



Programme syllabus

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

Masterprogram, Industriell och miljöinriktad bioteknologi

120.0 credits

Valid for students admitted to the education from autumn 17 (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:

- have broad knowledge and understanding of biotechnology as well as deep knowledge and understanding of subject areas.
- have knowledge and understanding of current research and development in the field of biotechnology.
- be able to exchange information and communicate with experts in subjects related to biotechnology, such as biology, chemistry, mathematics and physics.
- have deep knowledge of methods used in biotechnology.
- be able to develop, test and evaluate central parts in a bioprocess.

Skills and abilities

After completing the Industrial and environmental biotechnology programme the students should have:

- a capacity to critically and systematically integrate knowledge and be able to analyze, judge and handle complex phenomena, questions and situations even with limited information.
- a capacity to critically, independently and creatively identify and formulate questions and problems.
- a capacity to plan and execute complex tasks with adequate methods within given time frames and thereby contribute to the knowledge development, including evaluation of the results.
- a capacity to communicate knowledge in writing and verbally as well as discuss own conclusions and supporting arguments in national and international contexts for different audiences.
- a capacity to work with research and development issues or complex activities within a qualified sector.

Ability to make judgements and adopt a standpoint

After completing the Industrial and environmental biotechnology programme the students should:

- be able to critically evaluate relevant scientific, societal and ethical aspects on questions and problems within biotechnology.
- have an awareness of ethical aspects concerning research and development.
- have an awareness of possibilities and limits of science and its role in society.
- have an understanding of how scientific methods, products and processes can be used in a responsible manner.

- be able to identify the need for additional knowledge and be responsible for his/her own knowledge development.

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

Extent and content of the programme

Industrial and environmental biotechnology is a two-year (120 credits) master programme, second cycle. The language of instruction is English.

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.

For more information regarding general admission requirements, see: "Study at KTH/master's programmes/entry requirements" at www.kth.se

Specific admission requirements

In addition to the general admission requirement, the programme requires:

- Courses in cell biology, 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
- Courses in mathematics, numerical analysis and computer science to a total of at least 20 credits
- English proficiency corresponding to "Engelska B" in Swedish secondary school.

English proficiency is most commonly established through an internationally recognized test.

For more information on how to show English proficiency, see: "Study at KTH/master's programmes/entry requirements" at www.kth.se

Selection process

The selection process is based on the following selection criteria: University, previous studies (for instance GPA, grades in specific subjects and English), motivation for the studies (for instance letter of motivation, references, thesis proposal and relevant work experience). The evaluation scale is 1-75.

KTH's general admission regulation (in Swedish) see; www.kth.se

Implementation of the education

Structure of the education

The programme runs for two academic years with two semesters each year. Each academic year consists of 40 weeks, divided into four study periods, where one or more courses are simultaneously studied. The nominal study pace is 60 credits each academic year. For details about the structure of the academic year see; "Student at KTH/timetable" at www.kth.se

Year 1 consists of mandatory courses of 43.5 credits. Additional recommended and optional courses are chosen by the student to reach 60 credits.

Year 2 consists of mandatory courses of 45 credits, including the degree project (30 credits). Additional recommended and optional courses are chosen by the student to reach 60 credits.

Courses

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

The programme consists of mandatory, recommended and optional courses. The mandatory and recommended courses are included in appendix 1. Within the programme, the mandatory and recommended courses must add up to at least 105 credits. Optional courses to reach the full extent of the programme may be taken. The optional courses can be chosen by the student but should be relevant to the professional role as a master of science in biotechnology.

Teaching and examination methods vary between courses. Commonly, 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.

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. Thereafter the student must register to the term and to the courses via the personal menu. The students are required to make a course selection for the coming term via www.universityadmissions.se not later than November 15 and May 15 each academic year.

At least 45 credits have to be completed during the first academic year (which includes 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 may be granted exemption and allowed promotion to the second year after application to the programme director.

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 program director.

For more information see; "Regulations, policy in credit transfer" at www.kth.se

Studies abroad

Studies abroad are generally allowed on internationally recognized universities. The university and course selection must be approved by the programme director prior to the start of studies abroad. For more information, 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. This means that at least 60 credits (of which 30 must be in the second cycle within biotechnology) have to be completed before the start of the degree project. The examiner of the degree project may add additional prerequisites.

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 degree project, with assistance from KTH.

The degree project should normally be performed in the field of biotechnology. 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.

Information regarding the grading scale and criteria of the degree project work read the course syllabus.

Degree

The Master of Science in Biotechnology degree is obtained after completion of the Industrial and environmental biotechnology programme. The requirements are:

- passing grades in all mandatory courses
- passing grades in courses on the programme comprising a total of no less than 120 credits.
- passing grades in compulsory and recommended courses encompassing at least 105 credits.

The programme is designed so that students, when they graduate, have fulfilled Swedish national requirements for a Master degree.

Students must apply for the degree through the web service by logging into "Personal menu" applications for degrees. For further information visit www.kth.se

Degree name

Degree of Master of Science in Biotechnology (120 credits)

[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 2017

General courses

Year 1

Mandatory courses (60.0 credits)

Course code	Course name	Credits	Edu. level
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5	Second cycle
BB1030	Microbiology <i>Mandatory for CTKEM students</i>	9.0	First cycle
BB1300	Cultivation Technology <i>Mandatory for students who have not studied the programme CBIOT at KTH</i>	7.5	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

Recommended courses

Course code	Course name	Credits	Edu. level
AK2008	Ethics of Biotechnology	7.5	Second cycle
AL2140	Cleaner Production	7.5	Second cycle
BB1000	Programming in Python	7.5	First 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

Course code	Course name	Credits	Edu. level
BB2330	Plant Biotechnology	7.5	Second cycle
BB2420	Glycobiology and Carbohydrate Technology	7.5	Second cycle
BB2445	The Immune System in Health and Disease	6.0	Second cycle
KD2310	Advanced Organic Chemistry	7.5	Second cycle
KD2320	Spectroscopic Tools for Chemistry	9.0	Second cycle
ME2824	From Science to Business- Concepts in Biotechnology	7.5	Second cycle
MJ2659	Technology and Ecosystems, Larger Course	7.5	Second cycle

Supplementary information

Study year 1 consists of mandatory courses and recommended courses. Recommended courses may be cancelled if number of admitted students are less than minimum of places.

The course BB1300 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
BB2255	Applied Gene Technology	7.5	Second cycle
BB2445	The Immune System in Health and Disease	6.0	Second cycle
BB2570	System Analysis and Life Cycle Assessment	7.5	Second cycle
KD2320	Spectroscopic Tools for Chemistry	9.0	Second cycle
KE2325	Process Design for Industry and Society	15.0	Second cycle

Year 3



Appendix 2: Specialisations

Master's Programme, Industrial and Environmental Biotechnology, 120 credits
(TIMBM), Programme syllabus for studies starting in autumn 2017

This programme has no specialisations.