



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 19 (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:

- demonstrate broad knowledge and understanding of biotechnology as well as deep knowledge and understanding of subject areas.
- demonstrate 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.
- demonstrate 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:

- critically and systematically integrate knowledge and be able to analyze, judge and handle complex phenomena, questions and situations even with limited information.
- critically, independently and creatively identify and formulate questions and problems.
- be able 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.
- communicate knowledge in writing and verbally as well as discuss own conclusions and supporting arguments in national and international contexts for different audiences.
- demonstrate 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:

- critically evaluate relevant scientific, societal and ethical aspects on questions and problems within biotechnology and consider ethical aspects concerning research and development.
- recognize possibilities and limits of science and its role in society.
- show 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.

The programme is organized in three study tracks:

- cell-based process biotechnology
- enzyme biotechnology and
- environmental biotechnology

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/Engelska 6 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

The master program in Industrial and Environmental Biotechnology offers second cycle courses in three study tracks. Students must complete all courses within one of the study tracks: cell-based process biotechnology, enzyme biotechnology or environmental biotechnology. In addition, courses from any of the study tracks within the programme or within the programme in medical biotechnology can be chosen. Students are recommended to take all courses within two study tracks. Students may choose to study other courses of relevance for their future profession. There is an ongoing update of the master program and minor changes to the curriculum may occur.

Courses

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

Courses are organised to follow academic progression within each study track and students are recommended to follow the suggested outline. If other combinations of courses are studied it is important to check the prerequisites for each course. Courses belonging to each study track are listed in appendix 1. The courses are under revision and there may be minor deviations from this list during the two study years.

Graduation from the program requires at least 90 higher education credits in biotechnology. Students must complete all courses within the chosen study track. Optional courses relevant for the future profession as a master of science in biotechnology, are chosen freely by the student if they fulfil the program scope.

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 their studies in the end of August. To register, the student must be present in person at the programme start.

Participation requires admission to courses within the programme and course registration. Course registration is done via the personal menu at www.kth.se

Course selections for upcoming semesters are done no later than November 15 and May 15 each academic year.

Special admission requirements to each course are specified in the course syllabus.

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 must be on a level and have content that complies with the program's educational goals. Transfer of credits is decided by the program director.

KTH's guideline for the crediting of university education can be found in the KTH Regulations 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 degree project is the final part of the education. The project work may begin when special admission requirements for the course are fulfilled.

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 thesis will be conducted within major subject areas of Biotechnology. Degree projects in related fields have to be approved by the Director of Undergraduate studies at the School of Biotechnology. For more information, contact the School of Biotechnology 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:

Approved final grade in all courses within at least one of the major subject areas: cell-based process biotechnology, enzyme biotechnology or environmental biotechnology.

Passed second cycle courses selected from the major subject Biotechnology, encompassing at least 90 credits.

Passing grades in courses on the programme comprising a total of no less than 120 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 2019

General courses

Year 1

Mandatory courses (28.5 credits)

Course code	Course name	Credits	Edu. level
AK2030	Theory and Methodology of Science (Natural and Technological Science)	4.5	Second cycle
BB1160	Eucaryotic Cell Biology <i>Mandatory for students with background other than bachelor in biotechnology at KTH</i>	7.5	First cycle
BB2165	Biomolecular Structure and Function	7.5	Second cycle
CB1000	Sustainable development and project management <i>Mandatory for students lacking prior courses in sustainable development and project management</i>	3.0	First cycle
ME1003	Industrial Management, Basic Course	6.0	First cycle

Recommended courses

Course code	Course name	Credits	Edu. level
BB1000	Programming in Python <i>Recommended for students lacking prior courses in programming</i>	7.5	First cycle
BB1030	Microbiology <i>Mandatory for students from programme CTKEM at KTH</i>	9.0	First cycle
BB1300	Cultivation Technology <i>Mandatory for students from programme CTKEM at KTH</i>	7.5	First cycle

Supplementary information

The student should complete all courses within the chosen specialisation. In order to graduate at least 90 credits within the field of Biotechnology is required. To complete two specialisations is recommended.

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

Supplementary information

The student should complete all courses within the chosen specialisation. In order to graduate at least 90 credits within the field of Biotechnology is required. To complete two specialisations is recommended.

Track, Cell Based Process Biotechnology (CBPB)

Year 1

Mandatory courses (22.5 credits)

Course code	Course name	Credits	Edu. level
BB2020	Molecular Enzymology	7.5	Second cycle
BB2450	The Cell Factory	7.5	Second cycle
BB2485	Metabolic Engineering	7.5	Second cycle

Year 2

Track, Environmental Biotechnology (ENBT)

Year 1

Mandatory courses (22.5 credits)

Course code	Course name	Credits	Edu. level
BB2015	Environmental Toxicology	7.5	Second cycle
BB2560	Advanced Microbiology and Metagenomics	7.5	Second cycle
BB2570	System Analysis and Life Cycle Assessment	7.5	Second cycle

Year 2

Track, Enzyme Biotechnology (ENZB)

Year 1

Mandatory courses (22.5 credits)

Course code	Course name	Credits	Edu. level
BB2020	Molecular Enzymology	7.5	Second cycle
BB2425	Glycobiotechnology	7.5	Second cycle
BB2460	Biocatalysis	7.5	Second cycle

Year 2



Appendix 2: Specialisations

Master's Programme, Industrial and Environmental Biotechnology, 120 credits
(TIMBM), Programme syllabus for studies starting in autumn 2019

Track, Cell Based Process Biotechnology (CBPB)

Track, Environmental Biotechnology (ENBT)

Track, Enzyme Biotechnology (ENZB)