Programme syllabus

Master's Programme, Turbomachinery Aeromechanic University Training, 120 credits
Masterprogram, aeroelasticitet i turbomaskiner
120.0 credits

Valid for students admitted to the education from autumn 19 (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 national qualification description, in accordance with the Swedish Higher Education Ordinance, there are also specific objectives for this programme. On completion of this programme, the student shall:

Knowledge and understanding

- Have a broad scientific foundation that enables them to work within the field of turbomachinery aeromechanics. This should include knowledge of steady and unsteady aerodynamics in turbomachinery, structural dynamics, vibration phenomena, damping, material aspects and vibratory failure mechanisms encountering in turbomachines.
- Demonstrate broad knowledge within this technical field, including knowledge in mathematics and natural science, and substantial specialised knowledge within certain parts of the aeromechanics field.

Skills and abilities

- Demonstrate a good ability to, independently and in a group, apply knowledge and skills in practical activities while taking into account relevant scientific, professional and social 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 use of resources and manage processes for problem-solving/execution
- Have individual and professional skills, such as in the area of language, leadership, project management and communication, to work as an engineer in a management role or as a leading figure within a technology company, or to be able to continue towards a research career.

Ability to make judgements and adopt a standpoint

- Have a very good understanding of the fact that engineering problems are often complex, can be incompletely defined and sometimes involve conflicting objectives and conditions
- Be aware of the responsibilities and ethical considerations that may arise in connection with various technical, organisational, economic, ecological and social processes.

Extent and content of the programme

The programme comprises 120 higher education credits, which corresponds to two years of full-time studies. The programme is in the second cycle and the language of instruction is English.

Specialisation areas within the programme
Specialisations:

- Unsteady Aerodynamics (year 2 at DUKE University)
- Structural Vibration and Fatigue (year 2 at AUTH (Aristotle University of Thessaloniki)
- Aeromechanical and Material Design (year 2 at ULG, Université de Liège)

Choice of specialisation is made when applying to the programme.

**Eligibility and selection**

Eligibility for the Master's Programme requires a relevant Higher Education Diploma of at least 180 credits, a Degree of Bachelor in science of engineering, or a technical Degree of Bachelor, a higher education with specialization in mechanical engineering, physics, energy technology, aerospace engineering or materials science/engineering.

A sound and documented knowledge of written and spoken English equivalent to a minimum TOEFL score of 580/237/92, where the writing section meets the minimum requirement of 22 (iBT) or 4.0 (PBT); or a minimum IELTS score of 6.5 where the writing section fulfils the minimum requirement of 5.5; or a “Cambridge Certificate in Advanced English (CAE)” or a “Cambridge Certificate of Proficiency in English (CPE)”, where a minimum grade of “C” is required from all applicants.

Graduate Record Exam (GRE) results are required only for the specialization Unsteady Aerodynamics (2nd year at Duke University). The minimum scores required on GRE are: Quantitative Reasoning 155, Verbal Reasoning 150 and Analytic writing 3.0.

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 and relevant professional experience). The assessment of qualifications scale is 1-75.

The selection of students to the programme is made by the programme's Steering Committee, in consultation with the Admissions Office at KTH.

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

Programme arrangement:

- In year 1, all students take courses at KTH.
- Between year 1 and year 2, there will be a compulsory summer placement of at least 8 weeks at one of the involved industrial partners/universities/research institutes.
- In year 2, the student will specialise in one of the three specialization areas within the programme. (see above) Courses for the specialisation are taken at one of the partner universities.
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 compulsory courses are defined for each year and track/profile in course lists. Courses are further described on the programme's website http://www.kth.se/en/studies/master/joint/thrust/

The goals, prerequisites, content and course requirements for each course can be found in the official course syllabuses. The type of instruction and examination format vary between the courses and these are indicated in each official course syllabus.

The students apply for the individual courses in accordance with the regulations applicable at the different partner universities.

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.

As the programme is a cooperation agreement between KTH and three other universities, different grading systems are involved.

Conditions for participation in the programme
Participation requires admission to courses within the programme and course registration. Course registration is done via personal menu at www.kth.se

For studies at a higher study year there are specific admission requirements for the courses. Admission requirements are specified in the course syllabus.

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 theses 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 theses assignments should have been passed.

A student who does not fulfill these requirements must consult the programme director. 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 academic year are included. Special regard is taken to the prerequisites of the courses yet to be taken.

Specialisation Selection
The final selection of specialization is carried out during the first term. Limitation to the number of places available at each partner university do apply.
**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.

In order to fulfill specific admission requirements for a Degree Project, Second Cycle, 30 credits, courses corresponding to at least 60 credits, second cycle, must be completed. The courses at the second cycle shall include courses in the programme relevant to the degree project, as well as courses in science theory and research methodology.

In order to fulfill 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 (120 credits) - 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 higher education 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.

Appendix 1 - Course list
Appendix 2 - Programme syllabus descriptions
Appendix 1: Course list

Master's Programme, Turbomachinery Aeromechanic University Training, 120 credits (TAETM), Programme syllabus for studies starting in autumn 2019

General courses

Year 1

Mandatory courses (61.5 credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MJ2406</td>
<td>Thermal Power Systems</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2429</td>
<td>Turbomachinery</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2430</td>
<td>Thermal Turbomachinery</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2480</td>
<td>Introductions to Computational Fluid Dynamics and Mathematics</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2482</td>
<td>Measurement Techniques in Aeromechanics</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2483</td>
<td>Advanced Mechanics Vibrations</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2484</td>
<td>Advanced Mechanics and Finite Element Methods</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2485</td>
<td>Introduction to Unsteady aerodynamics</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2487</td>
<td>Aeromechanics Project Course</td>
<td>12.0</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Supplementary information

Students begin their first year at KTH and study the second year at one of the three programme tracks connected to three different universities in Liege, Duke or Tessaloniki

*Note: No intake for Tessaloniki Autumn 2019.*

Year 2
Appendix 2: Specialisations

Master's Programme, Turbomachinery Aeromechanic University Training, 120 credits (TAETM), Programme syllabus for studies starting in autumn 2019

This programme has no specialisations.