



# Utbildningsplan

Masterprogram, molekylär vetenskap och teknik

Master's Programme, Molecular Science and Engineering, 120 credits

120,0 högskolepoäng

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Gäller för antagna till utbildningen fr o m HT14.

## Utbildningens mål

### Kunskap och förståelse

To receive a Master of Science degree in *Molecular Science and Engineering* the student should:

- demonstrate general knowledge and understanding in chemistry and in-depth knowledge in selected chemistry area.
- have insight into current research and development.
- demonstrate knowledge of the scientific basis for physical and chemical processes, different kinds of energy and their conversion, the properties and use of different materials, and to assess the applicability of the used models in different contexts.
- demonstrate knowledge of the importance of chemical, thermodynamic and kinetic aspects of chemical reaction routes.
- demonstrate knowledge in how the molecules are build-up, chemical and molecular measuring and characterization techniques, molecular reactions, molecular interactions and their influence on the properties, methods for synthesis and production of molecules, materials and surfaces as well as molecular aspects of sustainable development.
- be able to apply knowledge of mathematics, numerical analysis and other sciences in chemistry field.

### Färdigheter och förmågor

To receive a Master of Science degree in *Molecular Science and Engineering* the student should:

- demonstrate the ability to develop chemical products and apply systematic thinking in terms of choice of raw materials, energy, security, environment, human conditions and needs as well as goals of sustainable society.
- demonstrate the ability to identify, formulate and manage current and real problems drawn from industry, society and research, taking into account the potential and limitations.
- demonstrate the ability to make assessment of the reasonableness of the obtained solutions, and compare and evaluate alternative solutions.
- demonstrate laboratory skills and knowledge of safe chemical managing, and the ability to implement and evaluate experiments on a laboratory scale and on a larger scale plan.
- demonstrate the skills to use computer tools for information retrieval.
- demonstrate the ability to orally and in writing present and discuss ideas and outcomes and communicate with persons with or without the technical scientific background.
- demonstrate ability to effectively work as an individual and as a team to plan and implement projects within a given framework.

## Värderingsförmåga och förhållningssätt

To receive a Master of Science degree in *Molecular Science and Engineering* the student should:

- demonstrate the ability to critically review the literature and technologies in areas related to chemistry.
- demonstrate the ability to take a stand on issues of ethical nature in their professional field.
- demonstrate an understanding for the fact that chemistry problems can be complex, incompletely defined and contain contradictory conditions, and also consider social, economic, commercial, environmental and working-environmental aspects.
- demonstrate the ability to rapidly acquire knowledge in new areas and to apply new knowledge for innovation and development of chemical products.

## Utbildningens omfattning och innehåll

**Molecular Science and Engineering** is a two-year (120 credits) master programme second cycle. The instruction language is entirely English. The programme consists of courses given by KTH, mainly by the School of Chemical Science and Engineering.

## Behörighet och urval

### *General admission requirements*

A completed *Bachelor's degree* - corresponding to a Swedish Bachelor's degree (180 credits), or equivalent academic qualifications from an internationally recognized university.

*Language requirements* – applicants must proof their proficiency in English, which is most commonly established through an internationally recognized test.

*Documentation* – for detailed information about list of required documents, see “Admission requirements and selection”  
[http://www.kth.se/en/studies/programmes/master/admission?l=en\\_UK](http://www.kth.se/en/studies/programmes/master/admission?l=en_UK)

### ***Specific admission requirements***

In order to be admitted to the Molecular Science and Engineering programme, a Bachelor's degree in Chemistry or closely related subject, of 180 credits, including following is required:

- Courses in chemistry or closely related subject corresponding to at least 75 credits.
- Basic knowledge in mathematics corresponding to at least 20 credits.
- Basic knowledge in numerical analysis/computer science corresponding to at least 9 credits.

Master´s programmes at KTH, “Admission requirements”

<http://www.kth.se/en/studies/programmes/master/programmes/life-science-technology/molecularscience/molecular-science-and-engineering-application-and-admission-for-external-applicants-1.48527>

### ***Selection process***

The selection process for the Molecular Science and Engineering programme is based on a total evaluation of the following selection criteria: university, grade point average (GPA), course work related to the programme, motivation letter and relevant work experience, references and English proficiency.

Complete information on the eligibility requirements can be found in the local admission policy of KTH, see:

<http://www.kth.se/en/studies/programmes/master/admission>

## **Utbildningens genomförande**

### **Utbildningens upplägg**

The academic year has a duration of 40 weeks. The academic year at KTH is divided into four periods. Each period lasts approximately seven weeks and is followed by an examination period.

The programme consists of courses for 90 credits followed by a degree project on advanced level (30 credits). One mandatory course (7,5 credits) is included the first year. The rest of the courses are conditionally elective or recommended. The student is required to choose at least 3 courses listed as conditionally elective. The remaining courses should be selected from the courses listed as conditionally elective or recommended with the exception of 15 credits that can be chosen freely outside the list. This gives the student a great opportunity to create his/her own curriculum. Guidelines and recommendations for course combinations will be given.

### **Kurser**

Utbildningen sker i kursform. Kurslistor finns i [bilaga 1](#).

The programme consists of mandatory, conditionally elective, recommended and elective courses. The goals, prerequisites, contents and examination requirements of different courses can be found in the respective course plans.

Two or three courses are usually studied parallel during each period. Teaching and examination methods vary between the courses. Normally the course contains lectures, which give an introduction to the concepts and theory. Exercises, seminars, laboratory work and project assignments deepen the conceptual understanding, give practical experience and give possibility to practice the group skills.

## **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.

## **Villkor för deltagande i utbildningen**

Students accepted to the programme will start the programme in the end of August when the registration also takes place and where the student must be present in person. The students are thereafter required to make a study registration and course selection for the coming term no later than November 15 and May 15 each academic year, respectively. At least 45 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.

Students who have not passed 45 credits in the first year, must contact the educational coordinator for an individual study plan. This study plan will include residual courses and appropriate courses for the upcoming year. The student who has not done this will not be registered on any courses in the upcoming academic year.

## **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

For more information see:

[http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/prestationer/policy-for-tillgodoraknande-av-hogskoleutbildning-inklusive-bedomning-av-reell-kompetens-1.27200?l=en\\_UK](http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/prestationer/policy-for-tillgodoraknande-av-hogskoleutbildning-inklusive-bedomning-av-reell-kompetens-1.27200?l=en_UK)

## **Utlandsstudier**

For information about studies abroad, contact the international coordinator at the School of Chemical Science and Engineering.

## **Examensarbete**

Students admitted to the programme are required to perform an individual study in the form of a degree project, advanced level, corresponding to 30 credits. This means 20 weeks of fulltime studies. The main portion of the studies must generally be completed before the degree project work can be started. At least 60 credits must be completed where at least 30 credits in the second cycle within the main field of study.

The purpose of the thesis project is that the student demonstrates the ability to perform independent project work, using the skills obtained from the courses in the programme. It is the student's responsibility to find a suitable thesis project, with assistance from KTH.

Degree project, advanced level for the Degree of Master of Science, Molecular Science and Engineering, can be performed in the following exam topics:

*Chemistry, Chemical engineering, Fibre and Polymer Technology.*

Other degree projects in related fields may also be allowed, but need approval by the Director of Undergraduate and Masters' studies at the School of Chemical Science and Engineering.

For more information, contact the study advisor at the CHE student office.

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-betygsattning-av-examensarbete-1.27212>

## **Examen**

Master of Science (120 credits) - is obtained after completion of the Master (Two Years) Molecular Science and Engineering study programme. The programme is designed so that students, when they graduate, have fulfilled national requirements for a degree and have completed courses comprising 120 credits, of which:

- At least 90 credits are at second cycle, of which at least 60 higher education credits (including a 30-credits degree project) with in-depth studies in the main field of study.

Students who fulfill all the requirements will be awarded a Master of Science (120 credits). Students must apply for the degree and also show proof of their basic degree (Bachelor or similar). To apply use the web service "Application for degrees" that is found in the personal menu.

### **Degree name**

*Master of Science (120 credits)*

*Teknologie masterexamen*

[http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examina/1.27227?l=en\\_UK](http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examina/1.27227?l=en_UK)

[Bilaga 1 - Kurslista](#)

[Bilaga 2 - Inriktningsbeskrivningar](#)



# Bilaga 1: Kurslista

Masterprogram, molekylär vetenskap och teknik (TMVMTM),  
Utbildningsplan för kull HT2014

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## Gemensamma kurser

### Årskurs 1

#### Obligatoriska kurser (7,5 Högskolepoäng)

| Kurskod                | Kursnamn  | Omfattning | Utb. nivå      |
|------------------------|---|------------|----------------|
| <a href="#">AK2036</a> | <a href="#">Vetenskapsteori och vetenskaplig metodik med tillämpningar (naturvetenskap)</a> | 7,5 hp     | Avancerad nivå |

#### Villkorligt valfria kurser

| Kurskod                | Kursnamn   | Omfattning | Utb. nivå      |
|------------------------|--|------------|----------------|
| <a href="#">KD2310</a> | <a href="#">Organisk kemi, fortsättningskurs</a>   | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2320</a> | <a href="#">Spektroskopiska verktyg inom kemi</a>  | 9,0 hp     | Avancerad nivå |
| <a href="#">KD2330</a> | <a href="#">Analytiska separationer</a>            | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2350</a> | <a href="#">Ytor, kolloider och mjuka material</a> | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2360</a> | <a href="#">Kvantkemi</a>                          | 9,0 hp     | Avancerad nivå |

#### Rekommenderade kurser

| Kurskod                | Kursnamn   | Omfattning | Utb. nivå      |
|------------------------|--|------------|----------------|
| <a href="#">BB2020</a> | <a href="#">Molekylär enzymologi</a>                         | 7,5 hp     | Avancerad nivå |
|                        | <a href="#">Biokemi, teori</a>                               |            |                |
| <a href="#">BB2380</a> | Läses ej av studerande med programbakgrund bioteknik (CBIOT) | 7,5 hp     | Avancerad nivå |
| <a href="#">BB2460</a> | <a href="#">Biokatalys</a>                                   | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2150</a> | <a href="#">Oorganisk materialkemi</a>                       | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2160</a> | <a href="#">Strukturkemi</a>                                 | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2340</a> | <a href="#">Molekylär termodynamik</a>                       | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2370</a> | <a href="#">Foto-, strålnings- och radikalkemi</a>           | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2410</a> | <a href="#">Kemins avbildningsmetoder</a>                    | 6,0 hp     | Avancerad nivå |

|                        |   |        |                |
|------------------------|---|--------|----------------|
| <a href="#">KE2350</a> | <a href="#">Riskanalys och riskhantering för kemiingenjörer</a> | 6,0 hp | Avancerad nivå |
| <a href="#">ME2814</a> | <a href="#">Idégenerering</a>                                   | 7,5 hp | Avancerad nivå |

### Kompletterande information

I årskurs 1 läses en obligatorisk kurs samt minst tre av de villkorligt valfria kurserna samt rekommenderade kurser.

### Rekommenderade kurser kan ställas in på grund av för få studenter eller ges vartannat år.

Studenter som läser civilingenjörsutb i Bioteknik och vill få en civilingenjörsexamen i bioteknik ska läsa följande kurser:

BB2460 Biokatalys, 7.5 hp

BB2020 Molekylär enzymologi ,7,5 hp

## Årskurs 2

### Rekommenderade kurser

| Kurskod                | Kursnamn  | Omfattning | Utb. nivå      |
|------------------------|---|------------|----------------|
| <a href="#">BB2280</a> | <a href="#">Molekylär modellering</a>                           | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2170</a> | <a href="#">Nanostrukturerade material</a>                      | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2300</a> | <a href="#">Biomedical Materials</a>                            | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2380</a> | <a href="#">Korrosion och ytskydd</a>                           | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2385</a> | <a href="#">Selektiv organisk syntes, teori</a>                 | 6,5 hp     | Avancerad nivå |
| <a href="#">KD2390</a> | <a href="#">Selektiv organisk syntes</a>                        | 9,0 hp     | Avancerad nivå |
| <a href="#">KD2401</a> | <a href="#">Bioaktiva molekyler</a>                             | 7,5 hp     | Avancerad nivå |
| <a href="#">KD2420</a> | <a href="#">Miljö kemi: atmosfär, vatten och mark</a>           | 7,5 hp     | Avancerad nivå |
| <a href="#">KE2110</a> | <a href="#">Tillämpad elektrokemi</a>                           | 7,5 hp     | Avancerad nivå |
| <a href="#">KE2300</a> | <a href="#">Elektrokemiska energiomvandlare</a>                 | 7,5 hp     | Avancerad nivå |
| <a href="#">KE2350</a> | <a href="#">Riskanalys och riskhantering för kemiingenjörer</a> | 6,0 hp     | Avancerad nivå |
| <a href="#">KF2130</a> | <a href="#">Polymerkemi</a>                                     | 7,5 hp     | Avancerad nivå |
| <a href="#">KF2140</a> | <a href="#">Polymerfysik</a>                                    | 7,5 hp     | Avancerad nivå |

### Kompletterande information

Detta är en preliminär lista över kurser för årskurs 2, för de som påbörjade programmet 2014. Det kan ske förändringar. Rekommenderade kurser kan ställas in på grund av för få studenter eller ges vartannat år.

I årskurs 2 läses rekommenderade kurser samt avslutas med ett obligatoriskt examensarbete, avancerad nivå 30 hp.

(Se lista över examensarbeten nedan)

Se lista över examensarbeten;

Examensarbete inom kemi, avancerad nivå - KD200X

Examensarbete inom kemiteknik, avancerad nivå - KE200X  
Examensarbete inom Fiber och Polymerteknologi, avancerad nivå - KF200X





## Bilaga 2: Inriktningar

Masterprogram, molekylär vetenskap och teknik (TMV(TM)),  
Utbildningsplan för kull HT2014

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Programmet har inga inriktningar.