



# **ASIIN Seal & EUR-ACE<sup>®</sup> Label**

## **Accreditation Report**

### **Bachelor's Degree Program**

*Industrial Engineering and Management*

### **Master's Degree Programme**

*Operations Management*

*Global Management of Innovation and Technology*

Provided by

**Lappeenranta – Lahti University of Technology**

Version: 22<sup>nd</sup> of September 2023

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## A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for <sup>1</sup>	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC) <sup>2</sup>
Tuotantotalouden kandidaatin tutkinto-ohjelma	Bachelor's degree programme in Industrial Engineering and Management	ASIIN, EUR-ACE® Label	ASIIN, 30.6.2017-30.9.2023	06
Tuotannon johtamisen diplomi-insinöörin tutkinto-ohjelma	Master's degree programme in Operations Management	ASIIN, EUR-ACE® Label	ASIIN, 30.6.2017-30.9.2023	06
Master's degree programme in Global Management of Innovation and Technology (GMIT)	Master's degree programme in Global Management of Innovation and Technology (GMIT)	ASIIN, EUR-ACE® Label	ASIIN, 30.6.2017-30.9.2023 (prolongation until 30.9.2023)	06
<b>Date of the contract:</b> 25.02.2023 <b>Submission of the final version of the self-assessment report:</b> 20.02.2023 <b>Date of the onsite visit:</b> 18.04.2023 <b>at: LUT Campus Lappeenranta</b>				
<b>Expert panel:</b> Alexander Eisenkopf, Zeppelin University Jyri Naarmala, University of Vaasa				

<sup>1</sup> ASIIN Seal for degree programmes; EUR-ACE® Label: European Label for Engineering Programmes.

<sup>2</sup> TC: Technical Committee for the following subject areas: TC 06 - Engineering and Management, Economics.

Olaf Neitzsch, Dr. Olaf Neitzsch Consulting Veronica Vanhanen, student at University of Oulu	
<b>Representative of the ASIIN headquarter:</b> Andrea Kern	
<b>Responsible decision-making committee:</b> Accreditation Commission for Degree Programmes	
<b>Criteria used:</b> European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of Technical Committee 06 – Engineering and Management, Economics as of September 20, 2019	

## B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF <sup>3</sup>	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Industrial Engineering and Management	Tekniikan kandidaatin tutkinto / Bachelor of Science in Technology	Industrial Engineering and Management	6	Full time	-	6 Semester	180 ECTS	annually in fall / 2008
Operations Management	Diplomi-insinööriin tutkinto / Master of Science in Technology	Supply Chains and Operations Management, Cost Management	7	Full time	-	4 Semester	120 ECTS	annually in fall / 2008
Global Management of Innovation and Technology	Master of Science in Technology	Innovation and Technology Management	7	Full time	-	4 Semester	120 ECTS	annually in fall / 2010

Lappeenranta - Lahti University of Technology (LUT) is a Finnish public university, which was established in 1969. Until 1996, the university operated with one campus in Lappeenranta before the second campus in Lahti was opened. Today, LUT has further expanded by two regional units in Kouvola and Mikkeli. Whereas the Mikkeli University Center focuses in research activities, the unit in Kouvola combines university-expertise in technology and business to support the development in the region. A strong cooperation exists further with the LAB, the Lappeenranta University of Applied Sciences, with whom they are one campus.

The Finnish government is the main supporter of LUT. It operates three different schools: the school of energy systems, the school of engineering science and the business school. Each school offers their own fields of expertise; however, LUT focuses predominately on the modern global challenges such as clean energy, water and air and supports businesses and the industry in their sustainable renewal. Their university strategy 2023 focuses on "TRAILBLAZERS – Science with a purpose". Currently, LUT has around 8,000 students.

The three study programs under review are part of the LUT School of Engineering.

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<sup>3</sup> EQF = The European Qualifications Framework for lifelong learning

For the bachelor's degree program "Industrial Engineering and Management", the institution has presented the following profile on their webpage:

"The Bachelor's Programme in Industrial Engineering and Management provides you essential knowledge and capabilities to become an expert in combining business and technology.

The programme increases your understanding of organisations' business, operations, and personnel in a contemporary business environment. It also provides you know-how on industrial production processes, their development and challenges.

The programme responds to the growing need to educate experts with capabilities to renew and develop contemporary industrial organisations sustainably. The aim of the programme is to educate graduates who can apply technical problem-solving skills in analysing and developing business operations in digitising industry environments."

For the master's degree program, "Operations Management" the institution has presented the following profile in the self-assessment report:

"MSc programme in Operations Management combines business, technology, and management studies. Both business life and the public sector need more experts who have a comprehensive understanding of both: the operations of supply chains and service networks, as well as the financial, cost and profitability aspects related to the operations. The aim of the programme is to create competences needed in organizational development and problem-solving by combining knowledge and skills in technology, cost management and supply chain management. Graduates from the programme are technical and business experts with strong capabilities in business process development. Graduates are able to operate in industrial-, service- and public sector organisations. Graduates have the ability and desire to work in an international environment, to act responsibly and ethically, and to develop and update their skills further (e.g., doctoral studies and academic research)."

For the master's degree program "Global Management of Innovation and Technology", the institution has presented the following profile on their webpage:

"In recent times, we have faced a number of global crises, including climate change, the prolonged COVID-19 pandemic, war in Europe, and the energy crisis. These crises have challenged organisations to renew their activities, seek novel solutions and think outside the box in their business ecosystems.

In such circumstances, the management of innovation and new technologies is more important than ever. We have already seen impressive results when organisations have made joint efforts to develop new vaccines, touchless solutions, or services for food delivery.

To prepare for the future, both large multinational enterprises and small new start-ups around the world are continuously looking for talented graduates who are capable of systemic thinking, have an innovative and international mindset, and understand how to manage innovations and new technologies effectively.

The slogan of this programme, "Build your own future", means that your studies will include both breadth and depth. You will acquire a broad managerial understanding of the various systems within an organisation and of their development, renewal and innovation. At the same time, you will focus on specific sectors and select technical and elective studies and projects based on your own background, needs and future visions.

During your studies, you will be exposed to concepts that you will need to be an effective manager, ranging from inventive design to strategic product and technology development, systems modelling or open collaborative innovation. In brief, you will become familiar with the whole process from ideas to innovations to business value.

Applying theories and frameworks to real practical projects is an essential step in the learning process. Close collaboration with industrial firms will ensure the practical real-world application of new knowledge and theories. The connection with companies during the course projects, seminar assignments or your Master's thesis will be an asset in your future career."

## C Expert Report for the ASIIN Seal<sup>4</sup>

### 1. The Degree Programme: Concept, content & implementation

**Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)**

**Evidence:**

- Self-assessment report
- LUT webpage <https://www.lut.fi/en>
- Webpage „Industrial Engineering and Management“ <https://www.lut.fi/en/studies/technology/bachelors-programme-industrial-engineering-and-management>
- Webpage „Operations Management“ <https://www.lut.fi/fi/opiskelu/tekniikka/tuotannon-johtamisen-maisteriohjelmalla>
- Webpage „Global Management of Innovation and Technology“ <https://www.lut.fi/en/studies/technology/masters-programme-global-management-innovation-and-technology>
- Curricular overview of each study program
- Module descriptions
- Learning Outcome Matrix of each study program
- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

LUT describes in their self-assessment report (SAR) that each study program has defined program-specific learning outcomes, which are part of a continuous process of development and therefore are reviewed annually. This process includes student feedback, statistics on the study process, employment rates of graduates, and the input of external stakeholders. The mission and strategy of LUT are integrated in the objectives of each study program.

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<sup>4</sup> This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.



In the three bachelor programs under reviews, the university strategy can primary be found in their focus on sustainable renewal of business and industry.

The bachelor program Industrial Engineering and Management (IEM) combines business, technology, and management studies, supported by studies in natural sciences, foreign languages, and communication. The aim is this study program is to increase the understanding of business and operations requiring and understanding of industrial production processes and competences to analyze and develop operations in various organizational environments. Graduates from this bachelor program mainly continue their education in the master program. LUT as stated the following intended learning outcomes (ILOs) for the program IEM:

1. Understand organizations' processes, activities, and personnel in different kinds of business environments
2. Analyze the developing opportunities and challenges of different business fields and in digitizing industry environment and apply alternative methods for solving them
3. Understand industrial production processes and operation models, and consider their development opportunities and challenges for the business
4. Understand and apply different methods and models of supply chain management
5. Understand and apply different cost management methods in controlling the costs and operations of a company
6. Understand the principles of innovation and technology management, and analyze different operation models for a company's innovation development
7. Apply technical problem-solving skills in analyzing and developing business operations
8. Act in projects and different development teams, and utilize experimental, pragmatic, and problem-solving attitude while working
9. Apply scientific working methods and understand the meaning of critical thinking in data gathering
10. Communicate fluently in business life, summarize essential things, and present them clearly
11. Act in different working environments and understand the need for continuous self-development and -learning according to the requirements of working life.

The master program "Operations Management" (OM) continues the education in business, technology and management. The study program mainly focuses on supply chain management and financial, cost and profitability aspects in relation to operations. Graduates from this master program mainly work as technical and business experts with strong capabilities

in business process development. Graduates have the ability to work in an international environment, to act responsibly and ethically, and to develop and update their skills further (e.g., doctoral studies and academic research). In the SAR, LUT describes the following ILOs for the study program OM:

1. Develop and manage organizations' processes, operations and personnel in production and service business environments in a sustainable and responsible way
2. Analyze operation and process improvement opportunities, challenges, needs and options and evaluate the impacts of the improvement actions to the organizations' success and position in the supply chain and business networks
3. Determine, produce and analyze data needed for data-based organizational development and decision-making and create management solutions and recommendations based on analyzed information
4. Apply supply chain management methods and models in inter-organizational development networks
5. Analyze and combine costs and processes by utilizing different types of cost management methods
6. Design models and measurement systems for lifecycle cost, profitability and performance management
7. Design, analyze and develop systems by applying methods of systems modelling, optimization and simulation
8. Evaluate and interpret the logic of different branch of industries and technologies
9. Utilize technological, mathematical and natural scientific thinking in business analysis and problem solving
10. Analyze application areas, business opportunities and process improvement possibilities for different types of technologies and technical solutions
11. Plan, organize and manage improvement projects and development teams and implement changes by utilizing research knowledge, critical thinking and considering sustainability and responsibility
12. Act and communicate effectively in different types of work and interaction situations by taking independently and actively responsibility for organizational development and management
13. Apply and utilize new knowledge both in academic postgraduate studies and in other lifelong learning situations.

The master program “Global Management of Innovation and Technology” (GMIT) combines multiple aspect on management of innovations and technology by combining business, engineering and management. These competences provide support for companies, who seek innovation and novel solutions. Graduates are able to think systematically, have an innovative and international mindset and understand how to manage innovations and new technologies effectively. The aim of the programme is to provide a wide set of skills and capabilities required in building smart and sustainable solutions for organizations. To guarantee the international capabilities of graduates, the study program is fully taught in English. The ILOs for the study program GMIT state graduates have the following skills and competences:

1. Understand and analyze the impact of global megatrends on innovation management in organizations
2. Evaluate, analyze, and create strategies within an international context relating to products, services and technologies
3. Make rational decisions based on gained understanding on decision-making strategies, frameworks, tools and analysis methods in global networks and markets
4. Analyze innovation-related processes and structures of organizations and identify their interconnected development issues
5. Practice, plan and manage the build-up of product and service systems for creating tangible and intangible solutions for techno-economic and sustainability-related problems
6. Plan and manage businesses from start-ups to multinational enterprises with an entrepreneurial and innovative mindset
7. Apply innovation and technology management theories, methods and tools to practical management activities
8. Work and lead efficiently in cross-cultural and inter-disciplinary teams and projects and communicate in a logical and convincing way both orally and in writing.

In the discussion with the experts, the representatives from the rector’s office characterize these three study programs at the heart of the Industrial Engineering and Management programs at LUT. Since the last accreditation, all three programs have improved, particularly due their connection to the industry. They continued to involve companies for various forms of collaborations including guest lecturers and joint modules. Upon the questions on the nature of the involvement of the industry partners, the representatives of the rector’s office explain that they do not meet regularly to discuss the study programs, but they are

in contact all the time based on their lectures and research collaborations. In addition, the university has an advisory board since seven years, which also contains members from the industry. The partners from the industry confirm that they were members of the advisory board at LUT. However, none of them is currently aware of any activities of the advisory board.

The experts are interested in the main target audience for the master programs OM and GMIT. The program coordinators state that the difference of the programs is the type of responsibility the graduates will have in the future occupations. Graduates from GMIT will continue to work in research and development, product development, service development, but also business development or business analysts. Graduates are skilled in management from the perspective of innovation including also marketing. Graduates from OM mainly work in production considering the entire operations of a company in the areas supply chain management or cost management.

The experts conclude that the presented objectives and learning outcomes of all three study programs under review are described briefly and concisely. They are transparently anchored and published and thus are available to students, lecturers and interested third parties. In the opinion of the experts, these objectives and learning outcomes reflect the targeted academic qualification level of each study program. Further, the objectives and learning outcomes are feasible and equivalent to the relevant subject-specific criteria of the ASIIN Technical Committee 06 as well as the criteria of EUR-ACE. The experts confirm that with the intended competence profile, a professional activity corresponding to the level of qualification (according to the European Qualifications Framework) can be taken up (professional classification). This qualification level EQF 6 is reached in the bachelor program Industrial Engineering and Management and the EQF 7 in the master programs Operations Management and Global Management of Innovation and Technology. All study programs support their graduates with adequate skills and competences for both the labor market and society. The experts confirm that these are regularly reviewed in a process that involves the relevant stakeholders (in particular from higher education and professional practice) and, if necessary, the objectives are revised accordingly.

<b>Criterion 1.2 Name of the degree programme</b>
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**Evidence:**

- Self-assessment report
- Webpage „Industrial Engineering and Management“ <https://www.lut.fi/en/studies/technology/bachelors-programme-industrial-engineering-and-management>

- Webpage „Operations Management“  
<https://www.lut.fi/fi/opiskelu/tekniikka/tuotannon-johtamisen-maasteriohjelm>
- Webpage „Global Management of Innovation and Technology“  
<https://www.lut.fi/en/studies/technology/masters-programme-global-management-innovation-and-technology>
- Examples of diploma and diploma supplement

#### **Preliminary assessment and analysis of the Experts:**

The experts consider the names of the three study programs under review and conclude that the title of each study program reflects the intended objectives and learning outcomes as well as the teaching and learning content. They state that the designation (both in the original language and in English) is used consistently in all relevant documents.

### **Criterion 1.3 Curriculum**

#### **Evidence:**

- Self-assessment report
- Curricular overview of each study program
- Module description of each study program
- Discussion during the audit

#### **Preliminary assessment and analysis of the experts:**

##### *Structure of the program*

The structure of the programs considers the program learning outcomes and allows the students to progress through their studies in the standard study duration. The structure of the programs contains compulsory courses, which are complemented by minor studies and elective studies the students need to choose individually with the support of their study counsellors and tutors.

The bachelor program IEM has in total 180 ECTS credits, which allow the students to complete the studies in three years studying full time. The program contains a minimum of 58 ECTS credits of general studies, which focus on the basic competences in the field of industrial engineering and management, natural sciences, software and information technology, language and communication skills and a short work internship. Modules on the intermediate specialization (minimum of 88 ECTS credits) provide students with the main skills in industrial engineering and management and foster their scientific thinking in this discipline.

The compulsory bachelor thesis is classified as part of this intermediate specialization studies. The bachelor thesis is accompanied by a seminar, which together account for 10 ECTS credits. In addition, the students have to take at least 24 ECTS credits in the field of minor studies in technology. For these modules, the students have to select one field of technology to learn all the technological processes and practices. The students also need to take an internship, which can amount for two ECTS credits in IEM in order to get familiar with the work at a company. Students can elect to take part in an additional internship of up to six ECTS credits to gain insight into the students own profession of choice.

The master program OM has a total workload of 120 ECTS credits. These are divided into advanced specializations (minimum of 78 ECTS credits) and minor studies in technology (minimum of 24 ECTS credits). In the field of advanced specialization studies, the students need to select one of the two core course topics on either cost management or supply chain management. Additional modules and elective specializations studies allow the students to gain competences in the field of performance management, general management and leadership. The master studies are considered as part of the advanced specialization and accounts for 30 ECTS credits.

The master program GMIT amount 120 ECTS credits in total. These include a minimum of 31 ECTS credits of core studies, 65 ECTS credits of advanced specialization studies and a minimum of 24 ECTS credits of minor studies in technology. The core studies contain modules on strategic technology and innovation management, academic writing, system modelling and design and problem solving. The Advanced specialization studies focus on inventive design, open innovations, system dynamics and intellectual property in technology management. The master studies are considered as part of the advanced specialization and accounts for 30 ECTS credits. The minor studies in technology allows the students to choose one area of technology to deepen their knowledge.

The experts want to initially confirm if each semester is divided into two periods at LUT. The program coordinators describe that this is common in Finland and at LUT to use two periods in one semester. One period consists of seven weeks; several courses last for one period instead of one semester. In their opinion, this gives a higher degree of flexibility to the study programs. The experts continue to ask on the characterization of minor, optional and elective studies. The program coordinator explains that they consider minor studies as a field of elective courses related to technical studies. Students usually select a “minor package” containing several modules on one field of technology. The program coordinators mention that in the bachelor program, there are no elective courses in the first semester. This is different in the master program, where students need to choose several electives in the first semester. To enable the students from outside LUT to find their right courses, the students have to attend the module “Introduction to MSc studies in IEM” which gives them

sufficient information to organized their studies. The program coordinators state that the students need to choose their minor field before they start their studies; support to make this decision is provided by a study counselor. The students report to the experts that they took this course, which was very helpful in order to organize their studies. They also verify that LUT issues also credits for this introduction. The introduction also included the online system of LUT which provides all information to the study programs.

The experts are interested in the mechanism of choosing the specializations in the master program OM as the curriculum lists different courses already in the first semester. The program coordinators describe that the students do not need to choose their specialization when they register for the program. In the first semester, both specializations share four modules. If students want to continue in another specialization, they can use the credits instead of taking another elective course. The program coordinators explain that they do not want to separate these programs because they want to assure that the students get a comprehensive picture of the operations in an organization. Therefore, students do not actively have to choose any specialization during the studies, but at the end they should have more courses of one topic in order to graduate.

In the discussion with the program coordinators, the experts ask about the student support when choosing their modules. They explain that LUT offers a variety of student advise, including counselling for enrolling in courses. One advisor is supporting students for their bachelor studies whereas a second counselor is available for master students. In addition, LUT employs student advisors, who are still studying at LUT in the same program and support the counseling department.

The experts want to increase their understanding of the final thesis in all three study programs under review. The program coordinators describe that bachelor students write their thesis in the third year of their studies. The majority writes in the spring semester of the last year. A bachelor course is organized three times a year. The bachelor thesis has a workload of ten ECTS credits whereas the master thesis awards 30 ECTS credits. In both master programs, the students write their thesis in the fourth semester. The program coordinators add that almost 100% of all master thesis are done in collaboration with companies. In these cases, the students have two advisors, one from LUT and the second one from a company. The company advisor, however, is not an official examiner as they are not associated with the university. The partners from the industry support this statement; they tell the experts that they are not involved in the final grading of the final thesis. They usually have a discussion with the supervisor from LUT; however, they are unaware of the impact their discussion has on the final grade of the student. In addition, they mention that the company also does its own grading, which is currently completely independent from the grading of the university. The grading within the company is important to determine the

salary of the master thesis the student receives for their work. They clarify that in most companies, students are paid for their master thesis. The teaching staff states that two internal examiners grade each thesis; in addition, they do consult the industrial advisor. The final decision always lies with the professor at the university.

The students explain to the experts that they are responsible to find a thesis outside the university by themselves. This means, that they usually write several applications, which they consider as positive in order to gain experience. Students who are not successful in finding a thesis topic at a company, they talk with their professors, who can give them an academic topic they are working on at LUT. This situation is more common for international students, who have fewer opportunities to work in Finnish companies. Both, the bachelor and master students feel well supported in writing their thesis. The teaching staff explains to the experts that the students have to select the topic of their thesis themselves. This includes also bachelor students. For master students, the lecturers consider it as important and encourage the students to find a summer job in a company where they might consider collaborating for their master thesis. Still, they confirm to the expert that it is possible to write the master thesis at the university by doing a research project in their research teams.

The experts confirm that each module in the three study programs under review represents a well-matched unit of teaching and learning. LUT has established a clear structure for the students to acquire knowledge, skills and competences in each module. The experts consider that the order of the modules ensures that the learning outcomes can be achieved and that the programs can be completed within the standard period of study. Furthermore, the experts highlight that the program allows the students to select their own study plan and gives them the opportunity to select elective courses in their field of interest.

### *Content*

The bachelor study program IEM starts with one semester of compulsory modules, which introduce the students to the basics of industrial engineering and management, as well as the fundamentals in natural science, computer science and mechanics and wave motion. In the second semester, the students are allowed to select their first elective and minor studies in technology modules (one in each period), which are accompanied by modules on the introduction in the various fields of industrial engineering and management. The third semester focuses mainly on course in financial accounting, marketing and cost management with additional modules on “Technical documentation and 3D-modelling” and one elective studies and minor studies in technology. The fourth semester allows the students to take a higher amount of elective and minor studies whereas the topics of the compulsory modules continue on financial aspects and modules on software project management and



analytics. The fifth semester starts with modules on “Strategic planning and management” and “Coordination in supply chain” together with elective modules and selected minor studies. The bachelor thesis and seminar can be written either in the fall or summer semester of the final year. It is divided in the actual work on the bachelor thesis and a seminar. The sixth semester contains the internship as well as the module “Management Game” next to elective and minor studies.

The curriculum content of master study program OM depends on the selection of the specialization on supply chain management or cost management. The specialization supply chain management has one module in each period accompanied by minor, elective and optional studies. In the first and second semesters, the students earn competences and skills in the fields of operations management, supply chain management, decision-making and expert work in supply chain management. In the third semester, the curriculum considers the course “Supply chain improvement project” followed by the “Master’s Thesis” in the fourth semester. The specialization cost management starts with the modules “Life-cycle costing of investment projects”, “Performance measurement system”, and “Advanced cost management” together with minor, electives and optional courses. In the second semester, the curriculum does not consider any compulsory modules but the students have to select their minor, electives and optional courses. In the third semester (second period) and the fourth semester (first period), the curriculum contains one module, which is a research seminar on cost management and analytics. The master thesis is placed in the first and second period of the fourth semester. While the third semester still requires the students to take elective and minor courses, the fourth semester focuses on the work on the master thesis.

The master program GMIT contains a higher number of compulsory courses in comparison to the master program OM. In the first semester, the students start with one module “Introduction to MSC studies in IEM”, which explain the students how a master program at LUT is organized, since this study programs has a higher number of international students. In the first academic year, the first three periods contain modules on technology and innovation management, which contains also a project course. The curriculum of the second semester additionally lists one module on “Inventive product design and advanced TRIZ” as well as one module on academic writing. The third semester focuses on the module “Software and application innovation.” All three semesters consider furthermore elective, optional and minor modules. The fourth semester is limited to the master thesis.

The program coordinators explain to the experts how the learning outcomes are developed. They consider the first year of all bachelor programs as an introduction to the topic providing basic knowledge. Several courses in the program IEM are taught by people outside the department to give the students a broad foundation. In the second year, courses

are mainly on an emphasized level, continuing with the third year were the studies continue to reach deeper by more advanced courses. The curricula of all programs are the result of a joint work in the department including among others lecturers, students and the quality assurance (see more criterion 5).

The experts are further interested about the involvement of companies in the study programs. The program coordinators inform the experts that the master program OM and GMIT have a strong involvement of industry partners. For example, within GMIT, there are assignments connected to company needs. They have ongoing collaborations with companies, which contact them every year with assignment topics suitable for students. In other courses, however, the lecturers have to search every year for suitable assignments from the industry as no regular collaborations are established yet. They highlight that due to their high collaboration in GMIT, especially the international students are able to gain insights into Finnish companies. The experts are curious on the type of companies they collaborate, to which the program coordinators answer that they collaborate with large Finnish companies as well as regional small companies. The program coordinators continue that the bachelor program IEM does not have a strong involvement of the industry at the moment. There are exceptions in the last years, when students developed strategic plans for the industry partners, which might lead to stronger collaborations in the future. The programs coordinators emphasize that LUT considers the collaborations with companies as very beneficial especially for the employability of students. The partners from the industry confirm to the experts that they are involved on both teaching and giving assignments to the university. After providing data, they support students in their analysis and join the seminar in order to see the results. The students mainly work on analytics and modelling with their data, which the industry representatives consider as very interesting for them. In cases of a collaborative course between lecturers from LUT and guest lecturers from the Industry, the industry partners were asked to participate in this module including the consideration of the course structure and learning objectives. They state that they have a close collaboration with the lecturer from LUT. The students confirm to the experts that they enjoy the real world cases from the industry; therefore, they are very motivated to work on projects including real world data as it prepares them for their future career. Additionally, the students consider it would benefit their studies if they could visit companies onsite to get a better impression of the real work. This should also include companies working on innovation for students of GMIT. The teaching staff add to this discussion that they also include international companies in their programs in order to find suitable assignments for their students. This is important for the students to learn how to collaborate with a company.

Moreover, the experts are interested on the representation of research in the curriculum. The program coordinators state that their curriculum does not have a separated course on academic writing; instead, an introduction is given to every student within the module of the bachelor thesis. There, students learn how to search for information, how to read scientific publications, and how to write a bachelor thesis. Additional courses on scientific writing are available as elective courses.

The experts ask the program coordinators how students learn their skills in communication. They draw the experts' attention to the first year, where students have a specific course on communication "Professional Communication (Industrial Engineering and Management)". In this course, the students have to work in a group and also are required to present their work. This course is provided by a person from the language center. In addition, the experts raise the topic of English in the bachelor program IEM and OM (since the program GMIT is fully taught in English). The program coordinators mention that there are several basic courses in English in these programs and that the number was increasing during the last years. By their regulations, only some modules can be organized in English in the Finnish programs, whereas the majority of courses needs to remain in Finnish. Nevertheless, the experts insist how LUT ensures that the level of English in graduates from IEM is adequate. The program coordinators say that they do not monitor the learning of English in their students. They are aware that English is important and that students needs to learn it during their progress of finishing their studies. Still, they consider the students become more familiar with English as the number of master thesis in OM in English was increasing during the last years. They have just recently started to encourage also the bachelor students to complete their thesis in English. In the opinion of the students, many do not enjoy when courses are fully organized in English. In the bachelor program IEM, there are currently no international bachelor students; therefore, they consider the level of English in their lectures as suitable. They highlight that at LUT, they have an international community, which provides them with multiple opportunities to practice their English. The students from GMIT report that they need to pass an English test and pass an interview in order to enroll in the program.

The experts continue to raise the question on soft skills. The program coordinators explain that soft skills are generally integrated into most of the modules in the master programs. This includes teamwork, presentations, and discussions in almost every module. In contrast, the lectures in the bachelor IEM are more organized as classical lectures where teamwork is integrated if suitable. Soft skills in the bachelor programs are more common in the elective courses, where the student numbers are much smaller. The students consider the integrated soft skills in the programs under review as good. They learned their soft skills from projects and group works (usually 3 to 5 students). In certain courses, they have the

opportunity to practice their negotiating and leadership skills. In addition, LUT also offers a course on business culture (three ECTS credits), where they introduce how Finnish companies operate. The teaching staff confirms the previous statements to the experts. They state that they encourage the students to train their soft skills and therefore propose group works as often as possible. This includes role-play as a group work, where one has the role of a project manager while other act as companies.

In the discussion, the experts ask about the regulations concerning the internship in the bachelor program IEM. The program coordinators describe that an internship of two ECTS credits is mandatory for all students; additional credits can be awarded for longer internships. The mandatory internship can be on any kind of work including usual summer jobs as the main idea of the internship is to provide students with the experience of working in a company. This type of internship is very common in Finland in which the students usually work for four weeks to earn the two credits. In contrast, longer internships should be connected to their studies or their chosen minor in technology. Internships, especially in the area of engineering, are not common in Finland. The students should work in their field of expertise and develop their skills in a company. At the end, the students have to write a report and describe what they have learned. Internships related to the studies are available for students in the second or third year whereas first year students usually do any sort of internship. The program coordinators estimate that about 50% of all students apply for additional credits for their internship. In addition, also the master programs offer elective internships, which represent the first step of the students career path. The program coordinators admit that the situation in Finland is often challenging for international students. The situation is similar for the project-related assignment, which is connected to the topic of the students' master thesis. In both cases, the lecturer supports the students by providing contacts of their own networks and their research projects. In addition, they offer job portals, student counselling and support of a student team in order to give advice on how to apply to companies. The partners from the industry also mention that they are searching for trainees to offer different sorts of cooperation. This includes also sharing data for the master thesis of students. In the opinion of the students, the flexibility to take any internships is seen as positive. They report to the experts that they have previously experienced problems in finding internships, especially suitable internships to their studies. The teaching staff describes to the experts that they consider any kind of summer jobs as sufficient. They support their students by organizing a "theme day" on which students can meet representatives from the companies. In addition, they offer a mailing list to their industry contact in order for students to apply for an internship.

Furthermore, students have expressed their opinion to the experts to increase the opportunities to integrate with students in extracurricular activities. Especially in the international program such as GMIT, foreign students have difficulties in getting to know their classmates. According to their information, there used to be integrative activities in the past (prior to COVID-19), which they consider as important. In addition, students mention that the schedule of the courses in one study program is often not suitable. In some occasions, they have to visit of four to six hours online, which is very demanding in their opinion. It occurs often, that the courses take place on one days, which causes this high peak of workload (usually on Wednesday). In addition, also elective courses often overlap. They have the impression, the lecturers do not communicate when they are teaching their courses; therefore the students have to often decide which course they would like to visit although both of them would be suitable for their studies.

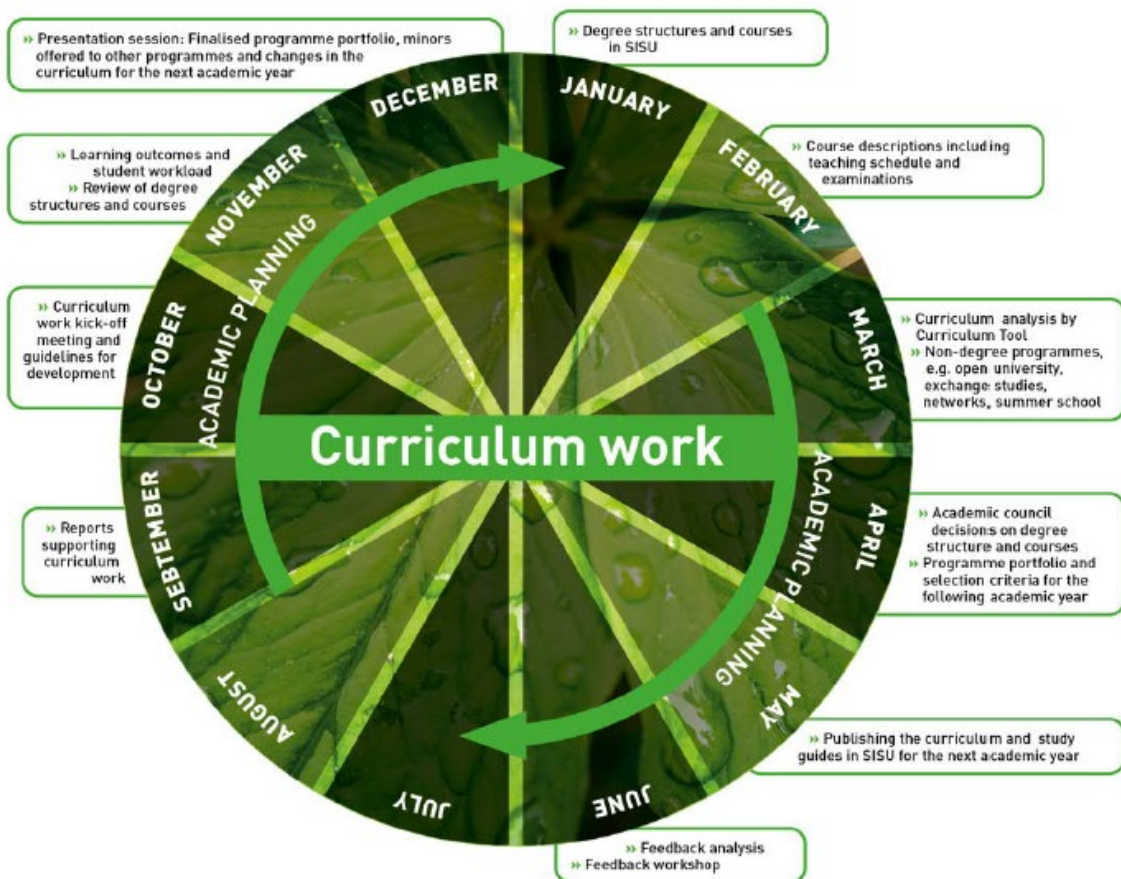
In conclusion, the experts ensure that the curricula of all three study programs under review enable students to achieve the in-tended learning outcomes. The experts verify that learning outcomes are defined for each module, which enable the achievement of the overarching program objectives of the study programs. This is well-integrated into the curriculum and strengthens the graduate profile on the job market. LUT assumes responsibility for the quality of the internship in terms of its content and structure. To this end, the university coordinates with the participating companies and supervises the students during the internship. Nevertheless, the experts see room for improvement concerning the organization of the internship. The experts are concerned that several students report problems in finding internships, especially international students. In addition, the internships are often not related to the study programs, which the experts consider non-ideal. Therefore, the experts recommend, that LUT should provide systematic support for all students in finding the suitable internship matching their skills and study program. The experts recommend LUT, to increase the collaboration with their industrial partners by developing a systematic cooperation. This could include partnership agreements, which regulate the type of contact and responsibilities of all involved parties. Furthermore, the experts recommend to oversee the schedule of all modules for each semester to minimize the overlap in modules in one semester. This applies especially for the master programs, as students often have only one chance to attend their courses of interest. In the experts' opinion, LUT should further increase the number of modules given in English in the master program Operations Management. Due to the international collaboration of companies today, the experts consider the English skills of all graduates in this area are of great importance. In addition, they recommend LUT to reconsider the structure of the study program. This concerns the two specialization, Supply chain management and cost management. The experts consider it might be

difficult for students to select their specialization in the first semester and therefore recommend reconsidering possibilities to offer all students one semester together before they have to decide their specialization.

### *Periodic Review of the Curriculum*

The curriculum is annually reviewed and monitored using several curriculum tools. The students are notified about any changes in regard to their study program on the online system of LUT. The curriculum tool considers the defined program specific indicators, which are discussed in annual quality workshops. The changes in the curriculum consider the opinion of internal and external stakeholder as described in criterion 5.

The annual curriculum review cycle was implemented in order to ensure that the course content, teaching and assessment methods, students workload, and virtual and campus environments are adequate to foster student learning. The LUT study services provide support the work on the curriculum by providing statistical data and feedback from survey, that lead to new strategies and improvements.



The experts have seen evidence that proves that the curriculum is periodically reviewed with regard to the implementation of the program objectives; curricular changes are documented. This review also includes whether the order of modules enables students to graduate within the standard period of study. Nevertheless, the experts consider the annual revisions of the curricula as high-paced and suggest to review this process (see criterion 5).

### *Student mobility*

LUT promotes international mobility by attracting international students and promoting outgoing students. The structure of the degree programs and the use of ECTS credit facilitate international transfer. Student services offer support and advice for LUT students to go abroad as well as the study counsellor, who serves the students of one particular study program. Further information is available within the LUT online system.

In addition, GMIT was developed as a study program to promote the internalization and student mobility. In the most recent year, twelve students from this program spent one semester abroad in Europe or Asia. It also offers the students to earn a double degree in cooperation with the Eindhoven University of Technology.

In the discussion with the expert, the representatives of the rector's office state that almost 75% of all students in their master studies apply to go abroad while the number of incoming students is slightly lower. Usually, students spend one semester abroad, which the majority spends within Europe. In the programs IEM, 40-50% of the students go abroad. They receive support from the study counselor and the student mobility coordinator in selecting the most suitable university and modules. Most mobility takes place in the bachelor programs, although it is possible to go abroad during the master studies. The representatives from the rector's office describe that students make a learning agreement before they go abroad in order to be accepted. They have the possibility to replace compulsory course with equivalent module or choose additional modules as elective. Usually, the students travel within the frame of an Erasmus agreement or a bilateral mobility agreement. If students want to go to a different university outside their collaborations, the situation needs to be carefully checked if it is possible to visit this university. The representatives of the rector's office add that studying is free in Finland, however, students from outside the EU need to pay tuition fees. This is €9,500 in bachelor programs and €13,500 in master programs. Scholarships for the third and fourth year are available if they have achieved 60 ECTS credits in the prior years. In these cases, a maximum of 50% of the tuition fees can be covered. The students report to the experts that they did not actively participate in any student exchange due to the COVID-19 pandemic. They add that in the master program OM, most students go abroad within the first semester. Other are also joining the double degree program offered with their partner university in Eindhoven, which requires them to

spend one year in the Netherlands. Nevertheless, the students were aware how to collect information to go abroad. They describe that they receive a list of partner universities to choose. Usually, the exchange lasts for six months and is accompanied by a seminar to prepare them in advance. In the opinion of the students, going abroad is more inconvenient due to the high amount of mandatory classes.

The experts confirm that LUT promotes student mobility through an appropriate framework (structural design of the degree programme, recognition of qualifications and support services).

#### **Criterion 1.4 Admission requirements**

##### **Evidence:**

- Self-assessment report
- LUT webpage <https://www.lut.fi/en/studies/apply-lut>
- Homepage studyinfo.fi <https://opintopolku.fi/konfo/en/>
- Universities act 558/2009 (Amendments up to 644/2016 included)
- Discussions during the audit

##### **Preliminary assessment and analysis of the experts:**

The admission to LUT is regulated according to the Finnish government decree on university degrees (794/2004) and the Universities Act 558/2009 (Amendments up to 644/2016), which connects the application procedure of LUT and other universities in Finland. In addition, universities might arrange separate admissions for programs with special qualifications such as foreign language or transfer students. At LUT, the university board decides annually on the number on new student intake. Special admission criteria can be issued by the vice rector based on a previous proposal by the dean of each school. Eligible applicants are admitted with a certain quota, where the vice rector also has the final decision on the admission of students.

The joint application for the Finnish universities including LUT is organized by the national service Opintopolku, which distribute the information about each study program and their admission criteria. Admission information is published in Finnish and English to support the application of international students. The portal is maintained by the Finnish National Agency for Education (Opetushallitus). The main period for applications to Finnish universities is between January and March/April.



The application to any study program in Finland has to be submitted to the webpage of Opintopolku. An applicant for a bachelor degree program can apply for six degree programs in an order of preference in one or several universities or universities of applied sciences. Condition for an application is the completion of the Finnish matriculation examination, a three-year vocational degree or an equivalent international high school degree. Students can be selected based on their success in the Finnish matriculation examination or by their success in the entrance examinations.

Admission to the master degree program considers two different recruitment channels: 1) the internal student continuing their master education after finishing their bachelor degree at LUT and 2) external applicants with an appropriate bachelor degree.

Internal students' applications consider the specialization area during their bachelor studies. It is possible to transfer to another specialization in the master program. External applicants need to submit their application via the Opintopolku system. The decision on the application is based on the required documentation and additional requirements set by the university such as interviews or exercises.

The two master programs under review differ in their application system. While the master program Operations Management only allows regular admissions, the admission for the master program Global Management of Innovation and Technology is organized by regular and rolling admission. Both applications either require a completed bachelor degree in Science and Technology, Engineering or any comparable field or a master degree in Science in Technology or Engineering.

The criteria for the admission of the master program Global Management of Innovation and Technology are adapted to the international study program, which is completely taught in English. The admission process takes place in two stages and demands an initial check on the educational background of the student (previous degree, studies in mathematics and physics, GPA, letter of motivation and letter of recommendation). In the next step, the applicants have to take part in an interview in order to evaluate their communications skills, their motivation, their background in the study field, and allow the program coordinators to gain an overall impression. The alternative admission for the master degree program GMIT considers a rolling admission. In addition to the previously described steps, the applicants need to receive a minimum of 50% of the maximum interview points.

International students from outside the EU will have to pay a tuition fee of 13.500 € per year for a master's degree program.

The experts discuss especially the admission criteria of the two master programs. The representatives of the rector's office mention that they changed to the bachelor-master system eight years ago, which also led them to create new specialized master programs. They highlight that in Finland, almost all graduates from bachelor programs still continue with their master studies. Of their programs, OM is one of the most popular among their students. Nevertheless, only about 50% of the applicants are graduates from LUT. In contrast, more than half of the applicants for the GMIT come from other universities to study at LUT. The experts are interested, if a practical background is somehow required for the master programs, which the representatives of the rector's office answer with no.

The experts acknowledge that the rules for the recognition of achievements and competences acquired at other higher education institutions are in accordance with the Lisbon Recognition Convention. In summary, the auditors find the terms of admission to be binding and transparent. They confirm that the admission requirements support the students in achieving the intended learning outcomes. All admission criteria and other admission information is published in the University's web pages in English and in Finnish.

#### **Criterion 1.5 Workload and Credits**

##### **Evidence:**

- Self-assessment report
- Curricular overview
- Module descriptions
- LUT Degree Regulation
- Discussion during the audit

##### **Preliminary assessment and analysis of the Experts:**

LUT uses the European Credit Transfer System (ECTS) as a unit to express the workload in each study program. The ECTS credit points represent the total workload of each student and equals 27 hours of work. This includes face-to-face hours, individual study as well as preparation for class and exams. Completing a degree requires an annual workload of 1600 hours. Since every semester at LUT is divided into two semesters, one semester corresponds to a workload of 30 ECTS points. Each semester is further divided into two periods including exams. All degree programs follow a study guide, which allows the students to complete their studies within the standard period of time. All LUT bachelor programs encompass 180 ECTS points and master programs 120 ECTS points.

LUT aims to distribute the student workload evenly by courses, periods, semesters and the entire academic year. Compulsory courses, including possible minor studies, are prescheduled in the students' personal study plans (PSP) to help students schedule their studies and to graduate in the targeted time. The PSP outlines which courses are included in the student's degree and how they situate in the degree structure according to the curriculum. Students prepare their PSP at the early stages of their studies and review and update it together with their study counsellors. Most general courses in the bachelor and master programs are weighted between three and six ECTS credits; smaller units are possible and mainly focus on introduction courses. The bachelor thesis consists of a workload of ten ECTS credits whereas the master thesis had a workload of 30 ECTS credits.

The actual workload of each student depends on their selection of courses. In the bachelor program IEM, students often choose to take less courses, which potentially prolongs their studies (e.g. due to work). Each student has the possibility to balance their optimal workload with their intended progression of their studies. Students receive guidance in this process by their study counsellor. In the master programs OM and GMIT, the selection of suitable elective courses is essential to keep within the standard study time. In these programs, the fourth semester is mainly reserved for the work on their master thesis.

LUT collects student feedback on every course, which also contain questions on the workload and if the workload corresponds to the awarded ECTS credits (see criterion 5). In the discussion with the program coordinators, the experts further inquire how LUT measure the actual workload of students. They consider this as part of their regular curriculum work. Their aim is to distribute the workload evenly between elective and compulsory modules. The modules of the selection on the minor field are, however, organized by different departments, therefore they have little influence on the workload of the modules. Consequently, the bachelor program IEM is not completely independent from other study programs. Nevertheless, they discuss the workload of all modules and aim to match the awarded ECTS credits to the real workload of the students. They emphasize that the workload is discussed with the students. LUT organizes workshops to address this issue together with the student representatives. They meet with students from different years in order to find a good strategy to improve. The program coordinators add that many students are doing more work than necessary, particularly in GMIT.

The students confirm to the experts that the workload in all the study programs under review is adequate. Exceptions can occur within their minor studies, which consist of courses organized by other departments. The students state that they give feedback on the high workload in certain courses. They admit that changes were made in the last few years; thus, they consider their comments were put into action by the university.

During the discussion with the peers, the students confirm that most of them will take five to six years to finish their combined Bachelor's and Master's programmes and that there are no structural problems in the organization of the programs that hinder them to finish their studies within the expected timeframe. Thus, the experts conclude that LUT has established a credit system, which is based on the student workload. The workload includes contact hours and self-study time. All compulsory components of the study program award credit points and that these credits are awarded for every module based on the respective workload. The experts consider the estimated workload is realistic and well-founded, so that the study programs can be completed in the standard period of study. Structural peaks in the workload are avoided. Furthermore, a process is implemented, which regularly monitors whether the credits awarded for each module correspond to the actual student workload and whether the distribution of the workload across all semesters enables graduation within the standard period of study. Students are involved in these processes by conducting surveys and interview. If adjustments are made, they are well documented.

#### **Criterion 1.6 Didactic and Teaching Methodology**

##### **Evidence:**

- Self-Assessment Report
- Curricular overview of each degree programme
- Module descriptions
- Discussions during the audit

##### **Preliminary assessment and analysis of the experts:**

The lecturer of each module is responsible to select the appropriate teaching methods for their courses. Based in the intended learning outcomes (ILOs), the content, pedagogical requirements and the number of students needs to be defined. The head of the degree program oversees this process and can interfere if necessary.

In the bachelor program IEM, the student numbers are usually very high. In some specializations, there are relatively small numbers, which allows the lectures to integrate student-oriented and problem-based learning approaches. LUT expects their lecturers to consider the students soft skills in designing their teaching methods. This includes team-working skills, communication skills, creative and critical thinking skills as well as personal and professional skills demanded in a modern work environment. This includes also methods to foster an entrepreneurial mind-set in students. Interactions between students and teachers in discussions and group works is therefore integrated in most modules, which foster the collaborative learning. The lecturers integrate assignments to involve real-life examples

and that require problem-solving and decision-making competences. Advanced specialization courses also involve assignments and extensive special projects. Moreover, the lecturers at LUT integrate interactive teaching methods such as case exercises, group projects, learning diaries, flipped classrooms and management games and simulations. Digitalization and distance learning are still part of the courses at LUT, although the majority of teaching is based on onsite classes. The teaching staff strongly improve their digital teaching capabilities during the COVID-19 pandemic and are qualified to consider the pedagogical requirements of online teaching. The appropriate balance between online and onsite teaching and assessment methods is constantly monitored and developed.

The teaching staff highlights how they integrate cases from companies into their lectures. The outcome of the projects varies and includes written reports, innovation-based survival themes or produced videos. In the master programs, the collaboration with companies allowed them to analyze a set of data from different viewpoints by using multiple approaches. In the master programs they further integrate learning games in order to let the students experience real life situations. In addition, they apply simulations in the module "Business Analytics"

The suitability of the selected teaching methods is also part of the student course evaluation at the end of the semester (see criterion 5).

In the opinion of the experts, LUT supports a variety of teaching methods and didactic means, which are used to promote achieving the learning outcomes and support student-centered learning and teaching. The study programs contain an adequate balance of contact hours and self-study time. The experts confirm that students receive an introduction to independent scientific work is an integral part of the study program. In addition, LUT regularly reviews whether the utilized learning and teaching methods support the achievement of the programme objectives.

**Final assessment of the Experts after the comment of the Higher Education Institution regarding criterion 1:**

Ad criterion 1.3.

In the statement, LUT states that the university has already increased their collaborations with their industrial partners on a systematic level. These cooperations have different forms including research, employer recruitment, internships, and teaching. The experts acknowledge this positive development at LUT; however, they confirm that the discussions with the partners from the industry as well as the students has demonstrated that there is

room for improvement in this regard. This included especially the feedback to partners from the industry on their involvement as well as the students' task in the industry. Therefore, the recommendations E1 and E2 remain in place.

Furthermore, LUT remarks that in the English language is already well integrated in the study program OM. This include several courses entirely taught in English as well as English material used in each course. Therefore, LUT considers that the students already need to demonstrate good skills in English before they graduate in this program. In the opinion of the experts, the showed a different picture, especially in regard to the confidence in speaking English of the students. Therefore, the experts continue to recommend to increase the English proficiency of the students in the master program OM.

## 2. Exams: System, Concept and Organization

### Criterion 2 Exams: System, concept and organization

#### Evidence:

- Self-assessment report
- Module descriptions of each study program
- Examination regulations
- LUT Degree Regulations
- Discussions during the audit

#### Preliminary assessment and analysis of the experts:

The lecturer of each module selects the most suitable method to assess if the students have achieved the intended learning outcomes. Therefore, various assessment methods are applied in the three study programs under review. Examinations range from written examinations, continuous assessment during the course to multiple types of assignment. The main assessment methods used in the programs under review are written exams, reports and oral presentations. Other assessment methods include for example exercises, seminars, group work, written reports, learning diaries, simulations, presentations, project work and peer evaluation. A high number of courses also involve assignments.

Students can find the information on the applied assessment methods of one course in their online system eLUT as well as in the module descriptions online. In addition, the lecturers communicate the assessment methods to the students at the beginning of each course. Examination and teaching periods are annually announced by the vice rector of

education and published in the academic calendar accessible in the online eLUT system. There are altogether six examination weeks during the academic year, plus an additional examination week for re-sits in summer. Next to the examinations weeks, exams can also take place during the teaching period.

Three examinations are arranged for each course. Students have to register online for the examinations. In each module, the students can take part in three examination sessions. If students fail three times in one course, they can apply for an additional retake. LUT has further issued a guidelines and procedures for students with learning disabilities and special needs. In addition, LUT has issued ethical guidelines and guidelines for handling misconduct.

Course evaluation follows a zero to five scale with the following grades: excellent (5), very good (4), good (3), satisfactory (2), sufficient (1) and failed (0), or pass – fail. On the five-point scale where 100 points is the maximum, the grade 5 requires 90–100, and 50 points are required to pass the course. The total score of one module can be a combination of various assessment methods including for example, an examination, exercises, home assignments, and seminars.

Students can contact the lecturer to discuss the results of their exams. In this discussion, the lecturer should be able to clearly explain the grading principles of the exam and give feedback on how the students' performance can be improved. If they disagree with the grading, they can request a revision of the grade and may submit a further appeal with the Degree Board within 14 days of receiving of the grade.

### *Final thesis*

A final thesis is mandatory in the bachelor program IEM and the two master programs OM and GMIT. LUT offers standardized templates and instructions in the eLUT system. Bachelor thesis are mainly written in Finnish; a thesis in English is optional. The works are checked for plagiarism using the Turnitin program. The evaluation of the bachelor thesis follows the same scale as the exams, based on a multi-item evaluation form. Master theses are evaluated based on the same scale, but the examination requires two experts. The assessment criteria differ from the master thesis in accordance to their scientific level.

The experts raise the question of assessment methods with the program coordinators. They describe that the assessment method is decided based on the intended learning outcomes of the module. In courses with a stronger focus on soft skills, the assessment is more based on group work, presentations, and essays. In other courses, the assessment method are written exams. Questions on the assessment methods are also included in the evalua-

tions at the end of the course in order to receive student feedback. The program coordinators add that the responsible teacher for each module needs to be someone holding a PhD. Young teachers are often grouped in pairs in order to support them in choosing the most suitable assessment methods. Additionally, experienced lecturers and professors are always available to support their colleagues. Members of the teaching staff add that they reduced the importance of written exams in the study programs under review. Instead, students are now required to do other task including presentations, seminar work, article studies or case work. They always use multiple assessment methods in their lectures to be able to assess different aspects of the students' knowledge. In addition, they offer group-based exams, where they practice the correct use of terminology and negotiation skills of the students. All information regarding exams is integrated into their online system.

The students give more details to the experts. They summarize that during the bachelor studies, 50% of the assessment is based on a continuous evaluation and 50% is based on the final exam. This situation is very common for most modules. The initial 50% can include group work, participation, and weekly tasks. LUT still organizes exams online, but examinations can also take place in the classroom. In some courses, they also use learning diaries and (reports on) practical work. In the opinion of the students, writing reports has prepared them to write their thesis.

In the opinion of the students, the lecturer should give them more feedback on their course work. Until now, the lecturers highlight the high amount of time a more personal feedback would require; however, the students consider it would have a positive effect on their studies. The experts address this issue also the teaching staff. They explain that in large courses with up to 350 students, individual feedback is not feasible in their opinion. In other courses, which apply group-based methods, each students receives a personally written feedback by the teacher as well as by their student peers. In such cases, an individual feedback is possible and already integrated in their assessment methods.

Moreover, the students explain to the experts that they are aware of possibilities to consult the lecturers to appeal an exam result. Based on experience, they report how they initially emailed the professor and explained the problem. The lecturer gave them a thorough feedback and explanations, which allowed them to understand the error in their exam and improve for the next try. On other occasions, the professors offered to take a look at the tests and everyone was welcome to come and discuss the results.

The experts conclude that the exams in the three study programs under review assess the extent to which the defined learning objectives in each module have been achieved. The exams relate to specific modules. Students are provided with feedback on the competencies that they have acquired. All study programs under review include a compulsory final



thesis or final project, which demonstrates that the students are able to work independently on a task at the intended level of the study program. Within the study programs under review, the experts see various assessment methods are applied. Students are informed about the conditions for completing the module (coursework, exams etc.) latest at the beginning of the module. There are transparent rules for make-up exams, non-attendance, cases of illness as well as compensation of disadvantages in the case of students with disabilities or special needs (e.g. pregnancy, childcare, caring for relatives) etc.

The experts consider the number and distribution of exams ensure an adequate workload as well as sufficient time for preparation. The organization of the exams ensures a smooth study process. The examinations are marked according to transparent criteria. The experts gain the impression that students have the opportunity to consult their lecturers about the results of their exams. In addition, the experts support the students' opinion to increase the personal feedback to students in order to improve their learning process.

### 3. Resources

<b>Criterion 3.1 Staff and Development</b>
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**Evidence:**

- Self-assessment report
- Staff handbook
- Discussion during the audit

**Preliminary assessment and analysis of the experts:**

According to the Self-Assessment Report, the academic staff at LUT consists of professors, associate/assistant professors, post-doctoral researchers and PhD-students. The composition of teaching and research personnel at LUT is based on a tenure track system. The tenure track is a professor's pathway to promotion and academic advancement. It is the process by which a lecturer becomes an assistant or associate professor and then a full professor based on their teaching record and research activities. The members of the teaching staff are either employed in a tenure track position or a non-tenure track position. Non-tenure track positions are either research or teaching oriented, based on the needs of the School of Engineering Sciences.

The school of Engineering Sciences has 310 full-time employees whereas the department of Industrial Engineering and Management has about 90 staff members. Next to the three

programs under review, the department offers one additional bachelor program and five master programs.

In the discussion with the experts, the representatives of the rector's office also discuss the mobility of the scientific staff. They explain that the university support their lecturers to spend up to one year abroad, but this is a rather new program. Otherwise, several non-Finnish professors work at LUT and teach in the programs under review. LUT further invites guest lecturers in order to increase internationality of the study programs. The staff members explain to the experts that their exchange is mainly driven by their research projects.

The experts inquire about the situation of research at the department of Industrial Engineering and Management. The representatives of the rector's office describe that the research is organized in research teams; they currently have seven research teams in their department. Associated with the master program OM, they have two research teams with one working on supply chain management and the second one working on cost management. Connected to the master program GMIT, there are three research teams working at Lappeenranta, Kouvola and Lahti. All scientific staff members are involved in research. Each team has one team leader, who is responsible for making decisions such as new personnel and resources. In the department, the team leaders, the head of department and the head of the degree programme meet on a regular basis to discuss the most relevant and recent developments in education and research. Based on the representatives of the rector's office, teaching should be based on research. They add that at LUT, team teaching is common in order to balance the workload. The individual workload depends on the level of their career or contract. Teaching load in the study programs under review can be divided to PhD students, teaching assistants, postdoctoral students, associated professors, university lecturers, and professors. The program coordinators specify that there are several lecturers with an industry background but mainly they have an academic background with collaborations to the industry. Due to their joint research activity, the lecturers are also able to keep their skills up to date. Several partners from the industry confirm to the experts that they are visiting LUT by giving guest lectures. They mainly use these opportunities in order to introduce their company, present cases from the industry and also promote the summer training in some cases. Other also use the guest lectureship to advertise for collaborations on the master thesis. They state that they are mainly involved in teaching of master courses of the program OM and GMIT. In return, several lecturers from LUT are also giving guest lectures at their companies.

The experts continue to ask about newly recruited staff members. The representatives of the rector's office describe that they hire everyone using a tenure track system. Everyone has to perform in giving lectures and conducting research. Once someone starts their job,

they conclude pedagogic studies to receive basic training. LUT offers expert training to support the lecturers in their further development. On a daily basis, the experienced lecturers can be approached for questions and suggestions. This mutual peer support is evident also in learning new topics as a team including questions on digitalization or artificial intelligence at the university. The program coordinators confirm that they have access to basic pedagogical training and advanced courses. As example, they mention the Tampere UAS pedagogical training awarding 60 credits; although this is not mandatory, most lecturers in the program under review have completed this training.

Furthermore, there are regular discussions on the development of each lecturer with the head of the research team. These discussions include both, teaching skills as well as research skills of the employees. The teaching staff further mention that they participated on a training on digital pedagogics, which provided them with information on advantages and disadvantages of certain digital media. Nevertheless, the teaching staff confirms to the experts that they solve many problems among themselves by discussing it with their colleagues.

The experts are also interested, how the scientific staff members from different departments collaborate with each other. The program coordinators explain that LUT has a specific research platform, where they are able to search the CV of every employee. Therefore, if they need to search for a new expert in one field, they can access the database and see if someone from LUT could join their project. In addition, members of the teaching staff report to the experts that they use this platform in order to find new experts at LUT.

The experts consider the composition, professional orientation and qualification of the teaching staff are suitable for successfully delivering the study programs under review. Thus, the research and development of the teaching staff contributes to the desired level of education. Lecturers have the opportunity to further develop their professional and didactic skills and are supported in using corresponding offers. In addition, the experts confirm that LUT regularly reviews whether the subject-specific and didactic qualifications of the lecturers contribute adequately to the delivery of the lectures due to the implementation of the teaching observation method.

<b>Criterion 3.2 Funds and equipment</b>
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**Evidence:**

- Self-assessment report
- Visit of the campus, classrooms and laboratories

- Discussion during the audit

**Preliminary assessment and analysis of the experts:**

The budget of LUT contains government sources, third party funding and research projects as well as tuition fees by non-European students. The dean of the School of Engineering Sciences is responsible for budgeting their resources to the school's activities, departments, and laboratories. The main source of third party funding in the School of Engineering Sciences are the Academy of Finland, the European Commission, Business Finland, Regional Councils and private companies. The annual revenue of the department in Industrial Engineering and Management is around eight million Euros. The internal budget is mainly used for education whereas the external funding is used for research activities. All faculty members are paid partly from the budget funding and partly from re-search projects according to distribution of their workload

LUT operates two main campuses, one in Lappeenranta and one in Lahti. These campuses are both shared with the LAB University of Applied Sciences with whom LUT shares laboratories and other facilities. The campus in Lappeenranta has 21 lecture halls and 10 computer classrooms. Multi-purpose classrooms are available for teaching. Due to the COVID-19 pandemic, the online learning facilities were improved including e-learning tools. A "digital learning team" supports the teaching staff in all technology-related issues including online learning.

The department of Industrial Engineering is strongly involved in research including interdisciplinary cooperation with companies. The research at IEM focus on five themes: Innovation Management, Supply Chain and Operations Management, Cost Management, Performance Management and Systems engineering. Ongoing projects are on local level to global ones.

LUT further offers an academic library to students, staff, and researchers. The library has an extensive collection of literature titles and journals, both printed and electronic. Several works are also publicly available. In Lappeenranta, the library is equipped with silent workspaces, several group work facilities and a room provided to students writing their thesis. The library is open for students and staff members 24 hours a day, seven days a week. Other facilities at the university campus are restaurants and cafes, sports halls and a gym as well as a health care center.

LUT offers the students access to their Student Union House with facilities available to all students. These include independent working rooms as well as meeting rooms and recreational facilities. Each club has their own room on campus.

The experts discuss with the students about their satisfaction of the campus facilities. The students are very satisfied with the facilities of the Lappeenranta campus. They mention that there is a sufficient amount of books in the library, although most of them use e-journals mainly. They have received an introduction to search the digital library, which they consider also beneficial for writing their thesis.

The experts conclude that the financial resources and the available equipment constitute a sustainable basis for delivering the study programs. This includes secure funding and reliable financial planning, sufficient infrastructure in terms of both quantity and quality as well as binding regulation of internal and external cooperation.

## 4. Transparency and documentation

### Criterion 4.1 Module descriptions

#### **Evidence:**

- Self-assessment report
- Module descriptions of each study program
- Webpages of the study programs
- Discussion during the audit

#### **Preliminary assessment and analysis of the experts:**

Detailed descriptions of the modules are available on the webpage of LUT and the eLUT study portal. The students, as all other stakeholders, have access to them. Additional study guidelines are available for download on the LUT webpage.

After studying the module descriptions, the experts confirm that they include all necessary information (course name, course code, students' total workload, awarded ECTS points, teaching language, grading scale, intended learning outcomes, content, course materials, possible prerequisites, name of teacher/teachers in charge, exam methods, and assessment criteria).

The experts conclude that the module descriptions reflect the curricula adequately and contain meaningful information about the individual modules. In particular, the descriptions provide comprehensive information about the persons responsible for each module, the teaching methods and workload, the credit points awarded, the intended learning outcomes, the applicability, the admission and examination requirements, and the forms of assessment, and details explaining how the final grade is calculated.

#### **Criterion 4.2 Diploma and Diploma Supplement**

##### **Evidence:**

- Self-Assessment Report
- Sample Transcript of Records for each degree programme
- Sample Diploma Supplement for each degree programme

##### **Preliminary assessment and analysis of the experts:**

LUT issues degree certificates which are composed of a certificate, a diploma supplement and a transcript of records. The degree certificate also indicate the title of the final thesis. The diploma supplement contains all required information about the degree programme whereas the Transcript of Records lists all the courses that the graduate has completed, the achieved credits, grades, and cumulative GPA. Thus, the Diploma Supplement contains all necessary information about the degree programme in order to give third parties an adequate overview about the profile and qualifications of graduates. Furthermore, LUT's Diploma Supplement complies with the model developed by the European Commission, the Council of Europe and UNESCO and it includes a description of the Finnish education system prepared by the Finnish National Agency for Education and approved by Finland's Ministry of Education and Culture.

Students who graduate from a master's programme in English receive a degree certificate in Finnish and English. Students who graduate from the Finnish-language bachelor program including IEM receive a certificate in Finnish and an English translation.

In the discussion, the experts address the university with a question on digitally issued certificates. The representatives of the rector's office state that they are currently still issuing certificates on paper. The representatives of the student guild raised this issue previously and they are currently discussing how to issue electronic certificates in the future.

The experts confirm that LUT issues a diploma (degree certificate) together with a diploma supplement shortly after graduation. Both are provided in with translations to English. These documents provide information on the student's qualifications profile and individual performance as well as the classification of the degree programme with regard to the respective education system. In the additional transcript of record, the grades of individual modules are presented and the way in which the final mark is calculated is explained. In addition to the final mark, statistical data as set forth in the ECTS Users' Guide is included to allow readers to assess the individual mark.

#### **Criterion 4.3 Relevant rules**

##### **Evidence:**

- Self-Assessment Report
- All relevant regulations as published on the university's webpage

##### **Preliminary assessment and analysis of the experts:**

The rights and duties are published in the University Act, Regulations of LUT and the Code of Conduct of all LUT Universities. The University Degree Regulation give guidelines on the study programs as well as the teaching and studying at LUT. These rules and regulations are updated regularly.

The experts confirm that the rights and duties of both LUT and the students are clearly defined and binding. All rules and regulations are published on the university's website in Finnish as well as in English and hence available to all stakeholders. In addition, the students receive all relevant course material in the language of the degree programmes at the beginning of each semester.

## **5. Quality management: quality assessment and development**

#### **Criterion 5 Quality management: quality assessment and development**

The study programme is subject to periodical internal quality assurance which includes all stakeholders. The results of these processes are incorporated into the continuous development of the programme. Processes and responsibilities are defined for the further development of the programme.

The results and any measures derived from the various quality assurance instruments used (various survey formats, student statistics, etc.) are communicated to the students.

##### **Evidence:**

- Self-assessment report
- LUT degree regulations
- LUT quality manual
- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

LUT has an established quality management system to ensure a continuous development of the university and its study programs. The quality management is part of the core operations at LUT including academic education, scientific research, societal interactions and support services. The quality management is based on the Universities Act, Regulations of LUT, the LUT Code of Conduct and the roles and responsibilities of university administration and decision-making bodies.

The quality management at LUT relies on internal as well as external quality assurance. External quality assurance is provided by external audits of the Finnish Education Evaluation Council, which took place in 2009, 2015, and 2021. LUT has passed all the audits without requirements. In addition, LUT successfully applied previously for international accreditation, including the three degree programs under review.

Internal quality assurance includes internal annual assessments and quality workshops for each study program. The workshops support management and promote the continuous development of the degree programs by considering internal and external stakeholder feedback and program performance indicators. The head of the respective study program and relevant program managers and students' representatives conduct the review together and provide a critical report with development targets, actions and persons responsible for the implementation. This process includes an annual review on the curriculum, which are assessed by the personnel of the study program. In addition, the programs are systematically monitored, which provides an annual plan for education statistics. The curriculum of each study program aims to reflect the strategic goals and objectives of the university, which is issues by the LUT board.

Each study program is systematically analyzed using common indicators and the students' achievement of the independent learning outcomes. LUT uses real-time data to monitor the programs. Statistics and feedback reports are used to make decision and develop strategies on how to improve the study programs. Specific education related statistics and feedback reports are available in the LUT intranet to restricted target group, mainly to those involved in LUT education management or academic affairs. The utilization of monitoring data needs to be constantly improved in order to further improve the proactive approach of programme management.

The student feedback contributes to the direct improvement of the program. LUT continues to experiment in receiving student feedback; newly launched ideas included monthly student feedback on their well-being, surveys of teaching practices or reviews of giving student feedback. Surveys of external stakeholder further give information on the employment rate of graduates and therefore the relevance of the qualification profile for the job



market. External stakeholder, such as partner in research collaborations, give additional feedback in an informal manner.

Course assessment is mainly provided through students' questionnaires in order to support the development of each module and each lecturer. The students give their feedback on the courses by filling out the questionnaire online each period. Students assess various aspects such as quality of the degree, quality of teaching, quality of guidance, and satisfaction with student life. Teachers are able to add their own questions to the questionnaires if they want to receive feedback e.g. on specific teaching methods applied in the course. Course-specific feedback reports are delivered via Moodle to the teachers responsible for the courses. The workshops support management and promote the continuous development of the degree programs. After the teachers have received the feedback report on their own course, they are expected to give a response to the feedback to inform students about conclusions and development actions based on the feedback.

In the discussion with the expert panel and the representatives of the rector's office, they verify the details of the regular evaluation processes at LUT. They add that the accreditation of the three study programs under review is already the third times they undergo external reviews. They add that they hold an annual workshop for each study programs to discuss the result of the evaluations and monitoring. In this workshop, representatives of the quality management meet with the head of the program and the student representatives to develop a strategy for the next year. They confirm that the students are actively integrated into the work of quality assurance at LUT. This workshop on quality management of the study program takes place before a workshop on the curriculum. Meetings with students take place four times a year, when the head of the program, the deputy head, student representatives, study counselors and several lecturers meet. Several students confirm to be part of the different quality assurance activities.

The quality management team describes to the experts that they build a strong quality circle to optimize the study programs at LUT. Each year brings new students with new problems, which they try to solve. Current adjustments deal with changes in the post-pandemic world and discussing the degree of online teaching and mandatory hours on campus.

The experts have interest in the process of student monitoring, which the representatives of the rector's office describe to them in detail. They currently use increased real-time data to monitor the student process. They still consider that this process needs more improvement on how strategies can be developed on this basis. A main questions is also, who is responsible to take action if anomalies occur in the monitoring process. Currently, the program management checks on the student monitoring data twice a year. For example, they

do record some problems when students enter their master studies for which they are considering new solutions right now. The student monitoring also allows LUT to contact students who became “passive” in their system due to not completing any modules or if they take too long to finish their thesis.

The experts further discuss the module evaluations each semester. The representatives of the rector’s office describe that all enrolled students of one module receive an invitation for the evaluations automatically. Next to the lecturer, the feedback is available for the head of the degree program and all students who took the course. The student guild members usually collect the course feedback in one report and send the data to the head of the program, who will be available to discuss the data with open feedback. The student guild works together with the student union in order to exchange on their data on the annual quality teaching survey. LUT collects data in between the period of two days before and two weeks after the teaching period. They confirm that almost 90% of all graduate students give feedback. In addition, they offer open feedback channels, where students can write anonymously during the entire year. Informal exchange is further taking place by coffee afternoons among the student guild. If students want to receive personalized feedback, they have to contact their supervisors individually as there is no systematic feedback available at the moment. The partners from the industry confirm to the experts that they also receive the teaching evaluation. The students confirm that they take part in course evaluations at the end of the semester via their online system. They are aware that the feedback is transferred to the student guild’s representative of academic affairs, who gather all feedback in order to write a summary before meeting with the head of the program and the head of the student guild. The students consider the opportunities to give feedback at LUT have a low threshold. They also use platforms like discord to give course feedback since they feel no barriers to the lecturers. In addition, they receive feedback on the results from the evaluation and consider their feedback to have a positive impact on the study programs.

The representatives of the rector’s office furthermore confirm that they conduct systematic survey among alumni among those who graduated five years prior. Other surveys among companies are conducted for those who cooperate on master thesis. However, in the discussion with the program coordinators, the problems of contacting alumni become evident as many graduates cannot be reached by phone or email. Several of the partners from the industry have a LUT background themselves; they would support a stronger involvement of alumni in the quality management processes. Additionally, they would also want LUT to approach companies more frequently to join quality assurance surveys, which they consider beneficial for both parties. A representative of the alumni organization suggests that a good idea would be a sort of collaboration forum, which would be open to all

alumni from LUT. This forum could then be used to give feedback even several years after their graduation at LUT.

Upon the questions by the expert panel, the representatives of the rector's office also explain that LUT also has a career center. This offers career services for graduates and support the students during summer jobs. They add that in the master programs under review, most graduates are already employed (95%), whereas the unemployment rate among graduates of the IEM program is 0%. Companies in Finland do not approach bachelor graduates from a university (difference to graduates of a university of applied sciences).

The experts are further concerned about the high pace of the development of the study programs by implementing changes annually. The program coordinators confirm that there are changes made on an annual basis, but these changes are minor. As one example, they name a change in the staff members leads to changes in the offered courses. The list of offered elective courses is adapted the most. The program coordinators further state that each workshop is concluded with a report which will be shared with all involved parties to ensure everyone is informed about ongoing processes and discussions.

Another topic of interest for the experts is the graduation time, especially in the master program OM where the average duration is almost twice the standard study period. The program coordinators state that students can graduate in the standard period, but that most master students work next to their studies in order to earn money. Therefore, they adapt the study plan to study longer. In contrast, the average in the bachelor program is 6.15 semesters, which indicates that students are also graduating in less than six semesters. The program coordinators confirm that this is possible if the students work hard. Nevertheless, the students consider it as a challenge to work and continue their studies in the master program OM. Nevertheless, students confirm that it is possible to finish the studies in four semesters if you study full time. In contrast, students in the GMIT programs often have a scholarship; therefore, they are required to finish 30 ECTS credits in one semester. Students confirm that it is possible to finish the bachelor program IEM in two and a half years (five semesters). According to the students, this was possible due to the online teaching during the COVID-19 pandemic, which allowed them to work from home.

In conclusion, the experts have seen evidence that all study programs under review are subject to periodical internal quality assurance, which includes internal and external stakeholders. The results of these processes are incorporated into the continuous development of the programs. Processes and responsibilities are defined for the further development of the programs. LUT uses various quality assurance instruments to measure these results. Still, the experts recommend LUT to review their feedback system and their annual feedback cycle in their quality management. The experts consider that a slower-paced review

of data collected over a longer time period might be more indicative towards systematic improvements than annual variations. LUT should reconsider the adaptations made during the past years and analyze the strategies drawn on this data in comparison with the approach based on a larger data size.

**Final assessment of the Experts after the comment of the Higher Education Institution regarding criterion 5:**

The statement of LUT remarks that LUT has already established alumni services, which organize collaboration forums of all LUT alumni. Since this part of the report is based on a comment in the discussions, the experts get the impression that these alumni network might not be well known and possibly could be promoted more. The experts do not issue any requirements or recommendations in this regard.

## D Additional Documents

No additional documents needed.

## E Comment of the Higher Education Institution (23.08.2023)

The institution provided a detailed statement to the accreditation report:

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**LUT Statement on ASIIN Accreditation report draft, Cluster D – Industrial Engineering and Management**

### **Criterion 1: The degree programme: Concept, content & implementation**

Citation from the accreditation report, page 15:

‘The program coordinators explain that they do not want to separate these programs as the students should get an impression of all the issues in a company.’

By the current programme structure and content, the programme coordinators of master’s programme Operations Management assure that the students get a comprehensive picture of the operations in an organization – not all the issues in a company.

Citation from the accreditation report, page 21:

‘The experts recommend LUT, to increase the collaboration with their industrial partners by developing a systematic cooperation. This could include partnership agreements, which regulate the type of contact and responsibilities of all involved parties.’

In recent years, LUT has started systematic cooperation with a number of partner companies. This cooperation takes various forms, from research to employer recruitment, internship, and teaching. More information is available on the LUT websites:

<https://www.lut.fi/en/research/partnerships-and-cooperation/strategic-partnerships-companies>

Citation from the accreditation report, page 21:

'In the experts' opinion, LUT should further increase the number of modules given in English in the master program Operations Management. Due to the international collaboration of companies to-day, the experts consider the English skills of all graduates in this area are of great importance.'

Although this is not reflected in the course descriptions, English is used in all courses in the Operations Management programme. Some courses are taught entirely in English, but all courses use a lot of material in English and some coursework is done in English. It is not possible to complete the programme without a good command of English.

(in Finnish).

Citation from the accreditation report, page 21:

'In the experts' opinion, LUT should further increase the number of modules given in English in the master program Operations Management. Due to the international collaboration of companies today, the experts consider the English skills of all graduates in this area are of great importance.'

Although this is not reflected in the course descriptions, English is used in all courses in the Operations Management programme. Some courses are taught entirely in English, but all courses use a lot of material in English and some coursework is done in English. It is not possible to complete the programme without a good command of English.

In addition, it should be noted that in Finland there are regulations that limit the amount of teaching in English if the programme is in Finnish.

Citation from the accreditation report, page 25:

'Internal students' applications consider the specialization area during their bachelor studies. It is possible to transfer to another specialization in the master program; however, additional studies may be required and the acceptance has to be considered case-by-case.'

At LUT, internal bachelor students can change their choice of master program as they wish, and there is no case-by-case assessment.

Citation from the accreditation report, page 27:

'In the bachelor program IEM, students often choose to take less courses, which potentially pro-longs their studies.'

Students in the IEM bachelor's programme typically graduate on time. Extension of studies is more typical for master's students, who may choose fewer courses per semester due to other commitments (e.g., work).

Citation from the accreditation report, page 28:

'In the bachelor program IEM, the number of students are usually lower than in other bachelor pro-grams at LUT.'

This is not the case; the IEM degree programme has the highest number of bachelor programme students when compared to other LUT degree programmes. Some of the specialisation courses in the bachelor's program may have a relatively small number of students, but the programme as a whole is one of the largest at LUT.

### **Criterion 3 Resources**

Citation from the accreditation report, page 33:

'Next to the three programs under review, the department offers three additional master programs'

In addition to the programmes under review, the department offers one bachelor's programme and five master's programmes (see Self-Assessment Report, chapter 3.1).

Citation from the accreditation report, page 34:

'The teams meet on a regular basis with the head of the programs and department to discuss the most relevant recent developments.'

The sentence does not correctly describe the management practices of the department. In the department, the team leaders, the head of department and the head of the degree programme meet on a regular basis to discuss the most relevant and recent developments in education and re-search.

Citation from the accreditation report, page 34:

'In some cases, professors are only teaching one course.' (page 34)

This is not the case in the IEM department. All professors are responsible for more than one course. Only in very rare cases, for example near retirement, can a professor reduce his/her teaching load.

Citation from the accreditation report, page 36:

Only the salary of post-doctoral staff members is primary paid by soft money of research funds.

This is not correct; all faculty members are paid partly from the budget funding and partly from re-search projects according to distribution of their workload. The term soft money is not known.

### **Criterion 5 Quality Management: Quality assessment and development**

Citation from the accreditation report, page 40:

'These statistics and reports are available to everyone interested in the LUT intranet'

At LUT not all statistics and reports are available to everyone who has access to the LUT intranet. Specific education related statistics and feedback reports are available in the LUT intranet to restricted target group, mainly to those involved in LUT education management or academic affairs.

Citation from the accreditation report, page 43:

'A representative of the alumni organization suggests that a good idea would be a sort of collaboration forum, which would be open to all alumni from LUT. This forum could then be used to give feedback even several years after their graduation at LUT.'

LUT has Alumni services which organises different collaboration forums to all LUT alumni. There are also subject specific alumni networks organized mainly by student guilds. Additional information is available on the LUT websites: <https://www.lut.fi/en/about-us/alumni-relations>.



## F Summary: Expert recommendations (31.08.2023)

Taking into account the additional information and the comments given by three the experts summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
B.Sc. Industrial Engineering and Management	Without requirements	30.09.2030	EUR-ACE®	30.09.2029
M.Sc. Operations Management	Without requirements	30.09.2030	EUR-ACE®	30.09.2029
M.Sc. Global Management of Innovation and Technology	Without requirements	30.09.2030	EUR-ACE®	30.09.2029

### Recommendations

#### For all degree programs

- E 1. (ASIIN 1.3 and 5) It is recommended to develop a more systematic cooperation with industrial partners in e.g. in the form of partnership agreements.
- E 2. (ASIIN 1.3) It is recommended to increase the university support for the students to find suitable internships.
- E 3. (ASIIN 1.3) It is recommended to create a study schedule in which courses are well distributed during the week and overlap is minimized.
- E 4. (ASIIN 5) It is recommended to review the feedback system and the annual feedback cycle of the quality management in order to result in more systematic improvements.
- E 5. It is recommended to give the students more personal feedback.

#### For the Master's degree program "Operations Management"

- E 6. (ASIIN 1.3) It is recommended to review the structure of the program including the two specializations.  
(ASIIN 1.3) It is recommended to increase the number of modules given in English.

## **G Comment of the Technical Committee 06 – Engineering and Management, Economics (12.09.2023)**

*Assessment and analysis for the award of the ASIIN seal:*

The Technical Committee decides to make minor modifications in the recommendations E2 and E5 to increase the English proficiency. In addition, the Technical Committee rephrases the recommendation E5 to clarify the circumstances of this case.

*Assessment and analysis for the award of the EUR-ACE® Label:*

The Technical Committee deems that the intended learning outcomes of the degree programs do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 06 – Engineering and Management, Economics /Technical Committees 06.

The Technical Committee 06 – Engineering and Management, Economics recommends the award of the seals as follows:

<b>Degree Programme</b>	<b>ASIIN Seal</b>	<b>Maximum duration of accreditation</b>	<b>Subject-specific label</b>	<b>Maximum duration of accreditation</b>
B.Sc. Industrial Engineering and Management	Without requirements	30.09.2030	EUR-ACE®	30.09.2031
M.Sc. Operations Management	Without requirements	30.09.2030	EUR-ACE®	30.09.2031
M.Sc. Global Management of Innovation and Technology	Without requirements	30.09.2030	EUR-ACE®	30.09.2031

### **Recommendations**

**For all degree programs**

- E 1. (ASIIN 1.3 and 5) It is recommended to develop a more systematic cooperation with industrial partners in e.g. in the form of partnership agreements.
- E 2. (ASIIN 1.3) It is recommended to increase university support for students to find suitable internships.
- E 3. (ASIIN 1.3) It is recommended to create a study schedule in which courses are well distributed during the week and overlap is minimized.
- E 4. (ASIIN 5) It is recommended to review the feedback system and the annual feedback cycle of the quality management in order to result in more systematic improvements.
- E 5. It is recommended to give students more personal feedback.

**For the Master's degree program "Operations Management"**

- E 6. (ASIIN 1.3) It is recommended to review the structure of the program so students do not have to choose their specialization within the first semester.
- E 7. (ASIIN 1.3) It is recommended to increase the number of modules taught in English.

## H Decision of the Accreditation Commission (22.09.2023)

*Assessment and analysis for the award of the subject-specific ASIIN seal:*

The accreditation commission discusses the procedure and follows the changes of the Technical Committee 06 without any further changes.

*Assessment and analysis for the award of the EUR-ACE® Label:*

The Accreditation Commission deems that the intended learning outcomes of the degree programs do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 06 – Engineering and Management, Economics /Technical Committees 06.

The Accreditation Commission decides to award the following seals:

<b>Degree Programme</b>	<b>ASIIN Seal</b>	<b>Maximum duration of accreditation</b>	<b>Subject-specific label*</b>	<b>Maximum duration of accreditation</b>
B.Sc. Industrial Engineering and Management	Without requirements	30.09.2030	EUR-ACE®	30.09.2031
M.Sc. Operations Management	Without requirements	30.09.2030	EUR-ACE®	30.09.2031
M.Sc. Global Management of Innovation and Technology	Without requirements	30.09.2030	EUR-ACE®	30.09.2031

\*Subject to the approval of the ENAEE Administrative Council

### Recommendations

#### For all degree programs

- E 1. (ASIIN 1.3 and 5) It is recommended to develop a more systematic cooperation with industrial partners in e.g. in the form of partnership agreements.

- E 2. (ASIIN 1.3) It is recommended to increase university support for students to find suitable internships.
- E 3. (ASIIN 1.3) It is recommended to create a study schedule in which courses are well distributed during the week and overlap is minimized.
- E 4. (ASIIN 5) It is recommended to review the feedback system and the annual feedback cycle of the quality management in order to result in more systematic improvements.
- E 5. It is recommended to give students more personal feedback.

**For the Master's degree program "Operations Management"**

- E 6. (ASIIN 1.3) It is recommended to review the structure of the program so students do not have to choose their specialization within the first semester.
- E 7. (ASIIN 1.3) It is recommended to increase the number of modules taught in English.

## Appendix: Programme Learning Outcomes and Curricula

According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the bachelor program *Industrial Engineering and Management*:

### **“Objectives of BSc programme in Industrial Engineering and Management**

In the B.Sc. programme the most important learning concepts are divided into six entities in which graduates acquire skills, knowledge and competences: 1) the core of managing business networks, organisations, processes, projects and data (emphasis on innovation and technology management, supply chain management and cost management), 2) the fundamentals of mathematics and physics, 3) the basics of information systems and software, 4) communication and foreign languages, 5) the basics in one field of engineering (software engineering, computational engineering, mechanical engineering, energy and environmental technology, or chemical engineering) and 6) experience in research (Bachelor’s Thesis) and practical work (internship).

### **Intended learning outcomes, curriculum 2022-23**

1. Understand organizations’ processes, activities, and personnel in different kinds of business environments
2. Analyze the developing opportunities and challenges of different business fields and in digitizing industry environment and apply alternative methods for solving them
3. Understand industrial production processes and operation models, and consider their development opportunities and challenges for the business
4. Understand and apply different methods and models of supply chain management
5. Understand and apply different cost management methods in controlling the costs and operations of a company
6. Understand the principles of innovation and technology management, and analyze different operation models for a company’s innovation development

7. Apply technical problem-solving skills in analyzing and developing business operations
8. Act in projects and different development teams, and utilize experimental, pragmatic, and problem-solving attitude while working
9. Apply scientific working methods and understand the meaning of critical thinking in data gathering
10. Communicate fluently in business life, summarize essential things, and present them clearly
11. Act in different working environments and understand the need for continuous self-development and -learning according to the requirements of working life.”

The following **curriculum** is presented:





According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the master program *Operations Management*:

**“Objectives of Master’s programme in Operations Management**

The M.Sc. programme divides the most important learning areas to the fields of supply chain management and cost management. In the studies the objective is to get a comprehensive picture of the operations in an organization from the perspective of one of these two areas and understand the relationships between them and to other aspects of operations. In addition, the aim is to reinforce knowledge in one field of engineering. An important objective is to reinforce broadly the capabilities in organizational analysis, problem-solving and development work. During the studies, the students improve their competences both in scientific work and in practical organizational improvement (Master’s Thesis and company assignments). The studies provide a firm basis for graduates to continue in postgraduate studies in the field.”

**Intended learning outcomes, curriculum 2022-23**

1. Develop and manage organizations' processes, operations and personnel in production and service business environments in a sustainable and responsible way
2. Analyze operation and process improvement opportunities, challenges, needs and options and evaluate the impacts of the improvement actions to the organizations' success and position in the supply chain and business networks
3. Determine, produce and analyze data needed for data-based organizational development and decision-making and create management solutions and recommendations based on analyzed information
4. Apply supply chain management methods and models in inter-organizational development networks
5. Analyze and combine costs and processes by utilizing different types of cost management methods
6. Design models and measurement systems for lifecycle cost, profitability and performance management
7. Design, analyze and develop systems by applying methods of systems modelling, optimization and simulation
8. Evaluate and interpret the logic of different branch of industries and technologies
9. Utilize technological, mathematical and natural scientific thinking in business analysis and problem solving

10. Analyze application areas, business opportunities and process improvement possibilities for different types of technologies and technical solutions
11. Plan, organize and manage improvement projects and development teams and implement changes by utilizing research knowledge, critical thinking and considering sustainability and responsibility
12. Act and communicate effectively in different types of work and interaction situations by taking independently and actively responsibility for organizational development and management
13. Apply and utilize new knowledge both in academic postgraduate studies and in other lifelong learning situations.

The following **curriculum** is presented:

### Workload/MSc in Operations Mgmt/Specialisation Supply Chain Management

1. Academic year	1. period	ECTS	2. period	ECTS	3. period	ECTS	4. period	ECTS	Workload of studies in the first academic year
	CS20A0121 Operations Management*	6	CS20A0360 Advanced course in Supply Chain Management	6	CS20A0251 Decision-Making and Expert Work in Supply Chain Development	3	CS20A0251 Decision-Making and Expert Work in Supply Chain Development	3	
Compulsory studies, sum	1 period	6	2 period	6	3 period	3	4 period	3	18
Elective / optional courses / exchange studies	Choose minor/optional/elective studies	9	Choose minor/optional/elective studies	9	Choose minor/optional/elective studies	12	Choose minor/optional/elective courses	12	42
All studies, sum	1 period	15	2 period	15	3 period	15	4 period	15	60

\* 2022-2023 exception due to staff changes

2. Academic year	1. period	ECTS	2. period	ECTS	3. period	ECTS	4. period	ECTS	Workload of studies in the second academic year
	CS20A0400 Supply Chain Improvement Project	3	CS20A0400 Supply Chain Improvement Project	3	CS90A0060 Master's Thesis	15	CS90A0060 Master's Thesis	15	
Compulsory studies, sum	1 period	3	2 period	3	3 period	15	4 period	15	36
Elective / optional courses / exchange studies	Choose minor/optional/elective studies	12	Choose minor/optional/elective studies	12		0		0	24
All studies, sum	1 period	15	2 period	15	3 period	15	4 period	15	60

### Workload/MSc in Operations Mgmt/Specialisation Cost Management

1. Academic year	1. period	ECTS	2. period	ECTS	3. period	ECTS	4. period	ECTS	Workload of studies in the first academic year
	CS31A0610 Life-Cycle Costing of Investment Projects	6	CS31A0161 Advanced Cost Management	6					
CS31A0351 Performance Measurement Systems	3	CS31A0351 Performance Measurement Systems	3						
Compulsory studies, sum	<i>1 period</i>	9	<i>2 period</i>	9	<i>3 period</i>	0	<i>4 period</i>	0	27
Elective / optional courses / exchange studies	Choose minor/optional/elective courses	6	Choose minor/optional/elective courses	6	Choose minor/optional/elective courses	15	Choose minor/optional/elective courses	15	33
All studies, sum	<i>1 period</i>	15	<i>2 period</i>	15	<i>3 period</i>	15	<i>4 period</i>	15	60

2. Academic year	1. period	ECTS	2. period	ECTS	3. period	ECTS	4. period	ECTS	Workload of studies in the second academic year
	CS31A0303 Research seminar of cost management and analytics		3	CS31A0303 Research seminar of cost management and analytics	3	CS31A0303 Research seminar of cost management and analytics	3	CS90A0060 Master's Thesis	
CS90A0060 Master's Thesis		15			CS90A0060 Master's Thesis	15			
Compulsory studies, sum	<i>1 period</i>	0	<i>2 period</i>	3	<i>3 period</i>	18	<i>4 period</i>	15	36
Elective / optional courses / exchange studies	Choose minor/optional/elective courses	15	Choose minor/optional/elective courses	9		0		0	24
All studies, sum	<i>1 period</i>	15	<i>2 period</i>	12	<i>3 period</i>	18	<i>4 period</i>	15	60

According to self-assessment report, the following **objectives and learning outcomes (intended qualifications profile)** shall be achieved by the master program *Global Management of Innovation and Technology*:

**“Objectives of Master’s programme in Global Management of Innovation and Technology**

The studies in the programme promote the abilities to understand and analyse the impact of global megatrends on innovation management and evaluate, critically analyse, and create strategies in an international context relating to products, services and technologies. Studies promote competences to make rational decisions based on an understanding of decision-making strategies, frameworks, tools and data analysis methods in global networks and markets. The aim is to reinforce ability to analyse processes and structures of organisations and identify their interconnected development issues. Already during the studies and the thesis projects, close collaboration with industry ensures the practical real world application of new knowledge and theories. Additionally, the studies on research methods and scientific writing construct a firm basis for graduates to continue in postgraduate studies in the field.

**Intended learning outcomes, curriculum 2022-23**

1. Understand and analyze the impact of global megatrends on innovation management in organizations
2. Evaluate, analyze, and create strategies within an international context relating to products, services and technologies
3. Make rational decisions based on gained understanding on decision-making strategies, frameworks, tools and analysis methods in global networks and markets
4. Analyze innovation-related processes and structures of organizations and identify their interconnected development issues
5. Practice, plan and manage the build-up of product and service systems for creating tangible and intangible solutions for techno-economic and sustainability-related problems
6. Plan and manage businesses from start-ups to multinational enterprises with an entrepreneurial and innovative mindset
7. Apply innovation and technology management theories, methods and tools to practical management activities
8. Work and lead efficiently in cross-cultural and inter-disciplinary teams and projects and communicate in a logical and convincing way both orally and in writing.”

The following curriculum is presented:

**Workload/MSc in Global Management of Innovation and Technology (GMIT)**

	1. period	ECTS	2. period	ECTS	3. period	ECTS	4. period	ECTS	
1. Academic year	CS30A0010 Technology and innovation management: Introductory course	3	CS30A0020 Intellectual property in technology management (start)	3	CS30A0020 Intellectual property in technology management	3	KE00BZ81 Academic writing	3	Workload of studies in the first academic year
	CS30A1342 Technology and innovation management; project course (start)	3	CS30A1342 Technology and innovation management; project course	3	CS30A1641 Inventive product design and advanced TRIZ (start)	3	CS30A1641 Inventive product design and advanced TRIZ	3	
	CS10A0120 Introduction to MSc studies in IEM	1	CS10A0120 Introduction to MSc studies in IEM		CS10A0120 Introduction to MSc studies in IEM		CS10A0120 Introduction to MSc studies in IEM		
Compulsory studies, sum	1 period	7	2 period	6	3 period	6	4 period	6	25
Elective / optional courses / exchange studies	Choose minor/optional/elective studies	8	Choose minor/optional/elective studies	9	Choose minor/optional/elective studies	9	Choose minor/optional/elective courses	9	35
All studies, sum	1 period	15	2 period	15	3 period	15	4 period	15	60

	1. period	ECTS	2. period	ECTS	3. period	ECTS	4. period	ECTS	
2. Academic year	CS30A7402 Software and application innovation (start)	3	CS30A7402 Software and application innovation	3	CS90A0060 Master's Thesis	15	CS90A0060 Master's Thesis	15	Workload of studies in the second academic year
Compulsory studies, sum	1 period	3	2 period	3	3 period	15	4 period	15	36
Elective / optional courses / exchange studies	Choose minor/optional/elective studies	12	Choose minor/optional/elective studies	12		0		0	24
All studies, sum	1 period	15	2 period	15	3 period	15	4 period	15	60