Utbildningsplan

Masterprogram, flyg- och rymdteknik
Master's Programme, Aerospace Engineering, 120 credits
120,0 högskolepoäng

Gäller för antagna till utbildningen fr o m HT13.

Utbildningens mål

The main objective of this programme is to educate skilled engineers for the European aerospace industry and research institutions. The programme is mainly intended for (but not exclusive to) Swedish students and students from European universities with which KTH has exchange agreements. It is a joint effort by several different KTH departments, providing leading expertise in their respective areas of research. The Department of Aeronautical and Vehicle Engineering coordinates the programme and contributes about half of the courses.

Kunskap och förståelse

A Master of Science in Aerospace Engineering will:

- have a good ability to independently apply mathematics and basic engineering science in the field of aerospace engineering,
- be able to formulate and approach new problem settings in a scientific manner, by having a creative, critical and systematic attitude to engineering practice.

Färdigheter och förmågor

A Master of Science in Aerospace Engineering will be able to:

- work out solution strategies to real engineering problems, knowing the capabilities and limitations of different methods and tools,
- plan, perform and evaluate basic experimental testing in order to investigate the validity of a theoretical model,
- work efficiently in a teamwork environment in groups with different compositions,
- work efficiently in an international environment, in particular where English is the professional language,
- communicate results and conclusions in a competent and intelligible manner, both orally and in writing,
- follow and participate in aerospace research and development.

Värderingsförmåga och förhållningssätt

A Master of Science in Aerospace Engineering will be able to:

- critically judge a situation and in an independent manner acquire the information and knowledge that is necessary to establish a qualified standpoint,
- have the ability to identify the need for further knowledge in the field and take responsibility for keeping their personal knowledge up to date.

Complete information on the degree requirements can found at the local regulation for qualifications at first- and second cycle:

http://intra.kth.se/en/regelverk/utbildning-forskning/grundutbildning/examina/lokala-foreskrifter-for-examina-pa-grundniva-och-avancerad-niva-lokal-examensordning-1.27227

Utbildningens omfattning och innehåll

Aerospace Engineering is a two-year (120 university credits) master programme on the advanced level (second cycle). The instruction language is entirely in English. The programme consists of a basic curriculum followed by four different specializations in aeronautics, space, lightweight structures or systems engineering. The courses in the basic curriculum are compulsory and constitutes about one third of the course work. In each specialization there is an additional set of compulsory courses to ensure that the students are qualified to perform a final Master's thesis project.

Behörighet och urval

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 organization. A good knowledge of written and spoken English. Applicants must provide proof of their proficiency in English.

Specific eligibility requirements

The applicant must have a basic degree, Bachelor's or similar, from an aeronautical, mechanical engineering, or similar programme with sufficient theoretical depth and good academic results. Course work must include multivariable calculus, linear algebra, numerical analysis, ordinary differential equations, rigid body mechanics, solid mechanics, and fluid mechanics.

Selection process

The selection process is based on a total evaluation of the following criteria: University, Grade Point Average (GPA), and relevant course work. Courses on topics such as complex analysis, partial differential equations, thermodynamics, and control theory are considered an additional qualification.

Complete information on the eligibility requirements can be found at the local admission policy of KTH.
http://www.kth.se/en/studies/programmes/master/admission

Utbildningens genomförande

Utbildningens upplägg

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 exam period consisting of two extra days and at least five exam days. 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 lasts for a duration of 40 weeks. Teaching activities may, if necessary, be scheduled outside the academic year.

In order to give a broad and interesting introduction to the field, the first semester consists of one introductory course in each major discipline (aeronautics, space, lightweight structures and systems engineering, respectively). The second semester offers a number of more advanced courses, that depends on the chosen specialization. Finally, the second year mainly consists of elective courses and the final degree project.

Kurser

Utbildningen sker i kursform. Kurslistor finns i bilaga 1.

The programme is course-based. Lists of courses are included in Appendix 1. The basic curriculum corresponds to approximately 35 university credits. In each track, there is an additional set of three (or two for track Aeronautics) compulsory courses, corresponding to approximately 25 university credits. This leaves approximately 30 university credits for optional (elective) courses. The optional courses should be on the advanced level, and preferably be related to aerospace engineering.

Betygssystem

För kurser på KTH används en sjugradig målrelaterad betygsskala A-F som slutbetyg för kurser på grundnivå och avancerad nivå. A-E är godkända betyg med A som högsta betyg. Betygen godkänd (P) och underkänd (F) används som slutbetyg då särskilda skäl föreligger.

Courses in 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.

Villkor för deltagande i utbildningen

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 semester. 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.

Tillgodoräknanden

Under certain circumstances, and in agreement with the programme director, credits for previous studies can be received according to the local policy of KTH, see

http://intra.kth.se/en/regelverk/utbildning-forskning/grundutbildning/prestationer/policy-for-tillgodoraknande-av-hogskoleutbildning-inklusive-bedomning-av-reell-kompetens-1.27200

Examensarbete

Students admitted to the programme are required to perform an independent study in the form of a degree project corresponding to 30 university credits. To begin the degree project, a student must have completed at least 60 university credits of the total course work and at least two of the three compulsory courses in the specialization.

The purpose of the degree 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 degree project can either be performed at a university or, more commonly, at a company in the aerospace sector with suitable infrastructure to provide sufficient supervision and resources for the project. The student must actively search for a suitable degree project; however KTH will provide some assistance with information on suitable points of contact. Exchange students are recommended to find a degree project in their country of permanent residence or in the country where they intend to start their professional careers.

More information on the KTH policy on the degree project can be found at http://intra.kth.se/en/regelverk/utbildning-forskning/grundutbildning/examensarbete/overgripande-regler-och-riktlinjer-for-examensarbete-30-hogskolepoang-for-masterexamen-120-hogskolepoang-samt-betygssattning-av-examensarbete-1.27212

Examen

Students who fulfill all the requirements will be awarded a Degree of Master of Science (two years). Students must apply for the degree and also show proof of their basic degree (Bachelor's or similar) and paid student union fee.

Complete information on the degree requirements can found at the local regulation for qualifications at first- and second cycle:

http://intra.kth.se/en/regelverk/utbildning-forskning/grundutbildning/examina/lokala-foreskrifter-for-examina-pa-grundniva-och-avancerad-niva-lokal-examensordning-1.27227
Bilaga 1 - Kurslista
Bilaga 2 - Inriktningsbeskrivningar

Bilaga 1: Kurslista

Masterprogram, flyg- och rymdteknik (TAEEM), Utbildningsplan för kull HT2013

Gemensamma kurser

Årskurs 1

Obligatoriska kurser (35,0 hp)

Kurskod	Kursnamn	hp	Utb. nivå
AK2030	Vetenskapsteori och vetenskaplig metodik (naturvetenskap)	4,5	Avancerad nivå
SD2411	Lättkonstruktioner och FEM	8,0	Avancerad nivå
SD2601	Flygteknik	7,5	Avancerad nivå
SD2900	Rymdteknikens grunder	7,5	Avancerad nivå
SF2863	Systemteknik	7,5	Avancerad nivå

Årskurs 2

Kompletterande information

Obligatorisk kurs, vårterminen årskurs 2: Examensarbete, avancerad nivå, 30hp:
Spår Flygteknik: SD280X
Spår Lättkonstruktioner: SD240X
Spår Rymdteknik: EF227X
Spår Systemteknik: SF289X

Flygteknik (FLT)

Årskurs 1

Obligatoriska kurser (9,0 hp)

Kurskod	Kursnamn	hp	Utb. nivå
SD2805	Flygmekanik	9,0	Avancerad nivå

Valfria kurser

Kurskod	Kursnamn	hp	Utb. nivå
EL2520	Reglerteknik, fortsättningskurs	7,5	Avancerad nivå
SD2905	Bemannad rymdfart	7,5	Avancerad nivå
SG2212	Strömningsmekaniska beräkningar	7,5	Avancerad nivå

Kurskod	Kursnamn	hp	Utb. nivå
SG2215	Kompressibel strömning	7,5	Avancerad nivå

Årskurs 2

Obligatoriska kurser (9,0 hp)

Kurskod	Kursnamn	hp	Utb. nivå
SD2810	Aeroelasticitet	9,0	Avancerad nivå

Valfria kurser

Kurskod	Kursnamn	hp	Utb. nivå
EH2720	Projektstyrning	7,5	Avancerad nivå
MJ2241	Flygmotorteknik, allmän kurs	6,0	Avancerad nivå
SD2611	Aerodynamisk utformning av flygplan	9,0	Avancerad nivå
SD2910	Rymdfarkosters dynamik	9,0	Avancerad nivå

Kompletterande information

Ang. SD2910 Rymdfarkosters dynamik - ny kurskod 2014/2015: SD2910 (tidigare SG2805). Kursen ges två kursomgångar läsåret 2014/2015: läsperiod 2 och läsperiod 4.

Lättkonstruktioner (LKR)

Årskurs 1

Obligatoriska kurser (12,0 hp)

Kurskod	Kursnamn	hp	Utb. nivå
SD2413	Fiberkompositer- analys och design	6,0	Avancerad nivå
SD2414	Fiberkompositer - material och tillverkning *För studenter som ej gjort kandidatexamensarbete mot lättkonstruktioner*	6,0	Avancerad nivå

Valfria kurser

Kurskod	Kursnamn	hp	Utb. nivå
SD2432	Lättviktsdesign	20,0	Avancerad nivå
SE2129	Brottmekanik och utmattning	9,0	Avancerad nivå

Årskurs 2

Obligatoriska kurser (12,0 hp)

Kurskod	Kursnamn	hp	Utb. nivå
SD2415	Processmodellering för kompositttillverkning	6,0	Avancerad nivå
SD2416	Strukturoptimering och sandwichdesign	6,0	Avancerad nivå

Valfria kurser

Kurskod	Kursnamn	hp	Utb. nivå
EH2720	Projektstyrning	7,5	Avancerad nivå
SD2432	Lättviktsdesign	20,0	Avancerad nivå
SD2450	Biomekanik och neuronik	6,0	Avancerad nivå
SD2810	Aeroelasticitet	9,0	Avancerad nivå

Kompletterande information

Ang. kursen SD2432 Lättviktsdesign, 20hp, kursen startar på vårterminen (10hp) och fortsätter på höstterminen (10hp).

Rymdteknik (RMD)

Årskurs 1

Valfria kurser

Kurskod	Kursnamn	hp	Utb. nivå
AH2923	Globala satellitnavigeringssystem (GNSS)	7,5	Avancerad nivå
EL2520	Reglerteknik, fortsättningskurs	7,5	Avancerad nivå
MJ2246	Rocket Propulsion	6,0	Avancerad nivå
SD2805	Flygmekanik	9,0	Avancerad nivå
SD2905	Bemannad rymdfart	7,5	Avancerad nivå
SG2215	Kompressibel strömning	7,5	Avancerad nivå

Årskurs 2

Obligatoriska kurser (21,0 hp)

Kurskod	Kursnamn	hp	Utb. nivå
EF2240	Rymdfysik	6,0	Avancerad nivå
EF2260	Rymdmiljö och rymdteknik	6,0	Avancerad nivå
SD2910	Rymdfarkosters dynamik	9,0	Avancerad nivå

Valfria kurser

Kurskod	Kursnamn	hp	Utb. nivå
AG1321	Fjärranalysteknik	7,5	Grundnivå
EF2200	Plasmafysik	6,0	Avancerad nivå
EF2245	Rymdfysik II	7,5	Avancerad nivå
EH2720	Projektstyrning	7,5	Avancerad nivå
EL2620	Olinjär reglering	7,5	Avancerad nivå

Kompletterande information

Ang. SD2910 Rymdfarkosters dynamik - ny kurskod 2014/2015: SD2910 (tidigare SG2805). Kursen ges två kursomgångar läsåret 2014/2015: läsperiod 2 och läsperiod 4.

Systemteknik (SYS)

Årskurs 1

Obligatoriska kurser (22,5 hp)

Kurskod	Kursnamn	hp	Utb. nivå
EL2520	Reglerteknik, fortsättningskurs	7,5	Avancerad nivå
SF2812	Tillämpad linjär optimering	7,5	Avancerad nivå
SF2852	Optimal styrteori	7,5	Avancerad nivå

Valfria kurser

Kurskod	Kursnamn	hp	Utb. nivå
EL2450	Hybrida och inbyggda reglersystem	7,5	Avancerad nivå
SD2905	Bemannad rymdfart	7,5	Avancerad nivå
SF2822	Tillämpad ickelinjär optimering	7,5	Avancerad nivå
SF2832	Matematisk systemteori	7,5	Avancerad nivå
SF2842	Geometrisk styrteori	7,5	Avancerad nivå

Årskurs 2

Valfria kurser

Kurskod	Kursnamn	hp	Utb. nivå
EH2720	Projektstyrning	7,5	Avancerad nivå
EL1820	Modellering av dynamiska system	6,0	Grundnivå
EL2620	Olinjär reglering	7,5	Avancerad nivå
SF2832	Matematisk systemteori	7,5	Avancerad nivå

Bilaga 2: Inriktningar

Masterprogram, flyg- och rymdteknik (TAEEM), Utbildningsplan för kull HT2013

Flygteknik (FLT)

The aeronautics track focuses on modeling, analysis and design of aircraft. The overall objectives are that the student should be able to design and estimate the performance of an aircraft, compute its aerodynamic properties, simulate its motion in flight, and analyze how its aerodynamic and structural properties influence stability and control. The track is characterized by a strong interaction between theory and practice, and the student will plan, perform and evaluate several wind tunnel tests during her education. An engineer with this profile is particularly attractive to companies working in aerodynamics and aeronautics.

Lättkonstruktioner (LKR)

The lightweight structures track focuses on lightweight materials and structures for the development of new engineering solutions and products. Reduced structural weight can be used for improved structural efficiency, cheaper production and maintenance, and reduced environmental impact. Emphasis is put on fibre composites, non-metallic materials and sandwich structures, often used in applications with extreme requirements. Students following the track will develop knowledge and skills in analysis, design, optimization, materials, manufacturing and testing of lightweight structures. Fibre composites design call for a systems approach to the choice of materials, manufacturing processes and product solutions, preparing the students for future roles as engineers working with development of new products or materials. A structural engineer is attractive to a large number of industries in aerospace-, naval- or automotive engineering, as well as smaller businesses working with e.g. manufacturing or innovation.

Rymdteknik (RMD)

Space technology plays a key role in modern society, enabling telecommunication and navigation services, weather forecasting, Earth observation and much more. The space track focuses on applications related to rocket and satellite technology, with particular emphasis on propulsion, trajectory analysis and spacecraft dynamics. The space environment and its impact on the design and instrumentation of satellites is another central theme in the education. Since most of the courses are given in the second year, the space track can conveniently be combined with (parts of) the other tracks in the program. As a space engineer you can for example work with design or control of satellites, or perform trajectory analysis of launchers or sounding rockets. You will become particularly attractive to companies working with spacecraft and satellite technology.

Systemteknik (SYS)

Aircrafts, rockets and satellites are complex systems that have to be designed with reliable control systems and efficient maintenance plans to be competitive in today's global market. The overall objective with the systems track is that you should be able to develop mathematical models of systems in order to analyze and optimize their performance. Control theory had a crucial role in the development of rockets, and has since improved robustness and performance of modern airplanes. Today, it is becoming an increasingly important factor in other areas such as the automotive industry and communications systems. A systems engineer could be working with the design of the control of the damping in an aircraft landing gear, or on how to find the least costly spare parts management system or analyzing the reliability of a radar system. A systems engineer is attractive to a large number of industries in various fields.