disability studies, and technology. There are Continuing Studies Institute, 2 research centers (Center of Gender Studies and Scientific Center of Public Health), 10 scientific centers at the faculties and 1 Institute, Distant Studies Center, Career Center, Library and other non-academic subdivisions.

The Master Study Programme „Mathematics“ is organized by the Faculty of Mathematics and Informatics. There are two departments in the Faculty, the Department of Mathematics and the Department of Informatics.

### **1. Programme aims and learning outcomes**

The framework for qualification for the European Higher Education Area (EHEA) defines learning outcomes as statements of what a learner is expected to know, understand and/or be able to do at the end of the period of learning.

The SU master programme Mathematics has clearly defined its mission in the Lithuanian economy and society. It is designed for the preparation of specialists who can successfully work in technology, business and social areas or systems. According to several recent studies well educated mathematicians, statisticians, and engineers with a good education in mathematics will be the most sought after specialists in coming years in highly industrialised countries.

According to the formulated learning outcomes of the programme Mathematics the graduates are supposed to possess knowledge in modern mathematics based on the results of research; are able to apply that knowledge in solving non-standard problems; know how to analyze, systematize and assess the research data necessary for studies, scientific and professional activity; integrate knowledge and manage sophisticated situations; be capable of presenting their conclusions to others; work within teams; and possess the skills and creativity necessary for doctoral studies.

The name of the Programme, its learning outcomes, content, and the qualifications offered are compatible with each other.

The methods of instruction in the Programme are rather exceptional. As some students and teachers do not come from Šiauliai the teaching is blocked and divided into three separate weeks of attendance each semester. During these weeks the subjects are taught in a very compact form requiring enormous commitment from students and teachers. In the interim periods between these weeks of attendance students meet each other on individual basis and consult teachers by email and other communication media.

Master degree programmes should include students in research activities. It was not visible to the Team how this was realized within the difficult organizational framework of this career.

The Team had no time to check in detail the quality and level of examinations. The Team was shown some examination questions but not the student answer sheets. The questions were rather easy, the level of difficulty in some cases not sufficient to check whether the learning outcomes are achieved. The success of students studying under the difficult circumstances of this Programme and the learning outcomes have to be monitored carefully.

## **2. Curriculum design**

The programme Mathematics is on the master's level. The standard period of instruction for this programme is two years. The workload amounts to 120 ECTS credits. This is compliant with the Bologna declaration and Lithuanian legal requirements.

The Programme is well designed. Each subject attracts 6 ECTS, the Research Work in Science 18 ECTS, and the Final Master's Degree Work 30 ECTS. The content of each educational component corresponds to the intended learning outcomes of that component. Size and content of all educational components are appropriate. The curriculum design meets the legal requirements.

The Team found that the subjects of the programme cover the learning outcomes and content that is required to educate a master in mathematics. However, graduates of mathematics often have to model processes and to apply methods of discrete mathematics, working with algebraic structures such as semigroups, groups and fields. This part of mathematics is not represented adequately in the curriculum and so there is an imbalance between applied analysis and applied algebra. The Team stresses that a certain knowledge of abstract algebraic structures, as well as basic knowledge of algorithms' time-complexity are essential to several applications of mathematics. The Faculty should consider providing for those missing elements by introducing appropriate educational components into the master programme. This will increase the

attractiveness of graduates to the regional business entities and municipal institutions, and thus widen employability of graduates. The introduction of those elements may be accomplished by reducing the volume of other subjects.

Some course headings and descriptions seem to be misleading and present a more demanding content than what is actually delivered. The curriculum is very broad for a master programme on one side and is lacking important subjects of applied mathematics on the other side. Nevertheless, the level of instruction meets the requirements of a modern, internationally competitive education in mathematics. The content of the programme reflects in a great area of mathematics the latest achievements in science and technology.

### **3. Staff**

The qualifications of the current academic staff are sufficient for achieving the aims and learning outcomes set for the Programme and meet the legal requirements. Twelve teachers with PhD or Habilitatus PhD are teaching in the Programme. The total number of students in 2011/12 was seven: four in the first study year and three in the second. While this number is small the Team is of the opinion that this is balanced by the fact that the programme gives an opportunity to gifted and ambitious students in the Šiauliai region, many busy with work and family obligations, to obtain a masters degree with what amounts to individual treatment from a dedicated and highly motivated staff.

### **4. Facilities and learning resources**

The number of students in the programme is small, and formal attendance at lectures is restricted to only three weeks per semester. Thus the demands on physical facilities are not at all onerous. The university provides rooms and space that are certainly adequate, in size and quality, for studies and research. The teachers are available in their offices for student consultations, and ongoing staff-student communication is guaranteed by email, skype, etc.

The Team visited the modern university library which is absolutely state-of-the-art and offers all opportunities for students and staff.

### **5. Study process and student assessment**

Students are admitted according to national regulations. Access to state financed places is competitive and has to meet minimum standards. Those not admitted to state funded places get access to the programme if they pay tuition on their own.

As has been mentioned already the academic year is organized in two semesters and the teaching is performed during three weeks of attendance each semester. Timetables are scheduled carefully. The programme is of great cultural importance for the Siauliai region. It is well respected by bright young people. The majority of the students follow PhD studies successfully after graduation. Others start immediately with work. Graduates of the Programme and stakeholders in the region (including the mayor of Šiauliai) praised the high standard of the Programme and stressed its importance for the city and region.

The fact that students in this programme have jobs makes international mobility problematic. Nevertheless there exists special support for working students on the European level. Internationalisation is an essential element of higher education development. It is a multidimensional task taking into account mobility programmes, language policy, curricula, joint study and double degree programmes, collaborative research, conference attendance etc. The Faculty should strengthen its foreign languages policy by using more English textbooks and offering lectures in English. SU and the Faculty of Mathematics and Informatics should look for equal partners for student and teacher exchanges and increase the incoming and outgoing mobility of both students and academic staff.

## **6. Programme management**

The Programme is very well monitored and the outcomes of internal and external evaluations are used for improvement. Students reported that at the end of each semester the dean arranges feedback and discusses problems and possible improvements with the students. Nevertheless the Team feels that clear and systematic procedures to improve teaching and research should be defined based on feedback from students and results of different evaluations. Mechanisms to support academic staff in their teaching (teacher training, teacher promotion) and research missions (study leaves, reduction of work load) should be developed.



### III. RECOMMENDATIONS

(The first number refers always to the corresponding section.)

2.1 The Team stresses that knowledge of discrete mathematics and algebraic structures is essential to several applications of mathematics. The Faculty should consider providing these topics in appropriate educational components and to incorporate such material into the degree programme. This would open wider fields of employability for graduates. The introduction of those elements may be accomplished by reducing the volume of other subjects. The team therefore recommends that fundamental topics such as algebraic structures should be included in the curriculum. On the other side the curriculum seems to be very broad for a master programme and should be more focused on subjects of applied mathematics.

2.2 One way of engaging students to participate actively in the process of learning is to introduce elements of project-based learning. Given the unique way this Programme is taught it is crucial to support autonomous student work and self-learning as much as possible. Creativity and practical components should be strengthened as much as possible. Full use of e-learning platforms such as Moodle is absolutely necessary. Student meetings and consultancies during the weeks of non lectures should be organised. Teachers should distribute homework and exercises to the students; each student should work on finding solutions, alone and possibly in collaboration with other students. Students should be more included into research work and clear priorities in research should be set.

3.2. Incentives should be set to give more attention to research. The possibility of study leaves and sabbaticals at universities abroad in order to exchange ideas on modern didactic methods as well as to perform research should be considered.

5.1 Realistic and reasonable course descriptions should be agreed, and examinations set at a level both to meet international standards and to guarantee the desired study outcomes.

5.2 Performance of students as well as the level and difficulty of examinations have to be carefully monitored. Examinations must correspond to the level of a master programme and guarantee the formulated learning outcomes are obtained.

6.1. Quality assessment should not be considered as a burden but as an instrument for improvement. Hence the Team suggests that clear and systematic procedures to improve teaching and research should be defined based on feedback from students and results of different evaluations. Mechanisms to support academic staff in their teaching (teacher training, teacher promotion) and research missions (study leaves, reduction of work load) should be developed.

6.2 Internationalisation is an essential element of higher education development. It is a multidimensional task taking into account mobility programmes, language policy, curricula, joint study and double degree programmes, collaborative research, conference attendance etc. The Faculty should further strengthen its foreign languages policy by using more English textbooks and offering lectures in English. SU and the Faculty of Mathematics and Informatics should look for equal partners for student and teacher exchanges and increase the incoming and outgoing mobility of both students and academic staff. There exists special support for working students on the European level.

6.3 Contacts between the University and the region (city of Šiauliai, enterprises, social partners) should be strengthened and formalised in order to embed even further the position of the University in the region.

#### **IV. SUMMARY**

The master degree programme “Mathematics” at SU meets the needs of society and the Lithuanian and European labour markets. It prepares specialists in the field of mathematics to work in many different fields of economy and industry as well as in scientific positions. Well trained mathematicians are now, and will in the future become more and more, a key element in our IT-dominated world.

The very modern library is impressive. A clear and well-designed curriculum of the programme enables students to complete the programme without delay and within the standard period of studies. There are no drop-outs. Students are highly motivated. The Programme offers the chance to attend a master’s programme beside work and family obligations especially for women in the region. However, the low number of students within the programme should be observed and measures taken in order to guarantee the sustainability of the programme. More applicable contents of mathematic could be integrated into the Programme in order to open new possibilities for the graduates and widen employability.

Notwithstanding peculiarities and some deficiencies, the programme can hopefully be improved, further developed and raised to a highly satisfactory level.

## V. GENERAL ASSESSMENT

The study programme *Mathematics* (state code – 621G10006) at Siauliai University is given positive evaluation.

*Study programme assessment in points by fields of assessment.*

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	2
2.	Curriculum design	2
3.	Staff	3
4.	Material resources	4
5.	Study process and assessment (student admission, study process student support, achievement assessment)	3
6.	Programme management (programme administration, internal quality assurance)	3
	<b>Total:</b>	<b>17</b>

\*1 (unsatisfactory) – there are essential shortcomings that must be eliminated;

2 (satisfactory) – meets the established minimum requirements, needs improvement;

3 (good) – the field develops systematically, has distinctive features;

4 (very good) – the field is exceptionally good.

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