Linnæus University

Jnr: 2019/1798-3.1.1.3

Programme syllabus

Faculty of Technology

Drift- och underhållsteknik, 180 högskolepoäng
Operation and Maintenance Engineering, 180 credits

Level
First Level

Date of Ratification
Approved 2013-11-05
Revised 2019-06-03 by the Faculty Board within the Faculty of Technology
The programme syllabus is valid from autumn semester 2020

Prerequisites
General entry requirements and Mathematics 2a / 2b / 2c, Physics 1b1 / 1a or Mathematics B, Physics A (Field-specific entry requirements 7/A7). Fysics A, Fysics 1b1/1a can be replaced by Science 2 or Energy Technology or equivalent.

Description of Programme

The purpose of the program is to prepare the student for a profession involving operation, supervision, maintenance, planning and management functions in plants that generate electricity, heating, cooling or other energy, but also in the process industries.

The program is in line with a large need for well-trained operating staff. After graduation, the student can work in most industries, which means that career prospects and career paths are numerous. A student with a degree in operation and maintenance technology has employability in the cogeneration, nuclear, process industries, hydropower and commissioning.

Within the program, the student acquires basic knowledge in a number of areas, but also deeper knowledge in courses in operation and maintenance technology as well as control and control technology. After a few years of professional activity, the student should be operationally responsible for operating personnel, facilities and equipment.

Objectives

Central degree objectives in accordance with the Higher Education Ordinance

Knowledge and understanding
For a Degree of Bachelor students must

- demonstrate knowledge and understanding in their main field of study, including knowledge of the scientific basis of the field, knowledge of applicable methods in the field, indepth knowledge of some part of the field and a general sense of current research issues.

Skills and abilities
For a Degree of Bachelor students must

- demonstrate an ability to seek, gather and critically interpret information that is relevant to a problem and to critically discuss phenomena, issues and situations;
- demonstrate an ability to independently identify, formulate and solve problems and to perform tasks within specified time limits;
- demonstrate an ability to present and discuss information, problems and solutions in dialogue with different groups, orally and in writing; and
- demonstrate the skills required to work independently in the field that the education concerns.

Judgement and approach
For a Degree of Bachelor students must

- demonstrate an ability to make assessments in their main field of study, taking into account relevant scientific, social and ethical aspects;
- demonstrate insight into the role of knowledge in society and into people's responsibility for how knowledge is used; and
- demonstrate an ability to identify their need of further knowledge and to upgrade their capabilities.

Independent project (degree project)

A requirement for the award of a Degree of Bachelor is completion by the student of an independent project (degree project) for at least 15 credits in the main field of study.

Programme specific objectives
The overall objective of the education is that the graduate student in Energy Engineering must possess such knowledge and skills that the student must

- operatively able to participate in the operation and maintenance of energy and process engineering facilities, both independently and in groups,
- be able to participate in introducing and using new technologies and optimally utilizing existing equipment with regard to maintenance, economy and environment,
- be able to detect and analyze disturbances in different processes and take measures to limit or remedy them,
- be able to assess the possibilities and limitations of technology,
- be able to prioritize the tasks within the business based on a customer-conscious, environmental conscious and economic perspective and
- communicate in writing and orally with energy technical staff, professional contacts and customers and the general public.

Content

Programme Overview

The programme is divided into three different blocks, which are energy engineering, control and regulation technology as well as courses aimed at technology, people and society. The courses included in the program are based on multi-line progression. Some of the courses must be read in strict order. This is evidenced by the reading system presented before each academic year.

Programme Courses

The program contains the following subject blocks and scope:

Energy engineering, 120 credits.
The courses in energy engineering cover basic theories and also include practical exercises in the field of operation and maintenance, so that the student will be able to use, maintain and optimize energy conversion facilities such as steam, district heating, hydropower, wind power and combustion engine plants.

Control and regulation technology, 30 credits.
The courses in Control and Control Technology will provide the student with the skills required to handle, maintain and optimize control and control equipment in energy conversion and manufacturing industries.

Courses aimed at technology, people and society, 30 credits.
The knowledge from the courses will give the student support in other courses within the program, but also understanding the relevance of technology in society. There are courses in mathematics, business administration and leadership.

The breakdown of the courses between the courses
The courses are distributed over the three academic years as follows (alphabetical order, not reading order):

Year 1

Analogue and power electronics, 5 credits, G1N
The course addresses basic analogue and power electronics with both passive and active components as well as applications. The student also conducts practical exercises with troubleshooting electrical circuits.

Labor Legislation and Work Environment, 5 credits, G1N
The course provides basic knowledge of labor law and work environment legislation, application in the workplace through systematic work environment work and risk assessments as well as legal issues.

Electrical engineering, 5 credits, G1N
Electrical Engineering is the first course in control and control technology where basic electrical engineering is treated. Calculations complement the theory along with application through practical exercises.

Renewable Energy and Basic Environmental Knowledge for Operating Engineering*, 5 credits, G1N
The course aims at creating an understanding of a sustainable society with fossil-free energy sources.

Industrial Leadership and Governance*, 5 credits, G1N
Ledarskapskurs med inriktning mot arbetsgrupper och organisation.

Pneumatics and Oil Hydraulics, 5 credits, G1N
Pneumatics and Oil Hydraulics are a practical course with practical exercises based on theoretical aspects in function, construction and optimization of pneumatic and hydraulic systems.

Technical systems*, 5 credits, G1N
The course is the first in the field of energy engineering. Overall understanding of energy systems and component knowledge.

Thermodymaics, 5 credits, G1N
Basic course on thermodynamics laws and processes that underlie courses later in the program.

Applied Business Administration, 5 credits, G1N
Basic knowledge of business economics related to the operation and maintenance of energy producing facilities.

Applied Mathematics I, 7,5 credits, G1N
Basic application of derivatives and integrals with concepts and methods in technical contexts.

Applied Mathematics II, 7,5 credits, G1N
In-depth application of derivatives and integrals with concepts and methods in technical contexts.

Year 2

Operative Engineering*, 5 credits, G1F
Introduction course for cogeneration production with start-up and shutdown of CHP plant. Simulator driving and thermodynamic calculations are included.

Electric power technology and power generation*, 5 credits, G1F
This course includes rotating electrical machines and control of these. Transformers, shields and power adapters are included. Calculations and practical exercises.

Faultfinding and Electrical Systems*, 5 credits, G1N
Here are different grounding systems presented, protection measures, electrical quality and documentation too. The theoretical knowledge is translated into practice in practical exercises. Introduction to high voltage and associated practical exercises.

Combustion Theory*, 5 credits, G1N
Med inriktning på biobränsle studeras förbränningsförlopp och rökgassammansättning. Praktiska övningar utförs i kursen.

Strength of Materials, Materials Science and Machine Elements, 5 credits*, G1F
The course includes calculations of stress and pressure load, shear, twisting, bending, cracking, fatigue and composite stresses.

Refrigeration and climate technology*, 5 credits, G1N
Here are the study of cooling machines, heat pumps and ventilation systems for ventilation. The course includes practical exercises and calculations.

Applied Mechanics and Mechanical Drawings*, 5 credits, G1F
Central to this course is statics and dynamics calculations as well as basic mechanical drawings in CAD applications.

Measurement and Control Engineering, 5 credits, G1N
Basic courses where the theory of regulators, sensors and measurement technology is given together with practical exercises.

Pump and Fan Technology*, 5 credits, G1N
In addition to the construction of pumps and fans, these are put into systems to learn about the movement of liquids and gases in technical systems. Both calculations and practical exercises are included.

Technical Report Writing, 5 credits, G1N
The course aims at giving the student the knowledge and ability to write technical reports, search information in databases, make scientific statements and apply criticism of the sources.

Maintenance technology I*, 5 credits, G1N
The course is basic with maintenance philosophies, maintenance methods and national regulations.

Steam and Heat Transfer*, 5 credits, G1N
This course examines the structure and function of steam plants and the steam in thermodynamic context and the use in production facilities. Students will also perform practical exercises during the course.

Year 3

Operational optimization *, 5 credits, G2F
Here the student is trained to run CHP efficiently, both economically and sustainably.

District heating and cooling*, 5 credits, G1F
In this course, students will learn how to efficiently transfer heat into both less local and larger urban integrated systems.

Internal Combustion Engines*, 5 credits, G1N
The course covers the working methods of piston engines and gas turbines and components. Theory is varied with practical exercises.

High voltage*, 5 credits, G1F
Here we are taught about electricity distribution systems, security measures, fault currents.

Nuclear Power Technology and Process plants *, 5 credits, G1F
The course includes basic terminology for the subject, as well as the construction and function of nuclear power plants. Industrial processing plants are also studied.

Programmable Control Systems, 5 credits, G1N
The first half of the course deals with digital technology, in the other half the students perform programming of PLC. The course consists of lectures and practical exercises.

Project management and applied Automation, 5 credits, G1F
Students will in this course both lead a project in a project group and simultaneously carry out the project's parts as programmers and entrepreneurs. The course consists of lectures and practical exercises.

Control Theory, 5 credits, G1F
This is a theoretical in-depth measurement and control technique with practical exercises as a complement.

Independent Project*, 15 credits, G2E
Independent work with investigatory content and report writing related to the content of the programme.

Maintenance technology II*, 5 credits, G2F
The majority of the course is about water treatment. Secondly, the maintenance economy and maintenance systems.

* = course in the main field.

The courses within the programme may change order. In consultation with the Programme Director, courses included in the programme may be exchanged for other courses within the same area.

Courses in the program can be given in English.

Social relevance
Part of the education is conducted in collaboration / contact with the industry through guest lectures and study visits. This contact between business and educators gives the student a good insight into the daily business with its problems, opportunities and development as well as a preparation for the opportunities and challenges of the future career.

Internationalization
Students are offered access to Linnaeus University's comprehensive range of agreements with foreign institutions. International studies can be conducted as a single course and partly for a certain period of time. The content and scope of international studies are determined in consultation with the program administrator.

Scope of Programme
Education, as well as other programmes and courses at Kalmar Maritime Academy, emphasizes the importance of reducing environmental impact, thus contributing to a responsible environment and social development. This by relating to the environment in the teaching and demonstrating that the current process or component is to be seen as part of the whole. Teaching within the programme is conducted with gender awareness, focusing on the individual.

Quality Development
Kalmar Maritime Academy's quality system is applied in all activities at the institution. All courses are valued by the students. In connection with the examination of the examination, students will be informed of the results and possible action that is caused by course evaluations. At the course introduction, students are informed of the previous course evaluation. The summary of course evaluations is archived according to Linnaeus University's archive routine.

The program is evaluated through term-based program evaluations conducted by the department together with class representatives who feedback to the class. The evaluation is returned to the teacher years at staff days.

Degree Certificate
After completing studies corresponding to the requirements set out in the University Regulations Degree Regulations and in the Local Degree Program for Linnaeus University, the student may apply for a degree. Those who completed the Operations and Maintenance Engineering program can obtain the following degree:

Teknologie kandidatexamen med inriktning mot drift- och underhållsteknik.
Huvudområde: Energiteknik

Bachelor of Science with specialization in operation and maintenance engineering
Main field of study: Energy Technology

The diploma is bilingual (Swedish / English). Together with the diploma, the Diploma Supplement follows.

Other Information

Other information

Mandatory elements that may incur additional costs for the student may occur in the program courses ex. in the form of study visits.