Programme syllabus

Master's Programme, Biotechnology, 120 credits
Masterprogram, bioteknik
120.0 credits

Valid for students admitted to the education from autumn 09 (HT - Autumn term; VT - Spring term).

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

Programme objectives

Knowledge and understanding

To receive a Degree of Master of Science in Biotechnology, the students should:

- demonstrate knowledge and skills in basic scientific and technical subjects that are of importance for Biotechnology and Chemistry
- be able to use information and communicate with experts in the related areas of Biotechnology such as physics, chemistry, biology and medicine
- demonstrate knowledge of biological and chemical processes at the molecular, cellular and organism level and to assess the applicability of the models used in different contexts
- show significantly advanced knowledge and understanding of current research and development in any part of Biotechnology
- demonstrate some knowledge of Swedish and international Biotechnology industry

Skills and abilities

To receive a Degree of Master of Science in Biotechnology, the students should:

- demonstrate the ability of a scientific approach and analytical thinking and the ability to plan, implement and evaluate experiments
- show a good understanding of methods and techniques that allow modern Biotechnology
- demonstrate the ability to orally and in writing, present and discuss ideas and outcomes and communicate and collaborate with persons with or without the technical and scientific background
- demonstrate skills and ability, which represent a foundation for postgraduate studies in Biotechnology

Ability to make judgements and adopt a standpoint
To receive a Degree of Master of Science in Biotechnology, the students should:

- demonstrate a responsible attitude and the ability to take a stand on issues of ethical nature in the application areas of Biotechnology
- demonstrate the ability to rapidly acquire knowledge in new areas and in the field of Biotechnology to apply those for technological innovation and development
- demonstrate the ability to critically review the literature and technologies in Biotechnology and related areas.

**Extent and content of the programme**

Nominal study period is 2 years, which corresponds to 120 credits at advanced level. The programme is given in English.

**Eligibility and selection**

In order to be admitted to the programme, a completed Bachelor's degree, corresponding to a Swedish Bachelor's degree (180 ECTS), or equivalent academic qualifications from an internationally recognised university is required. In addition to the general admission requirements, this program requires a background in biochemistry, chemistry, microbiology and molecular biology. The courses should be of university level and comprise at least 90 ECTS credits representing the above mentioned subjects in any combination. A good knowledge of English, equivalent to Eng B is required. Applicants from outside the Nordic countries and who do not have English as their native tongue, a completed TOEFL language test with a minimum score of 600 (245, for computer-based test, or 85, for internet-based test) or an IELTS test with minimum score of 6.5, is a requirement. The selection of the program is based on the following criteria: University / College, grades, relevant courses, personal letters, Work and References. If seats remain after admission referred to above, the requirement of grades in English will be reduced until the correct number of admitted students is reached.

**Implementation of the education**

**Structure of the education**

The school year is normally divided into 4 study periods and two or three courses are taken simultaneously at each period. Teaching and examination methods vary between courses. Normally, a proportion of the course is lectures, which gives an introduction with the concepts and theories. Exercises, seminars and laboratory work enhance the understanding of the theoretical relationship. In order to create a continuity of the program collaboration between courses is emphasized. The programme is completed by doing a Master’s thesis equivalent to 30 credits. The programme consists of a number of mandatory courses and two focus areas, Molecular Biotechnology and Industrial biotechnology. These two focus areas have separately a number of mandatory and recommended courses. In the second year, there's an opportunity for students to freely choose courses. To receive a Degree of Master of Science in Biotechnology, the students should have passing grades in all the mandatory and optional courses, which including the thesis will comprise 120 ECTS.

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

The course list can be found 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.

A seven scaled grading system from A-F is used for courses at basic and advanced level at KTH. A-E are passing grades, where A is the highest grade. The grades pass (P) and fail (F) are used for courses under certain circumstances. The grade Fx implies an opportunity to complement a failed grade to the passing grade (E).

**Conditions for participation in the programme**

Semester registration/study notification must be done before each semester. This is made on the Web and recorded by Student Office at the School of Biotechnology. Anyone who intends to take a break in the studies must apply for that in advance. Mandatory course registration is done at the course start for each course.

**Conditions for advancement**

Some courses have special prerequisites or conditions for participation in the exam. This will be assigned in the syllabus.

**Choice of course**

The students will be registered at the compulsory courses by the student office of BIO, this also happens after choice of the focus area. For courses in the focus area in the second year, the students have to register their courses via "My Pages" by themselves. No place restriction exists for the focus area.

**Course Registration**

Each student should register for the course on the first scheduled lecture. Students, who has been registered on a course and then decides not to pursue the course, must notify that immediately to the teacher who is responsible for the course. It is each student's responsibility to ensure that prerequisites from previous courses are reached before starting a new course. Information about prerequisites is assigned in the respective syllabus.

**Study break**

To take a break in the studies means that the student does not participate in lectures for at least one semester. Approved study break gives the student the right to return to the studies at the stated date. During this break, the student may do supplementary examinations and participate in examinations in previously started courses. The application concerning a study break must be handed in to the student office. When the student intends to resume the studies, a semester registration is required, see Conditions for participation in the programme. After the study break, if the student has not applied for the semester registration or prolonged study break, it will be recorded as a withdrawal from the programme.
Recognition of previous academic studies

The student has the right to transfer course credits from the college / university within or outside the country. The precondition is that the course / courses are of such a nature and have such an extent that they basically correspond to the qualification criteria for the programme.
In the case of whole courses, it must be checked by the programme director. Part of a course is checked by the examiner.

Studies abroad

Students in the program have no opportunity to study abroad. The only exception is the Master’s thesis, that after the approval from the examiner, could be located elsewherer or in another country, either in industry or other academic organization.

Degree project

The program includes a Master’s thesis of 30 credits. That means about 20 weeks of full-time studies. The thesis must be done in the chosen focus area of the programme. The thesis project should provide the students an insight into a research and development projects. It may also be of investigative nature.

The thesis is graded according to the scale A-F, based on the KTH-common assessment and criteria. In the thesis project, students demonstrate the ability to independently apply the knowledge they have acquired during the studies.

The student may start with the thesis when 60 credits are achieved. Exemption can be granted after a checkup by the programme director. It is the responsibility of the examiner to ensure that students have the in-depth studies in the focus area, as regarded above. The project may be carried out either in an academic environment or in an industrial setting. It can also be carried out abroad. Examiner for the thesis must always be a teacher, who is employed at the Royal Institute of Technology. Supervisors are appointed by the examiner. Several supervisors can be appointed.

If the thesis is performed in a company, a supervisor should also be appointed at the company. Before the thesis is started, it must be approved by the examiner and recorded by the School of Biotechnology, when an application is handed in to the Student Office of Biotechnology in AlbaNova.

The thesis project will consist of literature search, experimental and / or theoretical work. It will be presented both in a written statement in English, and orally at a seminar. It is the responsibility of the examiner to ensure that the thesis is performed and presented as above.

Degree

To receive a Degree of Master of Science in Biotechnology passing grades in all courses that are included in the student's study plan, are required. The study plan consists of the mandatory courses, the recommended and / or conditionally elective courses that the students have followed and the thesis. The study plan should include at least 120 credits. For receiving a degree certificate, the student need to apply for it on an application form and provide a copy of a student union card, copy of receipts or a certificate from the student union for paid union fee.
Appendix 1 - Course list
Appendix 2 - Programme syllabus descriptions
Appendix 1: Course list

Master's Programme, Biotechnology, 120 credits (TBIOM), Programme syllabus for studies starting in autumn 2009

General courses

Year 1

Mandatory courses (46.5 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB2020</td>
<td>Molecular Enzymology</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>BB2040</td>
<td>Biochemical Analyses and Separation Techniques</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>BB2160</td>
<td>Structure Biology</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>BB2240</td>
<td>Introduction to Biotechnology</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>BB2250</td>
<td>Applied Gene Technology</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>DD2396</td>
<td>Bioinformatics</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>DS2301</td>
<td>Scientific Writing</td>
<td>3.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>LI1081</td>
<td>Information Searching</td>
<td>1.5 hp</td>
<td>First cycle</td>
</tr>
</tbody>
</table>

Year 2

Mandatory courses (45.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK2036</td>
<td>Theory and Methodology of Science with Applications (Natural and Technological Science)</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>BB202X</td>
<td>Degree Project in Molecular Biotechnology, Second Cycle</td>
<td>30.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>BB2310</td>
<td>Research Topics in Biotechnology</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Industrial Biotechnology (IBT)

Year 1
### Mandatory courses (18.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB2070</td>
<td>Biochemical Technology</td>
<td>10.5 hp Second cycle</td>
</tr>
<tr>
<td>BB2150</td>
<td>Industrial and Environmental Microbiology, Theory</td>
<td>7.5 hp Second cycle</td>
</tr>
</tbody>
</table>

### Year 2

### Mandatory courses (15.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB2030</td>
<td>Enzymatic Synthesis</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>BB2420</td>
<td>Glycobiology and Carbohydrate Technology</td>
<td>7.5 hp Second cycle</td>
</tr>
</tbody>
</table>

### Molecular Biotechnology (MBT)

### Year 1

### Mandatory courses (16.5 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB2170</td>
<td>Drug Development</td>
<td>6.0 hp Second cycle</td>
</tr>
<tr>
<td>BB2320</td>
<td>Proteomics Technologies</td>
<td>4.5 hp Second cycle</td>
</tr>
<tr>
<td>BB2370</td>
<td>Nanobiotechnology</td>
<td>6.0 hp Second cycle</td>
</tr>
</tbody>
</table>

### Year 2

### Mandatory courses (15.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB2290</td>
<td>Molecular Biomedicine</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>DD2397</td>
<td>Applied Bioinformatics</td>
<td>7.5 hp Second cycle</td>
</tr>
</tbody>
</table>
Appendix 2: Specialisations

Master's Programme, Biotechnology, 120 credits (TBIOM),
Programme syllabus for studies starting in autumn 2009

Industrial Biotechnology (IBT)
Molecular Biotechnology (MBT)