



Programme syllabus

Master's Programme, Sustainable Energy Engineering, 120 credits

Masterprogram, hållbar energiteknik

120.0 credits

Valid for students admitted to the education from autumn 17 (HT - Autumn term; VT - Spring term).

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

Programme objectives

In addition to the objectives specified in the Swedish Higher Education Ordinance, there are also specific objectives for this programme. Graduates from the programme shall...

Knowledge and understanding

- have a broad scientific foundation that enables them to work within the fields of energy engineering. This applies to knowledge on sustainable systems in terms of energy sources and use, as well as the assessment of technical, economic and environmental implications related to different energy conversion processes.
- demonstrate broad knowledge within this technical field, including knowledge in mathematics and natural science, and substantial specialised knowledge within certain parts of the field.

Skills and abilities

- demonstrate a good ability to, independently and in a group, apply knowledge and skills in practice while taking into account relevant scientific, professional/profession-related and societal assessments and standpoints
- demonstrate a good ability to analyse, formulate and manage technical problems from a systems perspective, with a holistic view of their life cycle, from concept/requirements to specification, development, operation and decommissioning, and an ability to set boundaries, determine the necessary resource consumption and manage processes for problem-solving/realisation
- possess individual and professional skills, such as in the area of language, leadership, project management and communication, to work as an engineer in a management position or as a leader within a technology-intensive company, or to be able to continue towards a research career.

Ability to make judgements and adopt a standpoint

- have a particularly good understanding of the fact that engineering problems are often complex, can be incompletely defined and sometimes involve conflicting conditions
- be aware of the responsibilities and ethical standpoints that may arise in connection with various technical, organisational, economic, ecological and societal activities

The KTH local Degree Ordinance can be found in the KTH regulatory framework, www.kth.se.

Extent and content of the programme

The programme comprises 120 credits, which corresponds to 2 years of full-time studies.

The programme is in the second cycle and the language of instruction is English.

Elective specialisation areas (profiles) for the programme are within energy efficiency, sustainable power generation, solar energy and conversion of energy systems (Policy and Management).

Eligibility and selection

Eligibility for the Master's Programme requires a relevant university education of at least 180 credits, a Bachelor of Science in Engineering or a technical Degree of Bachelor within the subject area of mechanical engineering or chemical engineering. Another similar technical or scientific first-cycle education may also qualify the applicant. Courses in engineering thermodynamics, heat transfer and fluid mechanics for engineers are included in the admission requirements. English skills equivalent to English, course B/ 6.

These skills may be assessed as not complete if:

The selection process is based on the following criteria: university, credits awarded (e.g. grades, grades in specific subjects and English), motivation for the studies (for instance, letter of motivation, references, courses and relevant professional experience). The assessment of qualifications scale is 1-75.

Otherwise refer to the KTH admission regulations in the KTH regulatory framework, www.kth.se

Implementation of the education

Structure of the education

Academic year

The academic year comprises 40 weeks and is divided into four periods. If necessary, instruction may be provided outside the parameters of the academic year.

The division of the academic year is presented on the KTH student web www.kth.se

Structure of the programme

The programme begins with a common course package during semester 1 which provides a solid base for the profiles provided during semester two and three. The third semester includes advanced studies within the field of energy with a research preparatory perspective. The programme concludes with a degree project during semester 4.

Courses

The programme is course-based. Lists of courses are included in [appendix 1](#).

The programme is structured in the form of courses. Course lists are found in [appendix 1](#).

The programme consists of compulsory, conditionally elective, recommended and optional courses.

The compulsory courses are defined for each year and track/profile in course lists. The goals, entrance qualifications, content and course requirements for each course can be found in the official course syllabuses.

The forms of instruction and examination vary between the courses and these are indicated in each official course syllabus.

The optional courses can be chosen from KTH's range of offered courses. Credits from courses at other universities /higher education institutions can also be transferred if the qualification requirements are met.

The following limitations apply to optional courses:

- There is a limit imposed on the number of credits that may be chosen per semester
- An optional course may not correspond to a significant extent to an existing programme course or an already credited course
- Higher education preparatory courses may not be counted as optional courses

• Optional courses may be chosen freely but should be relevant to the professional role of engineer.

Grading system

A seven-grade criterion-referenced grading scale A-F is used for courses at KTH as final grades for courses at first and second cycle.

A–E are grades corresponding to a pass, with A being the highest grade.

The grades pass (P) and fail (F) are used as final grades when there are special reasons.

Conditions for participation in the programme

Semester registration

At the beginning of the semester, the student must submit a compulsory semester registration via their personal login at www.kth.se

Semester registration is required to take new courses and for credits awarded to be reported, and for any payments of student aid to be made by CSN.

Approved leave from studies

Approved leave from studies means that the student does not participate in the teaching for at least one study period.

Approved leave from studies entitles the student to return to the studies at a specified time. During their approved leave from studies, the student may engage in supplementary tasks and participate in the examination of previously commenced courses.

Applications for approved leave from studies are made using a form that is submitted to the school's office of student affairs. When a student intends to resume their studies, they should submit a new study application according to instructions from the school's office of student affairs.

For more information, see the KTH regulatory framework, www.kth.se

Application for courses within the programme

Prior to each semester, the student must apply for all courses the student intends to take. Course application is done at www.antagning.se or www.universityadmissions.se

- 1 - 15 May for autumn semesters
- 1 - 15 November for spring semesters

If the student does not apply via www.antagning.se or www.universityadmissions.se, the application is only considered subject to availability.

The student can obtain information on how to apply from the school's office of student affairs.

Course registration

Course registration requires that the student is admitted to the course. At course start, the student must register on the course to which they have been admitted. Course registration must be done individually, either via the student's personal login at www.kth.se or according to instructions from the school offering the course.

A person who has registered on a course, but has subsequently decided not to proceed with the course, must inform the school offering the course as soon as possible, according to the school's instructions.

Choice of track

Choice of track is made through applying to courses in semester 2

Conditions for participation in the instruction Conditions for moving up for studies in year 2

At least 45 credits from year 1, according to the course list of the programme syllabus, shall be earned by the end of the re-examination period in August.

Individual study plan

A student who does not fulfil the above requirements must, in consultation with the study advisor for the programme, establish an individual study plan for the continuing studies.

An individual study plan may mean that the student cannot be guaranteed full-time studies.

See the KTH regulatory framework: www.kth.se

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

Semester registration

At the beginning of the semester, the student must submit a compulsory semester registration via their personal login at www.kth.se

Semester registration is required to take new courses and for credits awarded to be reported, and for any payments of student aid to be made by CSN.

Application for courses within the programme

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The student can obtain information on how to apply from the school's office of student affairs.

Course registration

At course start, the student must register themselves on all courses. Course registration must be done individually, either via the student's personal login at www.kth.se or according to instructions from the school offering the course.

A person who has registered on a course, but has subsequently decided not to proceed with the course, must inform the school offering the course as soon as possible, according to the school's instructions.

Course registration requires that the student has been admitted to the course.

Conditions for studies in year 2

At least 45 credits from year 1, according to the course list of the programme syllabus, shall be earned by the end of the re-examination period in August.

Individual study plan

A student who does not fulfil the above requirements must, in consultation with the programme study advisor, establish an individual study plan for the continuing studies.

There are no guarantees for full-time studies for students with an individual study plan

See the KTH regulatory framework: www.kth.se

Recognition of previous academic studies

Students have the opportunity to apply to be given credit for results from a course or courses at another higher education institution/university within or outside the country. The entire KTH policy for credit transfer is included in KTH's regulatory framework, www.kth.se

As the grading systems differ widely between countries, grades from exchange studies are not translated to the KTH grading scale.

An application is made by submitting a form to the school's office of student affairs.

Studies abroad

There are numerous opportunities to go on a foreign exchange within the programme, for example, between year 1 and 2 or for a degree project. Some exchanges can take place with the help of scholarships, e.g., Minor Field Studies.

The application deadline for studies abroad is around 15 December for the following academic year.

Degree project

Degree project, second cycle

The programme includes a degree project for a Degree of Master that comprises 30 credits and which is usually carried out in the spring semester of year 2.

Commencement of the degree project requires that the majority of the studies in the Master's Programme are completed, i.e.,

- that 60 credits have been obtained, of which 30 credits relate to specialised studies in the second cycle within the Master's Programme.

KTH's comprehensive rules and guidelines for a degree project, 30 credits, for a Degree of Master, 120 credits, can be found in the KTH regulatory framework. www.kth.se

Degree

Application for a certificate

The student must apply for a certificate. Applications are made by logging on to the KTH website where "Applications for degrees" is found under the heading Programme.

Conditions for a Degree of Master, 120 credits

A Degree of Master of Science is obtained after completing the degree programme. The programme is designed so that the student, when they graduate, has fulfilled the national qualification requirements with a passing grade in all courses included in the student's study plan of 120 credits, of which

- at least 90 credits are attained in the second cycle, which includes at least 60 credits (including a 30 credit degree project) of specialised studies within the programme's main field of study.

Title of general qualification at second cycle

Degree of Master of Science (120 credits)

Teknologie masterexamen

Refer to the KTH guidelines (KTH regulatory framework), local directions for higher education qualifications at first and second cycle, the local Degree Ordinance www.kth.se

Appendix 1 Course lists for different years and possible specialisations

Appendix 2 Description of possible specialisations

[Appendix 1 - Course list](#)

[Appendix 2 - Programme syllabus descriptions](#)



Appendix 1: Course list

Master's Programme, Sustainable Energy Engineering, 120 credits (TSUEM),
Programme syllabus for studies starting in autumn 2017

General courses

Year 1

Mandatory courses (39.0 credits)

Course code	Course name	Credits	Edu. level
MJ1402	Introduction to Energy Technology <i>(not mandatory for KTH civing.students)</i>	3.0	First cycle
MJ2405	Sustainable Power Generation	9.0	Second cycle
MJ2407	Sustainable Energy Utilisation	9.0	Second cycle
MJ2410	Energy Management	6.0	Second cycle
MJ2411	Renewable Energy Technology <i>Mandatory for international students and profile "Power Generation" and "Solar Energy"</i>	6.0	Second cycle
MJ2413	Energy and Environment	6.0	Second cycle

Conditionally elective courses

Course code	Course name	Credits	Edu. level
ME2085	Transformation in Energy Systems and Industries <i>Profile: "Transformation of Energy Systems: Policy and Management"</i>	6.0	Second cycle
ME2087	Energy Business <i>Profile: "Transformation of Energy Systems: Policy and Management"</i>	6.0	Second cycle
MJ2381	Introduction to Energy Systems Analysis and Applications - Minor Course <i>Profile: "Transformation of Energy Systems: Policy and Management"</i>	6.0	Second cycle
MJ2412	Renewable Energy Technology, Advanced Course <i>Profile: "Power Generation"</i>	6.0	Second cycle
MJ2422	Thermal Comfort and Indoor Climate <i>Profile: "Sustainable Energy Utilization"</i>	6.0	Second cycle
MJ2423	Applied Refrigeration and Heat Pump Technology <i>Profile: "Sustainable Energy Utilization"</i>	6.0	Second cycle

Course code	Course name	Credits	Edu. level
MJ2424	Computational Methods in Energy Technology <i>Profile: "Sustainable Energy Utilization", "Power Generation" and "Solar Energy"</i>	6.0	Second cycle
MJ2426	Applied Heat and Power Technology <i>Profile: "Power Generation"</i>	6.0	Second cycle
MJ2476	Strategies in the Global Climate Agenda <i>Profile: "Transformation of Energy Systems: Policy and Management"</i>	6.0	Second cycle
MJ2500	Large Scale Solar Power <i>Profile: "Solar Energy"</i>	6.0	Second cycle
MJ2501	Solar Energy Systems for Buildings and Cities <i>Profile: "Solar Energy"</i>	6.0	Second cycle

Recommended courses

Course code	Course name	Credits	Edu. level
MJ2244	Airbreathing Propulsion, Intermediate Course I	6.0	Second cycle
MJ2246	Rocket Propulsion	6.0	Second cycle
MJ2430	Thermal Turbomachinery	6.0	Second cycle
MJ2437	Modeling of Energy Systems - Energy Utilization	6.0	Second cycle
MJ2438	Modeling of Energy Systems - Heat and Power Generation	6.0	Second cycle
MJ2472	Energy Planning and Applications	9.0	Second cycle

Supplementary information

One profile must be chosen during year 1:

Sustainable Energy Utilization

(mandatory courses: MJ2424, MJ2422, MJ2423)

Power Generation

(mandatory courses: MJ2424, MJ2411, MJ2412, MJ2426)

Solar Energy

(mandatory courses: MJ2500, MJ2501, MJ2424, MJ2411)

Transformation of Energy Systems: Policy and Management

(mandatory courses: ME2087, ME2085, MJ2476, MJ2381)

The courses: MJ2405, MJ2407, MJ2410, MJ2413 are mandatory for civ ing.

Year 2

Mandatory courses (18.0 credits)

Course code	Course name	Credits	Edu. level
MJ2409	Applied Energy Technology, Project Course	9.0	Second cycle
MJ2440	Measurement Techniques	3.0	Second cycle
MJ2475	Theory and Methodology of Science for Energy Research	6.0	Second cycle

Recommended courses

Course code	Course name	Credits	Edu. level
EG2340	Wind Power Systems	7.5	Second cycle
ME2086	Global Energy Markets and Systems in Transition	6.0	Second cycle
MJ2382	Energy Data, Balances and Projections	6.0	Second cycle
MJ2383	Energy System Economics, Modelling and Indicators for Sustainable Energy Development	6.0	Second cycle
MJ2420	Combustion Theory	6.0	Second cycle
MJ2429	Turbomachinery	6.0	Second cycle
MJ2434	Advanced Refrigeration and Heat Pump Technology	6.0	Second cycle
MJ2460	Green Building - Concept, Design, Construction and Operation	6.0	Second cycle
MJ2462	Achieving Energy Efficiency in Existing Buildings	6.0	Second cycle
MJ2477	Energy Policy and Planning	6.0	Second cycle
MJ2503	Small Scale Polygeneration	6.0	Second cycle
MJ2505	Practical Optimization of Energy Networks	6.0	Second cycle

Supplementary information

Recommended courses, but not mandatory:

Sustainable Energy Utilization

(Recommended courses: MJ2434, MJ2460, MJ2462)

Power Generation

(Recommended courses: MJ2420, MJ2429, MJ2503, MJ2505)

Solar Energy

(Recommended courses: MJ2503, MJ2505, MJ2460, EG2340)

Transformation of Energy Systems: Policy and Management

(Recommended courses: MJ2477, ME2086, MJ2382, MJ2383)

Mandatory: Master thesis project, 30 cr.

Year 3



Appendix 2: Specialisations

Master's Programme, Sustainable Energy Engineering, 120 credits (TSUEM),
Programme syllabus for studies starting in autumn 2017

This programme has no specialisations.