EVALUATION REPORT

OF Applied mathematics (new state code - 621G10003)

STUDY PROGRAMME

at Kaunas University of Technology

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Išvados parengtos anglų kalba
Report language - English

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### INFORMATION ON ASSESSED STUDY PROGRAMME

<table>
<thead>
<tr>
<th>Name of the study programme</th>
<th>Applied mathematics</th>
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</thead>
<tbody>
<tr>
<td>State code</td>
<td>62401P107, new state code - 621G10003</td>
</tr>
<tr>
<td>Study area</td>
<td>Physical Sciences</td>
</tr>
<tr>
<td>Study field</td>
<td>mathematics</td>
</tr>
<tr>
<td>Kind of the study programme</td>
<td>Master studies</td>
</tr>
<tr>
<td>Level of studies</td>
<td>second</td>
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<tr>
<td>Study mode (length in years)</td>
<td>Full time (2)</td>
</tr>
<tr>
<td>Scope of the study programme in national credits</td>
<td>80</td>
</tr>
<tr>
<td>Degree and (or) professional qualifications awarded</td>
<td>Master of Mathematics</td>
</tr>
<tr>
<td>Date of registration of the study programme</td>
<td>May 19, 1997</td>
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1 – vienas kreditas laikomas lygiu 40 studento darbo valandų
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I. INTRODUCTION
The Lithuanian Centre for Quality Assessment in Higher Education has invited four university experts (hereinafter called Expert Team) from Estonia, Latvia, Lithuania and Norway to review and assess the master level study programme “Applied Mathematics” (621G10003) at the Kaunas University of Technology (KTU). The study programme under evaluation is directed by two departments of the Faculty of Fundamental Sciences: Department of Applied Mathematics and Department of Mathematical Research in Systems.

The Expert Team visited the Faculty on April 13.

First, the Expert Team met the administrative staff of the Faculty represented by the Dean, Assoc. Prof. Dr. Vytautas Janilionis, and two Vice-Deans. Next, at the meeting with staff members (6) responsible for preparation of the Self-assessment report the Expert Team was given answers to the questions concerning less covered in the Self-assessment report issues. After that, a meeting with members of teaching staff (10) took place.

The Expert Team had possibility to observe various study support services (class rooms, computer services, library), as well as to familiarize with students’ final reports.

The Expert Team conducted also interviews with students. The group consisted of 33 students (15 - 1st year students and 18 - 2nd year students). The Expert Team was familiarized with students’ attitude towards the study programme. The meeting was carried out in an active and constructive atmosphere. The students expressed positive as well as critical opinions about the programme.

Finally the Expert Team met graduates (10) and potential future employers (6) of the students. They expressed positive attitude about the study programme. At the conclusion of the visit, the Expert Team conducted a meeting with staff of the Faculty and highlighted some strengths and weaknesses of the Programme.

In the following, the findings of the Expert Team are outlined. The Self-assessment report submitted by the Faculty, the observations made at the time of the visit, and the supplementary material received during the visit form the basis of these assessments.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

1.1. Programme demand, purpose and aims

1.1.1. Uniqueness and rationale of the need for the programme
The need of this programme comes from institutions and enterprises using mathematics or its applications, and graduates of bachelor programs. Mathematicians are needed in very wide area of practical activities, where mathematical thinking is involved. This programme is the second cycle (before doctoral studies) in order to prepare mathematicians for the scientific institutions and teaching staff at universities. In spite of the fact that study programmes in Mathematics at
master level are accomplished by the faculties of six Lithuanian universities, it seems that this programme is one of the most attractive ones.

1.1.2. Conformity of the programme purpose with institutional, state and international directives
The purpose of the study programme Applied Mathematics is compatible with the mission of Kaunas University of Technology, moreover research in the field of Mathematics is one of the strongest scientific areas in Lithuania. Furthermore, this programme is well related to international directives.

1.1.3. Relevance of the programme aims
The aims of the programme are strongly correlated with its purpose. They support general development of exact and technical sciences in the country.

1.2. Learning outcomes of the programme

1.2.1. Comprehensibility and attainability of the learning outcomes
Learning outcomes are realistic. Graduates of this study programme will get a good insight into mathematical statements, their proofs and interrelations. They have good working abilities to create deterministic and/or stochastic mathematical models of real world, to carry out their analysis, interpretation and to present conclusions. They have skills of using computer facilities and analytical way of thinking.

1.2.2. Consistency of the learning outcomes
Consistency of the learning outcomes is good. Learning outcomes at the programme and subject level are described clearly. However it is not clear how the program supports development of teamwork skills (that is mentioned as one of the aims).

1.2.3. Transformation of the learning outcomes
Development and implementation of the programme is based on the requirements of Kaunas University of Technology and Ministry of Science and Education of Lithuania. Transformation of the learning outcomes will take place when necessary. Continuous assessment of learning outcomes and reasonable renewal of learning outcomes take place.

2. Curriculum design

2.1. Programme structure

2.1.1. Sufficiency of the study volume
Study programme is adapted to meet the requirements of the consecutive study programmes regulation documents.

2.1.2. Consistency of the study subjects
The consistency corresponds to the Regulaminum of Mathematics study field. Relations between study subjects, as well as their consequences, are preserved. Nevertheless prerequisites of subjects must be more specific.

2.2. Programme content

2.2.1. Compliance of the contents of the studies with legal acts
The study programme content generally confirms to the requirements of legal acts and enables students to achieve nearly all learning outcomes. However, the requirement to have no more than 5 courses per semester must also be satisfied.

Studijų kokybės vertinimo centras
2.2.2. Comprehensiveness and rationality of programme content
Topics delivered in the subjects are up-to-date and more or less sufficient to achieve respective learning outcomes. Forms and methods used in classes are satisfactory. Nevertheless there is a need for changes that will support development of communication skills (team work, public presentation results of research projects, etc.)

3. Staff

3.1. Staff composition and turnover

3.1.1. Rationality of the staff composition
The competence of the teaching staff is sufficient to reach aims and learning outcomes of the programme. Proportion of lecturers and assistants in staff could be higher (some the staff members are approaching retirement).

3.1.2. Turnover of teachers
The staff is stable and its changes are minimal.

3.2. Staff competence

3.2.1. Compliance of staff experience with the study programme
The study programme corresponds to the research interests of the teaching staff. The staff members expertise is sufficient to assess or modify (if necessary) the whole teaching process, associated with the study programme.

3.2.2. Consistency of teachers’ professional development
During the assessment period, the majority of teaching staff participated in various international activities. On the other hand the scope of regulation and promotion of teachers’ professional development is comparatively low (many opportunities are left not realized). Support for conference participation should be formalized and improved. Sabbatical leave support should be implemented.

4. Facilities and learning resources

4.1. Facilities

4.1.1. Sufficiency and suitability of premises for studies
There are a sufficient number of lecture rooms and computer classes for both implementing the study programme and performing individual assignments. Technical (safety) and hygiene conditions of the premises meet the prescribed requirements and norms. Working places and working conditions (in particular, opening hours) in libraries (reading rooms) for maintaining high-level studies are quite good.

4.1.2. Suitability and sufficiency of equipment for studies
The computer hardware and software are up-to-date and legal. Available equipment is suitable and sufficient for studies.

4.1.3. Suitability and accessibility of the resources for practical training
Assessment is not applicable.
4.2. Learning resources

4.2.1. Suitability and accessibility of books, textbooks and periodical publications
Provision with printed publications required for the study programme is satisfactory. The library contains thousands of books and journals on mathematics, statistics, computer science, economics, etc. Access to electronic databases through personal Internet connection is available.

4.2.2. Suitability and accessibility of learning materials
Students have good access to existing methodological publications. Provision of students with methodological publications and learning aids is satisfactory. The teachers should further intensify developing up-to-date courseware.

5. Study process and student assessment

5.1. Student admission

5.1.1. Rationality of requirements for admission to the studies
Admission to the programme is organized according to the legal acts and regulations. Refined rules are used to build contest marks and make decisions.

5.1.2. Efficiency of enhancing the motivation of applicants and new students
According to the self-assessment report, motivation enhancement of future and new students is efficient. Measures are taken to enhance efficiency of the motivation of applicants and new students. A number of actions are carried out in attracting students capable to study, including different marketing measures in order to reach the potential entrants to the programme. The communication of information about the programme using all relevant channels is set up.

5.2. Study process

5.2.1. Rationality of the programme schedule
All types of lectures and practical works are uniformly distributed over semesters. However, we recommend moving elective courses to later terms in the curriculum.

5.2.2. Student academic performance
Monitoring of students’ progress and drop-out rate takes place. However, the effectiveness and impact of such monitoring is not clear.

5.2.3. Mobility of teachers and students
Scope of teachers (outgoing) and students (outgoing) mobility takes place, but appears to be rather low. It should be enhanced to gain further positive impact on the Programme and studies.

5.3. Student support

5.3.1. Usefulness of academic support
Students are informed about the programme and its changes. Students’ counselling on study issues is good. Students’ counselling on career possibilities could be more intensive. Possibilities to study according to individual programme exist. Possibilities of students to repeat subjects and to retake examinations are regulated properly.

5.3.2. Efficiency of social support
As for psychological, sports, health and cultural support, the students in this study programme get aid equally with the rest of the students of the university. The support can be evaluated as
5.4. Student achievement assessment

5.4.1. Suitability of assessment criteria and their publicity
Student’s knowledge assessment criteria are based on the learning outcomes of particular study subjects. The composition of final examination grades follows accumulative principle (attendance, seminars, mid-term tests, etc.).

5.4.2. Feedback efficiency
According to self-assessment report students are provided with the feedback on their achievements (item 100). However the efficiency of the feedback is not clear.

5.4.3. Efficiency of final thesis assessment
Requirements for final thesis exist. Procedure of final theses assessment is regulated and performed correctly. Results of final theses assessment correspond to the level of quality of final theses. The topics of final theses are in compliance with learning outcomes. However it is necessary to indicate clearly in master theses what part of work was done during previous three research projects.

5.4.4. Functionality of the system for assessment and recognition of achievements acquired in non-formal and self-education
Neither non-formal nor self-education studies are recognized.

5.5. Graduates placement

5.5.1. Expediency of graduate placement
One of the greatest advantages gained in the programme of graduate study is the well-developed abstract thinking that makes it easy to adapt to the ever-changing economic and social environment. According to master student survey, 85% employed graduates work according to speciality.

6. Programme management

6.1. Programme administration

6.1.1. Efficiency of the programme management activities
Study programme management is conducted by the programme committee approved by rector. Representatives of students and employers participate in the study programme committee. Personal responsibilities are distributed in accordance with the scheduled character of activities and experience of stakeholders. The qualification and experience of the study programme coordinator assoc. professor E. Valakevicius are high enough.

6.2. Internal quality assurance

6.2.1. Suitability of the programme quality evaluation
The internal study programme quality evaluation process is more or less continuous (regular sessions at the dean’s office, meetings of the programme committee members, Faculty Council meetings, etc.). Following the Self-assessment report, urgent programme management questions are discussed during the mentioned above meetings.

6.2.2. Efficiency of the programme quality improvement

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The application of assessment results is observable – they are used efficiently to improve quality of the study programme.

6.2.3. Efficiency of stakeholders participation.
According to the self-assessment report stakeholders’ representative participates in the quality assurance of the programme. However development of closer contacts with social partners/stakeholders is still needed to get topics for master theses and student research projects.

III. RECOMMENDATIONS

3.1. Prerequisites of courses must be more specific.
3.2. Support for conference participation should be formalized and improved.
3.3. Sabbatical leave support should be implemented.
3.4. The requirement - no more than 5 courses per semester - must be satisfied.
3.5. It is necessary to indicate clearly in master theses what part of work was done in previous three research projects.
3.6. Introduce changes for development of communication skills (team work, public presentation results of research projects, etc.)
3.7. Development of closer contacts with social partners/stakeholders is needed to tie topics for master theses and student research projects with practice.
3.8. Move elective courses to later terms in the curriculum.
IV. GENERAL ASSESSMENT

The study programme Applied Mathematics (state code – 62401P107, 621G10003) is given positive evaluation.

Study programme assessment in points by fields of assessment.

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<thead>
<tr>
<th>No.</th>
<th>Evaluation Area</th>
<th>Evaluation Area in Points*</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Programme aims and learning outcomes</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Curriculum design</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Staff</td>
<td>4</td>
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<tr>
<td>4.</td>
<td>Material resources</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Study process and assessment (student admission, study process student support, achievement assessment)</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>Programme management (programme administration, internal quality assurance)</td>
<td>3</td>
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<td></td>
<td><strong>Total:</strong></td>
<td><strong>20</strong></td>
</tr>
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*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.

Grupės vadovas: Prof. Vladimir Oleshchuk
Team Leader:

Grupės nariai: Prof. Janis Cepitis
Team members: Prof. Tõnu Kollo
Prof. Alfredas Račkauskas

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