



Programme syllabus

Master's Programme, Environomical Pathways for Sustainable Energy Systems, 120 credits

Masterprogram, miljövänliga energisystem

120.0 credits

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 judgment 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.

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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 higher education credits which correspond to two years full time studies. The Programme is mainly on the second level.

The Programme is offered within the framework of the Erasmus Mundus master's programmes.

Partner Universities in the programme Environomical Pathways for Sustainable Energy Systems (SELECT) are:

KTH – Royal Institute of Technology, Stockholm, Sweden
Aalto – Aalto University School of Science and Technology
TU/e – Eindhoven University of Technology, Netherlands
PoliTo – Politecnico di Torino, Italy
UPC – Barcelona Tech
IST – Instituto Superior Técnico, Portugal
AGH – AGH University of Science and Technology, Poland

Possible specialisation areas for the programme:

Specialisations for semester 3:

- Biomass (Aalto)
- Biorefinery (Aalto)
- Fuel Cells (PoliTo)
- Electrical Systems (TU/e)
- Solar Systems (UPC or TU/e)
- Polygeneration (UPC or KTH)
- Energy Efficiency (PoliTo)
- Sustainable Fuels Economy (AGH)
- Renewable Energy (IST)

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, or Chemical Engineering. Other equivalent technical or science degrees on the first level can also give eligibility, providing that courses in engineering thermodynamics, heat transfer, and fluid dynamics are included.

Eligibility may however 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 equivalent of TOEFL score minimum 580 (paper) or 92 (internet) and the writing section fulfilling the minimum requirement of 4.5 or 22, respectively; or IELTS score minimum 6.5 and the writing section fulfilling the minimum requirement of 5.5; or Cambridge Certificate in Advanced English (CAE) or Cambridge Certificate of Proficiency in English (CPE), minimum grade "C" is required from all applicants.

The selection of students to the programme is performed by the steering committee of the programme, in consultation with the admission offices of all partner universities, and in compliance with the directives given by the European Commission to the Erasmus Mundus programmes.

All applications will be handled by the KTH Admissions office.

In addition, it is referred to the local admission policy of KTH -- Royal Institute of Technology's (The KTH Regulations).

Implementation of the education

Structure of the education

The academic year, semesters (terms) and study periods are described by the KTH regulations (www.intra.kth.se/regelverk).

Structure of the programme

The programme extends over four semesters of which the first two, i.e. year 1, are given at either KTH, TU/e or UPC. The third and fourth semesters, i.e. year 2, is chosen by the students, among the all partner universities (KTH, PoliTo, Aalto, TU/e, UPC, AGH and IST) according to their desired field of specialization, including the area for their MSc thesis. However, the choice must be such that the mandatory mobility condition for the Erasmus Mundus programme is met which, for example, means that a student studying year 1 at KTH MUST choose another university and area of specialization for year 2.

In the fourth (final) semester the students can perform the MSc thesis in an industrial setting in common supervision with researchers from any of the participating universities

The first two semesters are considered fundamental within the field of sustainable energy systems, and renewable energy. Integrated in the year 1 curriculum is also energy management and introductory

business and entrepreneurship training. In the second semester, the first programme spring seminar is given at one of the partner universities. In this spring seminar, the topic is cutting-edge research in the field. Between the second and third semesters, a suggested Summer Internship course is offered where students combine their learning experiences from semesters 1 and 2 to a basic environmental problem in industry. During the third and fourth semesters the partners other than KTH offer courses within eight fields of specialization (see above), along with a common 7 ECTS compulsory course containing advanced environmental material. Also, during the second year the students apply their knowledge on a project in industry or at one of the partner universities to constitute the basis for the master thesis. This includes the second compulsory spring seminar given for one week at one of the partner universities with an advanced discussion on research in the area. The programme ends with a common, 1 week, wrap-up and degree ceremony (including oral thesis presentation) at one of the partner universities.

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 course structure is outlined in appendix 1, and they will be further described on the programme website www.explore-select.eu.

The student must register for the individual courses in the way each one of the partner universities decides.

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.

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Since the programme is a result of a cooperation agreement between KTH and four other universities, other types of grading might also be used.

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 final selection of specialisation is carried out during the second term. There is no limitation to the number of places available at each partner university.

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 Steering 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 "Term enrolment" 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 Steering Committee.

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

The master thesis project 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, out of which:

- *At least 90 credits are at second level, at least 60 credits of which (including a 30-credit master thesis project) consist of 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).

Depending on the chosen track of studies, a double degree may be issued from one of the partner universities.

[Appendix 1 - Course list](#)

[Appendix 2 - Programme syllabus descriptions](#)



Appendix 1: Course list

Master's Programme, Environomical Pathways for Sustainable Energy Systems, 120 credits (TMESM), Programme syllabus for studies starting in autumn 2012

General courses

Year 1

Mandatory courses (60.0 Credits)

Course code	Course name	Credits	Edu. level
MJ2405	Sustainable Power Generation	9.0 hp	Second cycle
MJ2407	Sustainable Energy Utilisation	9.0 hp	Second cycle
MJ2410	Energy Management	6.0 hp	Second cycle
MJ2411	Renewable Energy Technology	6.0 hp	Second cycle
MJ2490	Environomical Pathways	6.0 hp	Second cycle
MJ2491	Environomical Pathways, Advanced Course	9.0 hp	Second cycle
MJ2492	Advanced Renewable Energy Systems Technology	15.0 hp	Second cycle

Year 2

Mandatory courses (60.0 Credits)

Course code	Course name	Credits	Edu. level
MJ218X	Degree Project in Energy Technology, Second Cycle	30.0 hp	Second cycle
MJ2493	Environomical Pathways for Sustainable Energy Conversion	7.0 hp	Second cycle
MJ2494	Polygeneration	9.0 hp	Second cycle
MJ2495	Experimental Energy Technology	8.0 hp	Second cycle
MJ2496	Innovation and Entrepreneurship in Sustainable Energy Technology	6.0 hp	Second cycle



Appendix 2: Specialisations

Master's Programme, Environmental Pathways for Sustainable Energy Systems, 120 credits (TMESM), Programme syllabus for studies starting in autumn 2012

This programme has no specialisations.