



FINNISH EDUCATION
EVALUATION CENTRE

ACCREDITATION OF THE DEGREE PROGRAMME IN MECHANICAL ENGINEERING AT SAVONIA UNIVERSITY OF APPLIED SCIENCES

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Description of
the accreditation
process and of
the programme

1

1.1 Aim of the accreditation process

The aim of FINEEC's Engineering Programme Accreditations is to support the enhancement of quality in engineering programmes and to provide higher education institutions with the means of deciding whether an engineering study programme provides its graduates with the academic qualifications necessary for a career in the engineering profession. The accreditation assesses the way an engineering degree programme is planned, delivered and developed to ensure that the students reach the programme outcomes and how the programme outcomes align with the reference programme outcomes set in the FINEEC Engineering Programme Accreditations manual. The reference programme outcomes describe the knowledge, skills and competencies that engineering students should have acquired by the time they have completed a degree programme in engineering. The accreditation evaluates the extent to which the set standards for programme's planning, implementation, resources and quality management are met.

1.2 Degree programme in Mechanical Engineering

The Degree Programme in Mechanical Engineering belongs to the Savonia University of Applied Sciences. Savonia UAS is located in Eastern Finland, having a main campus in Kuopio. The Degree Programme leads to a Bachelor of Engineering degree. Language of instruction is Finnish. The degree programme consists of 240 ECTS and intended study time for full-time studies is 4 years. Yearly intake is 50 students, and additionally every 2nd year intake of 40 students to the adult education (part-time and partially distance learning). Both full-time studies and part-time studies follow the same curriculum.

The degree programme has two specialisation areas as follows:

- Product development
- Production technology.

1.3 The accreditation process

The accreditation was conducted in accordance with the principles set in the *FINEEC standards and procedures for engineering programme accreditation* document. The schedule of the accreditation was the following:

1. The accreditation team was appointed by the FINEEC Committee for Engineering Education on 23 September 2020.
2. Savonia University of Applied Sciences submitted the self-evaluation report on 9TH November 2020.
3. An online visit to the degree programme was conducted on 10–11 December 2020. The programme of the visit is given in table 1. The online visit was carried out by using Teams software.
4. Decision making meeting of FINEEC Committee for Engineering Education on 15 March 2021.

TABLE 1: Online visit programme

Online visit programme			
<i>Thursday, 10 December 2020</i>		<i>Friday, 11 December 2020</i>	
9.00–9.50	Presentation on the electronic evidence room (a Teams workspace) for the accreditation team	09.00–10.00	Accreditation team worked together in the electronic evidence room (a Teams workspace)
10.05–10.55	Interview with the Savonia UAS and the degree programme management	10.15–11.05	Interview with the students
11.10–12.00	Interview with the academic staff	11.20–12.10	Interview with the alumni of the degree programme
12.15–13.05	Interview with the support services staff	13.00–14.00	2 nd interview with the academic staff and questions on the electronic evidence room
14.00–15.00	Accreditation team watched together the video tour on the Savonia facilities (app. 30 min video with guidance)	14.00–16.30	Accreditation team meeting: discussion on the initial findings and preparation of the initial feedback
15.00–15.50	Questions on the recorded facilities tour directed to the degree programme staff	16.45–17.30	Initial feedback for the Savonia UAS and the degree programme
16.05–16.55	Interview with the external stakeholders		

1.4 The accreditation team

Chair of the accreditation team

Vice-Rector **Simona Lache**, Transilvania University of Brasov (Romania)

Team members

Master's programme student **Jakub Grodecki**, University of Science and Technology, Krakow (Poland)

Consultant **Leena Mattila**, ExcRes Oy (Finland)

Dean **Gary Marquis**, School of Engineering at Aalto University (Finland)

Senior Evaluation Advisor **Kati Isoaho** from FINEEC acted as a Project Manager for the accreditation process.

1.5 Evidence used in the accreditation process

- Self-evaluation report, along with the following appendices:

1.1.1	List of RDI projects 2017–2020
1.1.2	Report of amount of RDI work in 2017–2020
1.1.3	List of theses in 2017–2020
1.1.4	Survey for Syllabus Upgrading 2017
1.2.1	General Description of Degree Programme 2020
1.2.2	Savonia's Strategy 2017–2020
1.3.1	Compatibility of the criteria for substance learning outcomes with the criteria for substance competence of FINEEC
1.4.1	Instructions of general part of curriculum
1.4.2	Instructions on syllabus structure
1.4.3	Implementation plan of study units
1.5.1	Marketing advertisement 123x175mm Savonia
1.5.2	Marketing Savonia 2020 spotify 2 technology 30s
1.5.3	Marketing video and examples
1.5.4	Visitors to website of Mechanical Engineering
1.5.5	Student admission statistics spring 2020
1.5.6	Achieved learning levels in first year studies
1.6.1	Degree regulations
1.6.2	Student counselling plan

1.6.3	Instructions for assessment of competence
2.1	General part of the syllabus of mechanical engineering 2017
2.1.1	Mathematics 1, a course description
2.1.2	3D-Modelling, a course description
2.2.1	Machine Design 1, a course description
2.2.2	Production automation, a course description
2.3.1	RDI Project, a course description
2.3.2	Electrical Engineering, a course description
2.4.1	Practical Training 3a, s course description
2.4.2	Specialization Project 2, a course description
2.4.3	Tools for Cross-Cultural Communication, a course description
2.4.4	International Sales Management, a course description
2.5.1	Thesis, a course description
2.5.2	Product Development, a course description
3.1.1	Savonia's personnel plan 2017–2020
3.1.2	Recruiting implementation instructions
3.1.3	Description of recruitment process
3.1.4	CVs of key teaching staff
3.3.1	Responsibilities and resources of counselling
3.3.2	Half-yearly counselling themes
3.3.3	Guidance and Counselling Model
3.3.4	Structure of support and well-being services
3.4.1	Software in mechanical engineering 2020
3.5.1	Mechanical Engineering budget and actual amounts 2019
3.6.1	Partnership activity model
4.1.1	Summary of Strategy 2020
4.1.2	Savonia's Quality Programme 2021–2024
4.1.3	Activity Plan and Budget 2020
4.1.4	Performance Agreement 2020 Business Economics and Technology
4.1.5	Team Agreement in Mechanical Field 2020–2021
4.1.6	Savonia's Resource and Quality Management Plan
4.1.7	Rules of Procedure
4.1.8	Current and new (1.1 2021–) organisational chart
4.2.1	Observation of the degree programme in mechanical engineering 2017
4.2.2	SWOT of lialmi adult education 2017
4.2.3	Statistics and documents from quality system

- Accreditation team had access to the Savonia UAS student intranet Reppu and staff intranet Santra during the review process.
- The recorded video tour on Savonia UAS and the degree programme facilities, including classrooms, laboratory premises, self-study premises and library facilities.
- Evidence gathered by the degree programme for the electronic evidence room, which included course material, thesis works, project works and examples of course feedback, among other things. The evidence room was arranged as a Teams software workspace. The accreditation team had access to the evidence room starting from the 8th of December 2020 during the review process.

Evaluation of the fulfilment of the accreditation standards

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2.1 Planning of the programme

Standard 1: The programme aims, which describe the educational task and purpose of the programme, are consistent with the mission of the higher education institution and reflect the identified needs of employers and other stakeholders.

The degree programme's aims are described in the self-evaluation report and its annexes:

"The curriculum has been planned so that the degree programme provides the student with the knowledge, skills and competence required in working life and the studies ensure the development of the student's professional expertise. At the same time, it is possible to combine education and work-based research and development."

To help students achieve these goals, the degree programme has the following stated aim:

"Familiarization with the profession of mechanical engineering; mechanical engineering competence development; deepening knowledge of mechanical engineering in the field of product development and production technology; preparation for working life in the field of product development and production technology." These two professional profiles within mechanical engineering — product development and production technology — are well defined and outlined in the programme learning outcomes. During interviews with staff members, students and stakeholders, it was clear that all understood and valued the professional profiles that have been identified.

The programme aims are fully consistent with the mission of Savonia University of Applied Sciences (Savonia UAS), as stated in its strategy for 2017–2020: "Savonia UAS educates professional experts and entrepreneurs and enables lifelong learning. Education, RDI and business activities at Savonia UAS develop and renew business and service activities in companies and communities." During the interview with management, the accreditation

team learned that the Mechanical Engineering degree programme is one of the focus areas in achieving the university's mission and in implementing its strategy. The new Microkatu campus recently developed at Savonia UAS supports this statement, as it provides an enhanced learning environment for the mechanical engineering field.

At the same time, Savonia UAS considers "product development, creative experiments, entrepreneurship, innovation, business expertise and internationalisation" success factors in the focus areas. The mechanical engineering degree programme's aims are, therefore, in line with the institution's strategy.

The self-evaluation report as well as interviews with several target groups conducted during the online visit revealed strong collaboration between the degree programme and industry in the region. During the interviews with UAS management, degree programme management and stakeholders from local industries, the accreditation team received a clear and common message that the curriculum aims reflect the identified needs of the stakeholders. This is due to the capacity of North Savo to attract a large number of companies to do business in the region, several of which manufacture mobile working machines and equipment or work on applications in the energy field. There is a well-established culture of university-industry cooperation, which mainly focuses on research and development projects. At the same time, surveys have been conducted to identify future engineering skills, and the discussions with employers' representatives, teachers and students have confirmed the constant commitment of the degree programme to update its curriculum based on labour market needs. However, although it is clear to the accreditation team that stakeholders' feedback is taken into consideration and the degree programme curriculum is updated accordingly, it is recommended that all these consultation activities be conducted within a formalized framework and systematically applied by the institution.

Based on the team's assessment, the programme meets Standard 1 fully.

Standard 2: The programme learning outcomes, which describe the knowledge, understanding, skills and abilities that the programme enables graduates to demonstrate, are consistent with the programme aims, with relevant national qualifications frameworks (if applicable) and with the FINEEC reference programme learning outcomes.

As presented in the self-evaluation report and the degree programme curriculum, the degree programme learning outcomes are defined in terms of:

- Competence standards, according to the European and Finnish Qualification Framework – level 6,
- Generic competences for the engineering profile,
- Specific competences for mechanical engineering.

Thus, five competence areas corresponding to level 6 of the European and Finnish Qualification framework apply to the degree programme:

- Knowledge,
- Skills and application,
- Responsibility, management and entrepreneurship,
- Evaluation,
- Self-development and lifelong learning.

The degree programme also applies generic competences for the engineering profile, which are presented in detail:

- Learning competence,
- Ethical competence,
- Working community competence,
- Innovation competence,
- International competence.

At the same time, the following specific competences for mechanical engineers are listed and described:

- Basic competencies of mechanical engineering:
 - Knowledge of the basics of mathematics and physics and understanding their significance in mechanical engineering;
 - Knowledge of general mechanical engineering components and machine components and their operating and dimensioning principles and an understanding of the operating principles of common general machines;
 - Knowledge of general mechanical engineering manufacturing and measurement methods as well as the properties of more common materials;
 - Ability to prepare technical documentation of the product.

- Product development competencies:
 - Ability to approach and solve problems / challenges an engineering way;
 - Knowledge of the stages of the product development process;
 - Managing work in a 3D environment;

- Knows the basics of technical mechanics and understands its significance in the work of a designer;
 - Knowledge of the designer's operating environment in the company;
 - Knowledge of the basics of PLM (product lifecycle management) and understands the importance of product information throughout the product's lifecycle;
 - Knowledge of the most common construction materials and their use in mechanical engineering;
 - Understanding the basics of mass customization, modulation, configuration and standardization and their role in design and manufacturing;
 - Understanding the effects of design and usability as well as environmental friendliness on product design.
- Manufacturing competencies:
- Knowledge of the most common manufacturing techniques and the properties of the most common materials;
 - Knowledge of the effect of manufacturing technology and logistics on the product's structure.
- Machine safety competencies:
- Knowledge of the requirements of the machinery directive and its significance in machine design;
 - Knowledge of the usability, ergonomics and safety requirements for devices and the functions that support them.
- Industrial engineering basic competencies:
- Knowledge of the principles of implementing the main and support processes of the technology business;
 - Ability to work in operational B2B sales and purchase technology products and services as well as in material management and production management positions;
 - Knowledge of the principles of pricing and the requirements of the seller and product liability;
 - Knowledge of the principles of the business financial process and cost accounting as well as the most common key figures.

- Machine automation basic competencies:
 - Ability to select and dimension mechanization components essential for machine and device automation;
 - Ability to build control connections related to machine and production automation electrically and pneumatically;
 - Knowledge of the use of hydraulics in machine and equipment automation;
 - Ability to master the basics of flow technology;
 - Ability to design and dimension a hydraulic system;
 - Knowledge of the special components of hydraulics;
 - Ability to control the use of pneumatics in machine and equipment automation.

- Production systems basic competencies:
 - Knowledge of the operating principles of different production systems;
 - Knowledge of the principles of production control;
 - Understanding the methods of component manufacturing and assembly and their connection to product development;
 - Knowledge of the operating and control principles of the supply chain;
 - Understanding the concept of an extended product.

- Environment and product lifecycle competencies:
 - Understanding the principles of product lifecycle thinking;
 - Ability to manage the environmental impact of machinery products and production;
 - Knowledge of the principles of usage measurement;
 - Understanding the principles of maintenance and the operation of machines and equipment.

The self-evaluation report, together with the annexes, demonstrates the compatibility of the Mechanical Engineering curriculum with the FINEEC reference programme learning outcomes.

Based on the self-evaluation report, the accreditation team sees that the degree programme's learning outcomes are well defined and consistent with the programme aims, European and Finnish Qualification Framework and FINEEC provisions. The accreditation team is convinced that the programme's learning outcomes have been sufficiently well established in terms of what students are expected to know, understand and/or be able to demonstrate after completion of the learning process.

Based on the team's assessment, the programme meets Standard 2 fully.

Standard 3: The course level learning outcomes, including thesis work and possible practical training, aggregate to the programme's learning outcomes.

The degree programme curriculum is described in a general way in an annex of the self-evaluation report. The document includes a description of the programme's prerequisites, study goals and structure. The general syllabus for the degree programme is detailed and covers all the areas outlined in the FINEEC reference programme learning outcomes. The overall structure of the curriculum suits well the programme's aims and learning outcomes. This includes 100 ECTS of basic engineering studies, 80 ECTS of professional studies, 30 ECTS from internships and 15 ECTS each of elective studies and a thesis.

Mechanical Engineering studies focus on product development or production technology. The professional studies module includes 45 ECTS of joint studies and 35 ECTS studies for one of the two focus areas. The choice of specialization takes place during the second academic year, and the orientation studies begin in the spring of the third academic year.

According to the self-evaluation report, along with its annexes, there is good matching between the FINEEC reference programme's learning outcomes and the degree programme curriculum. Based on the self-evaluation report, on the course descriptions and on evidence presented during the online visit, it can be concluded that the programme provides students with the necessary knowledge and understanding for successful studies in mechanical engineering product development or mechanical engineering production technology. All courses in the basic of engineering studies module and most courses in the other modules contribute to achieving the learning outcomes under the topic of **knowledge and understanding**.

Regarding **engineering practice**, the topic is covered starting in the second year of studies. The curriculum includes courses that are intended to deepen competences in the general field of mechanical engineering, with some of them focusing on the specific fields of professional studies, as defined by the degree programme: production technology and product development. At the same time, a significant number of courses, scheduled mainly in the last two years of study, are dedicated to applying skills in mechanical engineering, specifically in the fields of professional studies. Based on the self-evaluation report, the course descriptions, the evidence presented during the online visit, as well as the results from the interviews with students, alumni and employers, it can be concluded that the degree programme provides students with the necessary engineering practice for successful studies in mechanical engineering product development or mechanical engineering production technology.

Information retrieval is covered by a set of courses in the degree programme curriculum. There are courses specifically designated for this topic, such as tools for technical studies during the first year or thesis planning, with the latter course serving as background for implementing and finalizing the thesis in the last year of studies. Furthermore, several courses integrate information retrieval with engineering, such as the orientation project in the first year, the RDI project in the second year as well as specialized projects 1 and 2 in the last year of studies. **Investigations** are included in several course topics during the first three years of study. The core of the investigation training involves working in laboratory settings, which

is covered by courses such as Manufacturing Technology 1 and 2 and Material Technology 1 and 2 during the first year, Electrical Engineering during the second year as well as Welding Production and Machining Production during the third year.

Multidisciplinary competencies acquired as part of the degree programme are designed to ensure a connection to technology, the practical societal, health, environmental, economic and industrial impacts of technology, and the ability to identify the limitations caused by a lack of them. Students acquire knowledge of the importance of financial, organizational and management issues (such as project management, risk and change management) in the industrial and business environment. The student is able to collect and interpret data and process it, while also considering social and ethical issues. The student is also able to manage complex technical or professional tasks and projects by taking responsibility for decision-making and to identify and practice the need for independent lifelong learning while monitoring scientific and technical progress. The key courses in this area are as follows: RDI Project, Leadership and Management, Practical Trainings, Specialized Projects and a Bachelor Thesis.

Students achieve the intended learning outcomes related to communication through various courses and activities included in the curriculum. The student should be able to communicate effectively with the engineering community and also with the rest of society, utilizing information, ideas, problems and solutions. It is also expected that the student will be able to act effectively in a national and international situation, both as an individual and as a member of a group. An analysis of the curriculum reveals that those competencies are being developed through the key courses, such as Engineering English, Leadership and Management, Practical Trainings, Production Management, Specialization Projects and a Bachelor Thesis. It is worth noting that the necessity and relevance of both **communication and teamworking** skills are highly rated throughout the student surveys.

Based on the team's assessment, the programme meets Standard 3 fully.

Standard 4: The curriculum gives comprehensive information on all the individual courses of the programme, including thesis work and possible practical training, and is accessible to students.

The degree programme curriculum, together with course descriptions, is publicly available on the Savonia UAS website. In addition, it is available for staff and students at Savonia's intranet sites.

The accreditation team reviewed English translations of the descriptions of 11 courses provided by the degree programme. The team also selectively reviewed descriptions of numerous other courses from the UAS website. From the student intranet, it is an easy task to find all courses in the degree programme curriculum and click on the link to find descriptions of individual courses. All of the reviewed course descriptions show well-defined learning outcomes as well as course contents and course requirements that are consistent with the programme aims.

For most courses, the learning outcomes establish what students are expected to know, understand and/or be able to demonstrate after completing an individual course. The accreditation team encourages the degree programme management to continue this process, ensuring an appropriate description of all courses and periodically reviewing them as part of the regular internal quality assurance procedures.

Based on the team's assessment, the programme meets Standard 4 fully.

Standard 5: The curriculum and the course timetable enable students to graduate in the expected time.

The timetable and curriculum of the degree programme allows students to graduate in the expected time, namely in four years, by which time they will have acquired 240 ECTS. Students and alumni, based on their experiences, expressed the opinion that the timetable enabled them to graduate in the expected time. They also highlighted the openness of the course management and academic staff when students asked to change the course timetable so it better fit their needs. By analysing the timetables, it becomes evident that they are arranged in such a way that makes it possible to take breaks between the lectures and classes, enabling students to rest and use the time for their own purposes, e.g. for learning or leisure. In the opinion of the accreditation team, the workload is balanced throughout the years. At the same time, an analysis of the syllabus leads to the conclusion that courses are equally weighted throughout the semesters.

Based on the team's assessment, the programme meets Standard 5 fully.

Standard 6: The criteria and process for student admission and transfer are clearly specified and published. Students should be informed of the qualifications necessary to enter the programme.

Based on the information provided by the self-evaluation report, interviews as well as the Savonia UAS website and intranet sites, the accreditation team can conclude that there are clear procedures in place for student admissions and that the information is publicly available on the Savonia UAS website. Interviews with the students and alumni confirmed that information about the qualifications required to enter the degree programme are clear, transparent and easily accessible. Information regarding the admission process is also communicated via e-mail, when needed.

During the past year, due to the COVID19 pandemic, student selection for the degree programme was organized partially online. All applicants received an invitation by email to participate in the online entrance exam. Mechanical engineering uses the UAS entrance examination, a common digital entrance examination of the universities of applied sciences.

At the second phase, the applicants with the best results in online examination were invited to the entrance examination which was held at the Savonia UAS premises.

Based on the team's assessment, the programme meets Standard 6 fully.

Standard 7: Students are informed of regulations and guidelines that concern recognition of prior learning, progress of studies and graduation.

Recognition, evaluation and validation of prior learning is an integral part of the student management system (Wilma). The right to have prior learning counted towards the degree covers students attending the degree programme in Savonia UAS who have been admitted on the basis of the entrance examination.

The student may request counting his or her prior studies and in-house training of the same level towards his or her degree by demonstrating competence acquired through corresponding practical training and work experience in line with the learning outcomes of the degree programme.

The aim is that the student can use his or her prior learning, or competence gained during his or her studies, as a part of the degree programme, irrespective of where the competence has been gained. Identification and recognition of prior learning (RPL) and counting them towards the degree is included in the student's personal study plan (PSP) when he or she begins the studies.

The recognition process in the degree programme is carried out by the student adviser, who has the job of analysing the transcript of records acquired by the students during international mobility training or other ways of learning and recognize their formal studies or other learning. Students interviewed by the accreditation team expressed an awareness of the recognition procedure.

Savonia UAS offers guidance for educated learners coming from outside of Finland by recognizing their competences and assisting them in finding suitable educational and career paths, irrespective of whether they have completed secondary education (being thus eligible to apply for higher education), have studied in higher education before or have already completed a degree in higher education. Savonia UAS belongs to the SIMHE (Supporting Immigrants in Higher Education in Finland) network.

In Savonia UAS, tools for monitoring study progress used by students and tutoring staff are integrated within the student management system (Wilma). The student is responsible for his or her performance and monitors the progress of his or her personal studies. Study progress is measured by tutoring teachers and student counsellors, as specified in a previously agreed plan, using a degree, group and student-specific DW reporting system with a real-time update feature. The reports show course completions, choices of study units and failed courses by

the students. This allows for early intervention in cases where the progress of studies seems to have slowed down for some reason.

Progress is also taken up in the annual personal study plan (PSP) discussions with students whenever required. Based on annual monitoring, an intervention is made if the student has not gained a sufficient number of credits and if the progress of studies has slowed down; the student is counselled in how to complete the required courses. The supportive approach from the side of teaching staff was mentioned by the students. The PSP, guidance and monitoring ensure that studies progress as expected.

The interviewed students confirmed that they are well informed about how their study progress is monitored. Both alumni and more advanced students also mentioned that successful studies are highly dependent on the student's personal engagement with the learning process.

Once students have completed all study units included in their degree programme (240 credits), they are awarded a degree certificate with the name of the degree and the degree programme, potential orientation studies as well as the title that the graduate is entitled to use. The degree certificate also includes the key contents of their studies, title of the final thesis, language of maturity demonstration or demonstration of competence in the field, a note on language skills required from a public official and other relevant information.

Upon graduation, students answer the AVOP questionnaire. AVOP is the national Graduate feedback questionnaire where graduating students are asked to evaluate and provide feedback on their education. The findings are used locally by institutions to improve their institutional processes and practices and nationally to inform performance-based monitoring and funding. All graduating degree students from universities of applied sciences are asked to complete the questionnaire. Savonia UAS provides a Diploma Supplement as an appendix to the original degree certificate.

Based on the team's assessment, the programme meets Standard 7 fully.

Strengths, good practice and areas for further development regarding section 2.1: planning of the programme.

The team notes the following strengths and good practice in this section:

- The degree programme is strategic for Savonia UAS and relevant to the region.
- The degree programme has close cooperation with regional industry in the field of mechanical engineering when looking for incentives and suggestions to update the programme learning outcomes.
- There is a clear steering chain from the Ministry of Education and Culture down to the degree programme team on the mandate of the degree programme.

- The structure of the degree programme is appropriate, and courses are designed in a manner that creates a logical study flow, starting from introductory courses and continuing to the final thesis phase.
- Information related to the degree programme is accessible for the students, applicants and wider audience, starting from the admission phase and continuing through individual courses.

The team sees the following as areas for further development in this section:

- For most courses, the learning outcomes establish what students are expected to know, understand and/or be able to demonstrate after completing an individual course. The degree programme is encouraged to review these courses and, if needed, ensure the completeness of these course descriptions as part of its regular quality management procedures.
- The degree programme is encouraged to continue having dialogue with the industry partners, for example by providing feedback for them on their suggestions and their implementation in the degree programme's operations. It is also recommended that all these consultation activities be conducted within a formalized framework and systematically applied by the institution and the degree programme.
- The degree programme is advised to set clear intended learning outcomes for all the practical training periods included in the degree programme.

2.2. Implementation of teaching and learning

Standard 8: The teaching and learning process, including the assessment of students, enables students to demonstrate that they have achieved the intended course and programme level learning outcomes. Students have an active role in co-creating the learning process and the assessment of students reflects this approach

The review of the self-evaluation report and the interviews with students and alumni confirmed that the quality of learning and teaching lies at the centre of development and interest at Savonia UAS. The majority of the courses receive positive evaluations by the students. The content of many courses is closely related to working life, and that direct co-relation is highly valued by the students and alumni of the degree programme. The students therefore experience real-life situations already during their studies. Many students are also recruited already during their studies. As the graduation is of interest both for students and employers, some of the interviewed employers provided examples of incentives created by them to support this goal.

Teaching staff uses to a large extent the digital, teaching and learning Moodle platform, where the course materials, schedules, tasks, course work, assessments and feedback for students are uploaded. Some of the course spaces in Moodle were demonstrated to the accreditation team during the online visit. The electronic assessment option is used and found to be efficient for describing student performance and achievement with respect to intended learning outcomes.

Teaching and learning methods include, for example, lectures, exercises carried out during the lectures, reported project work, guided and individual laboratory work, practical training along with reporting and feedback, self-study, joint projects with working-life partners, peer assessment during the courses and thesis preparation. However, teaching and learning methods are not described thoroughly in all the course descriptions. The degree programme is therefore advised to ensure that all the course descriptions include concrete and consistent descriptions of the teaching and learning methods.

From student interviews, the accreditation team learned that practical training periods outside UAS are very much valued, but, at the same time, that they are not always systematically organized and monitored by the degree programme. The degree programme has guidelines as well as intended learning outcomes for each of the three practical trainings foreseen in the curriculum. However, in practice the process varies from student to student and from company to company. The accreditation team thinks that more attention should be paid to adequate target setting, documentation and reporting of practical training results to ensure that the learning outcomes set for this activity are acquired by each graduate.

There is a recognized need to increase the level of international operations as a part of degree programme implementation. This should include an increase in the number of international exchange periods as well as encouraging the degree programme students to participate more actively in international activities in general.

Assessment methods include examinations (traditional and online), assessment of coursework and project work, feedback provided by teachers to the students on their progress and achievement of the learning outcomes assigned in the courses, peer assessment during the courses as well as assessment and feedback on the theses.

Student can actively join in co-creating their own learning process, for instance by compiling their personal study plans (PSP) and providing feedback on courses and study process. Aside from the assessment made by the teaching staff, peer assessment is also employed. During the interviews, the accreditation team learned that students were informed about the intended learning outcomes as well as the assessment criteria already at the beginning of the courses.

Knowledge and understanding

- knowledge and understanding of mathematics and other basic sciences underlying their engineering specialisation, at a level necessary to achieve the other programme learning outcomes;
- knowledge and understanding of engineering disciplines underlying their specialisation, at a level necessary to achieve the other programme learning outcomes, including some awareness at the forefront;
- knowledge and understanding of applicable materials, equipment and tools, engineering technologies and processes, and of their limitations, in their specialisation
- knowledge and understanding of applicable techniques and methods of analysis, design and investigation, and of their limitations, in their specialisation;

Basic courses in physics and mathematics are mandatory for every degree programme graduate. In the descriptions of the courses provided in advance to the accreditation team (Mathematics 1, Production Automation, 3D Modelling, Machine Design 1, RDI Project, Electrical Engineering, Specialized Project 2, Product Development and Thesis), the knowledge and understanding of learning outcomes and engineering practice outcomes are, for the most part, clearly specified and are consistent with the FINEEC reference programme learning outcomes. The one exception is Machine Design 1, for which the knowledge and understanding of learning outcomes could be more explicit.

The education modules for the basics of engineering and developing skills in mechanical engineering contain sufficient knowledge and understanding elements in mathematics and other basic sciences to help develop future mechanical engineers. This includes, for example, 15 credits in mathematics, 20 credits in physics and mechanics relevant to mechanical engineering, and 10 credits in materials technology.

The more advanced modules include sufficient advanced courses to help graduates begin their professional careers. With respect to production engineering, the curriculum includes knowledge and understanding elements concerning, for example, welding, machining, supply chain management, production automation and 3D printing. With respect to product development, the curriculum includes knowledge and understanding elements concerning, for example, design for manufacturability, mechanics, FEM analysis, machine design and steel structures.

Analysis

- ability to analyse complex engineering products, processes and systems, and to correctly interpret the outcomes of such analyses, by being able to select and having the practical skills to apply relevant established analytical, computational and experimental techniques and methods

According to the curriculum, the programme outcomes for Engineering Practice — Analysis is developed predominantly through the developing skills in mechanical engineering and application of skills in mechanical engineering modules. Most of the competencies needed to analyse complex engineering products, processes and systems, and to correctly interpret the outcomes of such analyses, are connected to courses within the specializations of production technology or product development. These are further developed in two specialized project courses that are conducted in cooperation with industry.

Problem-solving

- ability to identify, formulate and solve complex engineering problems, by being able to select and having the practical skills to apply relevant established analytical, computational and experimental techniques and methods

The programme outcome related to Engineering Practice — Problem Solving is specifically covered in courses placed in the modules dedicated to deepening of knowledge and competences and application of skills. In the course Production Automation, assigned for students in the professional field of production technology, the student is expected to code simple software programmes for manufacturing and use digital tools for programming of production.

Alternatively, the following courses contribute to the above-mentioned programme outcome in the professional field of product development: Fatigue Life Calculations – the student is able to solve simple fatigue life calculations for welded structures according to specific standards; FEM and Simulations – the student is able to apply the finite element method for static and dynamic calculations of structures and to use FE software; Machine Design 1 – the student is able to dimension gear motor drives and actuators, while taking into account the loading situations. There is also a course called Design of Machine Parts, which is dedicated to both professional fields, wherein the student acquires the ability to dimension statically loaded welded joints and calculate stresses of screw joints, shaft dimension and deformation, roll bearings and effect of lubricants. There are also several courses included in both professional

paths that enable students to apply skills for problem solving: Productions Systems (for production technology), Machine Design 2, Design of a Machine Automation System or Steel Structures (for product development).

Design

- ability to develop and design complex products (devices, artefacts, etc.), processes and systems to meet established requirements that can include societal, health and safety, environmental, economic and industrial constraints, by being able to select and having the practical skills to apply relevant design methodologies
- practical skills for realising complex engineering designs
- ability to use the awareness of the forefront of their engineering specialisation in design and development

The next topic of Engineering practice – Design – is covered in several modules: developing skills in mechanical engineering, deepening competences in mechanical engineering, deepening competences in production technology and deepening competences in product development.

The ability to develop and design complex products, processes and systems to meet the requirements specified by the FINEEC standard is developed in the following courses: Design for Manufacturing and Assembly, Design of Machine Parts and Machine Design 1. The courses Production Systems, Machine Design 2 and Design of a Machine Automation System contribute to preparing the students to apply the acquired skills.

According to the curriculum description, practical skills for realising complex engineering design are developed through courses on welding production and machining technologies, but most of these skills are acquired in the courses belonging to the application of skills module: Production Technology and Production Systems, for the production technology path, and Design of a Machine Automation System, for the product development path. By all means, the approach for complex engineering design in this degree programme focuses on production engineering, which the accreditation team considers reasonable.

The ability to make use of an awareness of the forefront of their engineering specialisation with respect to design and development is acquired by students during several practical projects, most of them devoted to finding information related to their study projects. They use the library to find material regarding courses and standards. Service staff (library, IT) is also available if students need advice. During the interviews, the accreditation team was convinced that students receive enough support from the teachers during the courses, when necessary. Pair or teamwork is extensively used in many courses where students conduct small projects. Larger projects can be completed in different targeted courses.

Investigations and information retrieval

- ability to conduct searches of literature, to consult and to critically use scientific databases and other appropriate sources of information, and to carry out simulation and analysis, in order to pursue detailed investigations and research of technical issues
- ability and practical skills to design and conduct experimental investigations, interpret data and draw conclusions
- ability to work in a laboratory/workshop setting

Many of the courses included in the degree programme curriculum develop students' skills in information retrieval. For example, thesis preparation is supported by courses that develop these skills and enhance the thesis preparation phase during the last year of studies. However, the material demonstrated to the accreditation team in the evidence room (coursework, project work, theses) was quite narrow in scope and could be more extensive concerning searches of literature and usage of scientific databases and other appropriate sources of information. In part, this derives from the practically-oriented nature of the degree programme. Ability and the practical skills to design and conduct experimental investigations, interpret data and draw conclusions are achieved.

The implementation of the degree programme includes a great deal of guided and individual laboratory work. Ability to work in a laboratory and workshop settings have been reached very well. All student work presented to the accreditation team in the evidence room and during the online visit included design and workshop settings.

Multidisciplinary competences

- awareness of the wider multidisciplinary context of engineering
- awareness of societal, health and safety, environmental, economic and industrial implications of engineering practice and recognition of the constraints that they pose
- awareness of economic, organisational and managerial issues (such as project management, risk and change management) in the industrial and business context
- ability to gather and interpret relevant data and handle complexity to inform judgements that include reflection on relevant social and ethical issues;
- ability to manage complex technical or professional activities or projects, taking responsibility for decision making
- ability to recognise the need for and to engage in independent life-long learning
- ability to follow developments in science and technology

Mechanical engineering is by definition a multidisciplinary field. Through analysing the curriculum and basing the assessment on the opinion of the alumni and students, it is clear that learners are aware of the implications of engineering practice in the multidisciplinary work environment. The degree programme explores topics related to health, safety and environmental issues. Also, social and ethical issues are treated explicitly in many courses, for example in International Sales Management. The expected outcomes are that students understand the role and responsibilities of a sales executive in managing, supervising and developing the sales and the customer base of a company. The multidisciplinary approach is also reflected in the description for the Bachelor Thesis course description, which enables students to link the final part of the degree programme to real-life competencies and include them into their thesis work.

Communication and team-working

- ability to communicate effectively information, ideas, problems and solutions with the engineering community
- ability to communicate effectively information, ideas, problems and solutions with the society at large;
- ability to function effectively in a national and an international context;
- ability to function effectively as an individual and as a member of a team;
- ability to cooperate effectively with engineers and non-engineers.

The generic communication and team-working skills are developed through several courses across the degree programme. Communication and teamwork skills are integrated with the core content of engineering in most of the courses.

Teaching and learning methods include both individual work and teamwork, which enhances students' ability to work in different situations. Students acquire experience in communication and engaging in teamwork with other engineering and non-engineering professionals through joint projects with working-life partners when taking RDI project and practical training courses. The production management course trains students to work in different teams and positions in working-life situations.

There are also courses devoted to communication and language skills, such as Engineering Swedish and Engineering English. Both courses consist of compulsory lectures along with tasks, course-work and individual study.

Based on the team's assessment, the programme meets Standard 8 fully.

Strengths, good practice and areas for further development regarding section 2.2: implementation of teaching and learning

The team notes the following strengths and good practice in this section:

- Students have equal access to student facilities and student support services.
- Course content and organisation are appropriate for the qualification earned at the time of graduation (e.g. project work, laboratory work). The degree programme makes good use of the facilities in the different courses.
- The degree programme uses different methods of teaching and learning, which facilitate student-centred learning.
- Staff members create a supportive atmosphere for the students.

The team sees the following as areas for further development in this section:

- There is a need for a more comprehensive approach to the practical training: to define and communicate to students the learning objectives and monitor their achievement.
- The degree programme is advised to strengthen the support provided to students in finding practical training positions to ensure that they achieve the learning outcomes set for these courses.
- There is a recognized need to enhance international activities (e.g. student exchange) as part of the implementation of the degree programme curriculum.

2.3. Resources

Standard 9: The academic staff are sufficient in number and qualification to enable students to achieve the programme learning outcomes. There are arrangements in place to keep the pedagogical and professional competence of the academic staff up to date.

The self-evaluation report lists a total of 26 staff devoted to the degree programme, including 12 teaching staff, 11 research staff and 3 other staff members. Most of the staff members have permanent work contracts. Twenty-four of them have academic degrees, including 15 with MSc degrees and three with either a doctorate or Licentiate of Technology degree.

CVs for the five key education staff show that all have 1) MSc degrees in a relevant discipline, 2) 60 ECTS of pedagogical education and 3) work experience in industry relevant to the field of their teaching. Based on the information provided and the interviews, all teaching staff appear to have good academic and pedagogical competencies.

Recruitments are carried out predominantly according to personnel and an education plan developed by Savonia UAS, which has well-documented recruitment guidelines. Recruitment plans consider the overall strategy of UAS with respect to the budget, forecast the future number of students and assess skill demands. Urgent recruitment needs are negotiated with the HR Director.

Selected teaching personnel must have acquired 60 ECTS professional teacher education at the time of employment or, at the latest, within three years from the start of the appointment, otherwise the appointment is revoked. The pedagogical skills of teachers are maintained by internal and external training, with the help of self-study material. Currently, the pedagogical strategy of Savonia UAS focuses on enhancing the pedagogical effectiveness of online courses.

Teachings staff members have regular development discussions with their superiors, where professional development needs are identified and targets set jointly. For example, student feedback results are handled in the development discussions.

Based on the team’s assessment, the programme meets Standard 9 fully.

Standard 10: An effective team of technical and administrative staff supports the programme. There are arrangements in place to keep the competence of the support staff up to date.

The self-evaluation material shows the staff development programme for Savonia UAS. In 2020, about 24% of the total staff work in roles other than teaching or research. The percentage has decreased slightly since 2013. The self-evaluation material provides the following information on these roles regarding the whole institution:

# of full-time employees	Role
25	Administration of information systems including IT and AV support
5	Financial administration services
5	Communication services including marketing as well as external and internal communication.
3	International services , which also helps manage collaboration agreements with nearly 200 higher education institutions in 30 different countries.
10	Library and information services for students and employees

Based on the information provided in the self-evaluation report and during the course of the online visit, the degree programme receives adequate administrative and technical services from Savonia UAS centralized services, as presented below. In addition, part of the academic staff works as project engineers and guide students in the laboratory settings.

Based on the team’s assessment, the programme meets Standard 10 fully.

Standard 11: The students are provided adequate and accessible support services to enable the achievement of the programme learning outcomes.

Student support services include personal, peer and team counselling. Centralized services include counselling in student affairs, admissions, internationality, library, ICT and student welfare services. Degree-integrated services consist of study counselling, teacher tutoring, peer tutoring and student welfare workgroups in different degree programmes. Centralized services area located on the Microkatu campus.

Savonia UAS has an institutional Guidance and Counselling Plan that steers programme-level counselling activities. This document describes the stages of counselling as well as the parties involved and their responsibilities. In addition, another document states half-yearly counselling themes that are followed in the degree programme. Based on the self-evaluation report, along with the annexes, the counselling covers the entire study path of 4 years/8 semesters.

Students also have access to sports facilities and student health care services. The student union plays a strong role in providing support for students, but the full extent of these support services could not be entirely assessed as part of the online visit.

During the interviews with service staff and the online tour of facilities provided by Savonia UAS, the accreditation team was impressed with the support staff. The student support team appeared to be dedicated in their efforts to enhance the supporting environment provided for students. As a conclusion, the student support structure within Savonia UAS enhances the achievement of the programme learning outcomes.

The student body as a whole is represented by the Student Union (SAVOTTA). SAVOTTA is an autonomic public corporation, a non-political service and support organisation for all students of Savonia UAS. It was founded based on the law pertaining to Universities of Applied Sciences. According to the law, the Student Union is part of the University of Applied Sciences and its mission is to act on behalf of the students as their representative.

The main support activities provided by SAVOTTA to students of Savonia UAS include, for example: acquiring the Student Card for learners, supervising and active participation in ensuring students' rights, organising events, delegating students for relevant boards and cooperation groups.

Based on the team's assessment, the programme meets Standard 11 fully.

Standard 12: The classrooms, computing facilities, software, laboratories, workshops, libraries and associated equipment and services are sufficient and accessible to enable students to achieve the programme learning outcomes.

Savonia operates in three cities (Iisalmi, Kuopio, Varkaus) and provides an engineering education at all three campuses. The Iisalmi campus specializes in extensive R&D activity as well as multiform education (adult education) in the mechanical field. The Varkaus campus focuses on energy technology. With respect to Kuopio, mechanical engineering activities were gradually transferred to the Mikrokatu campus together with other activities in 2020. The Mikrokatu campus includes approximately 190 pieces of individual learning and laboratory facilities, 20 of which have fixed computer equipment. There are also about 50 facilities equipped solely with monitors to which students can connect their computers. Most of the teaching and learning facilities on the campus are for mixed use by different educational fields, and all of them have audio-visual systems for distance teaching as well. Students can also study independently in a range of facilities on the campus.

According to the self-evaluation report, mechanical engineering field has two fixed computer classrooms for 40 students and two 40-student BYOD (Bring Your Own Devices) classrooms, where students bring their own computers to the "home base" of mechanical engineering. The accreditation team was able to review these facilities online. The team was able to visit the library and a variety of study spaces online as well. The study spaces were new, well-furnished for a variety of study needs and appeared to be easily assessable for students. Overall, the accreditation team strongly appreciates the facilities offered by Savonia UAS.

The mechanical engineering team maintains its own laboratories for materials processing technology, machining, sheet and welding work as well as NC machining. The accreditation team was especially pleased with recent investments in a wide variety of 3D printing devices that can be used both for RDI projects, coursework and student projects. Many of these spaces were included in the online facilities tour. The accreditation team appreciates the variety of laboratories and concludes that the facilities are sufficient for high-level education and consistent with the degree programme focus areas.

Students and staff in the mechanical engineering field can use the remote Citrix virtual mechanical environment, in which software requiring great computation capacity work smoothly. During their studies, students can obtain licences for a number of software applications (e.g. MS Office).

Savonia UAS's centralized library and information services have ten full-time employees. Its collection include both printed and electronic materials. The electronic materials are available for internal use by the organization's staff and students 24/7. The library also arranges guidance in best practices on the use of the library and how to search for information and provides information services for customers.

Based on the team's assessment, the programme meets Standard 12 fully.

Standard 13: The HEI and the programme have external partnerships that are adequate to the achievement of the programme learning outcomes.

Savonia UAS has the Partnership activity model specifying the guidelines for maintaining, implementing and developing partnerships. Savonia UAS's partners include a wide variety of local industries, several other universities of applied sciences and vocational schools in the region, as well as nearly 200 international partners.

Partnership agreements in the field of mechanical engineering are signed during the course of RDI activities. Cooperation is based on direct contacts with companies through RDI projects, face-to-face meetings and stakeholder surveys.

Local industry partners take advantage of the RDI activities provided by Savonia UAS and its premises. The activities with industry partners vary and include practical training, joint theses, material testing, development projects and different kinds of course-related exercises. The degree programme provides research, testing and education services to support local industries. The degree programme's special areas of expertise include welding automation, product design, materials as well as production techniques. These areas develop solutions and the competitiveness of local businesses. Students are involved in many projects (group or individual works) and have opportunities to develop their abilities with the companies. During the interviews with the stakeholder group, the accreditation team learned that, overall, stakeholders are pleased with the degree programme cooperation and the quality of the graduates.

Local partners provide practical training positions for the degree programme students to a large extent. According to the self-evaluation report, approximately 65% of all students annually complete the practical training included in the degree programme in regional companies. Students arrange the training positions themselves, assisted by the degree programme staff, who provide information on local industry in the field of mechanical engineering. Studies also include visits to the local companies, which help students line up contacts with potential practical training partners. However, in the interviews with the students and alumni it was noted that sometimes students need more assistance in finding suitable practical training positions. As the actual partnership network is notably wide, the degree programme is advised to ensure that all the students receive adequate support for arranging practical training positions.

The degree programme's experts work in a variety of different research and development networks. Savonia UAS provides yearly a series of publications and participates in the dissemination of information and know-how. Savonia's publications are mainly created in connection with the development of teaching, research projects, RDI projects and theses. International networks and opportunities to participate in international ventures become available to Savonia's partners through Savonia UAS. Unfortunately, the COVID-19 pandemic has also had an effect in this area at least in 2020.

With respect to the international partnerships, the actual value for the mechanical engineering programme's teaching and learning activities appeared to be rather low, i.e. the percentage of students participating in long-term exchanges is low. International activities, teaching and learning activities are also recognized by the degree programme as an area for development.

According to the self-evaluation report, in 2019 the degree programme had 17 students taking part in a short-term exchange (less than 3 months) abroad and two students in a long-term exchange (three months or more). There were no incoming exchange students, as the language of instruction is Finnish. None of the interviewed students had participated in an international exchange and only one knew a fellow student who had participated in an exchange. The degree programme is advised to establish practises that will increase the number of students taking part in exchange programmes, as international working skills are essential for any higher education graduate in the current world. The sister degree programme in mechanical engineering taught in English could provide opportunities also for Finnish students to become more integrated with the international community in the field of mechanical engineering.

Based on the team's assessment, the programme meets Standard 13 fully.

Standard 14: The financial resources are sufficient to implement the learning process as planned and to further develop it.

The degree programme is funded from two sources. Savonia's key operations are financed by the Ministry of Education and Culture, and in addition, Savonia funds its own activities by providing external RDI and other chargeable services for external customers. Savonia decides independently on its internal budget allocation.

The self-evaluation material shows that Savonia UAS has a process in place for the internal budget allocation. The Board of Savonia Ltd oversees the distribution of financial resources in an annual planning exercise. The annual budgeting cycle commences with springtime meetings of the Executive Board, following a review of the preceding year's results by schools and support services. A seminar of line managers is then held at the end of the semester to discuss the following year's joint strategic objectives. Schools and support units then complete the preparation of action plans, finance plans and investment proposals by autumn. The Executive Board and Board of Savonia Ltd agree to the action plans, finance plans and investments in December, with the director of the UAS having negotiated the final budget, investments and targets with the Executive Board.

The self-evaluation material includes the budget for 2020 as well as the accounts from 2018 and 2019. For the three years presented, the total budget was between 3.1 and 3.9 M€ yearly, of which approximately 61% was devoted to education.

Savonia UAS also has an English-Language Mechanical Engineering programme, the operations of which are beyond the scope of this accreditation review. These same financial resources also serve this programme, and it is not entirely clear how the work effort between these two degree programmes is managed. However, the intake for the English-language programme accounts for approximately 50% of the programme seeking accreditation renewal, so the financial resources appear to be enough.

The self-evaluation report shows that very significant investments have recently been made to improve the facilities in the area of mechanical engineering. The investment sum of 1.5 M€ during 2020 is significant and demonstrates a degree programme with sufficient resources.

Based on the team's assessment, the programme meets Standard 14 fully.

Strengths, good practice and areas for further development regarding section 2.3: resources

The team notes the following strengths and good practice in this section:

- The staff appear to be committed and enthusiastic.
- Staff have good support with respect to training opportunities for developing their digital skills and pedagogy.
- The technical staff includes professional engineers with a great commitment to the student learning experience. The staff has high-level technical competences and practical engineering experience, which is an advantage for the degree programme.
- The support services are highly visible and work in a coherent manner, leading to a high-quality student experience.
- The new library, as with all the new spaces, is designed to function effectively as a creative working space for individuals, pairs and groups. All the students have equal access to the facilities.
- The classrooms and the laboratories are of a high quality and are well maintained, leading to an excellent working environment and work ethic culture for the students.
- Active participation in RDI projects, like 3D printing and robotics, are an indicator of intense cooperation with industry partners and provides a significant contribution to the degree programme budget.

The team sees the following as areas for further development in this section:

- In some limited areas, e.g. support when arranging students' practical training, which are part of the curriculum, the student support seems variable and could be improved.

- Although good cooperation with industry in the region is acknowledged, there is a need to focus also on developing a dialogue regarding the students' practical trainings (both identifying practical training places and monitoring the achievement of the learning objectives set by the degree programme).
- The degree programme appears to have appropriate human resources as well as newly established learning and teaching environments. However, the budgeting system in use does not provide an exact state of the financial resources devoted for this single degree programme (there is one budget for all four degree programmes in the field of mechanical engineering). The degree programme is encouraged to further clarify the budgeting and budget monitoring practises and ensure appropriate financial resources both from the public and external sources.

2.4. Quality management

Standard 15: The quality management procedures of the programme are consistent with the quality policy of the higher education institution.

The current quality management system of Savonia UAS has existed since 2015. The quality system is based on the existing mission and strategy. In addition, Savonia UAS has a Quality Programme that covers institutional quality policy, share of responsibilities and core processes. According to the self-evaluation material, high quality, continuous improvement and a strong commitment to Savonia's strategic targets by the personnel seem to be essential also in planning and improving the degree programmes. The self-evaluation report describes how the quality management system implemented by Savonia UAS works at the degree programme level. The responsibilities are clearly stated in the "Rules of procedure".

The staff, both the management team and regular teaching/administrative staff, seem to be aware of the UAS provisions that say they are responsible for the quality of their actions. The educational development team is in charge of implementing the quality policy at the degree programme level.

Based on evidence gained from the self-evaluation material as well as the interviews, the degree programme follows Savonia UAS's common quality procedures. This includes institutional standards and instructions aimed at all the degree programmes as well as student feedback practises.

The degree programme reviews are regularly scheduled, but the process is not easily described by the mechanical engineering team. Even if the Savonia UAS quality system is suitable, there is room for improvement at the team level.

Student feedback is collected at different stages of the learning process using timetables and systems according to the approved standards of universities of applied sciences. The feedback results are reported as separate categories, such as university of applied sciences, field of education, degree programme and learning group. The numerical part of the feedback questionnaires is accessible for the whole staff in the personnel intranet (Santra). Access to written feedback is limited to the supervisors (directors responsible for education) only. Summaries of the feedback questionnaires are processed by groups representing all of Savonia and feedback on degree programmes by degree programme teams. Reports summarising the student feedback are published in the student intranet Reppu.

Based on the team's assessment, the programme meets Standard 15 fully.

Standard 16: The organisation and decision-making processes of the programme are fit for effective management.

The Savonia UAS organization was changed on 1 January 2021. Responsibilities are defined at different managerial and operational levels in the management system for 2020. Students are included in various positions.

At the time of the online visit, education at Savonia UAS was divided into two educational responsibility areas. Each educational responsibility area was steered by a director who reported to the president. Directors responsible for education acted as heads of the degree programmes and as immediate supervisors of teachers. The implementation plan for the degree programme is drawn up in degree programme teams supervised by the heads of teams. The goals of the educational fields are defined annually in a performance agreement and the goals of the teams in team agreements.

In addition to line management, the Savonia UAS organisation includes development teams with horizontal responsibilities. Their duties and compositions are defined by separate decisions made by the president. Responsibility for development of education as a whole lies with an Educational group that, in addition to the development manager, consists of the directors responsible for education, the planners of educational responsibilities, the head of study affairs, the coordinating study counsellor and a student representative. A steering group, eLearning group, YAMK (master level) group and a thesis group are sub-groups of the Educational group. Each group is headed by one of the directors responsible for education. Savonia's information group, core group and service management group are essential for the quality system and quality management.

The planning and implementation of the degree programme is supported by target-orientated, degree programme-specific objectives together with follow-up through annual evaluation and planning in accordance with Savonia management's yearly cycle and by the planning process. This process includes objective setting, monitoring, analysis of results and budgeting. Development and corrective actions are included in the planning and implementation process as well as an analysis of the effectiveness of the executed actions.

During the review process, the accreditation team saw some good examples of effective and responsive decision making. Given the self-evaluation material, the interviews output and the documentation presented in the evidence room, there was no evidence of any severe problems related to the decision-making capability of the degree programme. Meeting memos from the Board of Savonia UAS (Ltd) can be found on the Savonia UAS website, which enhances the transparency of its top-level management.

The accreditation team noticed that the procedures and process of updating the curriculum could be more effective if they were more systematically documented and applied. The formal decision-making processes for evaluating and possibly updating the learning outcomes and curriculum could be better clarified. Decision making on the curriculum at the team level should be structured and include a well-defined group of academic staff, support staff around the degree programme and students from the degree programme.

Currently, the degree programme does not fully make use of the opportunity to organise regular meetings with the student body. To fully establish a well-working process of feedback gathering related specifically to the Mechanical Engineering programme, the degree programme should organize, besides the official feedback forms and questionnaires, regular meetings between the students and key staff of the degree programme to identify suggestions for improvement and specific areas for developing the degree programme. Beforehand, students should be informed about the ways in which they can participate in the degree programme enhancement effort.

Savonia UAS entered a new strategic period (2021–2024) beginning 1 January 2021. At the same time, the organisational structure of the University of Applied Sciences was upgraded to better respond to future challenges. The activities of the University of Applied Sciences are divided into six performance units (degree programmes, continuous learning, internationality, student services and student wellbeing, RDI processes, partnerships) and supporting higher education services. However, the scope of the degree programme in Mechanical Engineering remains the same after restructuring.

Based on the team's assessment, the programme meets Standard 16 conditionally.

Standard 17: The programme reviews and develops the programme aims, curriculum, teaching and learning process, resources and partnerships and quality management in a systematic and regular manner, taking into account analysis of results of student admissions, students' study progress, achieved learning levels, student, graduate and employer feedback and graduate's employment data.

During the interviews with the management, the accreditation team learned that, although there was no specific time interval stated in the internal regulations for degree programme review, degree programmes were internally observed during the six year period (the time

between two external institutional audits). For the Mechanical Engineering programme, the last review was in 2018 and the next one is planned for 2021.

The planning and development of the curriculum is the responsibility of a mechanical engineering team. Based on the self-evaluation material and interviews, the planning and development process is not a very formalized one or adequately documented. In addition, one person is in charge of the team and responsible for coordinating the process, but his/her workload for this purpose is relatively small. The degree programme is advised to clarify the team-level planning and development process, document it in a consistent manner and ensure sufficient staff resources for this purpose. The process should include active participation of the teaching staff, support services staff around the degree programme as well as student representatives. The process should be part of internal quality management at the degree programme level.

Curriculum development takes into consideration the data collected by the quality system in a systematic and regular manner as well as the feedback from stakeholders — students, graduates and employers. The UAS quality system provides information on the results of student admission, progress of student performance, achieved learning levels, student and employer feedback, and graduates' employment rates. The most significant questionnaire impacting the development of the degree programme (curriculum) is sent to companies once every four years. The latest survey was conducted for the 2018 curriculum, and 51 company representatives responded. The self-evaluation material presents some examples of how the key observations gathered for the survey performed in 2017 were implemented in the 2018 curriculum review.

In the self-evaluation material and evidence room and during the interviews, the accreditation team learned about the new investments and curricula additions related to additive manufacturing. Both staff members and stakeholders view this as strong positive evidence of the degree programme taking practical and recent steps to review and develop the curriculum while adding modern content relevant for both specializations of the degree programme.

Savonia UAS offers numerous channels for students to express their voice regarding student life: personal study and career plan discussions; group discussions; course feedback in the "Wilma" system; semester surveys; echo feedback channel in the student intranet Reppu; nationwide survey on graduation; Nationwide Career Tracking Survey (five years after graduation); working for the student union SAVOTTA and in student associations; and acting as a student representative on one of Savonia's board or groups.

Besides these channels, the teaching staff from the Mechanical Engineering programme has its own way of collecting feedback from students about the disciplines being taught. Based on the interviews with the teaching staff and students, the importance of the degree-level ways of collecting feedback is even greater than the impact of the institutional feedback. There were also signals that in some cases, the response level to the institutional feedback is not very high. The degree programme is advised to ensure that students commit themselves sufficiently also to the institutional feedback practices.

The interviewed students also confirmed that communicating with their teachers is very easy and that they always receive feedback. Although not all students know about their representatives, it is clear that the student association discusses courses and other issues related to the study process with the degree programme heads.

Based on the team's assessment, the programme meets Standard 17 conditionally.

Standard 18: The programme provides public, up to date information about its objectives, teaching and learning process, resources, quality management procedures and results.

The Savonia UAS website is user-friendly. Most of the pages are up to date and information is provided both in English and Finnish. It is easy to navigate and find information and data about Savonia UAS, degree programmes, campuses, co-operation opportunities, RDI programs as well as the management system, objectives and learning process resources. More information for students is available at, for example, Savonia's student intranet Reppu and for staff members at Santra.

Information for students, applicants and a wider audience on the degree programme is publicly available at Savonia UAS's website. This includes information on the degree programme objectives, admission procedures, curriculum along with course descriptions and career possibilities for graduates.

Degree programme-level statistics or indicators are not publicly available, but common Savonia UAS statistics and score card results can be found in the Financial Statement and Annual Reports (published in Finnish).

Based on the team's assessment, the programme meets Standard 18 fully.

Strengths, good practice and areas for further development regarding section 2.4: quality management

The team notes the following strengths and good practice in this section:

- The staff appears to be committed to continuous improvement and quality is included in its operations. The quality culture of Savonia UAS and the degree programme appears to be inherent in everyday activities.
- Targets and goals defined in the strategy are steering the activities and development of Savonia UAS and the degree programme.
- Feedback is continuously gathered from students, industry partners and other stakeholders to improve the degree programme.

The team sees the following as areas for further development in this section:

- The curriculum and degree programme development processes at the team level should be described and more systematically organized, and there should be more student involvement.
- The formal decision-making processes for evaluating and possibly updating the learning outcomes and curriculum could be better clarified. Decision making at the team level should be structured and include a well-defined group of academic staff, support services staff around the degree programme as well as students from the degree programme.
- Degree programme reviews are regularly scheduled, but the process is not easily described by the mechanical engineering team. Even if the Savonia UAS quality management system is suitable, there is room for improvement at the team level. The updating process should be adequately described and documented at the team level.

Overall evaluation of the degree programme

3

Upon reviewing the degree programme the team highlights the following **key strengths and good practice**:

- Degree programme is strategic for Savonia UAS and relevant to the region. It has strong support from the management. There is good cooperation with nearby companies. There is a clear steering chain from the Ministry of Education and Culture down to the degree programme team on the mandate of the degree programme.
- There is a modern teaching and learning environment, including learning resources and software in line with the students' and companies' needs. All students have equal access to the facilities. Support services for the students appear to work well.
- Course descriptions are complete and easily accessible. Course contents and organization are appropriate for the qualification earned at the time of graduation (e.g. project work, laboratory work).

The team sees the following as **main areas for further development** of the degree programme:

- Decision-making process for designing and reviewing of curriculum could be better clarified. The mechanical engineering team, when preparing a curriculum proposal, could include academic staff, support staff around the degree programme and students from the degree programme. This should be part of internal quality management.
- There is a need for a more comprehensive approach to the practical training component: to define and communicate to the students the learning objectives and monitor their achievement and provide support for students in finding practical training places.
- There is a need to build up a platform to enhance systematic communication between the students and degree programme management.

The team recommends that the degree programme is *accredited with the following conditions*

- Decision-making process for designing and reviewing of curriculum should be better clarified. The mechanical engineering team, when preparing a curriculum proposal, could include academic staff, support staff around the degree programme and students from the degree programme (Standard 16).
- The degree programme-level process of regular programme reviews as well as curriculum updating should be adequately described and documented at the team level. The updating process should include academic staff, support services staff around the degree programme, students from the degree programme as well as use of the feedback gathered from external stakeholders. The degree programme should reserve appropriate staff resources for coordinating the review and updating process. The process should be a part of internal quality management (Standard 17).

Decision of
the FINEEC
Committee for
Engineering
Education

4

In its meeting on 15 March 2021 the FINEEC Committee for Engineering Education decided, based on the proposal and report of the accreditation team, that the Degree Programme in Mechanical Engineering at Savonia University of Applied Sciences is accredited conditionally. The set conditions are those listed in section 3.

The accreditation is valid until 15 March 2022 by which Savonia University of Applied Sciences should report to the Finnish Education Evaluation Centre on how they have met the set conditions. If the FINEEC Committee for Engineering Education then finds that the conditions have been successfully met, the validity of the accreditation will be extended until 15 March 2027.

Engineering programme accreditation is a degree programme specific evaluation that can lead to the European EUR-ACE® Label. The accreditation aims to support the enhancement of quality in engineering degree programmes and increase the international comparability and recognition of engineering degrees within Europe. The accreditation is voluntary for Finnish higher education institutions and degree programmes. This report presents the process and results of the accreditation of the Degree Programme in Mechanical Engineering at Savonia University of Applied Sciences in Finland.

The Finnish Education Evaluation Centre (FINEEC) is an independent agency responsible for the evaluation of education. It operates as a separate unit within the Finnish National Agency for Education. It implements system and thematic evaluations, learning outcome evaluations and field-specific evaluations. Moreover, FINEEC supports providers of education and training and higher education institutions in matters related to evaluation and quality assurance, as well as advances the evaluation of education.

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