



Programme syllabus

[An accessible version of the syllabus can be found in the Course and programme directory.](#)

Degree Programme in Biotechnology 300 credits

Civilingenjörsutbildning i bioteknik

Valid for students admitted to the education from autumn 21 (HT - Autumn term; VT - Spring term).

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

Programme objectives

Knowledge and understanding

For a Master of science in engineering degree in Biotechnology, the student should:

- demonstrate knowledge of the scientific basis and proven experience of biotechnology and insight into current research and developmental work
- show both broad knowledge in biotechnology, including knowledge in mathematics and science, as well as significant in-depth knowledge in certain parts of the field

Skills and abilities

For a Master of science in engineering degree in Biotechnology, the student should:

- **demonstrate** the ability to critically, independently and creatively identify, formulate and manage complex issues with a holistic approach and to participate in research and developmental work and thereby contribute to the development of knowledge;
- **demonstrate** the ability to create, analyze and critically evaluate various technical solutions;
- **demonstrate** the ability to plan and execute, using appropriate methods, complex tasks within a given framework;
- **demonstrate** the ability to critically and systematically integrate knowledge
- **demonstrate** the ability to model, simulate, predict and evaluate events even with limited information;
- **demonstrate** the ability to develop and design products, processes and systems with regard to people's conditions and needs and society's goals for economically, socially and ecologically sustainable development;
- show ability for teamwork and collaboration in groups with different compositions
- **demonstrate** the ability, both in writing and orally, both in national and international contexts, to clearly explain and discuss in dialogue with various groups their conclusions and the knowledge and arguments that underlie them.

Ability to make judgements and adopt a standpoint

For a Master of science in engineering in Biotechnology, the student should be able to

- demonstrate the ability to make judgments with regard to relevant scientific, social and ethical aspects as well as show awareness of ethical aspects in research and developmental work;
- show insight into the possibilities and limitations of technology, its role in society and people's responsibility for its use, including social and economic aspects, as well as environmental and work environment aspects, and
- demonstrate the ability to identify their need for additional knowledge and to continuously develop their skills.

Extent and content of the programme

The Master of science in engineering in Biotechnology includes 300 higher education credits, which is equivalent to 5 years of full-time studies (10 semesters). During the first three years (180 higher education credits), basic courses in the major field of study in biotechnology, as well as other technical fields of study such as chemistry, mathematics, physics and engineering skills are read. Year 3 concludes with a thesis for the Bachelor of science in engineering degree. Prior to year 4 and

5, one of four master programmes (120 higher education credits) is selected and courses are taken at the advanced level, according to the respective program. The program concludes with an independent degree project. After completed studies, a Master of science in engineering degree is obtained.

The master programmes offered are:

- Industrial & environmental biotechnology
- Medical biotechnology
- Macromolecular Materials *
- Molecular science and technology **

* To obtain a Master of science in engineering degree in Biotechnology, you must choose 2 of the following courses; BB2460 Biocatalysis, 7.5 credits, BB2020 Molecular Enzymology, 7.5 credits, BB2425 Glycobotics, 7.5 credits

** To obtain a Master of science in engineering degree in Biotechnology, the following courses should be taken BB2460 Biocatalysis, 7.5 credits and BB2020 Molecular Enzymology, 7.5 credits

The offered master programmes may be revised. An updated list of master programmes can be found on KTH's student web site for each academic year.

Language

The language of instruction for the first three years of education is mainly Swedish, but English literature is common. The final two-year courses are given in English. The language of a course is in the syllabus on KTH's student web site.

Eligibility and selection

Admission to the Master of science in engineering in biotechnology requires the following:

Basic eligibility for university studies including prior knowledge in Swedish and English and see below;

Secondary school before July 1, 2011 and upper secondary education before July 1, 2012

Area access 9 *

Special eligibility:

Mathematics E, physics B and chemistry A. In each of the subjects the grade Pass or 3 is required.

Secondary school from 1 July 2011 and upper secondary education from 1 July 2012 (Gy2011)

Area permission A9 *

Special eligibility:

Physics 2, Chemistry 1 and Mathematics 4. In each of the subjects, a passing grade is required.

* For more information on area permissions, see www.hsv.se

For eligibility requirements and selection principles, see KTH's admission scheme at www.kth.se

Implementation of the education

Structure of the education

Academic year

The KTH academic year is 40 weeks, divided into four periods. The study periods correspond to about seven weeks. Each study period is followed by an examination period. For details about the structure of the academic year see; "student at kth/timetables" at www.kth.se.

First cycle

The first three years consists of compulsory courses in natural sciences to provide fundamental knowledge and skills. The Study programme contains courses in Biotechnology, Chemistry, Mathematics and Engineering skills but it also includes two conditionally elective courses. The cycle also contains two independent projects and a diploma at the level of Bachelor of Science, in Biotechnology.

The course curriculum is presented in appendix 1.

Second cycle

During the second cycle, study year 4 and 5, one of the following master programmes are studied;

Industrial and Environmental Biotechnology, Medical Biotechnology, Macromolecular Materials, Molecular Science and Engineering.

The Master selection is done 1-15 May.

Courses

The programme is course-based. Lists of courses are included in appendix 1.

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

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

If a student registers for a course and then decides to not continue, the student must report this as soon as possible.

For students starting their education from the autumn semester 2018, previous promotion requirements have been replaced with special admission requirements to each course. Admission requirements are specified in the course syllabus.

Application for admission to courses will be made at:

- 1th-15th of May for the fall term.
- 1th-15th of November for the spring term.

In order to be eligible for advanced level studies within the integrated Master of Science programmes at KTH, you are required to complete 150 ECTS credits from year one through three. Of these, 110 ECTS credits must be from the year 1 and 2 curriculum. In addition to these credits, the bachelor thesis needs to be completed before Master's level studies commence.

Selecting a masters programme

Industrial and Environmental Biotechnology

You should study the conditionally elective courses BB1070 Genetics and KD1270 Organic Chemistry, Basic Concepts and Practice 2.

Medical Biotechnology

You should study the conditionally elective course BB1070 Genetics.

Macromolecular Materials

You should study the conditionally elective KD1070 Molecular Structure.

Molecular Science and Engineering

You should study the conditionally elective course D1070 Molecular Structure and KD1270 Organic Chemistry, Basic Concepts and Practice 2.

Degree project

Degree project, first level

The diploma work done in grade 3 is a thesis for a Degree of Bachelor of Science conducted in a course of 15 credits.

The degree project is the final part of the first level education. The project work may begin when special admission requirements for the course are fulfilled.

Degree project, advanced level

In the programme a final diploma work is done, i.e. a thesis for the Degree of Master of Science in Engineering/Master of Science (120 credits) corresponding to 30 credits.

The degree project is the final part of the second level education. The project work may begin when special admission requirements for the course are fulfilled.

For further information see KTH comprehensive rules and guidelines for thesis 30 credits at www.kth.se

Degree

Degree Name

Civilingenjörsexamen

Degree of Master of Science in Engineering, Degree Programme in Biotechnology

Conditions for the Degree of Master of Science in Engineering 300 credits

The Master of Science in Engineering degree is received after completing all the courses at the first and second cycles of education at the degree programme in biotechnology according to the programme specifications.

Students taking the master programs Macromolecular Materials or Molecular Science and Engineering, should have at least 15 credits of biotechnology courses at advanced level.

Application for graduation Students are requested to apply for the degree through the web service by logging into Personal menu/Application for degrees. For further information see www.kth.se

It is possible to apply for the following degrees: Degree of Master of Science in Engineering; Degree Programme in Biotechnology, Degree of Bachelor of Science and Degree of Master of Science.

For further information see; "Local regulation for qualifications at first and second cycle" at www.kth.se

Appendix 1 - Course list

Appendix 2 - Programme syllabus descriptions



Appendix 1: Course list

Degree Programme in Biotechnology (CBIOT)

General courses

Year 1

Mandatory courses (64.5 Credits)

Code	Name	Credits	Edu. level
BB1030	Microbiology	9.0 hp	First cycle
BB1150	Biochemistry 1	7.5 hp	First cycle
BB1160	Eucaryotic Cell Biology	7.5 hp	First cycle
BB1170	The Engineer in Focus	6.0 hp	First cycle
BB1190	Gene Technology	7.5 hp	First cycle
KD1020	Introductory Chemistry	6.0 hp	First cycle
KD1230	Organic Chemistry, Basic Concepts and Practice	6.0 hp	First cycle
KE1180	Introduction to Chemical Engineering	7.5 hp	First cycle
SF1625	Calculus in One Variable	7.5 hp	First cycle

Optional courses

Code	Name	Credits	Edu. level
KE0110	Introductory Course in Chemistry	1.5 fup	Pre-university level
SF0003	Introductory Course in Mathematics	1.5 fup	Pre-university level

Supplementary information

Study year 1 consists of mandatory courses.

Year 2

Mandatory courses (63.0 Credits)

Code	Name	Credits	Edu. level
BB1000	Programming in Python	7.5 hp	First cycle
BB1170	The Engineer in Focus <i>Continues from year one</i>	6.0 hp	First cycle
BB1200	Analysis of Biomolecules	6.0 hp	First cycle
BB1210	Purification of Biomolecules	6.0 hp	First cycle
BB1230	Biochemistry 2	6.0 hp	First cycle
CB1010	Project in Sustainable Development	3.0 hp	First cycle
KD1510	Chemical Equilibrium	6.0 hp	First cycle
SF1525	Basic Course in Numerical Methods	6.0 hp	First cycle
SF1624	Algebra and Geometry	7.5 hp	First cycle
SK1150	Fundamental Physics I	9.0 hp	First cycle

Supplementary information

This is a preliminary list of courses for study year 2 for those who started the program 2020. There might be changes.

Study year 2 consists of mandatory courses.

SF1524 - Basic Numerical Methods and Programming, will be replaced with a new 6 credits course.

Year 3

Mandatory courses (51.0 Credits)

Code	Name	Credits	Edu. level
BB103X	Degree Project in Biotechnology, First Cycle	15.0 hp	First cycle
BB1170	The Engineer in Focus <i>Continues from study year 1 and study year 2</i>	6.0 hp	First cycle
BB1300	Cultivation Technology	7.5 hp	First cycle
CB1020	Project in Mathematical Modelling	3.0 hp	First cycle
KD1500	Physical Biochemistry	7.5 hp	First cycle
SF1911	Statistics for Bioengineering	6.0 hp	First cycle
SI1410	Basic Modeling in Biotechnology	6.0 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
BB1070	Genetics <i>Mandatory for master programme TIMBM and TMBIM</i>	6.0 hp	First cycle
KD1070	Molecular Structure <i>Mandatory for master programme TMMMM and TMVTM</i>	6.0 hp	First cycle
KD1270	Organic Chemistry, Basic Concepts and Practice 2	7.5 hp	First cycle
SF1626	Calculus in Several Variables	7.5 hp	First cycle

Supplementary information

This is a preliminary list of courses for study year 3 for those who started the program 2020.

There might be changes.

Study year 3 consists of mandatory courses, 2 conditionally elective courses and ends with a degree project, first level.

The course KD1070 is mandatory for the masterprogrammes in Macromolecular Materials (TMMMM) and Molecular Science and Engineering (TMVTM).

The course BB1070 Genetics is mandatory for the masterprogrammes in Industrial and Environmental Biotechnology (TIMBM) and Medical Biotechnology (TMBIM).

Information regarding conditionally elective courses

In addition to the listed conditionally elective courses you have the option to choose language or economics.

Observe that the course selection affects your ability to apply for certain second cycle courses.

Year 4

Supplementary information

During study year 4 and 5 one of the four Masters programme should be taken:

- Master - Industrial and Environmental Biotechnology
- Master - Medical Biotechnology
- Master - Macromolecular Materials
- Master - Molecular Science and Engineering

Year 5

Supplementary information

During study year 4 and 5 one of the four Masters programme should be taken:

- Master - Industrial and Environmental Biotechnology
- Master - Medical Biotechnology
- Master - Macromolecular Materials
- Master - Molecular Science and Engineering

Study year 5 ends with a degree project, second level, 30 credits.



Appendix 2: Specialisations

Degree Programme in Biotechnology (CBIOT)

This programme has no specialisations.