



Programme syllabus

[An accessible version of the syllabus can be found in the Course and programme directory.](#)

Master's Programme, Innovative Sustainable Energy Engineering 120 credits

Masterprogram, innovativ uthållig energiteknik

Valid for students admitted to the education from autumn 12 (HT - Autumn term; VT - Spring term).

This is a translation of the Swedish, legally binding, programme syllabus.

Programme objectives

Beyond the objectives which are specified in the Higher Education Degree Ordinance, there are also specific goals for this programme. After completing the programme, the student will:

Knowledge and understanding

- Have a broad, scientific foundation to be able to work within the energy engineering area. It should comprise knowledge about sustainable systems, energy sources and usage, and judgements of technical, economical, and environmentally-related consequences related to different energy re-usage processes.

- Show broad knowledge within this technical area, including knowledge in mathematics and natural science, and essentially deepened knowledge within certain parts of the area.

Skills and abilities

- Show a good ability to, independently as well as in a group, be able to apply knowledge and abilities in practical activities with regard to relevant scientific professional and social judgements and viewpoints.
- Show good ability to analyze, formulate and manage the technical problems from a system perspective, with a holistic view of their life cycle, from concept / requirements to specification, development, operation and decommissioning, and the ability to set limits, determine the necessary resource usage and manage processes for problem solving / realization
- Possess individual and professional skills like languages, leadership, project management, and communication for work as an engineer in a leadership role or as a leader in a technical intensive company, or in order to be able to continue toward a research career.

Ability to make judgements and adopt a standpoint

- Have very good understanding that engineering-related problems are often complex, can be incompletely defined and sometimes contain conflicting goals and conditions.
- Be aware of the responsibility and the ethical viewpoints which can arise in connection with different technical, organisational, economical, ecological and social activities.

Extent and content of the programme

The programme consists of 120 credits which corresponds to two years full time studies. The Programme is mainly on the second level.

The Programme is offered by six participating universities in the cooperation called Nordic 5 Tech.

Participating Universities in Nordic 5 Tech (N5T):

KTH – Royal Institute of Technology, Stockholm, Sweden

Chalmers - Chalmers University of Technology, Gothenburg, Sweden

DTU - Technical University of Denmark, Lyngby, Denmark

NTNU -Norwegian University of Science and Technology, Trondheim, Norway

TKK – Helsinki University of Technology, Helsinki, Finland

Háskóli – University of Iceland, Reykjavik, Iceland has been invited to cooperate with N5T

Possible specialisation areas for the programme:

Specialisations for semester 2:

Energy utilization (KTH)
Power generation (KTH)
Bioenergy (TKK)
Energy Conversion (TKK)
Natural Gas Technology (NTNU)
Industrial Ecology (NTNU)
Wind Turbine Technology (DTU)
Electricity from Wind Turbines (DTU)
Energy economics, system and policy (Chalmers)
Combustion, heat transfer and thermal power engineering (Chalmers)
Geothermal Energy (Háskóli)

Specialisations for semester 3:

Cooling(KTH)
Energy Management (KTH)
Fluid Machinery (KTH)
Power Generation from Biomass (TKK)
Bioenergy in Transport (TKK)
Natural Gas Technology (NTNU)
Industrial Ecology (NTNU)
Wind Turbine Technology (DTU)
Electricity from Wind Turbines (DTU)
Energy economics, systems and policy (Chalmers)
Combustion, heat transfer and thermal power engineering (Chalmers)
Energy in buildings (Chalmers)
Geothermal Energy (Háskóli)

The language of instruction for the programme is English.

Eligibility and selection

In order to be eligible to the master's programme, a relevant higher education degree of at least 180 credits, degree of bachelor in science or in engineering, or technical bachelor's degree preferably within Mechanical Engineering, Chemical Engineering, Energy Engineering, where courses in engineering mechanics, applied thermodynamics and heat transfer are required. Other corresponding technical or natural scientific degrees on the first level can also give eligibility, providing that courses in engineering thermodynamics, heat transfer, fluid dynamics, mathematics and numerical methods are included.. Such specific requirements may be assessed as not fulfilled if

1. The average grade is in the lower third on the grading scale used (above pass level).
2. The degree awarding institution is not considered to meet acceptable quality standards by the authorities of the country in which the institution is located.

3. The degree does not qualify for admission to equivalent Master level in the country where the degree is awarded.

Other studies or work experiences are judged on the basis of the actual competences which are referred to.

A sound and documented knowledge of written and spoken English is required from all applicants. Applicants who do not qualify for a waiver as described by official KTH admission requirements must provide proof of English proficiency via one of the following tests:

- IELTS – Score 6.5 or higher, with a minimum of 5.5 on written section
- TOEFL – Minimum score 580 paper-based (written 4), 237 computer-based (written 4), or 92 Internet-based (written 22)
- Cambridge Certificate in Advanced English (CAE) or Cambridge Certificate of Proficiency in English (CPE) – grade "A", "B" or "C"

The selection to the programme is based on the evaluation of the following criteria: university/higher education institute, courses relevance for the programme, grades, suggestion to the degree project, recommendation letters, work experience and references.

Implementation of the education

Structure of the education

Structure of the programme

Admitted students may initiate studies either at KTH or NTNU, and thereafter students have the possibility to spend semester 2 and 3 at other universities. Selection of study location for the first semester is made by the applicant at the time of admission. Students in the program must spend at least one full semester at each of two participating universities. A maximum of 3 different universities can be selected. The studies are ended with a fourth semester where the student performs a degree project during 5-6 months, supervised at the university of choice.

Options for research preparatory courses exist.

It is recommended that students register for a summer internship course at one of the partner universities to get an even higher exposure to the partner universities. It is also recommended that students take language courses at the place of study. These will not be included in the Master Degree.

The academic year of higher education at KTH consists of 40 weeks divided in 4 periods, each one containing no less than 35 days of tuition followed by one week of examinations.

There are three re-examination-periods, in the beginning of January, after the spring semester and before the autumn semester.

Courses

The programme is course-based. Lists of courses are included in appendix 1.

The programme is in course form. The courses which are given in the programme can be found in appendix 1. The student must register for the individual courses in the way each one of the partner universities decides.

The Programme has various components related to research preparation. Among these it is required, at KTH, to follow a course on "Theory and methodology of science" to receive a degree from KTH.

Grading system

Courses in the first and the second cycle are graded on a scale from A to F. A-E are passing grades, A is the highest grade. The grades pass (P) and fail (F) are used for courses under certain circumstances.

Conditions for participation in the programme

Term enrolment

The students must apply (on a semester basis) for the courses they intend to follow. This application should be sent in not later than Nov 15 and May 15, respectively, during the Semesters 1, 2 and 3 (corresponding to studies during the Semesters 2, 3 and 4, respectively).

In order to be allowed to pass from Semester 1 to Semester 2 the students must have achieved at least 22 credits by the end of the exam period in January and must have attempted to pass all the compulsory assignments (calculations, simulations, laboratory,) present in all courses. At least 80% of these compulsory assignments should have been passed.

To pass from Semester 2 to Semester 3, at least 50 credits should have been achieved by the end of the exam period in August, all compulsory assignments should have been attempted and at least 80% of these assignments should have been passed.

To pass from Semester 3 to Semester 4, at least 80 credits, should have been achieved by the end of the exam period in January, all compulsory assignments should have been attempted and at least 90% of these assignments should have been passed.

A student who does not fulfil these requirements must consult the study counsellor. An individual study plan must be set-up. The main goal with the study plan is that the student should complete remaining courses/course-parts during the next study year. In the study plan, the remaining courses /course-parts and also suitable courses from the next study year are included. Special regard is taken to the prerequisites of the courses yet to be taken.

Specialisation Selection

The selection of specialisation is carried out in the form of the course selection before the second term starts. There is no limitation to the number of places available.

Recognition of previous academic studies

Credits from courses taken at another university/higher education institution both in Sweden and abroad, can, under certain circumstances be counted as part of the program. Students wishing recognition of previous academic studies must submit an application to the Programme Committee.

Reference to policy for recognition of previous academic studies at the Royal Institute of Technology (KTH Regulations).

The application form can be found on the KTH website.

Degree project

The degree project corresponds to 30 ECTS.

To start the degree project at least 80 ECTS course credits should have been achieved, all compulsory assignments should have been attempted and at least 90% of these assignments should have been passed (as described under "Conditions to participate in the educational program" above).

In order to fulfil requirements for obtaining a master degree the project must be part of the required in-depth studies at second level in the main field of study for the programme. The topic of the project must be accepted by the Programme Committee.

The project can be performed either at an industry, community, agency or at one of the partner universities.

The project course will be graded according to the scale A-F as all other courses.

The partner universities might have special requirements for the degree project.

Reference to rules for the degree project at the Royal Institute of Technology (KTH Regulations).

Degree

Masterexamen - Degree of Master (Two Years) - is obtained after completion of the programme. The individual study-plan must be designed so that students, when they graduate, have fulfilled the Swedish national requirements for a degree and have completed courses comprising 120 credits, of which:

- *At least 90 credits are at second level, of which at least 60 credits (including a 30-credit degree project) with in-depth studies in the main field of study.*

The name of the degree is “Teknologie masterexamen” - Master of Science (Two Years). The text on the degree certificate states the name of the educational programme completed.

Reference to local degree ordinance at the Royal Institute of Technology (KTH Regulations).

When all courses needed are completed and reported the student must personally apply for a degree certificate. This is done by filling in (the upper part of) the application form accompanied by an attested photocopy of the previous university degree (B.Sc. or a B. Eng, or equivalent)

Appendix 1 - Course list

Appendix 2 - Programme syllabus descriptions



Appendix 1: Course list

Master's Programme, Innovative Sustainable Energy Engineering (TIEEM)

General courses

Year 1

Mandatory courses (33.0 Credits)

Code	Name	Credits	Edu. level
MJ1402	Introduction to Energy Technology	3.0 hp	First cycle
MJ2405	Sustainable Power Generation	9.0 hp	Second cycle
MJ2407	Sustainable Energy Utilisation	9.0 hp	Second cycle
MJ2411	Renewable Energy Technology	6.0 hp	Second cycle
MJ2413	Energy and Environment	6.0 hp	Second cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
MJ2410	Energy Management <i>Power generation, Energy utilization</i>	6.0 hp	Second cycle
MJ2412	Renewable Energy Technology, Advanced Course <i>Power generation</i>	6.0 hp	Second cycle
MJ2422	Thermal Comfort and Indoor Climate <i>Energy utilization</i>	6.0 hp	Second cycle
MJ2423	Applied Refrigeration and Heat Pump Technology <i>Energy utilization</i>	6.0 hp	Second cycle
MJ2424	Computational Methods in Energy Technology <i>Energy utilization, Power generation</i>	6.0 hp	Second cycle
MJ2426	Applied Heat and Power Technology <i>Power generation</i>	6.0 hp	Second cycle

Supplementary information

Conditionally Elective profiles for TIEEM studentst staying at KTH for semester 2

Energy utilization
Power generation

Year 2

Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
MJ2424	Computational Methods in Energy Technology	6.0 hp	Second cycle
MJ2440	Measurement Techniques	3.0 hp	Second cycle
MJ2475	Theory and Methodology of Science for Energy Research	6.0 hp	Second cycle

Supplementary information

Mandatory courses for TIEEM students returning to KTH for semester 3



Appendix 2: Specialisations

Master's Programme, Innovative Sustainable Energy Engineering (TIEEM)

This programme has no specialisations.