



# Programme syllabus

Master's Programme, Industrial and Environmental Biotechnology, 120 credits

Masterprogram, Industriell och miljöinriktad bioteknologi

*120.0 credits*

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*Valid for students admitted to the education from autumn 14 (HT - Autumn term; VT - Spring term).*

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

## Programme objectives

### Knowledge and understanding

After completing the *Industrial and Environmental Biotechnology* programme the students should:

- be able to design central parts in bioprocesses both in the industrial and the environmental setting.
- understand and manage processes at the molecular, cellular and engineering level.
- have subject knowledge and understanding to a level that promotes a future career in the field of the programme, including research education.
- be able to communicate with colleagues in the various subject areas of biotechnology.
- have in-depth knowledge in a chosen biotechnology subject area.
- understand the driving forces, organization and management of Swedish and international biotech industry.

### Skills and abilities

After completing the *Industrial and Environmental Biotechnology* programme the students should:

- be able to critically read and extract information of technical and scientific nature from various sources, formulate conclusions and integrate this into the design work.
- know how to analytically and critically plan, execute and evaluate experiments.
- be able to use standard and advanced biotechnology methods and techniques.
- be skillful in technical communication, both in oral and written form.

### Ability to make judgements and adopt a standpoint

After completing the *Industrial and Environmental Biotechnology* programme the students should:

- be able to critically evaluate existing and new technological breakthroughs in the biotech society.
- use biotechnological methods, products and processes in a responsible way, and understanding its limitations and economic impact.
- understand the impact of biotechnological developments on social, ethical and gender level.
- understand the implications of biotechnological developments in the context of a sustainable society.

## Extent and content of the programme

*Industrial and Environmental Biotechnology* is a two-year (120 credits) master programme second cycle. The instruction language is entirely in English. The programme consists of courses given by KTH.

## Eligibility and selection

### 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 prove 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 addition to the general admission requirements, the programme requires:

- Courses in *biochemistry, microbiology and gene technology/molecular biology* corresponding to a total of at least 20 credits.
- Courses in *chemistry* corresponding to at least 30 credits.
- Basic knowledge in *mathematics, numerical analysis and computer science* to a total of at least 20 credits.

For more information, see Study at KTH, Master's programmes at KTH, “Admission requirements”.

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

### Selection process

The selection process for the *Industrial and Environmental Biotechnology* programme is based on a total evaluation of the following criteria: university, grade point average (GPA), courses relevant to the programme, motivation letter, 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://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/antagning/3-antagning-till-utbildningsprogram-pa-avancerad-niva-1.276218>

## Implementation of the education

### Structure of the education

The duration of a study year at KTH is 40 weeks, and is divided into four study periods, where two or three courses are simultaneously studied in each period. The nominal study pace is 60 credits each study year.

The mandatory courses comprise 88.5 credits (94.5 credits for International students) of which the final degree project is 30 credits. To reach a total of 120 credits, the students must choose among a list of recommended courses (appendix 1) but some may also be chosen freely from elsewhere (15 credits).

Thus, the students can tailor their education towards different profiles, e.g., “Industrial-Process design” or “Environmental-Environmental systems analysis”.

### Courses

The programme is course-based. Lists of courses are included in [appendix 1](#).

Teaching and examination methods vary between courses. During the first year, the concepts and theory of a subject is taught through lectures. Exercises, seminars and laboratory sessions aim to emphasize and deepen the understanding of the most important aspects of a subject. The second year is almost exclusively run in project format. The programme is concluded with a degree project, advanced level equivalent to 30 credits. To receive a Master of Science (120 credits) the students should have passing grades in all the mandatory and optional courses, which including the thesis will comprise 120 credits.

## **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**

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 study year, respectively. At least 45 credits have to be completed during the first study 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 programme coordinator for an individual study plan, otherwise the student will not be registered on any courses in the upcoming study year. This study plan will include residual courses and appropriate courses for the upcoming year.

## **Recognition of previous academic studies**

The students have the right to transfer credits from previous studies at universities in or outside of Sweden. The courses have to be at a level and include contents that agree with the goals of the programme. Transfer of credits is decided by the director of undergraduate and Masters' studies.

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)

## **Studies abroad**

For information about studies abroad, contact the international coordinator at the School of Biotechnology.

## **Degree project**

Students admitted to the programme are required to perform an individual study in the form of a degree project corresponding to 30 credits. The main portion of the studies must be completed before the start of the degree project, specifically those related to the mandatory courses of the programme. This means that at least 60 credits (of which 30 must be in the second cycle within the main field of study) have to be completed before the start of the degree project.

The purpose of the degree project is for the student to demonstrate the ability to perform an independent project, using skills obtained during 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, Biotechnology, can be performed in the following exam topics: *Biotechnology*.

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 Biotechnology.

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

Grading of the degree project is based on the listed evaluation criteria (see below) and some other aspects (see the course syllabus),

- the process of planning and performing the degree project within the given timeframe.
- the use of engineering approach and skills when performing the degree project.
- the oral and written presentation of the degree project.

More information on the KTH policy on the degree project can be found at: <https://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examensarbete/overgripande-riktlinjer-for-examensarbetskurser-gemensamma-mal-och-bedomningskriterier-1.551506>

## **Degree**

Master of Science (120 credits) - is obtained after completion of the Industrial and Environmental Biotechnology programme. The programme is designed so that students, when they graduate, have fulfilled Swedish 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 credits (including 30 credits degree project) are in-depth studies in the main field of the programme.

Within the programme the mandatory courses, conditionally elective courses and the recommended courses must add up to at least 105 credits. The final credits can be chosen by the student but should be relevant to their professional role.

Students must apply for the degree and are required to 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

For more information see “Local regulation for degrees at first and second cycle, local system of qualifications”

[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)

[Appendix 1 - Course list](#)

[Appendix 2 - Programme syllabus descriptions](#)



# Appendix 1: Course list

Master's Programme, Industrial and Environmental Biotechnology, 120 credits (TIMBM), Programme syllabus for studies starting in autumn 2014

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## General courses

### Year 1

#### Mandatory courses (49.5 credits)

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Course code	Course name	Credits	Edu. level
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5	Second cycle
BB1120	Cultivation Technology <i>Mandatroy for students who have not studied the programme CBIOT at KTH</i>	6.0	First cycle
BB2020	Molecular Enzymology	7.5	Second cycle
BB2450	The Cell Factory	7.5	Second cycle
BB2460	Biocatalysis	7.5	Second cycle
BB2480	Energy and Environment	7.5	Second cycle
ME1003	Industrial Management, Basic Course	6.0	First cycle

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#### Recommended courses

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Course code	Course name	Credits	Edu. level
AK2008	Ethics of Biotechnology	7.5	Second cycle
AL2140	Cleaner Production	7.5	Second cycle
BB2010	Environmental Toxicology	9.0	Second cycle
BB2160	Structure Biology	7.5	Second cycle
BB2170	Drug Development	6.0	Second cycle
BB2280	Molecular Modeling	7.5	Second cycle
BB2330	Plant Biotechnology	7.5	Second cycle
BB2420	Glycobiology and Carbohydrate Technology	7.5	Second cycle
KD2310	Advanced Organic Chemistry	7.5	Second cycle

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Course code	Course name	Credits	Edu. level
KD2320	Spectroscopic Tools for Chemistry	9.0	Second cycle

### Supplementary information

Study year 1 consists of mandatory courses and recommended courses.

The course BB1120 is mandatory for students who have not studied the Degree Programme in Biotechnology CBIOT at KTH.

## Year 2

### Mandatory courses (45.0 credits)

Course code	Course name	Credits	Edu. level
BB200X	Degree Project in Biotechnology, Second Cycle	30.0	Second cycle
BB2520	Bioprocess Design	15.0	Second cycle

### Recommended courses

Course code	Course name	Credits	Edu. level
AL2181	Environmental System Analysis and Decision-making	7.5	Second cycle
BB2420	Glycobiology and Carbohydrate Technology	7.5	Second cycle
KE2325	Process Design for Industry and Society	15.0	Second cycle
MJ2659	Technology and Ecosystems, Larger Course	7.5	Second cycle

### Supplementary information

This is a preliminary list of courses for study year 2 for those who started the program 2014. There might be changes. Recommended courses may be cancelled if number of admitted students are less than minimum of places.

Study year 2 consists of mandatory courses and recommended courses, and ends with a degree project, second level, 30 credits.



## Appendix 2: Specialisations

Master's Programme, Industrial and Environmental Biotechnology, 120 credits  
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This programme has no specialisations.