



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Lietuvos Edukologijos universiteto  
**STUDIJŲ PROGRAMOS MATEMATIKOS IR INFORMATIKOS  
MOKYMAS** (*valstybinis kodas - 612X13047*)  
**VERTINIMO IŠVADOS**

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**EVALUATION REPORT  
OF MATHEMATICS AND INFORMATICS TEACHING**  
(*state code -612X13047*)  
**STUDY PROGRAMME**

at Lithuanian University of Educational Sciences

**Experts' team:**

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3. **Assoc. Prof. Ants Aasma,** *academic,*
4. **Mr. Marijus Mikalauskas,** *representative of social partners,*
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**Evaluation coordinator -**

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Išvados parengtos anglų kalba  
Report language – English

## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Matematikos ir informatikos mokymas</i>
Valstybinis kodas	612X13047
Studijų sritis	Socialiniai mokslai
Studijų kryptis	Pedagogy
Studijų programos rūšis	Universitetinė studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė (4)
Studijų programos apimtis kreditais	240
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Dalyko pedagogikos, Matematikos ir informatikos bakalauras, pedagogas.
Studijų programos įregistravimo data	2014-09-01

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## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Mathematics and Informatics Teaching</i>
State code	612X13047
Study area	Social sciences
Study field	Pedagogy
Type of the study programme	University Studies
Study cycle	First
Study mode (length in years)	Full-time (4)
Volume of the study programme in credits	240
Degree and (or) professional qualifications awarded	Bachelor's degree in Subject Didactics, Mathematics and Informatics
Date of registration of the study programme	2014-09-01

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The Centre for Quality Assessment in Higher Education

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## **I. INTRODUCTION**

### ***1.1. Background of the evaluation process***

The evaluation of on-going study programmes is based on the **Methodology for evaluation of Higher Education study programmes**, approved by Order No 1-01-162 of 20 December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC).

The evaluation is intended to help higher education institutions to constantly improve their study programmes and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: 1) *self-evaluation and self-evaluation report prepared by Higher Education Institution (hereafter – HEI)*; 2) *visit of the review team at the higher education institution*; 3) *production of the evaluation report by the review team and its publication*; 4) *follow-up activities*.

On the basis of external evaluation report of the study programme SKVC takes a decision to accredit study programme either for 6 years or for 3 years. If the programme evaluation is negative such a programme is not accredited.

The programme is **accredited for 6 years** if all evaluation areas are evaluated as “very good” (4 points) or “good” (3 points).

The programme is **accredited for 3 years** if none of the areas was evaluated as “unsatisfactory” (1 point) and at least one evaluation area was evaluated as “satisfactory” (2 points).

The programme is **not accredited** if at least one of evaluation areas was evaluated as "unsatisfactory" (1 point).

### ***1.2. General***

The Application documentation submitted by the HEI follows the outline recommended by the SKVC. Along with the self-evaluation report and annexes, the following additional documents have been provided by the HEI before, during and/or after the site-visit:

No.	Name of the document
1.	Statistics of enrolled students competitive grade
2.	Statistics of student numbers in current programme and previous

### ***1.3. Background of the HEI/Faculty/Study field/ Additional information***

The Mathematics and Informatics Teaching Bachelor Programme is carried out by Department of Mathematics, Informatics and Physics of the Faculty of Science and Technology at Lithuanian University of Educational Sciences. This is the first international evaluation of the

Programme. After many years of offering single-subject teacher training Bachelor, the recently developed programme is based on the new governmental principles of teacher training programmes, where students must choose two subjects. The declared aim of this two-subject Bachelor is to reduce the demand of teachers in rural areas of Lithuania.

#### **1.4. The Review Team**

The review team was completed according *Description of experts' recruitment*, approved by order No. V-41 of Acting Director of the Centre for Quality Assessment in Higher Education. The Review Visit to HEI was conducted by the team on *14 March, 2017*.

- 1. Prof. Miklós Hoffmann (team leader)**, *Full Professor, Head of institute of mathematics and Computer Science, Eszterhazy Karoly University, Hungary;*
- 2. Prof. Neda Bokan**, *Former Professor of the University of Belgrade, Serbia;*
- 3. Assoc. Prof. Ants Aasma**, *Associate Professor, Department of Mathematics and Finance , Tallinn University, Estonia;*
- 4. Mr. Marijus Mikalauskas**, *CEO of insurance company "Būsto paskolų draudimas";*
- 5. Mr. Henrikas Vaickus**, *student of Vilnius University study programme Physics of Energy.*

**Evaluation coordinator – Mr. Pranas Stankus.**

## **II. PROGRAMME ANALYSIS**

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

The Mathematics and Informatics Teaching Bachelor Programme is carried out by Department of Mathematics, Informatics and Physics of the Faculty of Science and Technology at Lithuanian University of Educational Sciences. This is the first international evaluation of the Programme. The declared programme objectives and implementation are clearly defined and fully in line with European and Lithuanian higher education recommendations and legal requirements. The objectives perfectly fit the mission, operational objectives and strategy of the Lithuanian University of Educational Sciences. From the viewpoint of Dublin descriptors (which are not mentioned in the SER), “the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues, and especially the ability to “communicate information, ideas, problems and solutions to both specialist and non-specialist audiences” are also indicated in the Programme.

The title of the Programme *Mathematics and Informatics Teaching* well reflects the goals of the Programme. The degree awarded is „Bachelor’s degree in Subject Didactics, Mathematics and Informatics” which is also in line with the aims. The Programme declares Mathematics as “major study field” while Informatics as “minor study field”, but the Programme seems to be symmetric in terms of learning outcomes as well as number of credits gained from the two fields, therefore this distinction lacks credibility. However, during the visit the distinction was explained by programme administrators, which is a formal/legal way of naming one field as a major.

The needs analysis of the Programme declares that there is a lack of well-prepared teachers in rural areas of Lithuania, which fact would serve as a justification of merging the originally separated standard teacher programmes (two different programmes for maths and informatics) to one single programme. Although the need for more highly qualified teachers in these areas of the country is probably realistic (even if not supported by statistical data in the SER), the proposed solution is not well justified. Moreover, during the meeting with students most of them expressed their wish to teach in large cities of Lithuania, which further undermines the principles. Whilst the standard way of being a teacher in Lithuania requires a scientific knowledge equals 180 or 240 ECTS of the actual field provided by disciplinary bachelor programmes, the proposed programme can contain only 90 ECTS of disciplinary courses from each field. As it is clear from the curriculum design (see below in detail, under 2.2) this serious restriction yields fundamental problems in essential parts of the curriculum, consequently the Programme cannot fully cover the declared learning outcomes. The Review Team would like to emphasize that the university and the staff members who designed this Programme are only partially responsible for this problem – it is practically impossible to provide the necessary minimum knowledge and learning outcomes in 90 ECTS, therefore the problem is more substantial and can only be solved at higher stakeholder level: this kind of merged teacher training programmes necessarily suffer from the above mentioned shortcomings, independently of the actual field (mathematics and informatics).

As it is stated in the SER, the aim of the study programme *Mathematics and Informatics Teaching* is *to train a responsible and pro-active teacher competent in mathematics and informatics education, who systematically perceives the change in mathematics, informatics and education in the contemporary global information society, is able to organise education of learners and to create new learning/teaching environments that are enriched with modern teaching/learning and information technologies.* Learning outcomes of the Programme are well presented in the SER in a structured form, and clearly assigned with courses, which is a definite asset. Beside scientific competences, further soft skills are also included in the outcomes,

although in terms of social abilities these skills are formulated in a rather science-related manner, such as “capable of using correctly mathematical language”, which is not fully adequate in a teacher training programme. Learning outcomes are subject to regular (three-year) revision, which is credible.

## **2.2. Curriculum design**

The curriculum design of the bachelor level study programme Mathematics and Informatics Teaching is in line with the Regulation of Teacher Training approved by the Minister of Education and Science (Order No.V-1742, 12 December 2012). It is 4 years in duration. Study programme scope is of 240 ECTS. The programme comprises three blocks of study subjects: pedagogy (60 ECTS), mathematics (90 ECTS) and informatics (90 ECTS).

Analysing SER, Annex 2 (course descriptors) the review team concludes there exist serious shortcomings in terms of the content of the curriculum. First of all important subjects related to school mathematics are missing or underdeveloped, e.g. geometry, development of interest in mathematics for pupils who show abilities over average including solving of more complicated and Olympiad level problems, etc. - According to “Descriptor of the study field of mathematics” section 20. *basic knowledge from various branches of the study field of mathematics are provided when teaching, for example, the following subjects: algebraic structure, theory of algorithms, differential and analytic geometry, etc.* The review team conclude having in mind the study plan that geometry is underdeveloped. The courses of history of mathematics and philosophy of mathematics, topology are not included in curriculum. The course of professional English language does not exist in spite the fact of necessity to develop mobility of students.

Second, there do not exist elective subjects, and consequently there does not exist a chance for individualization of studies. The lack of elective courses implies obstacles to develop own responsibility of students in the frame of individualization of studies. Consequently personal abilities according to “Descriptor of the study field of mathematics”, Appendix 2 are not acquired. During the meeting with teaching staff the review team learned some reasons to design curriculum in that way. The scope of 90 ECTS is insufficient to cover all fields of mathematics and to involve elective courses. Geometry content is involved in the Didactics of Mathematics subject. During the meeting with students the review team learned that lectures are prepared in geometry for practice in schools using the school textbooks and instructions given by teachers from schools where practice is conducted. The review team cannot accept this approach to teachers education in mathematics as Euclidean geometry (synthetic approach), especially

stereometry, is very important for developing of spatial abilities which play furthermore significant role in developing of problem solving skills. Isometry group, affine transformations group, Platonian bodies symmetries groups do not exist in the curriculum, despite the fact that these are excellent examples of mutual connections among various fields of mathematics. Non-Euclidean geometries subject do not exist although is very important for developing of teachers' abstract way of thinking skill and philosophy of science. On the other hand, there exist Computer Graphics and Introduction to Programming subjects with themes of various figures drawing. However, in these courses are not emphasized possibilities of drawing more complicated geometrical figures by using simpler ones as well as possibilities of using developed tools in the research of geometrical properties of some figures changing some of their elements. This is an important application of these tools in the pupils education process.

Therefore, the review team concludes that curriculum must be redesigned to achieve all learning outcomes. Moreover, to acquire a proper curriculum design of this study programme the review team recommends usage of other universities' experience with corresponding view of specific needs in education of Lithuanian citizens. After the analysis of the curriculum design it is evident, having in mind facts mentioned above that in the frame of knowledge and its application learning outcomes is not acquired a level of knowledge which can be used in extensive interdisciplinary fields of studies or professional activity ( as indicated in *Descriptor of the study field of mathematics*, Appendix 2).

Descriptions of study subjects are well designed. It involves all details (prerequisites, course learning outcomes, programme learning outcomes, teaching/learning methods, assessment methods, etc.) important for acquiring of the aim of subjects separately as well as of the study programme at all. There exist some lacks in description of certain number of subjects. They comprise goal of subjects, prerequisites, overlapping of contents, references, etc. The review team illustrates it with some examples. C++ is considered in several courses: Programming Basics, Introduction to Object-oriented Programming, Programming Methods and Algorithm Theory but there are no written prerequisites for these courses. Set theory as a theme is involved in several courses: Discrete Mathematics, Theory of Functions of a Real Variable, Elementary Mathematics from Advance Standpoint. However, according to SER, (Annex 2, p.94 ) the course Elementary Mathematics from an Advanced Standpoint comprises modern theoretical arithmetic, equations, relations, functions, etc. as the subject of "school mathematics in terms of higher mathematics" is based on three classic big "A": arithmetic, algebra and analysis. It is easy to check that "school mathematics" comprises also other mathematical fields which are also based on higher mathematics. Nevertheless, the classification of mathematics as elementary and higher is not correct, as mathematical analysis is not elementary one. Some study subjects are really



well presented (for example the goal of Algebraic Structure and Number Theory, etc) in clarifications of connection and differences between university and secondary education teaching processes of the same subjects and themes. In informatics courses are considered coordinate system and drawing of lines, rectangular, circles, polygons and other shapes, but some of these shapes are not studied before (it might be possible to make an overview of these shapes in the course Elementary Mathematics from Advance Study).

For the course Functions of Complex Variable does not exist prerequisites. Applications of software and programming tools are not involved in mathematics subjects. There exists a course Technologies for Teaching Mathematics. But, the knowledge acquired in this course is not used in mathematical subjects. The use of IT technologies in teaching process of majority of subjects now is almost imperative to overview various methods of tasks solution. In this way, students may analyze efficiency of various solving methods of some tasks and develop analytical and logical way of thinking. Moreover, these IT technologies may help students to acquire skills important for their profession in the world with enormous number of information to choose a proper one as well as to prepare themselves for education process of pupils who are very familiar with computer facilities.

Assessment criteria for minimum, average and high level achievement of students are well defined, but, not always applied as students informed the review team during the visit.

Having in mind previously mentioned facts it follows that the current study programme curriculum is not sufficient to achieve the programme learning outcomes.

The scope of the programme is insufficient to achieve the learning outcomes, despite the social partners opinion that this option offer teachers in small schools to cover both subjects: mathematics and informatics. While the major field indicated in the programme is mathematics review team found programme shortcomings related to compliance with *Descriptor of the study field of mathematics* requirements. The content of programme corresponds partially to the latest academic and technological achievements. Furthermore the design of such study programme implied to prepare specialist for rural schools, but as mentioned before almost none of the students during the visit indicated a wish to be a teacher outside a major cities in Lithuania.

### **2.3. Teaching staff**

In total there are 22 lecturers affiliated with the Program. The academic staff, working in the Program, consists of 4 professors, 9 associate professors and 9 lectures (5 with PhD). 4 lecturers (approximately 18% from teaching staff) have experience in managerial or pedagogical work in an educational establishment (no less than 10% required). The requirement that not less

than 50% of study subjects are delivered by scientists is fulfilled, since 83% of the subjects are taught by persons having a scientific degree. 76% of courses are taught by teachers, who perform research in the field of taught subject (no less than 80% required). There are a good balance between older, middle-age and young researchers (4 persons under 40 years old, 9 – between 41 and 50, 4 - between 51 and 60, and 5 – between 61 and 68 years old). The staff is stable and its changes are not big: from the implementing of this Program at 2014, 4 teachers left from the Program and new teachers have not been employed.

The study program corresponds partly to the research interests of the teaching staff. The research areas are methodology of teaching mathematics, methods of operations research, mathematical modelling, numerical analysis, differential equations, dynamic and stochastic models, neural networks, probability theory and statistics, data analysis, modelling of information systems, computer science. However, the research interests do not comprise all the fields involved in study programme, for example, LEU does not have specialists in geometry and algebra.

During the assessment period, 11 lecturers (50% from staff) participated at 34 international conferences. Moreover, 9 members of the teaching staff participated in various activities (most of them several time) to raise their teaching skills in research and development of taught disciplines. They participated in several special seminars and courses in Lithuanian and foreign universities (for example, course „Training on Peculiarities of Organization of Distant Studies“, Training Courses for Developers of Descriptions of Study Fields, seminar „Methodology of Solving Nonstandard Mathematical Problems“, seminar “Mathematical Problematic Assignments“, seminar “Possibilities of Graphic Calculator and its Application in Mathematics Lessons in 11th-12th Forms”, the international symposium “Social Pedagogics in Social Projects”, seminar „Training in Virtual Learning Environment“, „Non-traditional Methods for Weight Calibration of Sampling Plan“: methodological seminar in statistics, etc.). So LEU offer the possibilities for professional development, and most of teachers use actively these possibilities. However, some teachers should use more actively these possibilities.

Summarizing, the qualification of the current academic staff is sufficient for achieving the aims and learning outcomes set for the Program, and surely meet the legal requirements.

#### ***2.4. Facilities and learning resources***

The Faculty of Science and Technology has more than sufficient number of classrooms and laboratories for the program. Department of Mathematics, Informatics and Physics has more than 90 computerised work places for 34 students.

All teaching workplaces are equipped in appropriate level: all the premises of the faculty (classrooms, laboratories and offices) have been renovated, high-speed internet access is ensured in all the computer classes, wireless internet access is also available. Well known software packages R+, SPSS, Maple and others are used in the teaching process. Software and programming tools used in the learning process are adequate and sufficient.

The teaching/learning materials are available at the institution's library, reading rooms and subject rooms and via access to e-publications. Library of LEU has 259 workplaces, 34 from them are computerised. Library provides access to the approximately 30 e-journals and big number of freely accessible databases. Department of Mathematics, Informatics and Physics use learning of the new learning methods in the Robotic and interactive classes Eduka. Those learning methods should be highly stimulated in the schools. The teaching materials and book accessibility to the students are suitable. Moodle learning environment is used for this purpose.

The students of the study program are entitled to teaching practices with the total volume of 30 ECTS credits (20 weeks). Students conduct their teaching practice mostly in educational institutions of various kinds in Lithuania, for example, Vilnius Lyceum, Vilnius Simonas Daukantas Gymnasium, Vilnius Vytautas Magnus Gymnasium. The regulation of the practice process is in place, placement institution and a trainee are regulated by a tripartite agreement of practical training. The quality of the internship is highly evaluated by all stakeholders.

addition

### ***2.5. Study process and students' performance assessment***

The admission process is clear and transparent, because it is organised and conducted by the Association of Lithuanian higher education institution for organization of general admittance (lith. acronym LAMA BPO). General admission system ensures even conditions, confidentiality for all applicants, guarantees a correct calculation of competition score and line up of applicants to the Programme. The admission score consists of national exams' results multiplied by weight factors (0.4 for mathematics, 0.2 for information technologies or physics, 0.2 for Lithuanian language and literature and 0.2 for other study subject, which do not coincide with the first three subjects) and a motivational test (it is organised in a common national level process, which mostly guarantees competent evaluation and equity). Applicants with 0 points from motivational test are not able to study the Programme, which leads to a lower number of

admitted students. Applicants can choose the place and time of the motivation assessment and the test of motivation is standardized.

There are several informational sources, allowing finding entrance requirements for all interested students: LEU website and the website of Association of Higher Education Institutions of Lithuania to Organize and Coordinate Common Admission Procedures (LAMA BPO); therefore the admission requirements are clear and publicized. The lowest competitive score for entrance is 2. Therefore it could be increased in order to provide more gifted students for the programme, because now the average admission score is relatively low (6,24 in 2014, 5,97 in 2015 and 7,53 in 2016), if taken into consideration that up to 2 points may be collected during motivational tests. In addition, at this moment the programme do not attract the most gifted students, as the highest annual competitive scores show. Finally, less than 1/3 of applicants annually choose the programme as the first priority and the average number of admitted students annually is low (11 in 2014, 5 in 2015 and 7 in 2016), as well as number of applications annually (20 in 2014, 15 in 2015 and 15 in 2016). All in all, it is clear, that the programme has serious difficulties in students' attraction, despite the fact that some certain means are used to increase the number of admitted students (visiting schools', project Academy of Young Teachers). The drop out of students of the programme is average (about 15%). The administration noticed, that there are two main reasons of dropout: by the student's request and in case of academic failure. The first one shows that student may find himself in an inappropriate field of studies and the second one could be unsuccessful adaptation to the system of studies in the University or lack of talent. However, because of low total numbers of students (therefore, small total dropout number as well), these presumptions cannot be very statistically accurate.

The organisation of the study process mostly ensures proper implementation of the programme and achievement of the intended learning outcomes. First of all, there is a good introduction of new students to the programme and the University, which is realized through introduction week, consultations and publicized information. The distribution of time between lectures, practical exercises and individual work is adequate, the consultations of lecturers are available. Students are satisfied about this distribution, as well as organization of additional consultations.

The programme contains a well-developed practises at schools, the whole process is supervised. Students are entitled to three teaching practices with total volume of 30 ECTS. In this way, they are able to apply their knowledge in practice, as well as to get some basic experience in the education sphere. Students get aims of the practise before it and makes detail reports about their activities and notices. They are encouraged to practice in educational

institutions of various kinds in Lithuania and foreign countries. In addition, mentors' programme is launched, where all teachers, who complete it, later may take trainees for a practice. Social partners and students emphasize, that their opinion is used in the further improvement of practises. As a consequence, the quality of practices is improved.

Students' opinion and feedback is collected every semester. In addition, a wide usage of virtual learning environments is a big advantage of the programme, but the alternative ways of teaching should be developed further.

However, the scientific research is not promoted, there are almost no encouragement to take a part in deeper science activities, students find a lack of official information about it. It was stated by students during the meetings, there was little attention about it in the SER too. Preparation of articles and presentations are mentioned in the SER as only ways of scientific work for students of programme, which is clearly not enough for a full-rate research.

There are basic conditions to take part in mobility programmes for students. However, students do not feel confident in their English skills. They noticed a lack of official information about mobility possibilities. As a result, in consideration of short programme existence, there are no students' mobility in this programme.

The higher education institution ensures proper academic and social support. Social scholarships, as well as scholarships for high study achievements and other financial support are granted for students. Also, students from other cities may be provided with dormitories. Academic environment is applied for students with disabilities: the alternative forms of assessment for disabled students to ensure achievement of learning outcomes is possible. The psychological assistance as well as personality development sessions are available.

The system of assessing student achievements is clear, public and appropriate to assess the learning outcomes. It is described by internal regulations of the University. The system of cumulative evaluation and evaluation during learning process (i. e. participation in seminars) determines a more equal distribution of workload during semester. Moreover, different methods of learning and evaluation lead to a better revelation of learning outcomes. All specific requirements of study objects are announced in the beginning of a semester. The final theses in the programme have not been written yet, but there are already topics of the final theses. The topics are related to problems which are common in school system and mathematics education separately. Exams' and assignments' dates are made in agreement with students; the tasks of assessments are renew annually.

As there was mentioned in SER, there are still no graduates of the programme, since it was started only three years ago. As result, it is hard to forecast the correspondence of professional activities of graduates to the expectations of programme operators or employers.

However, the professional activities of students during practises shows, that stakeholders appreciate their knowledge and abilities.

The programme corresponds to the state economic, social and cultural and future development needs. Although there are no graduates of the programme because the programme is new, the examples of previous similar programmes indicate a high level of graduates' employment.

The traditional methods of academic honesty implementation are used: the academic honesty principles are described by regulations, students are introduced to them. Processes of complaints and appeals submission are clearly defined by internal regulations in all spheres of studies. They are considered by a competent group of commissioners. Students' opinion about their side representation is good, their noticed problems are usually solved fluently.

## ***2.6. Programme management***

The Study Program Committee (hereinafter – the Committee) is the main management and decision making body of the Program. The Committee consists of researchers, students, alumni and other stakeholders. Also the Senate, the Directorate for Academic Affairs, the Council of the Faculty and the head of the department take part in program management process. Responsibilities for decisions and monitoring are clearly allocated.

The Committee also carries out opinion surveys of students, teachers and other social stakeholders and analyses their results. Students' opinion surveys are carried out after each semester; social stakeholders are surveyed once a year (usually at the end of academic year). During questionnaire surveys students are asked to express their opinion about the quality of studies, their motivation, needs, wishes and future plans. It appears from these surveys that students are satisfied with the teaching of the study subject. However, reviewers did not find any evidence that any changes happened based on these surveys.

The students and teachers closely collaborate with social stakeholders and with the teachers working in schools, improving the programs of teaching practices and assignments of teaching practices. Social stakeholders contribute giving their recommendations regarding application of innovative study methods in studies and during the teaching practice. The teachers collaborate with schools, educational centres delivering lectures on relevant issues in education, implementing projects together with social stakeholders, conducting research and maintaining close relations with Lithuanian Association of Teachers of Mathematics and the Lithuanian Association of Teachers of Informatics. A teacher-expert of Vilnius Vytautas Magnus Gymnasium is a social partner in the Study Committee of the Study Programme. She has

contributed to preparation of the new descriptions of teaching practices, together with a group of teachers from other teaching practice placements took an active role discussing and testing new integrated assignments of pedagogical practices. Using the feedback obtained from stakeholders, graduates and other social partners, the decision has been made to supplement the learning outcomes from the perspective of the block of informatics and to more systemise, generalise them approaching from the perspective of pedagogical studies.

Although the system of program management seems to be well developed, the outcomes are not so fair: the curriculum design has essential shortages (see Section 2.2). No elective subjects, no chance for individualization of studies. Also low number of students recruited. So the Program management process is not sufficiently effective.

As this Programme is new, there has been only one external evaluation, carried out in 2014 by the group of Lithuanian experts. This evaluation contains only positive comments: the title of the Programme reflects the aim, intended learning outcomes of the Programme and the qualification granted; the Programme aims and intended learning outcomes are clearly formulated and are in line with the kind and cycle of studies and qualification level; the demand for the Programme is comprehensively justified making reference to various sources. Despite the aforementioned, the previous evaluation was done as for a new study programme.

The internal quality assurance is carried out by Study Programme Committee. The Committee evaluates the content and implementation of the Programme in six areas: aims and learning outcomes of the programme, curriculum design, teaching staff, facilities and learning resources, Study process and student assessment and programme management. While implementing the Programme, the relations with potential employers of students are maintained. The majority of heads of general education schools in Lithuania are graduates of LEU, who searching for employees, directly address the University asking to recommend the graduates or current students for work at school. As it has been mentioned before, students' opinion surveys are conducted every half year. The students are satisfied with teaching of the study subjects of the Programme.

The information about the Programme is public, relevant and easily accessible. Firstly, the Programme aims and intended learning outcomes are announced on the Open Information Counselling and Guidance System (AIKOS) and on the website of our Department under "Bachelor's degree programmes". Secondly, information related to the Programme is also accessible via the LEU website.

### III. Main arguments for negative evaluation and “must do” actions\*

1. The curriculum must be substantially redesigned to achieve learning outcomes important for teachers, in compliance with curriculum design presented above, especially in terms of the content of the curriculum, important subjects related to mathematics, which are either missing or underdeveloped.
2. Efforts to promote the programme and to recruit students are obviously insufficient, consequently the number of applications are extremely low. The university must establish a better recruitment and promotion strategy in order to overcome this essential problem.

#### Further shortcomings:

1. It is recommended regular application and introduction of educational software, especially in mathematical subjects.
2. To involve elective subjects in order to achieve individualization of studies.
3. To include students in scientific research in mathematics and informatics as well as in didactics
4. There exists a lack of sufficient information about mobility programs, insufficient number and level of English courses for students, consequently there is very low level of student mobility.
5. No students’ active participation in scientific research, they should be more encouraged to take a part in deeper research.
6. Assessments criteria should be always completely clear and strictly used.

\*If the programme is going to be given negative evaluation (non-accreditation) instead of RECOMMENDATIONS main **arguments for negative evaluation** (non-accreditation) must be provided together with a **list of “must do” actions** in order to assure that students admitted before programme’s non-accreditation will gain knowledge and skills at least on minimum level.



#### **IV. SUMMARY**

In terms of programme aims and learning outcomes the Mathematics and Informatics Teaching Bachelor Programme of the Lithuanian University of Educational Sciences has some strengths, but also has some weaknesses. While European and Lithuanian higher education recommendations, standards and legal requirements are all fulfilled, and learning outcomes are clearly presented in the SER, and are assigned with courses, Dublin descriptors and their adequate coverage are not mentioned in the SER. Even if the need for more highly qualified teachers in the rural areas of the country is probably realistic (even if not supported by statistical data in the SER), the proposed solution is not well justified, moreover most students expressed their wish to teach in large cities of Lithuania. The Programme declares Mathematics as “major study field” while Informatics as “minor study field”, but the Programme seems to be symmetric in terms of learning outcomes as well as number of credits gained from the two fields, therefore this distinction lacks credibility.

Whilst the standard way of being a teacher in Lithuania requires a scientific knowledge equals 180 or 240 ECTS of the actual field provided by disciplinary bachelor programmes, the proposed Programme can contain only 90 ECTS of disciplinary courses from each field. As it is clear from the curriculum design (see below in detail, under 2.2) this serious restriction yields fundamental problems in essential parts of the curriculum, consequently the Programme cannot fully cover the declared learning outcomes. It is practically impossible to provide the necessary minimum knowledge and learning outcomes in 90 ECTS, therefore the problem is more substantial and can only be solved at higher stakeholder level: this kind of merged teacher training programmes necessarily suffer from the above mentioned shortcomings, independently of the actual field. Social abilities skills are formulated in a rather science-related manner, which is not fully adequate in a teacher training programme.

In terms of curriculum design the Programme suffers from serious weaknesses. Important subjects related to school mathematics are missing or underdeveloped, e.g. geometry, development of interesting in mathematics for pupils who show abilities over average including solving of more complicated and Olympiad level problems, etc. There do not exist elective subjects, and consequently there does not exist a chance for individualization of studies. Geometry content is involved in the Didactics of Mathematics subject. During the meeting with students the review team learned they prepare lectures in geometry for practice in schools using the school textbooks and instructions given by teachers from schools where practice is conducted. The review team can not accept this approach to teachers education in mathematics

as Euclidean geometry (synthetic approach) is very important for developing of spatial abilities which play furthermore significant role in developing of problem solving skills. Therefore, the review team concludes that curriculum must be redesigned to achieve all learning outcomes as well as the Descriptors of teacher training in mathematics and informatics.

Further on, there are some lacks in description of certain number of subjects. They comprise goal of subjects, prerequisites, overlapping of contents, references, etc. Applications of software and programming tools are not involved in mathematics subjects study, but there exists as a course Technologies for Teaching Mathematics. Assessment criteria for minimum, average and high level achievement of students are well defined, but, not always applied as students informed the review team.

The academic staff is qualified and competent: most of the lecturers are active in the research work and have published several scientific and methodological publications and performed some research projects. Academic staff members participate in international conferences, research traineeships, international exchange programs.

Scientific research conducted by the Programme lecturers is tightly related to the assessed Programme, although research activity can be more active for some lecturers. Scientific research activity of students should also be more encouraged by teaching staff members. The number of lecturers is sufficient for achieving of the Programme outcomes.

In terms of facilities and learning resources the review team does not observed any shortcomings: the high level of resources, and quality of practices and cooperation with schools are all convincing.

There is a comprehensive academic, social and etc. support for students in their study process. Good cooperation and communication with social partners and alumni is observed. There are plans of actions for increase of number of recruited students, some means of attraction are already used.

However, no individualisation of studies, all subjects are strictly fixed, no credits left for elective subjects. There is a lack of sufficient information about mobility programs, consequently there is very low level of student mobility. No students' active participation in scientific research, they should be more encouraged to take a part in deeper research. Assessment criteria are not always completely clear and strictly used.

In terms of Programme management the team also observed some strengths and weaknesses. While the Quality management structure is clearly defined in the internal documentation of the University, and there is a high quality of cooperation with schools, efforts to promote the Programme and recruit students are obviously insufficient, consequently the number of applications are extremely low. The university must establish a better recruitment and

promotion strategy in order to overcome this essential problem. The Programme management process is not sufficiently effective, which partly yields the fact that the curriculum design has essential shortages. This is overall the main reason of the negative evaluation of the Programme.

## V. GENERAL ASSESSMENT

The study programme *Mathematics and Informatics Teaching* (state code – 612X13047) at Lithuanian University of Educational Sciences is given **negative** evaluation.

*Study programme assessment in points by evaluation areas.*

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	2
2.	Curriculum design	1
3.	Teaching staff	3
4.	Facilities and learning resources	4
5.	Study process and students' performance assessment	2
6.	Programme management	2
	<b>Total:</b>	<b>14</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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