SKVC

STUDIJŲ KOKYBĖS VERTINIMO CENTRAS
CENTRE FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

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PRODUCTION and MANUFACTURING ENGINEERING FIELD OF STUDY

Kaunas University of Technology

EXTERNAL EVALUATION REPORT

Expert panel:
1. Panel chair: Prof. Dr. Gita Revalde ……………………….... (signature)
2. Academic member: Prof. Dr. Brian Vejrum Wæhrens;
3. Academic member: Prof. Dr. Tauno Otto;
4. Social partner representative: Mr Audrius Jasėnas;
5. Student representative: Mr Džiugas Vyšniauskas.

SKVC coordinator: Dr. Ona Šakaliene

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I. INTRODUCTION

1.1. OUTLINE OF THE EVALUATION PROCESS

The field of study evaluations in Lithuanian higher education institutions (HEIs) are based on the following:

- Procedure for the External Evaluation and Accreditation of Studies, Evaluation Areas, and Indicators, approved by the Minister of Education, Science, and Sport;
- Methodology of External Evaluation of Study Fields approved by the Director of the Centre for Quality Assessment in Higher Education (SKVC);
- Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG).

The evaluation is intended to support HEIs in continuous enhancement of their study process and to inform the public about the quality of programmes within the field of study.

The object of the evaluation is all programmes within a specific field of study. A separate assessment is given for each study cycle.

The evaluation process consists of the following main steps: 1) Self-evaluation and production of a self-evaluation report (SER) prepared by an HEI; 2) A site visit by the review panel to the HEI; 3) The external evaluation report (EER) production by the review panel; 4) EER review by the HEI; 5) EER review by the Study Evaluation Committee; 6) Accreditation decision taken by SKVC; 7) Appeal procedure (if initiated by the HEI); 8) Follow-up activities, which include the production of a Progress Report on Recommendations Implementation by the HEI.

The main outcome of the evaluation process is the EER prepared by the review panel. The HEI is forwarded the draft EER for feedback on any factual mistakes. The draft report is then subject to approval by the external Study Evaluation Committee, operating under SKVC. Once approved, the EER serves as the basis for an accreditation decision. If an HEI disagrees with the outcome of the evaluation, it can file an appeal. On the basis of the approved EER, SKVC takes one of the following accreditation decisions:

- **Accreditation granted for 7 years** if all evaluation areas are evaluated as exceptional (5 points), very good (4 points), or good (3 points).
- **Accreditation granted for 3 years** if at least one evaluation area is evaluated as satisfactory (2 points).
- **Not accredited** if at least one evaluation area is evaluated as unsatisfactory (1 point).

If the field of study and cycle were **previously accredited for 3 years**, the re-evaluation of the field of study and cycle is initiated no earlier than after 2 years. After the re-evaluation of the field of study and cycle, SKVC takes one of the following decisions regarding the accreditation of the field of study and cycle:

- To be accredited for the remaining term until the next evaluation of the field of study and cycle, but no longer than 4 years, if all evaluation areas are evaluated as exceptional (5 points), very good (4 points) or good (3 points).
- To not be accredited, if at least one evaluation area is evaluated as satisfactory (2 points) or unsatisfactory (1 point).

1.2. REVIEW PANEL

The review panel was appointed in accordance with the Reviewer Selection Procedure as approved by the Director of SKVC.

The composition of the review panel was as follows:

1. Panel chair: Prof. Dr. Gita Revalde, professor at the Riga Technical University, Institute of Technical Physics, Latvia;
2. Academic member: Prof. Dr. Brian Vejrum Wæhrens, professor at the Aalborg University, Department of Materials and Production, Denmark;
3. Academic member: Prof. Dr. Tauno Otto, professor at Tallinn University of Technology, School of Engineering, Department of Mechanical and Industrial Engineering, Estonia;
4. Social partner representative: Mr Audrius Jasėnas, Director of the Public enterprise ,,Intechcentras", Lithuania;
5. Student representative: Mr Džiugas Vyšniauskas, Second-year master's student of the life and chemical physics program of Vilnius University's Faculty of Physics, Lithuania.

1.3. SITE VISIT

The site visit was organized on 18 November 2024 onsite.

Meetings with the following members of the staff and stakeholders took place during the site visit:

- Senior management and administrative staff of the faculty(ies);
- Team responsible for preparation of the SER;
- Teaching staff;
- Students;
- Alumni and social stakeholders including employers.

There was no need for translation and the meetings were conducted in English.

1.4. BACKGROUND OF THE REVIEW

Overview of the HEI

Kaunas University of Technology (KTU) is a public, interdisciplinary University known for its global competitiveness in knowledge and innovation. Established in 1922 as the University of Lithuania, it underwent several name changes, becoming Kaunas Polytechnic Institute in 1950 and finally KTU in 1990. Since its founding, KTU has graduated over 153,000 students.

The KTU has 9 faculties (Chemical Technology; Civil Engineering and Architecture, Electrical and Electronics Engineering, Informatics; Mathematics and Natural Sciences; Mechanical Engineering and Design; Panevėžys Faculty of Technologies and Business; School of Economics and Business; Social Sciences, Arts and Humanities), the Library and eight institutes (Architecture and Construction; Biomedical Engineering; Environmental Engineering; Food; Health Telematics Science, Materials Science; Mechatronics and Prof. K. Baršauskas Ultrasound Research Institute), 9 science centers.

Overview of the study field

There are 6 study programmes in the Production and Manufacturing Engineering study field (MIDF) at KTU: three 1st cycle (one is interdisciplinary) and three 2nd cycle programmes. The study programmes are taught by the academic staff from the Faculties of Chemical Technology, School of Economics and Business, Electrical and Electronics Engineering, Informatics, Social Sciences, Arts and Humanities, Mathematics and Natural Sciences, and the Vilnius Academy of Arts, and others. There are two Study Programme Committees (SPC) responsible for the quality and implementation of KTU Production and Manufacturing Engineering study programmes (SPs): the KTU Production and Manufacturing Engineering SPC and a joint SPC of KTU and the Vilnius Academy of Arts in Production and Manufacturing Engineering and Design fields.

Previous external evaluations

The 2008 evaluation of the Production Engineering master's SP at KTU resulted in a positive assessment, highlighting areas for improvement to align the programme with the General Requirements for Technological Studies. Key recommendations included revising and optimizing the number of specializations, enhancing the utilization of scientific laboratories for student projects, and integrating entrepreneurial and economic aspects into coursework. Measures to address a high student drop-out rate were also advised. Following these recommendations, the SP improved its structure and content to meet employer needs and comply with European and national higher education standards.

The Mechatronics bachelor's SP, first established in 1997, was reviewed in 2008. The evaluation emphasized the need to revise the curriculum to fully meet general requirements, improve laboratory equipment, and increase the availability of relevant textbooks. A deeper focus on the quality of final degree projects was also recommended. In response, the SP made adjustments to improve its structure and execution, enhancing practical and theoretical components to address these recommendations. The bachelor's SP in Mechatronics received a positive evaluation in 2017, achieving a score of 18 out of 24 and accreditation for six years. The evaluation praised the integration of mechanical and information technologies but recommended the inclusion of more innovative teaching approaches and interdisciplinary modules to meet industry trends. Subsequent improvements focused on fostering problem-solving and innovation in digital manufacturing and robotics.

The 2008 evaluation of the Mechatronics master's SP focused on improving laboratory resources, increasing the availability of academic materials, and strengthening the faculty's research base. These recommendations were implemented, resulting in better-equipped facilities, a richer selection of textbooks, and enhanced research integration into the SP. These changes aimed to ensure the SP remained competitive and aligned with the needs of employers and European education standards. Thereafter the 2017 review of the Mechatronics master's programme recognized its strong research orientation and technical focus, awarding a score of 20 out of 24 and a six-year accreditation. Suggestions included broadening international collaboration and enhancing research facilities. Following the review, the SP emphasized cutting-edge mechatronic system development and collaboration with international academic and industrial partners.

The Industrial Engineering and Management master's SP was last evaluated in 2012 and accredited for three years. The review called for improvements in the quality and depth of final degree projects, the development of team-based research projects, and enhanced facilities for supporting group work. Additionally, the inclusion of modern educational software was recommended. These suggestions were successfully addressed, leading to advancements in project quality, team collaboration, and the integration of new technologies into the curriculum.

The external evaluation conducted in 2017 for the Production Engineering master's SP highlighted its strong alignment with the needs of the Lithuanian industry and international standards. Recommendations included enhancing research integration and revising the structure of specializations to maintain relevance with labor market needs. The SP incorporated these improvements, emphasizing advanced production strategies and decision-making capabilities. The Industrial Engineering and Management master's SP was evaluated and accredited for six years, receiving 20 out of 24 points. The review commended the SP's interdisciplinary approach, combining engineering and management skills, while recommending enhanced support for entrepreneurial initiatives and modern management software. Improvements following the evaluation included integrating innovation-driven modules and field-specific software.

Documents and information used in the review

The following documents and/or information have been provided by the HEI before or during the site visit:

- *Self-evaluation report and its annexes*
- *Final theses*

Additional sources of information used by the review panel:

- *KTU stakeholders' surveys (2021-2022 survey of employers (in Lithuanian);*
- *Survey of teachers (202-2021) (in Lithuanian);*
- *MIDF Graduate survey 2022-2023 (in Lithuanian);*
- *Professional practice feedback template (in Lithuanian);*
- *KTU students and teachers survey templates (in Lithuanian);*
- *SPC protocols (in Lithuanian);*
- *KTU information about SP* **Industrial (Production) Engineering** *title change (in Lithuanian);*
- *Numbers of admitted students 2020 - 2024;*
- *Home page of the KTU.*

II. STUDY PROGRAMMES IN THE FIELD

First cycle/LTQF 6

Title of the study programme	Industrial (Production) Engineering	Mechatronics	*Industrial Design Engineering
State code	6121EX016	6121EX017	6123EX001
Type of study (college/university)	University	University	University
Mode of study (full time/part time) and nominal duration (in years)	Full time (4)	Full time (4)	Full time (4)
Workload in ECTS	240	240	240
Award (degree and/or professional qualification)	Bachelor of Engineering Science	Bachelor of Engineering Science	Bachelor of Engineering Science
Language of instruction	Lithuanian	English	Lithuanian
Admission requirements	SER 3.1	SER 3.1	SER 3.1
First registration date	2010-05-10	1997-05-19	2011-06-15
Comments (including remarks on joint or interdisciplinary nature of the programme, mode of provision)			*interdisciplinary study programme

Second cycle/LTQF 7

Title of the study programme	Production Engineering	Mechatronics	Industrial Engineering and Management
State code	6211EX015	6211EX017	6211EX018
Type of study (college/university)	University	University	University
Mode of study (full time/part time) and nominal duration (in years)	Full time (1.5)	Full time (2)	Full time (2)
Workload in ECTS	90	120	120
Award (degree and/or professional qualification)	Master of Engineering science	Master of Engineering science	Master of Engineering Science
Language of instruction	Lithuanian	English	English
Admission requirements	Bachelor's or equivalent degree	Bachelor's or equivalent degree	Bachelor's or equivalent degree
First registration date	2007-02-19	2007-02-19	2007-02-19

Comments (including remarks on joint or interdisciplinary nature of the programme, mode of provision)			

III. ASSESSMENT IN POINTS BY CYCLE AND EVALUATION AREAS

The **first cycle** of the *production and manufacturing engineering* field of study is given a **positive** evaluation.

No.	Evaluation Area	Evaluation points[1*]
1.	Study aims, learning outcomes, and curriculum	4
2.	Links between scientific (or artistic) research and higher education	4
3.	Student admission and support	5
4.	Teaching and learning, student assessment, and graduate employment	4
5.	Teaching staff	5
6.	Learning facilities and resources	4
7.	Quality assurance and public information	4
	Total:	30

The **second cycle** of the *production and manufacturing engineering* field of study is given a **positive** evaluation.

No.	Evaluation Area	Evaluation points[2*]
1.	Study aims, learning outcomes and curriculum	4
2.	Links between scientific (or artistic) research and higher education	4
3.	Student admission and support	5
4.	Teaching and learning, student assessment, and graduate employment	4
5.	Teaching staff	5
6.	Learning facilities and resources	4
7.	Quality assurance and public information	4
	Total:	30

[1*]**1 (unsatisfactory)** - the area does not meet the minimum requirements, there are substantial shortcomings that hinder the implementation of the programmes in the field.
2 (satisfactory) - the area meets the minimum requirements, but there are substantial shortcomings that need to be eliminated.
3 (good) - the area is being developed systematically, without any substantial shortcomings.
4 (very good) - the area is evaluated very well in the national context and internationally, without any shortcomings.
5 (exceptional) - the area is evaluated exceptionally well in the national context and internationally.
[2*]

IV. STUDY FIELD ANALYSIS

AREA 1: STUDY AIMS, LEARNING OUTCOMES AND CURRICULUM

1.1.	Programmes are aligned with the country's economic and societal needs and the strategy of the HEI

FACTUAL SITUATION

1.1.1. Programme aims and learning outcomes are aligned with the needs of the society and/or the labour market

The study programmes (SPs) in the Production and Manufacturing Engineering field of study have been developed to take into account long-term EU and national strategies and Roadmaps, EU and national industrial policy initiatives, reports from world-class fora, as well as internationally recognized studies and surveys.

These strategic documents highlight key competences that are relevant today and will be relevant in the near future, such as sustainable manufacturing, artificial intelligence, and high technology. The curricula also focus on soft competences such as creativity, innovation and social responsibility.

The SPs have been developed in line with Lithuania's ambition to boost its competitiveness by strengthening the level of automation and robotization in the Lithuanian industry, and by investing in competences for the development of high-tech applications in manufacturing.

Some of the SPs have been awarded a high-quality label, "Investors' Spotlight". It demonstrates that the programme meets the expectations of Lithuanian and foreign companies and investors.

The programmes of the field of study have diverse curricula and complement each other well. The business community actively contributes to the curricula of these SPs using various forms of cooperation. The SPs fully meet business expectations. Please note that the Mechatronics study programme is available in English only which meets business needs as the majority of employers that hire the study programme alumni use English as the key communication language in their companies.

Businesses are positive about the quality of the alumni knowledge. However, they are explicitly concerned that the growing Lithuanian industrial economy would wish to recruit much higher numbers of alumni, but not enough of them graduate.

1.1.2. Programme aims and learning outcomes are aligned with the HEI's mission, goals, and strategy

The Production and Manufacturing Engineering field of study includes a wide range of professional activities spread over the first and second cycles of studies. One may continue with the third cycle of studies. The field of study covers most of the Manufacturing Sector based on the Classification of Economic Activities. The Manufacturing Engineering field of study covers nearly all the key codes of the Classification of Economic Activities attributed to the Engineering and Technology Industry.

Under this field of study, the KTU cooperates closely with the largest and most prominent Lithuanian employers in the KTU region and nationwide. The employers are highly diverse both in terms of their activity areas and business models, and the cooperation partners include world-renowned international companies.

The field of study directly correlates with Lithuania's SMART specialization strategy and R&D areas.

The aims of the field SPs correspond to the mission of KTU – "to provide research-based studies at the international level, create and transfer interdisciplinary knowledge and innovative technologies for the sustainable development of society and innovation development, create an open-minded, creative environment inspiring leaders and talented individuals".

The curriculum of each study programme matches the programme objectives. The SP curriculum is up-to-date and regularly updated while the individual SPs complement each other perfectly, without duplication.

The SPs of the study field fully match the KTU priorities, such as *the development of internationality, the quality of studies, the breakthrough of science and innovation, and organizational coherence.*

The vision of the field of study that describes how it is envisioned in six or seven years, and what measurable KPIs should preferably be achieved, is not available.

ANALYSIS AND CONCLUSION (regarding 1.1.)

The SPs in the Production and Manufacturing Engineering field of study have been developed to take into account long-term EU and national strategies and Roadmaps, EU and national industrial policy initiatives, reports from world-class fora, as well as internationally recognized studies and surveys.
The field of study directly correlates with Lithuania's SMART specialization strategy and R&D areas. Some of the SPs have been awarded a high-quality label, "Investors' Spotlight".
Under this field of study, the KTU cooperates closely with the largest and most prominent Lithuanian employers nationwide in the region.

1.2.	Programmes comply with legal requirements, while curriculum design, curriculum, teaching/learning and assessment methods enable students to achieve study aims and learning outcomes

FACTUAL SITUATION

1.2.1. Programmes comply with legal requirements

The 6 SPs of this study field comply with the legal requirements of the Republic of Lithuania. Three of these SPs are taught in English. The I and II-cycle study programmes are developed and regularly updated in compliance with Lithuanian legislation, including the Law on Higher Education and Research, the Lithuanian Qualifications Framework, the Descriptor of Study Cycles, the General Requirements for Studies, and the Descriptor of the Study Field of Engineering. The allocation of study credits is designed to ensure students achieve the expected outcomes effectively. The structure and volume of I-cycle (240 credits) and II-cycle (90–120 credits) SPs comply with Lithuanian regulations, including the General Requirements for Studies and the Descriptor of the Study Field of Engineering. I-cycle SPs span four years (6400 hours), with a semester workload of 240 credits, while II-cycle SPs are 1.5–2 years (2400–3200 hours), also with 90-120 credits per semester. Both cycles ensure alignment with field-specific requirements, covering study outcomes, teaching, evaluation, and implementation standards.
Study credits represent the volume of knowledge and skills gained during studies, measured by learning outcomes and assessed by a mark. A credit serves both, as a unit of study time and a tool for recording, storing, and transferring learning outcomes. Typically, 1 ECTS credit corresponds to 26.67 hours of on-campus and individual work, though this may vary based on the nature of the outcomes. A standard 6-credit module includes 160 study hours, with 40% allocated to on-campus

activities. The alignment of learning outcomes, content, credits, and workload is reviewed annually or at least every three years by the Study Programme Committee.

All field SP comply with the description of the study field of Engineering, approved by the order of July 5, 2023, of the Minister of Education, Science and Sport of the Republic of Lithuania No. V-948, requirements for coverage, general and special study outcomes, teaching, studying, evaluation, and implementation of study programmes.

1.2.2. Programme aims, learning outcomes, teaching/learning and assessment methods are aligned

The aims of the Production and Manufacturing Engineering programmes align with learning outcomes, guiding the goals of courses and the selection of study and assessment methods. KTU's integration of SP aims, learning outcomes, teaching, and assessment methods follows a systemic approach using matrices. Module matrices confirm that all modules fully address the SP's learning outcomes. The didactic concept of study programmes is also based on a systematic approach, designed to motivate students to learn and demonstrate their achievement of study outcomes. Study modules integrate classical and modern methods, aligning teaching, learning, and assessment approaches to ensure constructive harmony. Teachers, in collaboration with the Head of the Study Programme and the Study Programme Committee, regularly review and adjust methods to effectively assess the achievement of learning outcomes.

During the evaluation period (2020–2023), the learning outcomes of the study programmes were revised in collaboration with teachers, social partners, and students. At the start of each academic year, improvement aspects are discussed by the Field Study Programme Committee (SPC), as approved by the Rector. The SPC head and the Head of the Department of Production Engineering review and attest study field modules for one or three years, depending on whether it is the first or subsequent attestation. Modules with comments are revised, improved, and validated promptly.

In addition to traditional learning methods, modern methods like the collaborative learning method are included. Both, traditional and modern assessment methods are used also to evaluate students' achievements in study modules. The traditional methods include examinations (oral, written, or computer-based), mid-term tests, reports, project defences, and laboratory work. Modern methods include problem-solving tasks, peer assessments, engagement evaluations, essays, mind mapping, scientific article analysis, competency portfolios, design projects, and concept maps, tailored to specific module outcomes. Examples of these methods are applied across various field programs.

1.2.3. Curriculum ensures consistent development of student competences

Modules are distributed systematically to avoid overlap unless foundational topics are later deepened in specialized courses. The curricula include categorized modules as General subjects, Core subjects of Engineering, Mathematics and Physical sciences, and Competence electives supporting holistic competency development. Regular meetings among faculty members aim to harmonize programmes outcomes with module-specific learning objectives. Elective modules and interdisciplinary projects enable students to tailor their learning to personal and career interests, thereby deepening or broadening competencies. The study programmes are regularly evaluated and updated based on student feedback, labor market needs, and technological advancements. For each programme learning outcomes are mapped directly to study modules. Methods like group work, problem-based learning, case studies, laboratory work, and experiential learning are employed to foster both theoretical and practical understanding. Multiple assessment techniques ensure that students are evaluated on a variety of competencies, including application, analysis, and synthesis

of knowledge. Courses progress logically, reinforcing and deepening competencies as students advance. KTU's curriculum often integrates theoretical learning with practical applications. According to Appendix 1 there are numerous projects, however, at the MSc level, Research Projects are tied with the thesis topic in very early phases.

1.2.4. Opportunities for students to personalise curriculum according to their personal learning goals and intended learning outcomes are ensured

KTU students have various opportunities to personalize their studies. Bachelor's students can address knowledge gaps through bridging courses in subjects such as mathematics, physics, chemistry, English, and IT during their first semesters. They can also select general KTU study modules, including a 6-credit course from philosophy and sustainable development alternatives (e.g., *Sustainable Development*, *Media Philosophy*) and foreign language modules at C1 level (e.g., *Academic and Subject Area Communication in English*, *French*, *German*, *Russian*). Additionally, students can choose programme-specific alternatives to gain deeper or additional competencies, decide on topics for semester projects and the final degree project, and opt for an additional 6-credit module each semester. Participants in the "GIFTed" Talent Academy also have access to specialized modules, with 2 Industrial Design Engineering and 1 Mechatronics student benefiting from these during the evaluation period.

Master's students can tailor their studies through MA+ competencies, such as change management and data analytics, offered in partnership with business and public sector organizations. They can also explore specializations and elective modules within their field for added expertise or alternative focus areas. Furthermore, students can select topics for semester, group, and final projects and participate in the "GIFTed" Talent Academy, which offers additional free 6-credit modules each semester. Flexible internship opportunities are also available during breaks or summer, providing practical experience alongside academic studies.

1.2.5. Final theses (applied projects) comply with the requirements for the field and cycle

The final thesis/research projects reflect alignment with the areas of production and manufacturing engineering, mechatronics, and industrial design engineering. Most theses aim at practical improvements, innovations, or optimizations. The presence of supervisors and grades for each project suggests that these theses are formally evaluated by panels that include both internal and external experts who can provide unbiased assessments of the work's quality and its adherence to field standards. Both the BSc and MSc thesis were well formed, properly referred with enough number of relevant references, and following academic IMRAD structure. Applied projects ensure students develop competencies in technical design and innovation, as seen in projects that create functioning prototypes. Also critical thinking and problem-solving, by analyzing and optimizing industrial processes, and proper research methodology, through literature reviews, data analysis, and experimental testing are taught through projects.

ANALYSIS AND CONCLUSION (regarding 1.2.)

All SPs in the study field demonstrate compliance with the official requirements. All field SPs comply with the description of the study field of Engineering and requirements for coverage, general and special study outcomes, teaching, studying, evaluation, and implementation of study programmes. The aims of the Production and Manufacturing Engineering study programmes are aligned with their learning outcomes and with the objectives of individual modules and the selection of teaching and assessment methods. A systemic approach ensures that SP aims, outcomes, teaching, and assessment are integrated. The module matrices confirm that the modules comprehensively cover the programme's learning outcomes. As a remark, it was slightly difficult to analyze area 1.2.

requirements since the self-evaluation report was composed in a different format, the numeration did not correspond to the numeration of the area's indicators.

During the meeting with the stakeholders, it was clearly stated that there is a significant demand for engineers in the production and manufacturing sectors in Lithuania. However, the number of students in the programmes is too low, creating challenges in meeting industry demand.

Students have access to elective courses in both cycles, they have many possibilities to personalize the curriculum; however, the range of choices in reality is limited due to small class sizes and economic constraints because the number of applicants choosing the specific elective course can be too small to open it.

AREA 1: CONCLUSIONS

AREA 1	Unsatisfactory - 1 Does not meet the requirements	Satisfactory - 2 Meets the requirements, but there are substantial shortcomings to be eliminated	Good - 3 Meets the requirements, but there are shortcomings to be eliminated	Very good - 4 Very well nationally and internationally without any shortcomings	Exceptional - 5 Exceptionally well nationally and internationally without any shortcomings
First cycle				x	
Second cycle				x	

COMMENDATIONS
1. The study programmes are needed due to high demand for production engineers from stakeholders.

2. KTU has great potential to attract international students, as study programmes are offered in English.

RECOMMENDATIONS
To address shortcomings
None

For further improvement
1. The number of enrolled students, particularly local ones from Lithuania, could be higher. Therefore, it is suggested to invest more effort in career guidance, partnerships with engineering lyceums, and their promotion. Additional efforts, in collaboration with stakeholders and industry, are necessary to attract more local secondary school or college graduates. Strengthening the marketing strategy to increase the visibility of the programmes and allocating additional resources for promotion are also advised.

2. Although KTU has had notable success in attracting foreign students, it is essential to address the issue of training students in Lithuanian so they can more effectively participate in internships at local companies.

3. There is no clear vision for the field of study, describing how it is imagined in six or seven years, including goals to be achieved and tasks to be completed. This vision should be integrated with labor market demand surveys and the marketing strategy mentioned above.

AREA 2: LINKS BETWEEN SCIENTIFIC (OR ARTISTIC) RESEARCH AND
HIGHER EDUCATION

2.1.	Higher education integrates the latest developments in scientific (or artistic) research and technology and enables students to develop skills for scientific (or artistic) research

FACTUAL SITUATION

2.1.1. Research within the field of study is at a sufficient level

Faculty members actively engage in research projects that align closely with study modules, ensuring that the latest scientific advancements are incorporated into the curriculum. Students participate in research through theses and projects, contributing to both theoretical and applied fields. The research in Mechanical and Materials Engineering at KTU has been assessed as high-quality, with Mechanical Engineering receiving the top national score. Publications in international, peer-reviewed journals and active patent applications highlight the global relevance and quality of KTU's research. In 2023, the University entered into 28 licensing agreements and intellectual property transfer contracts with business entities to advance technologies developed by its researchers. Additionally, KTU filed 31 patent applications for its inventions, including 8 in Lithuania and 23 internationally. During the same period, KTU was granted 19 patents: 8 Lithuanian patents and 11 from foreign jurisdictions. The faculty's involvement in international research projects as Horizon 2020 and COST actions, enhances academic standards and introduces interdisciplinary approaches to the educational framework. Increased revenue from international research funding reflects the competitiveness of KTU's research on a global scale. Students are encouraged to participate in research projects and international conferences, providing practical exposure and opportunities to contribute to innovative developments. Many final theses are based on or inspired by ongoing research projects, bridging theoretical learning and real-world applications. KTU focuses on critical global challenges such as digital transformation, sustainable manufacturing, and advanced materials, aligning its research priorities with international trends and industry needs.

2.1.2. Curriculum is linked to the latest developments in science, art, and technology

The curriculum incorporates modules such as *Computer-Aided Process Design* and *Innovative Production Technologies*, which address cutting-edge topics like Industry 4.0, digitalization, and sustainable manufacturing. Courses on artificial intelligence, robotics, and additive manufacturing provide students with the tools to tackle modern technological challenges. Learning outcomes and study modules are frequently updated to reflect advancements in scientific research. Students engage in projects that contribute to contemporary challenges, such as sustainable development and digital transformation. Partnerships with industry leaders as Mitutoyo, enhance the practical application of the curriculum by introducing students to state-of-the-art equipment and real-world case studies.

2.1.3. Opportunities for students to engage in research are consistent with the cycle

At BSc the research engagement begins early, with modules such as *Introduction to Specialty* that present cutting-edge research in the field and encourage participation in faculty-led initiatives. Students participate in conferences like the *Industrial Engineering Young Scientists Conference* and events such as *Technorama*, where they present their research projects. Master's students are involved in more advanced research, including co-authorship of publications in high-impact journals

indexed in databases such as WoS. Funded research opportunities in the form of the *Student Research Project During Semes*ters and Summer Internship Projects, enhance their ability to independently explore complex topics under academic mentorship. During the evaluation period, 61 students participated in research activities (including involvement in scientific conferences and projects under faculty supervision). Students undertook 8 scientific internships funded by state budgets in engineering and materials research area, made more than 40 presentations at conferences (Technorama etc.), contributed to 7 publications indexed in WoS/Scopus and published over 30 conference papers in conference proceedings. Regarding EU Structural Funds projects there were 4 projects with student involvement, and State-Funded Research 4 projects, addressing topics of advanced material studies and biodegradable packaging.

ANALYSIS AND CONCLUSION (regarding 2.1.)

The faculty is clearly research-active and has documented the ability to engage students in research activity through joint publications. Faculty members are actively involved in research projects that closely align with the study modules, ensuring the integration of cutting-edge scientific advancements into the curriculum. Students contribute to both theoretical and practical fields by engaging in research through theses and projects. Research in Mechanical and Materials Engineering at KTU has been recognized for its high quality, with Mechanical Engineering earning the highest national rating.

An issue of concern could be to increase the number of publications in top-25 journals (Scopus impact analytics), which is at the lower end at the moment.

AREA 2: CONCLUSIONS

AREA 2	Unsatisfactory - 1 Does not meet the requirements	Satisfactory - 2 Meets the requirements, but there are substantial shortcomings to be eliminated	Good - 3 Meets the requirements, but there are shortcomings to be eliminated	Very good - 4 Very well nationally and internationally without any shortcomings	Exceptional - 5 Exceptionally well nationally and internationally without any shortcomings
First cycle				x	
Second cycle				x	

COMMENDATIONS

1. The Production and Manufacturing Engineering field at KTU is supported by high-quality research, as evidenced by publications in international journals, participation in global research projects, and patents developed by faculty and students.

2. Both bachelor's and master's students are actively involved in research through theses, projects, and participation in conferences such as *Technorama* and the *Industrial Engineering Young Scientists Conference*.

RECOMMENDATIONS
To address shortcomings
None

For further improvement

1. It is suggested to deepen collaborations with industry partners to make more study visits to companies and also expand opportunities for applied research and problem-solving projects, ensuring that students gain practical insights and experience working on real-world challenges.
2. The prototyping and product development-related project activities could be added.

AREA 3: STUDENT ADMISSION AND SUPPORT

3.1.	Student selection and admission is in line with the learning outcomes

FACTUAL SITUATION

3.1.1. Student selection and admission criteria and procedures are adequate and transparent

The student selection and admission criteria and procedures at KTU have a structured and well defined approach for both I and II cycle SPs. There are different admission pathways for local and international students, mainly consisting of a national application system and internal application system. The applicants are selected by calculating a competitive score. For I cycle applicants, this score consists of state and annual grades as well as additional points for certain achievements. For II cycle applicants, the competitive score is based on undergraduate performance, scientific activity, and motivational assessment.

In the first cycle programme of Industrial Engineering, there was a decline in applications which resulted in the suspension of the programme in 2022 (1st priority from 15 to 6). This is attributed to the insufficient numbers of first priority applicants and potentially influenced by low national maths exam results. The Mechatronics programme is offered exclusively in English and is experiencing a steady interest from both domestic and international students (1st priority ~20 students per year). This programme allowed for additional admission time in the spring semester, however, it will be discontinued in 2024. The Industrial Design Engineering programme has seen an increase in application numbers (all priorities from 58 to 82), showing a rising interest in engineering fields due to industry demand and evolving programmes content. Second-cycle programs have a steady number of applicants (all priorities get about 100 applicants per year, and the admission rate is about 60%) and are popular among experienced professionals in the field aiming to acquire a higher qualification.

3.1.2. Recognition of foreign qualifications, periods of study, and prior learning (established provisions and procedures)

KTU has procedures for recognizing foreign qualifications, prior studies and informal learning. This evaluation is exclusively handled by the International Relations Department, except for state funded bachelor's positions. The analysis is completed by competent employees and guided by national and SKVC recommendations. KTU allows for several levels of recognition: full recognition, recognition with specific rights or recognition only with additional requirements.

Their procedures allow for the recognition of prior learning and structured guidelines for credit transfer. Full credits earned in other institutions may be recognized under mobility agreements or Erasmus+ programs. In other cases, depending on the course content alignment, KTU may approve up to 75% of the SPs volume. Optional modules are included without limitations; however, the final thesis project cannot be recognized.

These procedures have shown to be successful to KTU`s SPs in English (Mechatronics I/II cycles and Industrial Engineering and Management), where international students often make up more than 60% of all program students. Also, from the university data it is visible that the number of recognized courses from other higher education institutions and previously acquired learning outcomes have seen growth. Comparing 2020/2021 and 2022/2023 timeframes we can see an increase in these numbers from 81 to 172.

ANALYSIS AND CONCLUSION (regarding 3.1.)

The student selection and admission procedures are transparent and well-structured. They are mainly based on competitive scores calculated from academic performance. Admission processes are also well structured and swift. The increasing number of international students also shows that KTU has a functioning mechanism for the recognition of foreign qualifications, prior studies, and informal learning. This process is wholly managed by the International Relations Department.

3.2.	There is an effective student support system enabling students to maximise their learning progress

FACTUAL SITUATION

3.2.1. Opportunities for student academic mobility are ensured

KTU actively supports student academic mobility and offers multiple options for education, international and cultural experience. Generally, they offer physical, mixed, and virtual mobility. Students have the possibility of engaging in partial studies abroad in many partner countries across Europe, the Americas, and Asia. Also, through Erasmus+ and other programs, like "Vulcanus in Japan", students are able to get internship work experience at international companies and research centers. Tuition fees are generally waived through exchange agreements; however, students must cover travel and accommodation costs. In some cases, it is possible to get mobility scholarships for such expenses.

In recent years, factual student mobility has seen some decreases in numbers, however, this can be attributed to the COVID-19 pandemic and recent geopolitical issues. The total number of students who left for partial studies and internships abroad was 13 in 2019/2020, 17 in 2020/2021 and 27 in 2021/2022. There is clear growth of mobility, however they still haven't reached pre-pandemic numbers. As for incoming students, there were a total of 26 in 2020/2021, 30 in 2021/2022 and 20 in 2022/2023 for both 1st and 2nd cycles. KTU has programs in place to promote the available opportunities through events such as "Go Abroad Fair", "Cafe Erasmus" and one-on-one consultations. This structured support, partnerships, and various programs show KTU`s commitment to student academic mobility, however, students still face some logistical and financial challenges.

3.2.2. Academic, financial, social, psychological, and personal support provided to students is relevant, adequate, and effective

KTU offers a variety of student support programs for a variety of student needs. They have services for academic, social, financial, psychological as well as personal aspects. Mentorship programs such as GUIDed, GIFTed and SKILLed are designed for all study levels and bridging courses. In 2023 there were a total of 443 academic support mentors who gave consultations to 428 students and 132 career mentors who gave consultations to 203 students.

On top of that, students have access to one-on-one teacher consultations and extracurricular activities like Technorama and Startup Space. Regarding financial assistance, there are

scholarships, mobility grants, and tuition fee exemptions. The total number of students who received financial support was 183 in 2020/2021, 218 in 2021/2022 and 172 in 2022/2023. The drop in the last timeframe is mainly attributed to no mobility grants being given out during that time.

There is also customized help for students in challenging socio-economic conditions and/or with disabilities. Career development is offered through social support initiatives like WANTed and UNITed, as well as opportunities for non-formal education, and artistic and sports activities. KTU offers free psychological consultations from trained psychologists, resources for stress management, and group activities. In 2023 there were 182 students who used psychologist consultations. Peer mentors and tutors help students with study, career or personal related challenges.

3.2.3. Higher education information and student counseling are sufficient

KTU adopts a widely accepted procedure called Welcome Week, where first-year students receive guidance on studies, mentorship programs, scholarships, libraries, mobility opportunities, and student associations. After an in-depth introduction, students get assigned peer mentors for further integration. Additionally, modules such as Introduction to Speciality are developed to familiarise students with their study field, career, and research opportunities.

During their studies, students have access to resources through online platforms such as Academic Information System, Moodle, and intranet. They are also communicated through other channels like newsletters, social media, and email. KTU has support departments, academic mentors, and the Study Center for consultations on academic, financial, and well-being matters. KTU also supports the Study@KTU Ambassadors program led by students which promotes student engagement and cultural exchange.

ANALYSIS AND CONCLUSION (regarding 3.2.)

KTU actively promotes student mobility by participating in Erasmus+ and bilateral partnerships with institutions across Europe, Asia and the Americas. The students have options to choose physical, mixed or fully virtual mobility, though some logistical and financial challenges remain. These programs are continuously promoted through events and consultations. It can be concluded that KTU provides comprehensive academic, financial, social, psychological, and personal support for both 1st and 2nd cycle students. They are well-constructed and advertised through events, consultants, and electronic communications.

AREA 3: CONCLUSIONS

AREA 3	Unsatisfactory - 1 Does not meet the requirements	Satisfactory - 2 Meets the requirements, but there are substantial shortcomings to be eliminated	Good - 3 Meets the requirements, but there are shortcomings to be eliminated	Very good - 4 Very well nationally and internationally without any shortcomings	Exceptional - 5 Exceptionally well nationally and internationally without any shortcomings
First cycle					X
Second cycle					X

COMMENDATIONS

1. There is a well-established, effective and functional collaboration between faculty administration and student representatives.
2. Both local and international students are very satisfied with the application process and the support provided by the faculty administration.

RECOMMENDATIONS

To address shortcomings
None

For further improvement

1. Due to the increasing number of international students and continuing research internationalization, lecturers should be encouraged to enhance their English levels.

AREA 4: TEACHING AND LEARNING, STUDENT ASSESSMENT, AND GRADUATE EMPLOYMENT

4.1.	Students are prepared for independent professional activity

FACTUAL SITUATION

4.1.1. Teaching and learning address the needs of students and enable them to achieve intended learning outcomes

The teaching and learning process at KTU is structured to consider the diverse needs of students. The content of studies is continuously updated to align with the latest scientific, artistic, and technological achievements. Students at KTU have opportunities to engage in scientific, artistic, and practical activities. This integration of theory and practice enhances learning outcomes and prepares students for professional success. KTU offers various supports such as academic advising, career services, and psychological counselling, contributing to a supportive learning environment. Modular design enables students to deepen or broaden their competencies by choosing alternatives or specializations, ensuring a personalized learning experience that caters to individual goals.

4.1.2. Access to higher education for socially vulnerable groups and students with individual needs is ensured.

KTU has procedures in place to ensure inclusivity and accessibility to education for socially vulnerable groups and students with individual needs. This is achieved through Equal Opportunities and Diversity and Violence Prevention Policy as well as guidelines for emotional and social wellbeing. Specific measures are outlined by support for students with special needs through social welfare coordinator services, religious and cultural diversity guidelines, centralized support systems, flexible learning assessment methods and community awareness and training.

KTU carries out student-centered teaching and learning, which is completed with updated content, scientific, and practical activities, and diverse support services such as academic advising and career counselling to create a supportive and effective learning environment during and after studies. The university ensures accessibility for socially vulnerable groups and students with individual needs through inclusive policies, services of the welfare coordinator, flexible assessments, and community

awareness initiated in order to create an equal educational experience. According to their survey, 100% of students who have used these services in 2023 were satisfied with the adaptation of studies according to their personal needs.

ANALYSIS AND CONCLUSION (regarding 4.1.)

KTU carries out student-centered teaching and learning, which is completed with updated content, scientific, and practical activities, and diverse support services such as academic advising and career counselling to create a supportive and effective learning environment during and after studies. The university ensures accessibility for socially vulnerable groups and students with individual needs by inclusive policies, services of the welfare coordinator, flexible assessments, and community awareness initiated to create an equal educational experience. Facilities include modern classrooms, laboratories, and virtual spaces designed to support active learning. These are equipped with advanced tools such as virtual and augmented reality technologies. Continuous investments in infrastructure, industry collaboration, and innovative teaching methods ensure that the study process remains competitive and aligned with future labor market needs.

4.2.	There is an effective and transparent system for student assessment, progress monitoring, and assuring academic integrity

FACTUAL SITUATION

4.2.1. Monitoring of learning progress and feedback to students to promote self-assessment and learning progress planning is systematic

KTU has established mechanisms to monitor the progress of students' studies systematically. The feedback mechanism is structured to inform students of their current academic standing and encourage self-evaluation. The Academic Information System (AIS) tracks student attendance and performance. Absenteeism or poor academic performance triggers alerts to the study center, enabling timely interventions through academic mentors. Annual reports on students' learning outcomes are prepared in September. Semester-level evaluations include mid-term and final assessments. Mid-term reviews include roundtable discussions where students highlight process shortcomings for immediate resolution. Based on the feedback received, students at KTU are encouraged to plan their learning progress. This involves setting future academic goals and strategies for achieving these goals, thereby enhancing their overall educational experience. KTU provides various tools and advisory services to assist students in this process, including academic advising and access to learning resources that support the development of personal learning strategies. Specific projects, such as bachelor's and master's final degree projects, have scheduled intermediate evaluations where students receive feedback from their supervisors and departmental commissions.

4.2.2. Graduate employability and career are monitored

Surveys of manufacturing engineering alumni demonstrate that they are predominantly happy with their studies, while actively expressing their views on areas for improvement. They expect more hands-on practice and want to have a better and more in-depth understanding of the down-to-earth operations of industrial companies.

Employers are positive about students, are willing to invite them for internships, and often offer them positions after the internship or graduation. The list of employers ranges from metalworking

companies to cutting-edge robotics ones, as well as companies manufacturing electronic components. Moreover, employers are active in the final theses assessment committees.

KTU actively and systematically collects data on the alumni's employability and tracks their career developments. The monitoring is systematic and regular and applies various data collection methods comprehensively.

No structured information or annual analysis of the current or future demand for specific professionals in the region or Lithuania was provided.

4.2.3. Policies to ensure academic integrity, tolerance, and non-discrimination are implemented

KTU has a policy on academic integrity, which is actively promoted and enforced across the university. KTU has established policies to promote tolerance and prevent any form of discrimination. KTU has specific committees and bodies, such as the Board of Academic Ethics and Equality and Violence Prevention Committee, overseeing the implementation of these policies. The university conducts regular training sessions and awareness programs to educate students and staff about the importance of these values and the specifics of the policies in place. These initiatives help to foster an inclusive and supportive campus environment. The effectiveness of these policies is regularly monitored and evaluated. Feedback from the university community is sought to continuously improve the implementation strategies and ensure that the policies are meeting their intended goals.

4.2.4. Procedures for submitting and processing appeals and complaints are effective

KTU has established transparent procedures for submitting and processing appeals and complaints. These procedures are designed to be accessible, ensuring that all university community members can easily utilize them when needed. Violations are monitored using tools such as "Turnitin" for plagiarism detection. Students and staff can report violations confidentially via an online system or email. The system is effective, as 16 cases of plagiarism were identified, including 3 cases in the first cycle of Mechatronics, and 13 cases in the second cycle of Industrial Engineering and Management over the last 3 years. The university ensures that all appeals and complaints are handled promptly and with the necessary attention. Appeals and complaints are processed fairly and impartially. KTU has mechanisms in place to ensure that the individuals involved in handling these cases are unbiased and trained to manage them appropriately. Those who submit appeals or complaints are kept informed about the progress of their cases and are provided with clear feedback once a resolution has been reached. During the last three years, **3** appeals were submitted by students in the evaluated study field (Production and Manufacturing Engineering). No formal complaints were recorded during this period. The effectiveness of the procedures is regularly reviewed, and feedback from the process is used to make continuous improvements.

ANALYSIS AND CONCLUSION (regarding 4.2.)

KTU has implemented comprehensive measures to support socially vulnerable students and those with special needs. Financial assistance includes scholarships for students facing economic difficulties and targeted payments for those with disabilities. Additional accommodations such as reduced dormitory fees and tuition exemptions, are provided based on individual circumstances. Students can access free psychological counseling and stress management sessions.

AREA 4: CONCLUSIONS

AREA 4	Unsatisfactory - 1 Does not meet the requirements	Satisfactory - 2 Meets the requirements, but there are substantial shortcomings to be eliminated	Good - 3 Meets the requirements, but there are shortcomings to be eliminated	Very good - 4 Very well nationally and internationally without any shortcomings	Exceptional - 5 Exceptionally well nationally and internationally without any shortcomings
First cycle				x	
Second cycle				x	

COMMENDATIONS

1. Teaching is well aligned with industry needs. The integration of industry-relevant topics and real-world projects into the curriculum ensures students are well-prepared for the labour market.

RECOMMENDATIONS
To address shortcomings
None

For further improvement

1. An increased focus on internships and practical training opportunities is essential. Expanding the number of available internships, strengthening partnerships with local and international companies, and integrating more hands-on practice into the curriculum would provide students with valuable real-world experience. This would help them develop practical skills, enhance their employability, and ensure a smoother transition from education to the workforce.
2. Organizing more excursions to relevant industrial and economic sites, such as the Kaunas Free Economic Zone, is highly beneficial. These visits should not be limited to the first year of study but should continue throughout the program. Regular excursions will provide students with deeper insights into real-world operations, foster connections with industry professionals, and enhance their understanding of practical applications related to their field of study.
3. KTU should consider organizing systematic, annual surveys of labor market demand for specific professionals, along with future demand forecasts. These surveys would provide valuable insights into industry needs and trends, ensuring that study programmes align with current and future market requirements. Additionally, the results of these surveys should be integrated into the university's marketing strategy to effectively promote study programmes and attract prospective students. Furthermore, the findings can be used to enhance career guidance services, helping students make informed decisions about their education and career paths.

AREA 5: TEACHING STAFF

5.1.	Teaching staff is adequate to achieve learning outcomes

FACTUAL SITUATION

5.1.1. The number, qualification, and competence (scientific, didactic, professional) of teaching staff is sufficient to achieve learning outcomes

According to the SER, the study field is covered by a total of 125 members of the teaching staff. The distribution of staff is well balanced between research active full/associate professors and teaching staff (lectors). Formal requirements are met with the current distribution. Within the lectors category, there is a small number of staff without a degree (5-7 on I-cycle study programmes, and 1-3 on II-cycle study programmes), which should serve as a point of attention for the further development of the staff, especially when considering the second cycle.

The group of staff has long-standing experience within the domain (+10 years experience). The average age of teaching staff is approx. 48, illustrating the presence of an experienced teaching capacity. A point of attention should be the pipeline of younger and new members of staff, to secure the longer-term viability and development of the SPs. Some subjects/programs seem to have a particular distribution either towards early stage or late stage of career, which could also be a point of attention. There seems to be a commendable gender balance in the faculty.

ANALYSIS AND CONCLUSION (regarding 5.1.)

The number of teaching staff is sufficient to cover the required courses and ensure the achievement of learning outcomes for the evaluated study field. A significant majority hold doctoral degrees, showcasing strong academic and research qualifications. Only a small percentage of teaching staff do not have degrees, so it might affect the perception of the programme's academic rigor. The teaching staff has a good balance of academic and professional experience, and involvement in research projects. Adequate pedagogical qualifications are supported by certifications for teaching in English enhancing the programme's international dimension.

The link to the environment is good, although it could be recommended to strengthen the engagement with industry and civil society in more aspects of the teaching programs. 20 members of the teaching staff have practical experience from FTE jobs in the field of their teaching, which also supports the connection to engineering practice. Visiting teachers are invited to bring in experience from the world of practice. They are on entry systematically assessed to ensure compliance with quality demands, which is commendable.

Overall, the teaching staff is well established to provide appropriate learning conditions in support of the individual programs. Although the use of lectors without a degree in II cycle studies is limited (ranging between 1 and 3), it could be an area of concern to ensure research-based teaching engagements, but a well-established vetting process is in place. Although the faculty has seen strong development over the last three years, an increased focus on publishing more and publishing in high-quality international journals should be further encouraged as should the monitoring of FWCI progress (as per Scopus). With age distribution tending towards end-of-career, the inclusion and qualification of new staff members should be a point of attention. It is not in the short term an area of concern, but rejuvenation should be actively supported, through career opportunities and formalized training and development of teaching. The engagement with the environment and level of practical experience is generally good but could be further advanced through systematic engagement with the environment throughout the SPs and at all semesters.

5.2.	Teaching staff is ensured opportunities to develop competences, and they are periodically evaluated

FACTUAL SITUATION

5.2.1. Opportunities for academic mobility of teaching staff are ensured

Staff participate actively in EU research and innovation programs of various sorts, apart from producing R&I actions these engagements also ensure mobility by securing funding for travelling and peer-to-peer learning. A listing of ongoing projects is provided on page 75 of the SER, which supports the impression of international engagement opportunities. As described below KTU also has a well-established infrastructure of agreements with international partners that enable mobility. Erasmus+ programs are also a well-established source of mobility and exchange at KTU. Visits in the duration from 2 days to 2 months are possible within these schemes. After COVID the number of visits has settled at approx. 20 mobility exchanges of KTU staff and approx.10 visiting incoming lecturers per year. While many strong partnerships are reported in the SER, there is a direct account of how different partnerships help to serve different learning and development purposes or how these support the learning and development strategy of the faculty.

5.2.2. Opportunities for the development of the teaching staff are ensured

Learning and teaching development is partly ensured through peer-to-peer learning where teams of teachers come together in common courses as described in the SER. Although this is difficult to institutionalize as a practice, it would have been appropriate to include details of how this is facilitated and which kind of framework conditions the institution supplies to support this activity. Another key element is reported as international mobility, where staff through well-established formal and informal agreements gain experience from international peers. Mobility seems to be at an appropriate level of approx. every sixth teacher/year engaging in exchanges. More details of the nature, outcome and duration of the engagement would have been appropriate, as would have been the opportunities and financial support supplied by the institution.

KTU has for the last 5 years organized didactic training and development in the "EDU-LAB", which offers courses and consultation to teaching staff. The program offered has been followed by 76 teachers since the initiation of the LAB.

ANALYSIS AND CONCLUSION (regarding 5.2.)

While opportunities for professional training and learning are encouraged and supported, mandatory participation in EDU-LAB basic training is advised. This is especially important to support a coherent and systematic teaching and learning paradigm. Challenge-based-learning (CBL) is according the SER strongly encouraged by the university, which was also supported by impressions from the physical visit, to further advance this it could be recommended that the university works systematically with developing a clear learning and teaching paradigm to support teachers and students in their engagement with the learning situation and in particular with the perspective of enrolling new members of staff into core KTU principles. This could also be further supported by systematically seeking our mobility options that directly support CBL.

AREA 5: CONCLUSIONS

AREA 5	Unsatisfactory - 1 Does not meet the requirements	Satisfactory - 2 Meets the requirements, but there are substantial shortcomings to be eliminated	Good - 3 Meets the requirements, but there are shortcomings to be eliminated	Very good - 4 Very well nationally and internationally without any shortcomings	Exceptional - 5 Exceptionally well nationally and internationally without any shortcomings
First cycle					x
Second cycle					x

COMMENDATIONS

1. There is a strong link between research projects and professional development.
2. There is a dedicated structure and laboratories for professional development at KTU.
3. There is a fair and effective vetting process for new members of teaching staff.

RECOMMENDATIONS

To address shortcomings
None

For further improvement

1. It is suggested to make professional development a formal requirement, particularly for new staff members. This initiative would ensure that all faculty members continually enhance their skills and stay updated with the latest developments in their fields, contributing to improved teaching quality and overall academic excellence.
2. It is suggested to invite more industry representatives to deliver guest lectures.
3. It is suggested to identify and systematically support a coherent learning and teaching paradigm - possibly with an outset in challenge-based learning.
4. A more focused mobility and development partnership strategy could be established to support a more consistent flow of inputs to the development of teaching and learning competencies and capabilities.

AREA 6: LEARNING FACILITIES AND RESOURCES

6.1.	Facilities, informational, and financial resources are sufficient and enable achieving learning outcomes

FACTUAL SITUATION

6.1.1. Facilities, informational and financial resources are adequate and sufficient for an effective learning process

Learning facilities and resources are adequate for the SPs considered. During the visit the expert panel was introduced to learning facilities (library, classrooms, IT facilities, prototyping, and learning spaces) which were of good quality and conducive for supporting a good learning environment. This also includes considerations about disability access and special needs. Labs were also inspected

during the visit, and it is clear that the faculty has access to many, diverse and good-quality lab facilities, where the students were actively engaged for their course and project work. AR/VR labs represented the latest investment and agreements with software ecosystem providers like Dassault were about to be completed. This gave proof of an active and updated lab resource.

Several labs were mainly designed for instructive learning, but many also offered the opportunities for more experiential and experimental learning. The latter offers opportunities for systems integration and work related to IT/OT integration, which is important to future manufacturing systems. More system integration in the labs would be critical to engage with research and learning activities in the domain of I4/5.0, Industrial Metaverse.

6.1.2. There is continuous planning for and upgrading of resources.

The SER describes an annual process of inspection of the learning facilities, which also includes inputs from students. The visit showed that although not all facilities are state-of-the-art, ongoing investments are made into facilities, with some newly established/planned lab facilities including the opportunity to embrace modern industrial processes and modern learning principles (AI Centre, AR/VR lab, Prototyping Lab, AM lab). Many investments are supported by ongoing projects, which also seem to provide a bridge between research and teaching.

ANALYSIS AND CONCLUSION (regarding 6.1.)

Although learning facilities are generally actively used, there are only a few examples of active engagement with technology providers or industrial partners. The faculty is recommended to activate lab resources further for enhancing industrial collaboration – providing industry with a lab-based "playground" where new ways of working, technologies, and industrial processes can be developed and tested in collaboration with staff and students.

AREA 6: CONCLUSIONS

AREA 6	Unsatisfactory – 1 Does not meet the requirements	Satisfactory – 2 Meets the requirements, but there are substantial shortcomings to be eliminated	Good – 3 Meets the requirements, but there are shortcomings to be eliminated	Very good – 4 Very well nationally and internationally without any shortcomings	Exceptional – 5 Exceptionally well nationally and internationally without any shortcomings
First cycle				x	
Second cycle				x	

COMMENDATIONS

1. There are learning facilities supporting modern technologies.
2. There is a systematic and annual process for upgrading facilities and equipment, as well as links with actual research needs.

RECOMMENDATIONS
To address shortcomings
None

For further improvement

1. An increased level of system integration would enable students to engage more with realistic problems and principles of modern manufacturing during their master's studies (for the second cycle.
2. Increase the level of external partnerships and collaboration with an outset in lab facilities and upgrading of lab facilities. This in particular will be relevant for Master's, where the research-based work could benefit from an increased engagement with lab facilities, technology providers, and industrial partners.

AREA 7: QUALITY ASSURANCE AND PUBLIC INFORMATION

7.1.	The development of the field of study is based on an internal quality assurance system involving all stakeholders and continuous monitoring, transparency and public information

FACTUAL SITUATION

7.1.1. The internal quality assurance system for the programmes is effective

Internal quality assurance is a key component of the KTU 's overall quality system, detailed in the "Description of the Internal Study Quality Assurance System. "The University's internal study quality assurance system centers on six key elements: study management, student-centered learning, faculty, student success support, quality monitoring, and societal impact. The 6 principles of the overall QA system are described in the self-evaluation report. The division of the responsibilities between different bodies of the university is described. The MIDF oversees the Production and Manufacturing Engineering study field, managing human resources and ensuring programme realization. The MIDF Council and Dean implement university research and study policies, and make decisions on SPs offerings, competitiveness, quality, investments, and research integration. Faculty Study Committees contribute to development of programmes, ensure study quality, foster a quality culture, and support the Dean and Study Programmes Committee in implementing and assuring programmes quality. The quality and implementation of SPs in the field of Production and Manufacturing Engineering are the responsibility of the Production Engineering Study Programmes Committee (SPC) and the joint KTU-VDA Production and Manufacturing Engineering and Design SPs Committee. Field's Study Programme Committees and the heads of academic departments approve study modules.

7.1.2. Involvement of stakeholders (students and others) in internal quality assurance is effective

KTU involves a broad range of stakeholders - social partners, employers, students, and alumni - for their in-house quality assurance measures. Employers participate in the final thesis defence committees, teach individual topics and modules, and propose thesis subjects. Employers have heavily contributed to the award of the high-quality label, "Investors' Spotlight" to some SPs. Students are serving on governing bodies, faculty councils, and committees, ensuring that student input is taken into consideration. Alumni are engaged in mentoring, lecturing, and community events.

7.1.3. Information on the programmes, their external evaluation, improvement processes, and outcomes is collected, used, and made publicly available

Each year, the SP and its modules are reviewed and refined based on feedback from students, graduates, employers, and expert recommendations, ensuring alignment with general requirements for the SPs.

The KTU's website provides details on SPs, admission requirements, tuition fees, learning outcomes, programme structure, accreditation, qualifications, career prospects, module information, faculty, and additional competencies. It also publishes study survey results and programme approvals. Information on study and research activities, while protecting personal data and intellectual property, is publicly available, with regulatory documents accessible on the website and in the KTU 's Document and Process Management System.

7.1.4. Student feedback is collected and analyzed

The students have the opportunity to anonymously express their opinion about the quality of individual modules of their study programme in the "Survey on Study Modules and Teaching" at the end of the autumn and spring as well as the "Student Voice" survey which covers broader aspects such as teaching quality, study programme organization, and KTU facilities. According to the results, the KTU has shown consistent improvement over time.

ANALYSIS AND CONCLUSION (regarding 7.1.)

Considering student responses, students appreciate anonymous feedback opportunities and value practical aspects of programmes, engaging teaching methods, and real-world examples. However, there are suggestions for improving balancing assessments and better structuring course materials.

Regarding interactions with stakeholders, it emerged during discussions that these interactions are largely based on personal connections It is recommended that the involvement of relevant industry representatives, particularly from larger companies, be organized on a more systematic basis.

AREA 7: CONCLUSIONS

AREA 7	Unsatisfactory - 1 Does not meet the requirements	Satisfactory - 2 Meets the requirements, but there are substantial shortcomings to be eliminated	Good - 3 Meets the requirements, but there are shortcomings to be eliminated	Very good - 4 Very well nationally and internationally without any shortcomings	Exceptional - 5 Exceptionally well nationally and internationally without any shortcomings
First cycle				x	
Second cycle				x	

COMMENDATIONS

1. KTU involves a broad range of stakeholders - social partners, employers, students, and alumni for their in-house quality assurance measures.

RECOMMENDATIONS

To address shortcomings
None

For further improvement

1. It is suggested to establish a more systematic approach to involving relevant industry representatives, particularly from larger companies, keeping also stakeholder interactions based on personal connections about all aspects of the study process and content.

2. It is advised to organize surveys of relevant industry representatives on various aspects of the study field and study programmes every year.

V. SUMMARY

Labor market: Some of the study programmes have been awarded a high-quality label, "Investors' Spotlight". It demonstrates that the programmes meet the expectations of Lithuanian and foreign companies and investors. The programmes of the field of study have diverse curricula and complement each other well. The business community actively contributes to the curricula of these study programmes using various forms of cooperation. However, it is necessary to prepare a long-term vision for improving the SP, based on an analysis of labor market needs. It is also important to develop a marketing strategy for promoting the field of study, which directly correlates with the vision mentioned above.

Teaching staff: are well qualified to support the programmes and program-relevant research is undertaken and connected to the studies and study activities. Mobility and development opportunities are generally well-structured and available, but a more focused approach to support learning philosophies and strategies more directly could be suggested.

Research: Academic staff and students are actively involved in the science. The strong research focus enhances student learning, as students actively participate in research through theses and projects, contributing to both theoretical advancements and practical applications. Research in Mechanical and Materials Engineering at KTU has been widely acknowledged for its excellence, with Mechanical Engineering receiving the highest national rating and further strengthening the programme's academic reputation.

Learning Facilities: Appropriate and updated learning facilities are available to the students. Labs are updated and well-equipped, especially for instructive learning and single-standing technologies (CAD/CAM, CNC, AR/VR, etc.). For the second cycle particularly, labs could benefit from the ability to work with system integration, e.g. IT/OT interaction, production flows, and issues pertaining to the industrial metaverse.

Student admission and support: The application process is straightforward, prompt and transparent for both local and international students. There are highly functional and collaborative discussions between the students and faculty administration. KTU has shown that there are large efforts for student mobility and support. However, to support student and scientific internationalisation, more efforts should be put in place to provide English language classes for lecturers.

Quality assurance: KTU engages a diverse group of stakeholders, including social partners, employers, students, and alumni, in its internal quality assurance processes. To enhance collaboration, it is recommended to establish a more systematic approach to involving relevant industry representatives, particularly from larger companies. An annual survey of industry representatives would help involve them in improving various aspects of the field of study, including employment and student recruitment.

VI. EXAMPLES OF EXCELLENCE

KTU has high-quality study programmes in the field of *Production and Manufacturing Engineering.* Some of the study programmes have been awarded a high-quality "Investors' Spotlight" label. This shows that the programmes meet the expectations of Lithuanian and foreign companies and investors.

KTU has demonstrated excellent international student admission procedures, the faculty administration is helpful, and the turnaround time is extremely low.