

STUDY PLAN

Electrical Engineering - Master

120 ECTS

Narvik

Based on the document "Vilkår for bruk av tilleggsetegnelsen Sivilingeniør (siv.ing.)" approved by The Norwegian Association of Higher Education Institutions spring 2016.

The programme description has been approved by the board of Faculty of Engineering Science and Technology on 01.12.2017

Programme Name	Bokmål: Electrical Engineering - master Nynorsk: Electrical Engineering - master Engelsk: Electrical Engineering- Master
Workload	120 ECTS
Qualification awarded	Master of Science
Target group	The Master Program in Electrical Engineering is suitable for students with an interest in power systems and electric energy sources, energy storage and conversion, as well as advanced electric motor drives.
Admission requirements, requirements and Pre requirements	To be applicable for the master program in Electrical Engineering, you must have a relevant undergraduate Bachelor Engineering programme within electronics. The candidate should have basic knowledge in power electronics and electrical machines. Basic knowledge in power systems is also an advantage. There is also a requirement of 30 points with preliminaries in mathematics/statistics, equivalent to the Norwegian courses Mathematics 1, 2, and 3, as well as Statistics. Knowledge in Physics (7,5 - 10 ects) on a higher level is recommended to be able to follow different courses on the master programme. Some of the courses in the bachelor programme have a certain amount of physics included and can be accepted.
Programme description and content	The program is aimed at automated industrial processes, with the use of computer aided advanced control systems and inverter technologies. In addition, there is an emphasis on a basic understanding of the properties and limitations of power systems, as well as the potential of small-scale renewable energy sources. The study also focuses on applied mathematics, economics and business development. The program covers the following disciplines: <ul style="list-style-type: none"> - Linear Algebra and Numerical Analysis - Control Engineering - Instrumentation and Measurement - Signal Transmission - Computer Programming - Programmable Controllers - Electrical Machines and Power Electronics - Basic Power System Theory - Renewable Energy Sources - Power System Operation and Stability - Final thesis See additional information in the different course descriptions. The program is uniform and does not include different modules, and all teaching is on campus. Mandatory tasks are described in the different course descriptions.

It will be possible to take part of the studies abroad, provided that the external courses are similar in content and scope to those specified in the study plan.

Programme structure			
Sem-ester	10 ECTS	10 ECTS	10 ECTS
1.	SMN6190 Linear algebra 2	ELE-3501 Control Engineering	ELE-3500 Power System Fundamentals
	SMN6191 Numerical Methods		
2.	ELE-3506 Programming	STE6256 Instrumentation & measuring systems	SAD6210 Innovation and economics
	ELE-3502 Signal Distribution and Transmission	STE6217 EI Machines and Power Electronics 1	ELE-3503 Power System Stability
3.	STE6225 EI Machines and Power Electronics 2	STE6285 Renewable energy - generation and conversion	STE6287 Power System Operation and Control
	SAD6211 Innovation and management	ELE-3504 Fundamentals of Programmable Controllers	ELE-35xx Electives
4.	ELE-3900 Diploma Thesis - M-EL		
Learning-outcome	<p>After completing the study program the candidate has the following learning outcome:</p> <p>Knowledge:</p> <p>The student has acquired</p> <ul style="list-style-type: none"> • basic knowledge about economics and innovation, with special focus on creating an enterprise, developing concepts and protection of rights. • knows the principles of electric power system and understands the limitations and bottlenecks in such a system. Key topics are renewable energy, stability of power systems and operation and control of power systems. • a thorough knowledge of electrical machines, their dynamics and choice of suitable converter types for motor drives. The candidate also knows about available measurement sensors and how these could be integrated in an advanced control system. • basic knowledge of computer architecture and programming. <p>Skills:</p> <p>The student can</p> <ul style="list-style-type: none"> • use linear algebra and numerical methods as mathematical tools for analyzing physical processes and technical solutions. • combine power electronics, control engineering and electrical systems into advanced electric motor drives. • perform basic simulations and analyzes of power systems, in regards to load flow, stability, operating conditions or economic considerations. • use computers, microcontrollers or other types of microelectronics in order to control and monitor mechatronic systems. • completes the study program through performing a larger diploma work of a six-month duration. <p>Generell kompetanse:</p>		

	<ul style="list-style-type: none"> • gains insight into new and innovative technologies and will be able to put these into a society perspective. • gains insight into various aspects of future network systems, energy solutions and climate challenges. • is able to combine energy systems with signal transfer and ICT solutions in an overall system with high flexibility.
Programme relevance	<p>The program is suitable for candidates who want to work with industrial electrical engineering, automation, power grid operation and utilizing renewable energy sources. The program also provides a basis for working with project management and marketing, or teaching in technical subjects at Bachelor's level.</p> <p>The program also qualifies for doctoral studies in related fields.</p>
Scope and learning activities	<p>Most courses are based on lectures, self-study and assignments or small projects, individually or in groups. Each 5 ECTS course usually includes 40 lectures, plus supervision time. The hand-outs can be voluntary or mandatory. Mandatory lab exercises are included in some topics. Scientific theory application and analysis is emphasized in assignment and project solution. The different course descriptions provide additional information.</p>
Assess-ments	<p>Different assessment methods is applied through the study program. In most cases the assessment is based on a written exam. In some cases an overall assessment is applied, combining a written exam with assignments or projects, or a final report combined with an oral exam. The different course descriptions provide additional information.</p>
Master Theses	<p>The final master thesis (diploma) can be carried out in close collaboration with industry partners and/or on the basis of existing research and development projects. The work is usually performed individually. Regular status meetings will be held throughout the entire project period. The diploma will be evaluated solely on the basis of a final written report.</p>
Language of instruction	English
Internationalization and exchange possibilities	<p>It is possible to study the parts of the master's program at other universities. An individual plan must then be drawn up in consultation with the study coordinator.</p>
Professional and administrative liable	Department of Electrical Engineering - Faculty of Engineering Science and Technology
Quality control	<p>By the end of each course the students are offered a survey with an electronic questionnaire. Various forms of alternative evaluations are offered, including reference groups.</p>