



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

**CLUSTER REPORT ON THE EVALUATION OF THE
STUDY PROGRAMMES**

**MATHEMATICS AND ITS APPLICATIONS
at Vytautas Magnus University,**

**APPLIED MATHEMATICS
at Kaunas University of Technology,**

**MATHEMATICS AND ITS APPLICATIONS
at Šiauliai University**

AND

**MATHEMATICS AND INFORMATICS TEACHING
at Vilnius University**

performed from Oktober 9 to 12, 2012.

International Evaluation Team

The international evaluation team (Team) composed by the Lithuanian Centre for Quality Assessment in Higher Education (CQAHE) consisted of the following experts:

Prof. Dr. Winfried Müller, Austria (team leader)
Assoc. Prof. Dr. Vytautas Būda, Lithuania (team member)
Prof. Dr. Jüri Kiho, Estonia (team member)
Prof. Dr. Donal McQuillan, Ireland (team member)
Šarunas Venslavas, Lithuania (student team member)

I. Introduction

This cluster report is based on an analysis of the findings of the Team evaluating the following four study programmes during October 9 to 12, 2012:

- Mathematics and its Applications at Vytautas Magnus University (4 years bachelor programme),
- Applied Mathematics at Kaunas University of Technology (4 years (full time) / 6 years (part time) bachelor programme)
- Mathematics and its Applications at Šialiai University (2 years master programme) and
- Mathematics and Informatics Teaching at Vilnius University (4 years bachelor programme).

In preparation for the evaluation all four institutions provided a self assessment report and additional documents concerning teaching and staff.

On October 8, 2012, the Team attended an introductory meeting at the building of CQAHE in Vilnius.

The following observations and remarks reflect the findings of the individual team members from a European and an international point of view.

II. Legal Framework

All four study programmes are compliant with the Bologna system and the Lithuanian legal requirements. Learning outcomes are clearly defined, employability and the regional, as well as the national, dimension of the individual programmes are described. Activities with respect to internationalisation and quality assurance are set out. Number and qualifications of staff are sufficient for achieving the aims and learning outcomes. Facilities and learning resources are adequate in size and quality. Maintenance and modernisation of buildings and laboratories are visible, and this important work should continue.

III. Observations and Findings

Students and staff at all four institutions are very motivated. Graduates find jobs without much difficulty. All four institutions contribute with their programmes to the needs of society and the Lithuanian and European labour markets. According to international studies well educated mathematicians, statisticians, and engineers with a good education in mathematics will be the most sought after specialists in the coming years in highly industrialised countries.

The majority of students graduate within the legal study time.

The curriculum design and the description of the programme aims and learning outcomes are, with a few exceptions, nearly perfect on paper.

- Some formulations concerning learning outcomes in the Self Assessment Reports are too detailed, too specific and too artificial. Tables showing the outcome of each course with respect to knowledge, cognitive skills, practical skills and transferable skills are neither informative nor meaningful.

- At all four institutions some course headings and descriptions are misleading and promise more than what actually is taught and examined.

- Studying the content of the curricula there is a general imbalance between the courses in analysis and applied analysis on one hand, and algebra and applied algebra on the other. Only at Kaunas TU do the students receive a minimum education in algebraic structures. The other three institutions more or less ignore this field of mathematics. Algebraic structures are an important topic in the education of applied mathematicians as well as in teacher education. Abstract algebra is not only an important cultural good, it is also an important tool for applications in computer mathematics such as coding theory, cryptography etc.

The methods of instruction are rather traditional. The Team did not find much evidence of activating forms of learning. Thus self-learning and project-based learning should be increased. This is also an important part of the Bologna reform.

Teaching loads, especially for young teachers, are too heavy. This does not leave enough time for research and may lead to poor quality teaching. Furthermore, a change of culture should be enforced so that academic teachers have the focus of their activities at one institution only, and do not work simultaneously at several institutions.

In our globalised world internationalisation is an essential element of higher education. Internationalisation is a multi-dimensional task taking into account mobility programmes, language policy, curricula, joint study and double degree programmes, collaborative research, conference attendance, staff recruitment etc. Actually, mobility of teachers and students at all four institutions is very low. English textbooks are rare in the libraries and not many courses are given in English. Institutions should open themselves to the international scientific community and offer more courses – especially at master and doctoral level - taught in English and open positions for international specialists. These actions would also attract more foreign students.

There is an urgent need for improvement with respect to student assessment. Examinations are too easy and do not correspond to the desired learning outcomes. In general, with the possible exception of Kaunas TU which seems to be marginally better, student assessment material focuses on easy theoretical material and nearly trivial examples and problems.

The three institutions involved with education at the bachelor level have to be praised for requiring practical parts in the curriculum (internships, educational practise). But the Team was not able to find clear regulations and instructions for these practical parts nor information on what was expected from the students. In the master programme at Šiauliai University it was not clear how the master students were integrated into project and research work.

All four institutions have started quality assessment procedures and should proceed with enforcing a climate of quality assurance within their institution. Student participation is very poor at all four institutions. Only a small percentage of students fill out the questionnaires assessing the quality of the educational components at the end of each semester. The Team suggests that clear procedures to improve teaching, course management and research should be

defined based on feedback from students, the extensive collection of information, and the results of different evaluations. The collected data should be used to provide advice. Students and teachers should be kept fully informed of the impact their responses and suggestions have on the quality improvement of teaching and course management. Mechanisms to support academic staff in their teaching (teacher training, teacher promotion) and research activities (study leaves, reduction of teaching load) should be developed.

With the exception of Kaunas TU the number of students in the programmes is quite small. While nowhere in the world is a career in mathematics the goal of a large number of students nevertheless student numbers should be closely monitored, and measures taken to guarantee the sustainability of the programmes. The Team praises Vilnius University for its activities in attempting to attract more students to its programme in teacher education. However there is one obvious problem with the teacher education programme there: the curriculum is not really focused on the education of teachers in mathematics and informatics, and at the same time the pedagogical studies do not fully meet the needs of future teachers.

The Team appreciates the significant work already carried out at all institutions with outside partners from industry and economy. We recommend that these services to society should be strengthened, and that research and services to society should be made more visible.

IV. Concluding Remarks

Mathematics education at the four universities visited in Lithuania follows international standards. Specialists in the field of mathematics, working in different fields of economy and industry as well as in teaching and scientific positions, are trained. There are two problem areas which needs urgent improvement. The first has to do with the level of examinations and the way student assessments are carried out. The second is the imbalance in the curricula, in at least three of the institutions, between topics related to analysis and topics related to algebra.

The Team appreciates the significant efforts made by the institutions in carrying out this evaluation exercise. However the Team hopes that the process will not end with this. The individual reports should assist the institutions for further improvement and greater reflection on their target to educate and form graduates who will be significant players in Lithuanian and European society and economy.

Winfried Müller
(team leader)

Post Scriptum

Visiting and evaluating four different institutions with mathematics programmes on four consecutive days is a very demanding task. There is little time between visits to reflect and compare notes. To avoid confusion the team members had to work late into the night and start very early each morning in order to record impressions and findings. Under these circumstances it is difficult to elaborate a constructive report that is helpful to the institution and the Centre of Quality Assessment in Higher Education. We recommend that in future not more than two site visits should be arranged for a team, with a day in between for reflection, discussion and “office work”.