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 20 (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 ) (no intake 2020)
- 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.
Implementation of the education

Structure of the education

Academic year
Each academic year consists of two semesters which are 20 weeks each. Each semester is divided into two study periods.

Structure of the programme

- 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 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.

Grading scale is found in the course syllabus.

Conditions for participation in the programme

Participation requires admission to courses within the programme and course registration.

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.

Degree project

Degree project, second cycle
The programme includes a degree project for a Degree of Master that comprises 30 credits.

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.

Degree

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

- 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 2020

## 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 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2429</td>
<td>Turbomachinery</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2430</td>
<td>Thermal Turbomachinery</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2480</td>
<td>Introduction to Computational Fluid Dynamics and Mathematics</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2482</td>
<td>Measurement Techniques in Aeromechanics</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2483</td>
<td>Advanced Mechanics Vibrations</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2484</td>
<td>Advanced Mechanics and Finite Element Methods</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2485</td>
<td>Introduction to Unsteady Aerodynamics</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2487</td>
<td>Aeromechanics Project Course</td>
<td>12.0 hp</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 2020.*
Appendix 2: Specialisations

Master's Programme, Turbomachinery Aeromechanic University Training, 120 credits (TAETM), Programme syllabus for studies starting in autumn 2020

This programme has no specialisations.