Decision Regarding the Assessment of the Physical Sciences Study Programme Group

University of Tartu

15/09/2016

The Quality Assessment Council for Higher Education of the Estonian Quality Agency for Higher Education and VET decided to approve the report by the Assessment Committee and to conduct the next quality assessment of the Physical Sciences study programme group in the first and second cycles of higher education at the University of Tartu in seven years

On the basis of subsections 12^2 (1) and 10 (4) of the Universities Act, point 3.7.3 of the Statutes of the Estonian Quality Agency for Higher Education and VET (hereinafter referred to as 'EKKA') and point 41.1 of the document, 'Quality Assessment of Study Programme Groups in the First and Second Cycles of Higher Education', authorised in point 3.7.1 of the above-mentioned EKKA Statutes; the Quality Assessment Council for Higher Education of EKKA (hereinafter referred to as 'the Council') affirms the following:

1. On 14.05.2015 the University of Tartu and EKKA agreed upon a time frame to conduct the quality assessment of the study programme group.

2. The Director of EKKA, by her order on 15.02.2016, approved the following membership of the quality assessment committee for the Physical Sciences study programme group in the first and second cycles of higher education at the University of Tartu and Tallinn University of Technology (hereinafter referred to as 'the Committee'):

Bob Munn (Chair)	Consultant, Finchwood Academic, UK
Dimitris Ballas	Senior Lecturer, University of Sheffield, UK
Lars Erik Holmer	Professor, Uppsala University, Sweden
Juha Karhu	Professor, University of Helsinki, Finland
Dionis Martsinkevichus	Student, Vilnius Gediminas Technical University, Lithuania
Mamoun Muhammed	Senior Research Director, Royal Institute of Technology, Sweden
Risto Nieminen	Professor, Aalto University, Finland

Barbara A. Sawrey	Professor, University of California San Diego, USA

3. The University of Tartu submitted the following programmes for evaluation under this study programme group:

   Geography (BSc)
   Geography (MSc)
   Geology (BSc)
   Geology (MSc)
   Geology and Environmental Technology (BSc)
   Chemistry (BSc)
   Chemistry (MSc)
   Physics (BSc)
   Physics (MSc)
   Materials Science (BSc)
   Materials Science (MSc)

4. The University of Tartu submitted a self-evaluation report to the EKKA Bureau on 1.02.2016 and the assessment coordinator forwarded it to the Committee on 17.02.2016.

5. An assessment visit was made to the University of Tartu during 3–4.05.2016.

6. The Committee sent its draft assessment report to the EKKA Bureau on 14.06.2016, EKKA forwarded it to the University of Tartu for its comments on 14.06.2016, and the University delivered its response on 29.06.2016.

7. The Committee submitted its final assessment report to the EKKA Bureau on 1.07.2016. That assessment report is an integral part of the decision, and is available on the EKKA website.

8. The Secretary of the Council forwarded the Committee's final assessment report along with the University's self-evaluation report to the Council members on 30.08.2016.

9. The Council with 8 members present discussed these received documents in its session on 15.09.2016 and, based on the assessment report, decided to point out the following strengths, areas for improvement, and recommendations regarding the Physical Sciences study programme group in the first and second cycles of higher education at the University of Tartu.

Assessment at the Level of the Study Programme Group

Strengths

- The University of Tartu (UT) is engaged in compiling teaching materials in Estonian as well as translating textbooks into Estonian.
- The student-to-staff ratio is favourable and teaching staff are readily available to students.
- All study programmes are associated with significant research activities and students are involved in research from the very first year of their BSc studies.
- The University has a clear strategic approach to developing teaching and popularising physical sciences in society, for example, students write Wikipedia articles. The University supports internationalisation and good teaching by recognising the best staff members, for example.
- Senior students act as mentors to junior students in their first year of studies and as teaching assistants while conducting studies.
- Students are very satisfied with the new and refurbished buildings as well as with the excellent sports facilities.

Areas for improvement and recommendations

- The assessment committee recommends that all MSc programmes be taught entirely in English. Both the students and employers support this idea. The University has the capability and prerequisites to provide high-quality education, and this would help to increase the number of students. English is the *de facto* language of science, and students need to become fluent in scientific English. MSc programmes in English would also facilitate inward and outward mobility of both staff and students.
- More active cooperation with Tallinn University of Technology is needed, to share resources and to develop and conduct study programmes, offering specialisation and elective courses to each other's students, among other things. Opportunities should be created to seek funding for joint research projects.
- Teaching should be more student-centred. The study programmes reflect the narrow research interests of the chairs and laboratories, and therefore they are not well balanced. The programmes should give students a substantive introduction to their chosen discipline from the very beginning of their studies.
- The University has taken a positive direction towards offering broader BSc programmes, but it is vital to ensure integration of the new programmes rather than just presenting an array of individual programmes. Programme managers should have greater powers to integrate the programmes.
- Not all staff members have acted to improve their pedagogical skills. The assessment committee recommends that all staff be required to take courses in pedagogy.
- Programme managers should be provided with trainings in programme design to avoid a situation, for example, where teaching staff discuss the intended learning outcomes only after having agreed on the courses to be taught.
- In the new programme in chemistry , physics and materials science, envisaged in the near future, these three disciplines are not sufficiently integrated. Teaching staff from different institutes should more closely collaborate to design a coherent study programme. This is really crucial, because according to students, even now there is insufficient interconnection between courses in these study programmes, and there are overlaps between them.
- Staff mobility within and outside of Estonia should be increased and sabbatical leave opportunities should be used to a greater extent.
- Students should be systematically informed about actions taken based on their feedback. The programme as a whole also needs a more systematic feedback.
- Contacts with alumni and employers are weak. Both should be surveyed on a regular basis to determine the suitability of programmes for actual jobs (especially outside of universities).
- The structure of BSc programmes in Physics, Chemistry and Materials Science takes into account only the progression from BSc to MSc to PhD and then on to an academic position — and does not adequately consider the possibility of moving into employment after graduating from the BSc programme or changing the speciality in master degree studies.
- Teaching is funded to a great extent (up to 80%) by research funds which might not be sustainable.

Assessment at the Study Programme Level

GEOGRAPHY (BSc, MSc)

Strengths

- These study programmes meet high international standards and are well structured. There is a good balance between theory and practice in the programmes.

- The Department closely collaborates with employers, who are satisfied with the programmes. Employers participate in developing the study programmes, teaching practical courses and supervising theses.
- Many staff members are engaged in high-quality research which is also used effectively in teaching.
- Visiting lecturers from abroad also participate in teaching.
- There is a good collegial atmosphere among the teaching staff; off-campus departmental meetings as well as informal meetings are held.
- Laboratories are of excellent quality with modern equipment.
- Teaching staff employs e-learning capabilities and new educational technology with enthusiasm; there is extensive use of Moodle. The teaching and learning processes are flexible.
- Access to international research literature is very good.
- Teaching staff have published in Estonian a Geography textbook for universities, which includes examples of student work.
- Students have high opinions of the teaching staff; a number of staff members of the Department have been selected for the 'Best Teacher' award by the Faculty.
- Students are very motivated. They take an active part in the process of study programme development, the European Geographers Association, conferences, summer schools and other departmental events.

Areas for improvement and recommendations

- Generic courses of the BSc programme (Economics, Chemistry and Mathematics) should include more geographic content. There should also be a general introductory course into geography and its modern applications. This could better motivate students and reduce dropouts.
- The study programmes should be reviewed and overlaps between the courses eliminated.
- The Department should identify as to how the current teaching process facilitates student mobility and seek ways to increase the mobility.
- Ways to increase the number of international field classes should be sought.
- Since costs to maintain and upgrade research equipment are high, long-term plans should be developed to ensure sustainability during changing circumstances. Joint use of the equipment with companies would be beneficial.
- Students have too few physical spaces in which to undertake individual learning and group work and to socialise.
- Based on recommendations by employers, more teamwork should be employed and more opportunities to develop students' transferable and social skills created within the study programmes.
- The Department should more clearly inform students about staff's research interests and expertise, to make it easier for students to choose a supervisor.
- Good teaching performance does not play any significant role in staff promotions. This sends out the wrong signals to the staff that teaching is not important. Teaching quality should be taken into account when promoting or selecting teaching staff.
- Despite good international contacts, the staff mobility is low. Sabbatical leave options are underutilised.
- The student dropout rate is high. This is partly due to the fact that secondary school students do not have sufficient knowledge of geography as a science at the University. There is a need to advocate geography among secondary school students. Other options (financial, counselling) should be used to reduce the dropout rate.
- Employer feedback should be systematically collected.

GEOLOGY (BSc, MSc); GEOLOGY AND ENVIRONMENTAL TECHNOLOGY (BSc)

Strengths

- The new BSc programme in Geology and Environmental Technology is broad based and offers an integrated education in both disciplines.
- The MSc programme, in a close collaboration between students and teaching staff, offers a number of opportunities for problem-based practical studies in laboratories and field classes.
- Geological and geochemical laboratories are modern and well equipped.
- Students and researchers have easy access to the UT Natural History Museum's collections and exhibits. Content of the geological collections is largely digitised and available on the internet.
- The opportunities for teaching and research are expanded by a close collaboration with the Institute of Chemistry, whose equipment exceeds the average level at European universities.
- Teaching staff are highly qualified, active and committed to teaching.

Areas for development and recommendations

- The small number of MSc students is a serious risk for the future; in 2015/16 only 5 students were enrolled.
- Sustainable development as a topic is underrepresented in the study programmes. There are no schemes for student internships with Estonian companies and agencies. Students should be offered internship opportunities within the framework of the Institute's research programmes.
- The existing geological databases are excellent and could also be made available in English.
- Student dropouts are a big concern for the Geology BSc programme.
- The University budget supports only 2.5 professor positions, which is not sufficient. A solution to this problem could be to deliver the programmes in closer collaboration with Tallinn University of Technology and with the UT Institute of Ecology and Earth Sciences. It is advisable to seek opportunities to involve international lecturers as well.
- It is necessary to examine labour market needs and to ask for feedback from alumni and employers on a regular basis.

CHEMISTRY (BSc, MSc)

Strengths

- The MSc programme has a strong focus on entrepreneurship.
- Student satisfaction is high.
- Lecture rooms are of good quality and basic teaching laboratories are well equipped.
- The high quality of research is reflected in the electives of the study programme, and in student involvement in the research groups.
- Mentors, tutors and teaching assistants support students in their studies in every possible way.
- The Institute and its students closely cooperate with upper secondary schools, in order to increase students' interest in chemistry. For this purpose, a mobile laboratory and 'science bus' are used; the students from upper secondary schools visit the UT chemistry laboratories; teaching staff help school students prepare for chemistry Olympiads.

Areas for improvement and recommendations

- Narrow research interests of the different chairs and laboratories pose a threat to the coherence of the programme.
- There should be more rooms for students to undertake individual learning and group work.

- The equipment in some laboratories urgently needs updating. A priority should be given to developing teaching laboratories for synthetic chemistry.
- Teaching staff lack a uniform approach to the assessment of learning outcomes. Every course should include formative assessment at least once in the middle of the course, allowing students to improve their performance before the final assessment.
- Graduates' employment is not systematically surveyed. Many graduates continue their studies and then work at the University, but too little attention is paid to the graduates who follow a different career path. At the same time employers have difficulty in finding specialists with a chemistry education.
- The employers with whom the assessment committee met had not been asked for their opinions about the study programmes or the graduates, although they employed quite a large number of the graduates. The Institute should have a clearer overview of the labour market in the field, in order to meet the wider needs of society, and not only those of the University.

PHYSICS (BSc, MSc); MATERIALS SCIENCE (BSc, MSc)

Strengths

- The Institute of Physics is housed in a modern building with well-equipped laboratories.
- Teaching staff are highly qualified, active in research and have extensive international cooperation ties.

Areas for improvement and recommendations

- Student admission numbers are small and the dropout rate is high.
- The Physics programme should include more aspects of modern physics. In the opinion of employers the programme should include more computer programming and computational sciences.
- The Materials Science programme comprises many chemistry courses. In order to differentiate itself from the Chemistry and Physics programmes, it should include more courses in basic materials science.
- Additional funds must be budgeted to ensure that students receive adequate experience in working with different instruments.
- Approaches to teaching and learning are not sufficiently modern and do not require active engagement by the students. Approaches to assessment by the teaching staff differ, particularly with regard to the achievement of learning outcomes. Formative assessment is underused. Every course should include formative assessment at least once during the studies, so that students could improve their performance before the final assessment.
- Students have too little opportunity to work in groups and make presentations. However, these skills are highly valued by employers. A lack of attention to soft skills reflects the nature of the programme as a collection of individual courses; even programme managers have no clear overview of the programmes as a whole.
- International staff mobility should be increased in both directions.
- The Institute should systematically survey the employment of its graduates outside of the University to learn how well the programmes are meeting the needs of non-academic jobs. The Institute is currently not preparing its students well enough for non-academic careers.

10. Point 41 of the document, 'Quality Assessment of Study Programme Groups in the First and Second Cycles of Higher Education', establishes that the Quality Assessment Council shall approve an assessment report within three months after receipt of the report. The Council shall weigh the strengths, areas for improvement, and recommendations pointed out in the

assessment report, and then shall decide whether to conduct the next quality assessment of that study programme group in seven, five or three years.

11. The Council weighed the strengths, areas for improvement, and recommendations referred to in point 9 of this document and found that the study programmes, the teaching conducted under these programmes, and development activities regarding teaching and learning conform to the requirements, and, on the basis of point 41.1 of the document, 'Quality Assessment of Study Programme Groups in the First and Second Cycles of Higher Education',

DECIDED

to approve the assessment report and to conduct the next quality assessment of the Physical Sciences study programme group in the first and second cycles of higher education at the University of Tartu in seven years.

The decision was adopted by 8 votes in favour. Against 0.

12. The Bureau of EKKA will coordinate a date for the next quality assessment of the study programme group with the University of Tartu no later than 15.12.2022.

13. The Council proposes that the University of Tartu will submit an action plan to EKKA with regard to the areas for improvement and recommendations pointed out in the report no later than 15.09.2017.

14. A person who finds that his or her rights are violated or his or her freedoms are restricted by this decision may file a challenge with the EKKA Quality Assessment Council within 30 days after the person filing the challenge became or should have become aware of the contested finding. A judicial challenge to the decision may be submitted within 30 days after its delivery, filing an action with the Tallinn courthouse of the Tallinn Administrative Court pursuant to the procedure provided for in the Code of Administrative Court Procedure.

Tõnu Meidla
Chair of the Council

Hillar Bauman
Secretary of the Council