Programme syllabus

An accessible version of the syllabus can be found in the Course and programme directory.

Master's Programme, Engineering Mechanics 120 credits

Masterprogram, teknisk mekanik

Valid for students admitted to the education from autumn 10 (HT - Autumn term; VT - Spring term).

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

Programme objectives

Engineering Mechanics is an important part of the design process for a large range of products. As requirements become more and more complex and challenging, the demand for engineers trained to deal with advanced mechanical problems is increasing. The objective of the programme is to encourage and enable students to learn advanced topics in Engineering Mechanics. The programme is well balanced between theoretical studies and practical applications and thus provides a platform for a successful career in industry or continuation towards a PhD.

Knowledge and understanding

A master of science in Engineering Mechanics will:

- have the ability to independently apply mathematics and basic engineering science in the field of engineering mechanics.
- have the ability to master and apply principles in the field of engineering mechanics.
- be able to be creative and critical in order to formulate and investigate mechanical problems using modern methods and tools.

Skills and abilities

A master of science in Engineering Mechanics will:

- have the ability to critically and systematically analyse, judge and handle complex mechanical problems and situations even with access to limited information.
- have the ability to critically, independently and creatively formulate problems and to plan and perform work within given time limits.
- have the ability to, both orally and in writing, communicate and discuss conclusions and the underlying theory and argumentation.
- be able to follow the latest development and research and have the ability to participate in research and development work in the field of engineering mechanics.
- communicate results and conclusions in a competent and intelligible manner, both orally and in writing.

Ability to make judgements and adopt a standpoint

A master of science in Engineering Mechanics will:

- have the ability to make decisions in the field of engineering mechanics regarding research and development work based on relevant scientific, societal and ethical aspects.
- show insight regarding the possibilities and limitations of engineering science and its role in the society.
- have ability to identify the need for further knowledge in the field and take responsibility for keeping the personal knowledge up to date.

Complete information on degree requirements can be found at the local degree policy of KTH:

http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examina/1.27227

Extent and content of the programme

Engineering Mechanics is a two-year (120 university credits) master programme on the advanced level (second cycle) and starts in the end of August each year. The programme is composed of three two-year tracks: Fluid Mechanics, Solid Mechanics and Sound and Vibration. The language of the programme is English.

Eligibility and selection

Basic eligibility requirements

A completed Bachelor's degree**,** equivalent to a Swedish Bachelor's degree (180 university credits), from a university recognized by government or accredited by other recognized organisations. Students in their final year of undergraduate education may also apply and if qualified, receive a conditional acceptance. A good knowledge of written and spoken English is required. Applicants must provide proof of their proficiency in English. KTH accepts a TOEFL test score of a minimum of 550 (213 in the computer-based test, 79 in the internet-based test) or an IELTS overall score of at least 6.0, no section lower than 5.0 (both general and academic accepted). English proficiency tests are waived for applicants with English as language of instruction (minimum 3 years of full-time higher education studies). A relevant certificate from the university has to be enclosed with the application. For EU citizens from KTH’s partner universities, a certificate from the University language department or the relevant Head of department stating the student's good level of English will be accepted.

Specific eligibility requirements

The applicant must have a basic degree, Bachelor’s or similar, from a mechanical, aeronautical engineering, engineering physics, or similar programme with sufficient theoretical depth and good academic results. The 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.

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

Selection process

The selection process is based on a total evaluation of the following criteria: University, Grade Point Average (GPA), relevant course work, motivation letter, references and work experience. In addition, English language skills above the minimum requirements will give a higher overall evaluation score. Complete information on the eligibility requirements can be found at the local admission policy of KTH:

http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/antagning/1.27192

Implementation of the education

Structure of the education

The academic year at KTH is divided into four periods. Each period lasts approximately seven weeks with at least 33 days of study. Each period is followed by an examination period. In addition to the four regular exam periods, there are three additional re-examination periods: after Christmas, after May and immediately preceding the first study period of the academic year. The academic year has duration of 40 weeks. Teaching activities may, if necessary, be scheduled outside the academic year.

The first two periods in the first year of the programme are mainly dedicated to the compulsory courses within each track: Fluid Mechanics, Solid Mechanics or Sound and Vibration. The third and fourth periods mainly contain elective courses within or outside the chosen track. The second year mainly consists of elective courses and the final degree project.

Courses

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

The programme is course-based and the course part corresponds to 90 university credits (the thesis is 30 university credits). Each track starts with basic courses, which must be selected if equivalent courses are not included in the student's Bachelor's degree. The basic courses for each track are listed in Appendix 1. The compulsory courses correspond to between 21.5 and 37.5 university credits depending on track. This leaves between 52.5 and 68.5 university credits for elective courses. The first part of the elective courses must be on the advanced level and selected from the list of courses in Appendix 1. Together with the compulsory courses, the first part of the elective courses shall add up to at least 70 university credits. The choice of elective courses from the list in Appendix 1 is not completely free, because each track has a pool of four to six courses and at least one of these pool courses must be selected. The remaining second part of the elective courses, at most 20 university credits, does not need to be selected from the course list in Appendix 1, but an elective course may not be similar to a course already completed in a previous degree.

The list of compulsory and elective courses is given in appendix 1.

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

No later than November 15 and May 15 each academic year, respectively, the students are required to make a study registration and course selection for the coming term. At least 45 university credits have to be completed during the first academic year, including the re-examination period in August, in order for the student to be promoted to the second year of the programme. After being registered to the programme, each student shall select one of the three tracks: Fluid Mechanics, Solid Mechanics or Sound and Vibration. Change of track is not recommended after September 15 in the first period of the first term. Courses are selected by filling in an individual study plan, which must be approved by the director of the selected track before the student can be registered to the selected courses.

Recognition of previous academic studies

Under certain circumstances, and in agreement with the director of the selected track, credits for previous studies can be received according to the local policy of KTH: http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/prestationer/1.27200

Studies abroad

Under special circumstances and after approval by the director of the selected track, a limited number of compulsory and elective courses may be taken at other universities. For example, the Sound and Vibration track is currently participating in the NINA cooperation with Chalmers and NTNU providing the possibility for students to take elective courses at the other participating universities.

Degree project

Students admitted to the programme are required to perform an independent study in the form of a thesis project corresponding to 30 university credits. To begin the thesis project, a student must have completed at least 60 university credits of the total course work. The purpose of the thesis project is that the student should demonstrate the ability to perform independent project work, using and developing the skills obtained from the courses in the programme. The thesis project can either be performed at a university or, more commonly, at a company. The student must actively search for a suitable thesis project in industry; however KTH will provide some assistance with information on suitable points of contact. The thesis project will be graded on a scale from A to F, where A-E are passing grades and A is the highest grade.

More information on the KTH policy on the degree project can be found at http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examensarbete/1.27212

Degree

Students who fulfill all the requirements of the programme will be awarded the Degree of Master of Science in Engineering Mechanics (two years). Students must apply for the degree and also show proof of their basic degree (Bachelor or similar). Complete information on the degree requirements can found at the local degree policy of KTH: http://intra.kth.se/regelverk/utbildning-forskning /grundutbildning/examina/1.27227

Appendix 1 - Course list
Appendix 2 - Programme syllabus descriptions

Appendix 1: Course list

Master's Programme, Engineering Mechanics (TTEMM)

General courses

Year 1

Conditionally elective courses

Code	Name	Credits	Edu. level
SD2125	Signals and Mechanical Systems	6.0 hp	Second cycle
SD2140	Vibro Acoustics	8.0 hp	Second cycle
SD2150	Experimental Structure Dynamics, Project Course	9.0 hp	Second cycle
SD2155	Flow Acoustics	6.0 hp	Second cycle
SD2160	Sound and Vibration, Project Course	8.0 hp	Second cycle
SD2165	Acoustical Measurements	8.0 hp	Second cycle
SD2170	Energy Methods	6.0 hp	Second cycle
SD2175	Numerical Methods for Acoustics and Vibration	9.0 hp	Second cycle
SD2180	Non-linear Acoustics	6.0 hp	Second cycle
SD2190	Vehicle Acoustics and Vibration	6.0 hp	Second cycle
SE1025	FEM for Engineering Applications *Given in English in per 1 and in Swedish in per 3.*	6.0 hp	First cycle
SE2121	Introduction to Biomechanics	9.0 hp	Second cycle
SE2123	Testing Techniques in Solid Mechanics	6.0 hp	Second cycle

SE2126	Material Mechanics	9.0 hp	Second cycle
SE2127	Packaging Materials	7.5 hp	Second cycle
SE2128	Computational Material Mechanics	7.5 hp	Second cycle
SE2129	Fracture Mechanics and Fatigue	9.0 hp	Second cycle
SE2132	Applied Elasticity with FEM	9.0 hp	Second cycle
SE2134	Dynamic Problems in Solid Mechanics	7.5 hp	Second cycle
SG2126	Non-linear Oscillations and Dynamical Systems in Mechanics	7.5 hp	Second cycle
SG2150	Rigid Body Dynamic	7.0 hp	Second cycle
SG2211	Vehicle Aerodynamics	6.0 hp	Second cycle
SG2212	Computational Fluid Dynamics	7.5 hp	Second cycle
SG2214	Fluid Mechanics	7.5 hp	Second cycle
SG2215	Compressible Flow	7.5 hp	Second cycle
SG2218	Turbulence	7.5 hp	Second cycle
SG2219	Advanced Compressible Flows	7.5 hp	Second cycle
SG2221	Wave Motions and Hydrodynamic Stability	7.5 hp	Second cycle
SG2222	Micro Fluids	4.5 hp	Second cycle
SG2224	Applied Computational Fluid Dynamics	5.0 hp	Second cycle
SG2804	Biomechanics of Human Movement	7.0 hp	Second cycle
SG2860	FEM Modelling	8.0 hp	Second cycle
SG2870	Non - Linear Finite Element Methods *Studied the second year*	7.0 hp	Second cycle

Supplementary information

Compulsory courses + recommended courses + conditionally elective courses = at least 70 hp.

Year 2

Mandatory courses (7.5 Credits)

Code	Name	Credits	Edu. level
AK2030	Theory and Methodology of Science (Natural and Technological Science)	4.5 hp	Second cycle
SG2128	Research Methodology in Engineering Mechanics	3.0 hp	Second cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
SD2125	Signals and Mechanical Systems	6.0 hp	Second cycle
SD2165	Acoustical Measurements	8.0 hp	Second cycle
SD2180	Non-linear Acoustics	6.0 hp	Second cycle
SD2190	Vehicle Acoustics and Vibration	6.0 hp	Second cycle
SE1025	FEM for Engineering Applications	6.0 hp	First cycle
SE2126	Material Mechanics	9.0 hp	Second cycle
SE2132	Applied Elasticity with FEM	9.0 hp	Second cycle
SE2135	Fatigue, Reliability and Design	9.0 hp	Second cycle
SE2140	Continuum Mechanics	12.0 hp	Second cycle
SE2141	Principles of Continuum Mechanics	7.5 hp	Second cycle
SG2010	Project Course in Engineering Mechanics	15.0 hp	Second cycle
SG2126	Non-linear Oscillations and Dynamical Systems in Mechanics	7.5 hp	Second cycle
SG2150	Rigid Body Dynamic	7.0 hp	Second cycle
SG2214	Fluid Mechanics	7.5 hp	Second cycle
SG2219	Advanced Compressible Flows	7.5 hp	Second cycle
SG2221	Wave Motions and Hydrodynamic Stability	7.5 hp	Second cycle
SG2804	Biomechanics of Human Movement	7.0 hp	Second cycle
SG2860	FEM Modelling	8.0 hp	Second cycle
SG2870	Non - Linear Finite Element Methods	7.0 hp	Second cycle

Supplementary information

Compulsory courses + recommended courses + conditionally elective courses = at least 70 hp.

Track, Fluid Mechanics (TEMA)

Year 1

Mandatory courses (36.0 Credits)

Code	Name	Credits	Edu. level
SG1220	Fluid Mechanics for Engineers *For students who has not studied corresponding course before*	6.0 hp	First cycle
SG2212	Computational Fluid Dynamics	7.5 hp	Second cycle
SG2214	Fluid Mechanics	7.5 hp	Second cycle
SG2215	Compressible Flow	7.5 hp	Second cycle
SG2218	Turbulence	7.5 hp	Second cycle

Recommended courses

Code	Name	Credits	Edu. level
SD2155	Flow Acoustics	6.0 hp	Second cycle
SD2180	Non-linear Acoustics	6.0 hp	Second cycle
SE1055	Strength of Materials and Solid Mechanics, Basic Course with Energy Methods *Given in english in per 1 and in Swedish in per 3*	9.0 hp	First cycle
SE2126	Material Mechanics	9.0 hp	Second cycle
SE2132	Applied Elasticity with FEM	9.0 hp	Second cycle

Supplementary information

At least one of the recommended courses has to be studied.

Year 2

Recommended courses

Code	Name	Credits	Edu. level
SD2180	Non-linear Acoustics	6.0 hp	Second cycle
SE2126	Material Mechanics	9.0 hp	Second cycle
SE2132	Applied Elasticity with FEM	9.0 hp	Second cycle

Supplementary information

At least one of the recommended courses has to be studied.

Track, Solid Mechanics (TEMB)

Year 1

Mandatory courses (32.0 Credits)

Code	Name	Credits	Edu. level
SE1025	FEM for Engineering Applications *For students who has not studied corresponding course before*	6.0 hp	First cycle
SE2126	Material Mechanics	9.0 hp	Second cycle
SE2132	Applied Elasticity with FEM	9.0 hp	Second cycle
SG2860	FEM Modelling	8.0 hp	Second cycle

Recommended courses

Code	Name	Credits	Edu. level
SD2125	Signals and Mechanical Systems	6.0 hp	Second cycle
SD2140	Vibro Acoustics	8.0 hp	Second cycle
SD2150	Experimental Structure Dynamics, Project Course	9.0 hp	Second cycle
SG1220	Fluid Mechanics for Engineers	6.0 hp	First cycle
SG2150	Rigid Body Dynamic	7.0 hp	Second cycle

Supplementary information

At least on of the recommended courses has to be studied.

Year 2

Recommended courses

Code	Name	Credits	Edu. level
SD2125	Signals and Mechanical Systems	6.0 hp	Second cycle
SG1220	Fluid Mechanics for Engineers	6.0 hp	First cycle
SG2150	Rigid Body Dynamic	7.0 hp	Second cycle
SG2870	Non - Linear Finite Element Methods	7.0 hp	Second cycle

Supplementary information

At least on of the recommended courses has to be studied.

Track, Sound and Vibrations (TEMC)

Year 1

Mandatory courses (35.0 Credits)

Code	Name	Credits	Edu. level
SD1115	Fundamentals of Noise and Vibration Control *	6.0 hp	First cycle
SD1120	Noise and Vibration Control *	9.0 hp	First cycle
SD2125	Signals and Mechanical Systems *	6.0 hp	Second cycle
SD2140	Vibro Acoustics	8.0 hp	Second cycle
SD2155	Flow Acoustics	6.0 hp	Second cycle

Recommended courses

Code	Name	Credits	Edu. level
SE2123	Testing Techniques in Solid Mechanics	6.0 hp	Second cycle
SE2126	Material Mechanics	9.0 hp	Second cycle
SE2132	Applied Elasticity with FEM	9.0 hp	Second cycle
SG2211	Vehicle Aerodynamics	6.0 hp	Second cycle
SG2215	Compressible Flow	7.5 hp	Second cycle
SG2860	FEM Modelling	8.0 hp	Second cycle

Supplementary information

*SD1115, SD1120 and SD2125 are basic courses. For students who has not studied correspond course before, one has to be studied.

At least one of the recommended courses has to be studied.

Year 2

Recommended courses

Code	Name	Credits	Edu. level
SE2126	Material Mechanics	9.0 hp	Second cycle
SE2132	Applied Elasticity with FEM	9.0 hp	Second cycle

Supplementary information

At least one of the recommended courses has to be studied.

Appendix 2: Specialisations

Master's Programme, Engineering Mechanics (TTEMM)

Track, Fluid Mechanics (TEMA)

Mechanics of solids, fluids and gases are fundamental areas within classical physics and plays a pivotal role in the design and analysis in almost every branch of engineering science. Today, this position is enhanced by even larger amount of the areas engulfed by the subject. For instance, chemical and material sciences in combination with fluid mechanics lead to a deeper understanding of various physical phenomena and also lead to new technical innovations. The courses in fluid mechanics, turbulence, compressible flow, computational fluid dynamics and vehicle aerodynamics provide a stable platform for solving complex fluid mechanics problems in industry or performing research towards a PhD. The Fluid Physics and Applied Fluid Mechanics Laboratory is a part of the Department of Mechanics where both experimental and computational projects of various fluid dynamical systems are carried out. The Linné FLOW Centre is an environment for fundamental research in fluid mechanics, with research projects integrating experiments, computations and theory and combining expertise in stability and transition, flow control, turbulence and geophysical flows, micro-fluid flows, aero-acoustics and numerical analysis.

Track, Solid Mechanics (TEMB)

Solid Mechanics can be seen as a link between material science and applied mechanics with more focus on the latter. Solid Mechanics deals with the mechanical behaviour of materials and structures. The research at the Department of Solid Mechanics covers computational, fracture, composite, contact, material, bio and paper mechanics as well as reliability and fatigue. A primary goal of this research is to develop methods for reliable design of structures, material systems and processes. The Department of Solid Mechanics is host for the Biofibre Material (BiMaC) Excellence Centre and the Forest Products Industry Research College (FPIRC). The research within the field of solid mechanics at the Department of Mechanics is focused on the behavior biomechanical systems. The specialisation in Solid Mechanics is composed of fundamental and advanced courses.

Track, Sound and Vibrations (TEMC)

Noise and vibration are important issues in modern society. Applications of technical acoustics cover an extremely wide field, from applied mathematics and mechanics to measuring techniques plus signal processing down to motors, transport and building technology. The Marcus Wallenberg Laboratory for Sound and Vibration Research (MWL) is a part of the Department of Aeronautical and Vehicle Engineering and is the largest university centre in northern Europe in the area of sound and vibration research. The specialisation in Sound and Vibration introduces acoustics as an integrated element of engineering with a particular bearing on mechanics, fluid dynamics and solid mechanics. The contents of the courses cover a wide area within sound and vibration control. Included are fundamental principles on sound and vibration generation, transmission and reduction in complex structures, with coupling between vibrating structures and surrounding media, such as gases and liquids.