Decision of the Quality Assessment of the Engineering, Manufacturing, and Technology Study Programme Group of the Estonian University of Life Sciences

26.05.2022

The Higher Education Assessment Council of the Estonian Quality Agency for Higher and Vocational Education (EKKA) decided to approve the report of the Assessment Committee and to carry out the next quality assessment of the first and second levels of higher education of the Engineering, Manufacturing, and Technology Study Programme Group of the Estonian University of Life Sciences in seven years.

Pursuant to clause 41 of the document "Quality Assessment of the Study Programme Group at the First and Second Levels of Higher Education," established on the basis of the authorization contained in § 48 (4) of the Institutions of Professional Higher Education Act, § 10 (4) of the University Act and clauses 24 and 5 of the Statutes of the Education and Youth Board, the Higher Education Assessment Council of the Estonian Quality Agency for Higher and Vocational Education (hereinafter the Council) states the following:

1. On 08.04.2019, the Council decided to carry out the next quality assessment of the first and second levels of higher education of the Engineering, Manufacturing, and Technology Study Programme Group of the Estonian University of Life Sciences after three years.
2. The Estonian University of Life Sciences coordinated with EKKA the quality assessment time of the Engineering, Manufacturing, and Technology Study Programme Group of the University of Life Sciences on 04.07.2021.
3. On 02.12.2021, the Director of EKKA approved the Quality Assessment Committee of Engineering, Manufacturing, and Technology Study Programme Group of the Estonian University of Life Sciences (hereinafter the Committee) in the following composition:

EKKA

Markus Mueller (Chairman)	Professor of Electrical Generation Systems, School of Engineering, University of Edinburgh (United Kingdom)
Sten Siro	a student member; Member of the student union of Tallinn University of Technology (Estonia).
Per Ertbjerg	Associate Professor in Food Science, Department of Food and Environmental Sciences, University of Helsinki (Finland).
Rain Kuldjärv	Center of Food and Fermentation Technologies, researcher; Ph.D. student at Tallinn University of Technology (Estonia).
Marino Menozzi	Head of the group "Ergonomics of Information Media," ETH Zurich (Switzerland)
Rudolf von Rohr	Professor of Process Engineering, ETH Zurich (Switzerland)
Dick Sandberg	Chaired Professor and Head of the division of Wood Science and Engineering, Luleå University of Technology (Sweden)

4. The Estonian University of Life Sciences submitted the following study programmes for evaluation in the Engineering, Manufacturing, and Technology Study Programme Group:

   Wood processing technology (professional higher education)

   Technotronics (professional higher education)

   Engineering (Bachelor's study)

   Food Technology (Bachelor's study)

   Food Technology (Master's study)

   Ergonomics (Master's study)

   Energy Application Engineering (Master's study)

   Production Engineering (Master's study.)

5. Estonian University of Life Sciences submitted the final self-analysis report to the EKKA office on 26.11.2021, which was sent to the Committee by the assessment coordinator on 01.12.2021.

6. The hybrid assessment visit took place at the Estonian University of Life Sciences on 25.-27.01.2022.
7. The Committee sent the draft assessment report to the EKKA office on 30.03.2022, which EKKA forwarded to the institution of higher education for comment on 13.04.2022 and to which the Estonian University of Life Sciences submitted a reply on 28.04.2022.
8. The Committee submitted the final assessment report to the EKKA office on 06.05.2022. The assessment report is an integral part of the decision. The report is available on the EKKA website.
9. The Secretary of the Assessment Council forwarded the final assessment report and self-analysis report to the members of the Assessment Council on 19.05.2022.
10. The Council discussed the received documents at the meeting on 26.05.2022 with the participation of 10 members and decided to point out the following strengths of the Engineering, Manufacturing, and Technology Study Programme Group of the Estonian University of Life Sciences, areas for improvement, and recommendations, as well as proposals for further developments.

The Committee identified the following cross-cutting strengths in the study programmes of the Engineering, Manufacturing, and Technology Study Programme Group of the Estonian University of Life Sciences:

1) Both the University's management, academic staff, and the staff of the support structure are motivated and committed.
2) Professional employment of alumni is high.
3) The study programmes meet the needs of Estonia.
4) The management is dynamic and supportive at all levels - starting with the rector and the directors of the institutes and ending with the heads of the chairs.
5) Very good cooperation ties with companies that contribute to the development of the study programme group through the conducted studies, internships, and consulting.

The Committee identified the following areas of improvement and made the following recommendations regarding the study programmes of the Engineering, Manufacturing, and Technology Study Programme Group of the Estonian University of Life Sciences:

1) It is necessary to reduce the number of dropouts. Across the entire study programme group, measures that have already been partially used in individual study programmes should be implemented - a motivation letter upon admission, the introduction of a mentoring system in professional higher education and bachelor's programmes, and mental and academic support for students. Without the necessary financial support for students, it will be

difficult to achieve success in terms of dropping out, and here the state, employers, and universities should work together to develop an appropriate package of measures.

2) In terms of internationalization, the activities that have already been started, which were put on the back burner due to the pandemic, must be continued. The student's level of English is certainly not an obstacle to the internationalization of subject courses. In particular, this concerns the subject courses of Master's programmes, as graduates of Master's programmes are more likely to work in management positions where they have to communicate with foreign partners and clients.
3) The number of lecturers with a doctorate must be increased in order to strengthen the scientific basis of teaching and cooperation between universities. This is an important area for improvement in the first-level study programmes of higher education. In this regard, it is necessary to develop a plan for the participation of teaching staff in doctoral studies for the next 5-10 years while foreseeing a suitable workload for teaching staff undergoing doctoral studies (e.g., 50% doctoral studies, 50% teaching). In particular, the focus should be on younger academic staff who already have publications that could be used as part of a doctoral thesis.
4) A clear model of academic staff workload needs to be developed. Currently, there is a lot of uncertainty in this regard, and the workload depends on the agreement between the employee and the head of the chair. This would also make it possible to better plan the doctoral studies of academic staff.
5) Better cohesion between theory and practice should be created in study programmes. According to the students, there is a need for more industrial and practical examples of how theory is applied in practice.
6) More cooperation needs to be done with alumni. Alumni are ready to contribute, but some of them admitted that despite their offer, they had not been contacted. Alumni are a valuable resource for the study programmes of the study programme group to forge partnerships with companies in order to conduct guest lectures and provide mentorship to students.
7) Study programmes should be reviewed, and consistency in terms of student workload should be ensured. The previous evaluation of the study programme group also drew attention to this problem. There are important differences in the study programmes in terms of module volumes - in Europe, it is generally customary that the module volumes are more or less equal. Such an approach would also encourage the transfer of studies within the framework of mobility and would enable better planning of the teaching staff's workload.

TECHNOTRONIC'S (PROFESSIONAL HIGHER EDUCATION)

Strengths

1) The student's assessment of the quality of the internship is high.

2) Access to various technical software is guaranteed.
3) Faculty members are open to introducing changes in subject courses based on student and alumni feedback.
4) Employers value students highly.
5) Students are well supported both academically and mentally.

Areas for improvement and recommendations

1) The University has set a goal that all teaching staff has a doctorate degree. In the Technotronics study programme, less than fifty percent have a doctoral degree. If the University is of the opinion that the 100% doctoral degree requirement in the study programme of professional higher education is appropriate, then the number of professors with doctoral degrees must be increased. Better opportunities for research work must also be created for teaching staff.

Proposals for further developments

1) More problem-based learning should be implemented, and students should be advised on how to use theory to solve real-life problems.
2) It is recommended to share more information about study opportunities in English on the University's English-language website.
3) All CNC milling machines, except for one model offered by Demek CNC OÜ, are no longer state-of-the-art. A sustainable financial model is needed to renew the machine fleet and thereby ensure high-quality, practical training of students.
4) The focus of the study programme is on practical learning, which is good and distinguishes the technotronics programme of the EULS from other similar ones in Estonia, but this does not mean that theoretical learning should be neglected. Employers have highlighted students' poor problem-solving skills. However, this requires basic knowledge and an understanding of how to apply the theory.
5) The entrance requirements of the study programme should be increased, and an interview with candidates should be conducted before admission.

WOOD PROCESSING TECHNOLOGY (PROFESSIONAL HIGHER EDUCATION)

Strengths

1) The study programme has a strong connection with practice and includes a large amount of practical training.
2) Academic staff, company representatives, students, employers, and alumni have contributed to the development of the study programme.
3) The laboratories are modern and open to students for various project works.

4) The students are enthusiastic, and the learning atmosphere is positive due to very good relations between students and lecturers.
5) Noticeable progress compared to the evaluation of the previous study programme group has taken place in giving feedback to students and using feedback in development activities.
6) The proportion of academic staff and practitioners in teaching is well-balanced.
7) The age structure of the teaching staff is good, and the gender balance is quite good.
8) Teaching is flexible and takes into account the interests of working students.

Areas for improvement and recommendations

1) The study programme tries to cover too many different areas of the wood industry, which can cause various problems: it is difficult to create and maintain a good academic level necessary for all areas; to secure the necessary resources for all areas (including teaching materials and laboratories); it is difficult to avoid repetitions in the contents of subject courses; to define the focus of the study programme for students; to ensure that students have deep knowledge in professional fields.
2) It remains unclear how permanent funding and state-of-the-art laboratories will be ensured. The University does have an amortization fund, but its volume is small. In the long term, project-based funding of laboratories is not sustainable. It is necessary to develop a long-term strategy to avoid negative scenarios (closing of laboratories).
3) The student mobility of the study programme does not work in either direction. Mobility would make it possible to internationalize the learning environment and offer students the international experience desired by employers.
4) Teaching should be primarily based on academically active lecturers with a doctorate degree. Too few teaching staff have a doctorate degree, and it mostly concerns the direction of wood technology. This is a clear point of risk in ensuring quality education in both the short and long term. It is necessary to develop a plan to strengthen the direction of wood technology and to provide appropriate financial resources for this.

Proposals for further developments

1) Environmental aspects are also highlighted in the objectives of the study programme. They should be highlighted even more in the marketing of the study programme and recruitment of new students. Environmental and sustainable development aspects should be highlighted in each subject course.
2) It is also possible to finish the study programme with a final exam instead of a thesis/project. Since companies need engineers with project management and report writing skills, the Committee recommends not implementing the final exam option. The volume of the graduation thesis could even be increased to

30 ECTS so that it would be a collaborative project in a company rather than a traditional graduation thesis.
3) The educational literature used is quite outdated and mainly in Estonian. Some subject courses have no written study material at all. It is advisable to start a project to update the study literature and make it available to students digitally and free of charge.
4) It is advisable to promote international cooperation in research, teaching, and student exchange, including, for example, in the Baltic-Scandinavian region.

ENGINEERING (BACHELOR'S STUDY)

Strengths

1) The study programme has a clear focus on the following three Master's programmes (Ergonomics, Energy Application, and Production Engineering).
2) Student feedback on the study programme is taken seriously, and changes are implemented.
3) Academic staff are readily available to students, creating a culture of open discussion.

Areas for improvement and recommendations

1) The study programme should not be changed too frequently. It takes time to discover weak points. It is not advisable to make major changes in the next 4-5 years.
2) Although the technical infrastructure of the study programme is very good (except for the CNC benches), the challenge is to maintain and update it regularly. There is no relevant strategy in the University. A solution could be sought together with companies using their infrastructure.
3) It is necessary to develop and implement a strategy for regular (every 3-4 years) updating of the computer fleet so that students and staff have access to the latest technology and can also use new versions of industry-standard software.
4) For many lecturers, doctoral studies should be important, but their high teaching load does not allow them to engage in research, publish, or attend conferences. The free semester system and other measures supporting doctoral studies must be implemented.
5) The salary of lecturers is lower than in companies and is not motivating. It is highly desirable to raise the salaries of the lecturers to a level comparable to the industry. Without it, it is not possible to fulfill the University's strategic goal of rising in the international rankings of universities.
6) The age structure of the teaching staff is a problem. 50% of the teaching staff are older than 50 years, 25% of the teaching staff are older than 60 years, and three teaching staff are already over 70.

7) Students use mobility programs little, mainly in connection with working in parallel with their studies. One solution could be to offer foreign internships in cooperation with employers.

Proposals for further developments

1) The study programme does not take into account the employment of students. Scholarships could create an opportunity to reduce dropout rates.
2) The study programme should include more problem-based learning and teamwork.
3) Efforts should be made to involve practitioners who also have research experience in conducting special courses.

FOOD TECHNOLOGY (BACHELOR'S STUDY AND MASTER'S STUDY)

Strengths

1) The feedback system works well. The students' feedback to the teaching staff is generally positive, and the feedback is used in study programme development.
2) Together with the Study Programme of Veterinary Medicine, they participate in the implementation of the "Farm to Table" strategy of the European Green Deal.
3) Several research projects have been developed and studies initiated on the valorization of food processing by-products.
4) There is a clear focus on raw material-based technologies, and the Master's program has corresponding specializations.
5) The Technology of the Bakery and Pastry-Cook specialty module of the Master's program has been expanded into a Plant-based Food Technology module.
6) The laboratory complex is modern and meets the requirements of high-level research.
7) Various methods are used in teaching, including exemplary e-learning opportunities.
8) The number of subject courses in English has increased, and the attitude towards teaching in English is positive on all sides.
9) The overall atmosphere is positive, and student satisfaction with the teaching staff, resources, and the study programme are high. Career opportunities in the food industry are very good.
10) The University's new academic structure and recognition system have been well received by all parties.

Areas for improvement and recommendations

1) Due to the labor shortage in the sector, many students are recruited to work already during their studies. Together with employers, the University should

find a solution to this problem that would value the completed university education and diploma.
2) Although the number of teaching staff with a doctorate degree has increased, their proportion is still low. Research capacity must be increased through participation in national and international research projects. When hiring new teaching staff, a doctoral degree must be required.
3) The number of scientific publications is low in international comparison. Although the goals in terms of publication have been set, the high teaching load of the teaching staff does not allow them to be achieved.
4) The number of students in the Master's programme is too small. It is necessary to expand domestic and international cooperation with other universities. It is also necessary to strengthen cooperation with companies in order to motivate them to start and complete their Master's studies.

Proposals for further developments

1) Students' awareness of research projects and the benefits of participating in them should be raised. Seminars should be organized for students, where all ongoing research projects and opportunities to participate in them are introduced.
2) It is necessary to increase the diversity of top-level teaching and research equipment. A good addition would be to focus on in-depth food analysis. Additional funding from national and international research projects should preferably be obtained in cooperation with companies.
3) Research-based study and analytical writing skills could be improved by making a Bachelor's thesis compulsory.
4) The mobility of academic staff should be increased. This would create more opportunities for international cooperation, new projects, and more funding. The University could introduce a motivation system to increase staff mobility.
5) The international mobility of students should be increased. There should be a motivation system to direct students to study abroad. The current situation shows that there are enough financial opportunities; rather it is a question of students' motivation. The University needs to do more comprehensive analyzes to understand what would motivate students to increase international mobility.
6) It should be ensured that the study programme admission information contains sufficient information about the content of the study programmes. Students should be made clear during the application process that a university degree in food technology involves advanced science and that it is not a culinary education. This can potentially reduce later dropout.

ERGONOMICS (MASTER'S STUDY)

Strengths

1) The study programme has an optimal balance between theory and practice.

2) Employees themselves are engaged in the development of complex equipment and test methods. A great example is the development of the electromyography recorder.
3) The laboratories are spacious, and their furnishings are suitable.
4) Almost all teaching staff have PhDs.
5) Students are very highly motivated.
6) Enthusiastic alumni are involved in the study programme activities.
7) Graduates have good perspectives on the labor market.
8) Dropouts from the study programme are low.

Areas for improvement and recommendations

1) The lack of computers and software, which causes delays for students in completing assignments and the study programme, needs a quick solution.
2) The workload of lecturers is high. It is necessary to recruit more lecturers, including inviting more foreign guest lecturers than before.
3) Financial problems hinder international mobility. By its nature, ergonomics is strongly related to practice. Therefore, ways to solve financial problems in cooperation with local employers could be explored. In the Committee's experience, this ultimately results in a significant return on investment for employers.

Proposals for further developments

1) Such "hot topics" in ergonomics as human-robot collaboration and human-cyber-physical systems should be included (or made more visible) in the study programme.
2) Students' summer internships in foreign companies would be useful, and recommendations for internships could be received from global companies operating in Estonia.
3) Publishing locally developed devices and methods in international journals would encourage contact with the international community.
4) Opportunities to increase mobility by establishing links with international networks to promote ergonomics education should be explored. Several initiatives have been taken to promote and exchange ergonomics and occupational health education at an international level, such as the ENETOSH network (www.enetosh.net) or the Global HFE Education Map (https://iea.cc/global-hf-e-education-map/).

ENERGY APPLICATION ENGINEERING (MASTER'S STUDY)

Strengths

1) The study programme is well-managed and in line with energy sector developments and professional standards. Lecturers with experience in relevant

specialist areas, such as smart grids and renewable energy, have been recruited.
2) The laboratories are of high quality and diversity and ensure the achievement of the practical outputs of the study programme. Laboratories are also shared with other study programmes.
3) Participation in international programmes allows students to participate in specialized laboratories.
4) The study organization is flexible and takes into account the interests of working students.
5) Good IT support in the development of e-learning and Moodle courses.
6) The new format of the Master's thesis is flexible, allows students to contribute to research, and reduces dropout rates.
7) The lecturers are highly motivated and offer very good support to the students.
8) Good cooperation with companies and foreign partners (especially with universities in France, Latvia, and Egypt) supports the implementation of the study in every way. The chair has a realistic plan for internationalization, mobility, and the promotion of English language learning.
9) The employment rate of graduates is high. Employers are satisfied with the students' preparation.

Areas for improvement and recommendations

1) Due to the heavy teaching load, it is difficult for lecturers to participate in doctoral studies. The teaching load of lecturers studying in the doctoral program should not be more than 50% of the total load. The University has a goal that all teaching staff should have a doctoral degree, but there is no clear plan in this regard, and the problem is left to be solved by each chair individually.
2) Dropout rates are high.
3) The international mobility of students is low, and the main problem is students' family and work obligations. There are also few incoming foreign students due to the lack of courses in English.

Proposals for further developments

1) The number of non-university members of the Study Programme Council should be increased, especially as regards alumni. The representation of students should also be increased.
2) The practical aspects of the subject courses should be updated in accordance with the practices of the industrial sector, and engineers from companies should be involved in teaching and laboratory development.
3) Although the laboratories are well-equipped, some of the equipment, such as transformers and measuring instruments, are outdated and date back to the Soviet era. Such devices can fulfill the required function, but a plan to upgrade some devices would be beneficial.

4) Students who met with the Committee pointed out that modern electric drives and servo drive systems exist, but not all lecturers know how to demonstrate them. It is necessary to train lecturers in this regard.
5) It is recommended to further develop the online practical study so that it is not just a demonstration of something but so that the student can actively participate. For example, work sets have been sent out to students in the Technotronics Study Programme.
6) Foreign guest lecturers should be involved more, and researchers with international backgrounds should be recruited.
7) Lecturers should be supported more in the preparation of applications for research grants, and younger lecturers should also be included in the projects.
8) There is clear room for improvement in the involvement of the Study Programme's alumni - for example, none of the alumni who spoke to the Committee had any contact with the University. Alumni are available to offer guest lectures and mentor students.

PRODUCTION ENGINEERING (MASTER'S STUDY)

Strengths

1) In study programme development, cooperation has been made with seven different universities across Europe.
2) The study programme meets the expectations of employers. The employment rate of graduates is high. Alumni are very satisfied with the education they received at the University.
3) The laboratories have been renovated, especially in the field of biotechnology.
4) The teaching staff is highly motivated and qualified and supports students in every way. 75% of the teaching staff have a doctorate degree, and most of them are younger than 50 years.

Areas for improvement and recommendations

1) The problem is the small number of students (only 31 graduates in four years), e.g., more admission applications are submitted to the Energy Applications Study Programme. At the same time, there is a shortage of engineers in Estonia. The low number of applications and admissions may be due to some confusion about the nature of the study programme, as it is not actually a manufacturing engineering or mechanical engineering study programme (although it is more similar to the latter). The study programme should be renamed the Master's program of Engineering, and different specializations should be developed there. It would be clearer for both students and employers. The study programme needs to be better marketed.
2) Since three lecturers are aged 69+, it is necessary to develop a strategy for recruiting new lecturers.

3) The workload of younger lecturers should be reviewed, and they should be provided with better time resources for research. Young lecturers must be encouraged to take a free semester.
4) The workload of students is high due to working alongside their studies. The University should analyze the situation in order to create opportunities for students for activities other than study and paid work.

Proposals for further developments

1) It is advisable to create an advisory board made up of company representatives for the study programme to regularly discuss the study programme, the labor market situation, and possible topics for Master's theses. One employer representative on the current Study Programme Council is not enough to get a broader view.
2) It is recommended to conduct more subject courses in English in order to, among other things, increase the number of foreign students.
3) The study programme should include more sustainable development topics.
4) The University should have a plan for regular updating of the computer fleet.
5) In cooperation with employers, opportunities for international mobility in foreign partner companies should be sought.
6) The results of the student's assessment of the teaching staff could be made public.
7) Lecturers should participate more in various training.

11. Clause 41 of the document "Quality Assessment of the Study Programme Group at the First and Second Level of Higher Education" stipulates that the Assessment Council shall approve the assessment report within three months after its receipt. The Council will consider the strengths, areas for improvement, and recommendations identified by the Assessment Committee and decide to carry out the next quality assessment of the Study Programme Group in seven, five, or three years.

12. The Council considered the strengths, areas for improvement, and recommendations set out in clause 10 and found that the study programme, the studies provided on it, and the development activities related to the studies meet the requirements.

13. In view of the above, the Council

DECIDED

To approve the assessment report and to carry out the next assessment of the quality of the Engineering, Manufacturing, and Technology Study Programme Group of the Estonian University of Life Sciences in seven years.

The decision was adopted by ten votes in favor and none opposed.

14. The Council asks the Estonian University of Life Sciences to present to the Council an overview of the consideration of the improvement areas and recommendations outlined in point 10 of this decision by 26.05.2023 at the latest, paying special attention to increasing the number and proportion of teaching staff with a doctorate degree and activities to update the laboratory and computer fleet.
15. A person who considers that the decision has violated his or her rights or restricted his or her freedoms may file a challenge with the Assessment Council of EKKA within thirty (30) days after the appellant became aware of or should have become aware of the contested act. The Assessment Council shall send the challenge to the challenge committee of the Assessment Council of EKKA, which shall submit a written, impartial opinion to the Assessment Council on the reasoning of the challenge within five (5) days of receipt of the challenge. The Assessment Council shall resolve the challenge within ten (10) days of receipt, taking into account the reasoned position of the appeal committee. If the challenge needs to be further investigated, the Assessment Council may extend the term for reviewing the challenge by up to thirty (30) days. Contestation of a decision in court is possible within thirty (30) days of its service by submitting an appeal to the Tallinn Courthouse of the Tallinn Administrative Court pursuant to the procedure provided for in the Administrative Court Procedure Act.

Hillar Bauman
Secretary of the Council