CURRICULUM

MECHANICAL ENGINEERING

An Engineer graduating from the Degree Programme of Mechanical Engineering (Bachelor of Engineering) has various career opportunities where very extensive competences are expected. Careers can be found in a diverse range of industry sectors. Your studies will especially aim at gaining competences needed in the product design and development work, as well as in production, in the field of mechanical and metal industry. The degree contains common core studies closely connected to the working life and mechanical engineering in wood harvesting as well as complementary studies in precision technology, concept planning and production technology competences.

Degree

Degree Title	Bachelor of Engineering
Extent	240 cr / 4 years

Typical Tasks for Graduates

Those who have graduated with a Bachelor of Engineering Degree in the Degree Programme of Mechanical Engineering operate in the field of design, production, use and maintenance of machines, implements and production lines. Other areas of employment are, for example, marketing and training tasks. The graduates can work, for example, in production facilities, mechanical design offices and importing companies. Your future employers will appreciate strong basic competences in mechanical engineering and entrepreneurial attitude and customer service skills. The strong manufacturing network in the province in metal and plastic product systems as well as in mechanical engineering will employ experts.

Implementation of Studies

In your studies, you will become familiar with the working life: you will participate in practical training in working life and work placement periods and implement different assignments to our working life partners. In teaching, we use various appropriate methods, such as virtual studies, lectures, excursions, and practical assignments. Moreover, a part of your studies is learning in our workshop. The latest and most developed professional software are utilised in your studies.

You may also improve your skills by choosing studies from the common complementary modules of Karelia UAS. You can gain international competences in exchange studies, work placement abroad or by studying together with incoming exchange students at our university of applied sciences. You are welcome to utilise our extensive partnership network in Europe, Russia and Asia. The close connections with the working life are based on persevering cooperation with the local working communities and networks. Consequently, some of your assignments during your studies will be commissioned by our working life partners.

Structure and Content of Studies

The degree contains common core and complementary studies enhancing your key and specialized competences. The extent of common core studies in mechanical and production engineering is 210 credits and that of complementary studies 30 credits. The common core studies include 30 credits of work placement and the thesis of 15 credits. The thesis process is divided into three 5-credit courses. Each course can be completed at different stages of studies. However, the thesis plan needs to be accepted before the implementation phase.

In the beginning of your studies you will become familiar with the basics of mechanical design and natural sciences and you will be able to apply these to mechanical engineering e.g. through a practical starting project. During your second year you will develop your skills in mechanical design and manufacturing technology. In your third year you will apply the knowledge and knowhow of mechanical design diversely with our cooperating partners. You will learn to take responsibility for your part in design projects, your own work quality and development. At the end of your studies you will grow into a developer of your own work: you will become a professional who is able to develop production and design work independently and as a member of a work community.

You can take your studies either according to the design or production orientated programme. In the production orientated studies work placement is used as a study method to take 30 credits of complementary studies. In the design oriented programme you choose at least three modules applicable to design.

The topics of studies in the production oriented programme are mainly the same as those of design. Alongside with mastering the entities of mechanical engineering also knowing production environments, production development methods and communication skills are emphasized.

The complementary studies mostly contain modules of 15 credits. The first three modules are aimed at you who want to specialise in mechanical design. The following modules suit especially those who study in the Degree Programme in Mechanical and Production Engineering:

- Precision Engineering
- Practical Training in Working Life 1
- Management and Supervision
- Business Competence and Entrepreneurship
- International Studies 1
- International Studies 2
- Optional Language (Spanish, Chinese, French, German, Russian)
- Refresher Courses in Languages and Mathematics (3–12 credits)
- Training Programme of Joensuu Sports Academy (3–15 credits)
- Participation in Peer Tutoring and Student Union Activities (3–15 credits)

If you are already an entrepreneur or thinking of becoming one, some core and complementary studies, international exchange, practical training and thesis can be combined with your business activities or developing your business idea. As an entrepreneur or if you are planning to become one, you have a possibility to get guidance and support in combining studies and entrepreneurship during your studies.

The complementary studies are scheduled to take place in the spring semester of the third and the autumn semester of the fourth year. Additionally, complementary studies can be taken during summer months. Participation in Sports Academy training and optional language studies can be spread over several semesters. If the studies mentioned above do not match with your professional objectives, you can discuss other alternatives with your teacher tutor or counsellor.

MECHANICAL ENGINEERING

Bachelor of Engineering (UAS) | 240 cr / 4 years

Karelia

Basic Competence of Mechanical Engineering | Design Competence | Manufacturing Technology Competence | Machine Automation Competence | Business Competence | Mathematic-Scientific Competence | Ethical Competence | Innovation Competence | Internationalisation Competence | Learning Skills | Work Community Competence

4th year STARTING PROFESSIONAL IN MECHANICAL ENGINEERING

Career Planning and Development	1 cr	Thesis	5 cr
Thesis	10 cr	Work Placement	25 cr
Automation Project	4 cr		
Complementary Studies	15 cr		

3rd year SPECIALISING IN MECHANICAL ENGINEERING

Manufacturing Automation	4 cr	Lightweight Structures Technology	5 cr
Production Development Methods	4 cr	FEM	4 cr
Production Equipment Design	4 cr	Hydraulic Systems	4 cr
Project Work	3 cr	Management and Human Resources	3 cr
Machine Power Transmission	5 cr	Simulation of Mechanisms	3 cr
Business Economics	5 cr	Svenska för maskiningenjörer (Swedish language)	2 cr
Production Control and Optimization	5 cr	Design of Welded Structure	3 cr
		Choice of Material	2 cr
		Communication	3 cr
		Career Planning and Development 3	1 cr

2nd year BASIC COMPETENCE IN MECHANICAL ENGINEERING

Thermodynamics and Fluids	5 cr	Quality of Production	5 cr
Strength of Materials	3 cr	Machine Automation	5 cr
Design of Machine Elements	5 cr	Product Development in Mechanical Engineering	5 cr
Differential Calculus	3 cr	Project Management	5 cr
Manufacturing Technology	6 cr	Materials Study	5 cr
Sociala kontakter i arbetslivet (Swedish language)	3 cr	Dynamics	5 cr
Professional Communication in English	3 cr		
Career Planning and Development 2	1 cr		

1st year FAMILIARIZING WITH THE FIELD OF MECHANICAL ENGINEERING

Technical Documenting and Basics of Modelling	7 cr	Basics of Machine Design	5 cr
Geometry	4 cr	Hydraulics and Pneumatics	5 cr
Algebra	3 cr	Basics of Strength of Materials	3 cr
English for Mechanical Engineering	3 cr	Chemistry for Mechanical Engineering	3 cr
Reporting and Written Communication	2 cr	Maintenance	3 cr
Basics of Production Techniques	5 cr	Statics	5 cr
Mechanics	3 cr	Machine Safety Engineering	3 cr
Career Planning and Development 1	2 cr	Work Placement	5 cr

Competence Requirements

Area of Competence	Description of Competence Bachelor of Engineering
Basic Competence of Mechanical Engineering	- is able to utilise mathematics and physics to describe phenomena and solve problems related to mechanical engineering - knows the most general components and engine parts and understands the operating principles of the most common machines - knows how to apply mechanical engineering measurements - understands the basics of energy technology and use
Design Competence	- knows the basics of technical documentation and is able to utilise 3D-modelling in designing - knows the most general construction materials and their properties - understands the meaning of standardisation in product design and production - is able to consider the entire product life cycle in design work - is able to understand the importance of group work in product design and is able to operate as a member in an international design organisation - knows the requirements of the Machinery Directive in design work - is able to design safe and easy to use implements and structures - is able to apply methods of product development
Manufacturing Technology Competence	- knows the methods, tools and possibilities of manufacturing technology - understands the basics and effects of manufacturing systems and automation on product structure - understand the requirements of precision products in production - understands the basics of logistics
Machine Automation Competence	- is able to apply pneumatic and hydraulic components in automation - understands the basics of production machinery and controls - is able to design a mechatronic implement - understands the structure and user policies of flexible manufacturing systems and robotics
Business Competence	- understands the prerequisites for profitable business operations - is able to carry out simple investment calculations - has skills for entrepreneurship
Ethical Competence	- is able to assume responsibility for one's own actions and their consequences - is able to work according to the code of professional ethics of one's field. - is able to consider various actors in working - knows how to apply the principles of equality - knows how to apply the principles of sustainable development

Innovation Competence	- is able to solve problems and develop working methods innovatively - is able to work in projects - is able to carry out research and development projects and to apply existing knowledge and methods of one's field - is able to find customer-oriented, sustainable and profitable solutions
Internationalisation Competence	- has the language competence necessary for the work in the field and its development - is able to cooperate with people from different cultural backgrounds - is able to take into account the opportunities and effects of internationalisation
Learning Skills	- is able to assess and develop one's competences and learning methods. - is able to retrieve/ search, process and analyse information critically. - can assume responsibility for team learning and knowledge sharing.
Work Community Competence	- is able to function as a member of a work community and contribute to its work well-being - is able to function in various communication and interaction situations at work - is able to use information and communication technology in the tasks of one's field - is able to establish personal occupational contacts and to work in networks - is able to make decisions in new and unforeseen situations - is able to manage one's work and to work independently in tasks requiring expertise