

## CURRICULUM

### BUILDING SERVICES ENGINEERING

The importance of the requirements of energy efficiency and usability of buildings is increasing constantly. At the same time new technology creates possibilities to implement new solutions which fulfill the increasing requirements. Education in building services engineering gives you a solid and broad base to understand modern building services engineering as a whole.

### Degree

Degree Title	Bachelor of Engineering
Extent	240 cr/ 4 years

### Typical Tasks for Graduates

As an engineer in building services you will design energy saving buildings and implement energy efficient solutions. Education in building services and work experience in the field enables you to get qualifications for authorized electrical and HVAC planning and implementation tasks. You can work in various expert tasks in companies or public administration in supervision and management or as entrepreneur.

You will get the readiness to work in building services engineering in planning, implementation, product development and authoritative tasks or as an independent entrepreneur. The tasks in the field include planning, contracting, supervision, sales and development tasks as well as contracting, planning and supervision tasks requiring electrical and HVAC competence.

### Implementation of Studies

In Karelia University of Applied Sciences you will study for your degree in building services engineering in versatile, modern and multi-professional learning environments closely connected to real working life using diverse development tools and technologies. You will network with expert communities in the region and become a skilled professional. You will learn in various monitored learning environments and apply your skills in companies in the field during work placement periods. You will also co-operate with students of energy and environmental engineering and civil engineering during your studies. An important part of your studies are language and communication studies which especially emphasize communication and interactive skills required in working life. You can also complete some of your studies or work placement abroad.

## 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 building services engineering is 210 credits and that of complementary studies 30 credits. The common core studies include 30 credits of practical training 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.

During your studies you will increase your competence in engineering and acquire the mathematic-scientific basic skills needed in problem solving. In your work placement and studies-related commissions from working life you will familiarize with tasks typical to building services engineer. You will enhance your know-how by getting to know the business opportunities in the field. This creates the foundation for the building services engineering degree's common core studies. As your studies proceed, your competence in building services engineering increases and you will apply it in planning entities.

The complementary studies mostly contain modules of 15 credits. The following modules suit especially those who study building services engineering:

- Design Competence in Building Services Engineering (required in order to get design and contracting qualifications)
- Project Management in Building Services Engineering
- Management and Supervision
- Customer-Oriented Marketing
- Business Competence and Entrepreneurship
- Expertise Pertaining to Russia
- International Studies 1
- International Studies 2
- Optional Language (Spanish, Chinese, French, German, Russian)
- Refresher Courses in Languages and Mathematics ( 3-12credits)
- 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.

Complementary studies have been scheduled to take place in the autumn and spring semesters of the fourth year. Additionally, complementary studies can be taken during summer months. Participation in Sports Academy training, peer tutoring or student union activities as well as 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 study counsellor.

Design Competence in Building Services Engineering | Building Services and Electric Qualifications | Building Services Production Competence | Business Competence | Mathematic-Scientific Competence | Ethical Competence | Innovation Competence | Internationalisation Competence | Learning Skills | Work Community Competence

## 4<sup>th</sup> year **STARTING PROFESSIONAL IN BUILDING SERVICES ENGINEERING**

Application Design of Building Automation	5 cr	Thesis	10/15 cr
Thesis	5/15 cr	Work Placement	20 cr
Professional Communication in English	3 cr		
Career Planning and Development 4	1 cr		
Complementary Studies	15 cr		

## 3<sup>rd</sup> year **COMPETENCE IN BUILDING SERVICES ENGINEERING**

Laboratory Work in Building Automation	5 cr	Complementary Studies	15 cr
Building Acoustics and Lighting	3 cr	HPAC Laboratory Work	5 cr
User Interface and Data Transfer	5 cr	Svenska för husteknik (Swedish language course)	2 cr
Management and Leadership	4 cr	Mathematical Statistics	3 cr
Building Automation Systems and Field Equipment	5 cr	Indoor Climate and Air Conditioning Technology	5 cr
Building Automation Laboratory Work	5 cr	Expert Communications	3 cr
Heating and Energy Technology	5 cr		
Electrical Safety	4 cr		
Career Planning and Development 3	1 cr		

## 2<sup>nd</sup> year **BASIC COMPETENCE IN BUILDING SERVICES ENGINEERING**

Ventilation Systems	4 cr	Work Placement	7 cr
House Building and Technical Building Solutions	5 cr	Planning of Heating, Plumbing and Ventilation	3 cr
Business Economics	5 cr	Laboratory Work in Electrification of Buildings	5 cr
Power Electronics and Drives	5 cr	Electricity Distribution Technology in Buildings	5 cr
Function Transforms and Modelling	2 cr	Career Planning and Development 2	1 cr
Electrical Systems	5 cr	English for Building Services Engineering	2 cr
		Building Automation Systems and Field Equipment	5 cr
		Water and Sewage Systems	4 cr

## 1<sup>st</sup> year **FAMILIARIZING WITH BUILDING SERVICES ENGINEERING**

Documentation in Building Services Mechanics, Electrostatics and Electrodynamics	6 cr	Work Placement	3 cr
Construction and Building Services	5 cr	Heating Systems	4 cr
Career Planning and Development 1	2 cr	Automation and Digital Technology	4 cr
Engineering English	3 cr	Sociala kontakter i arbetslivet (Swedish language course)	3 cr
Reporting and Written Communication	2 cr	Thermodynamics and Flow Mechanics	5 cr
Tools and Instruments	3 cr	Integral and Differential Calculus	5 cr
Algebra and Geometry	5 cr	Electric Circuits	5 cr

## Competence Requirements

Area of Competence	Description of Competence Bachelor of Engineering
Design Competence in Building Services Engineering	<ul style="list-style-type: none"> <li>- knows how to design systems in electrical building services and HPAC engineering</li> <li>- masters entities in building services engineering systems</li> <li>- knows how to use the most common design tools and data modeling</li> <li>- understands the life cycle of building services</li> <li>- knows how to apply energy efficient solutions in changing environments</li> <li>- masters the safety of building services engineering systems for their entire life cycle</li> </ul>
Building Services and Electric Qualifications	<ul style="list-style-type: none"> <li>- masters factors related to electrical safety, maintenance of electrical safety, legislation and regulatory provisions , masters the required information for qualifications of design competence in HPAC field</li> </ul>
Production Competence in Building Services Engineering	<ul style="list-style-type: none"> <li>- masters production processes in building services engineering systems</li> <li>- knows how to use appropriate tools in implementation of designs</li> <li>- knows how to operate in projects</li> <li>- masters work supervision</li> </ul>
Business Competence	<ul style="list-style-type: none"> <li>- knows the principles of business and understands the significance of economy considering the whole life cycle of production</li> <li>- understands the significance of customers in business</li> <li>- knows the basics of marketing</li> </ul>
Mathematic-Scientific Competence	<ul style="list-style-type: none"> <li>- knows how to apply natural scientific thinking and common regularity in technical designing, implementation, product development and problem solving</li> <li>- is able to communicate with actors in other fields of engineering</li> </ul>
Ethical Competence	<ul style="list-style-type: none"> <li>- is able to assume responsibility for one's actions and their consequences</li> <li>- is able to work according to the code of professional ethics of one's field</li> <li>- is able to take different parties into account</li> <li>- is able to apply the principles of equality</li> <li>- is able to apply the principles of sustainable development</li> </ul>
Innovation Comptence	<ul style="list-style-type: none"> <li>- is able to solve problems and develop working methods innovatively</li> <li>- is able to work in projects</li> <li>- is able to carry out research and development projects and to apply existing knowledge and methods of one's field</li> <li>- is able to find customer-oriented, sustainable and profitable solutions</li> </ul>

Internatio- nalisation Competence	<ul style="list-style-type: none"> <li>- has the language competence necessary for the work in the field and its development</li> <li>- is able to cooperate with people from different cultural backgrounds</li> <li>- is able to take into account the opportunities and effects of internationalisation</li> </ul>
Learning Skills	<ul style="list-style-type: none"> <li>- is able to assess and develop one's competences and learning methods</li> <li>- knows how to retrieve/search, process and analyse information critically</li> <li>- can assume responsibility for team learning and knowledge sharing</li> </ul>
Work Community Competence	<ul style="list-style-type: none"> <li>- is able to function as a member of a work community and to contribute to its work well-being</li> <li>- is able to function in various communication and interactive situations at work</li> <li>- is able to use information and communications technology in the tasks of one's field</li> <li>- is able to establish personal occupational contacts and to work in networks</li> <li>- is able to make decisions in new and unforeseen situations</li> <li>- is able to manage one's work and to work independently in tasks requiring expertise</li> <li>- has developed entrepreneurial skills</li> </ul>