



**Karolinska
Institutet**

Programme syllabus for

Master's Programme in Biomedicine, 120 credits

Masterprogrammet i biomedicin, 120 hp

Basic programme information

Programme code	4BI11
Name of the programme	Master's Programme in Biomedicine
Number of credits	120.0 credits (120.0 ECTS credits)
Starting date	The syllabus applies to students who commence their studies in or after autumn 2011.
	Approved revisions of the syllabus are described under the heading Transitional Provisions.
Decision date	2010-11-09
Decided by	Board of Higher Education
Last revision	2013-12-13
Revised by	Board of Higher Education
Reference number	3-3000/2013
Specific eligibility requirements	A Bachelors degree or a professional degree worth at least 180 credits in biomedicine, biotechnology, cellular and molecular biology, medicine, or the equivalent. And proficiency in English equivalent to English B/English 6.
Main field of study	Biomedicine
Qualification	Medicine masterexamen med huvudområdet biomedicin <i>Degree of Master of Medical Science (120 credits) with a Major in Biomedicine</i>
	Upon request, a student who meets the requirements for a qualification is to receive a diploma.

Outcomes

Outcomes of second cycle education according to the Higher Education Act

Second-cycle courses and study programmes shall be based fundamentally on the knowledge acquired by students during first-cycle courses and study programmes, or its equivalent.

Second-cycle courses and study programmes shall involve the acquisition of specialist knowledge, competence and skills in relation to first-cycle courses and study programmes, and in addition to the requirements for first-cycle courses and study programmes shall:

- further develop the ability of students to integrate and make autonomous use of their knowledge,
- develop the students' ability to deal with complex phenomena, issues and situations, and
- develop the students' potential for professional activities that demand considerable autonomy, or for research and development work.

Outcomes of the Degree of Master (120 credits) according to the Higher Education Ordinance

Knowledge and understanding

For a Degree of Master of Science (120 credits) the student shall

- demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and
- demonstrate specialised methodological knowledge in the main field of study.

Competence and skills

For a Degree of Master of Science (120 credits) the student shall

- demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information
- demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work
- demonstrate the ability in speech and writing both nationally and internationally to report clearly and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and
- demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

Judgment and approach

For a Degree of Master of Science (120 credits) the student shall

- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

Outcomes of the study programme at Karolinska Institutet

Knowledge and understanding

Students must:

- demonstrate general and integrated understanding of molecular, cellular and organ biology processes and their relationship with disease in humans, and considerably deeper knowledge of certain biomedical subject areas,
- demonstrate in-depth knowledge of relevant experimental methods within the field of biomedicine, including the theoretical background, implementation, applications and limitations of the methods, as well as the necessary precautions, and deeper knowledge of experimental methods within certain parts of the field of biomedicine, and
- demonstrate knowledge of statistical methods which are used within biomedicine and bioinformatics.

Competence and skills

Students must:

- demonstrate insight into the biomedical research process, both individually and working with others to have good abilities to formulate relevant hypotheses within the field of biomedicine and, on the basis of these, to plan and carry out studies and experiments, document and analyse observations and assess the relevance of these observations,
- demonstrate an ability to apply for the relevant permissions and funding for carrying out studies within the field of biomedicine,
- demonstrate a good ability to independently find, summarise and assess scientific information within the field of biomedicine, and to be able to use this information in other problems, and
- demonstrate a good ability, both orally and in writing, to account for a biomedical problem/project in English, both for experts and for the public.

Judgment and approach

Students must:

- demonstrate a good insight into research techniques, as well as respect for patients' integrity and safety and for ethical aspects of experiments in which human samples and live animals are used, and
- be able to evaluate information and relate this to established knowledge within the field of biomedicine.

Description of the main field of study

The scientific basis for the main field of study, biomedicine, consists of explanations in the natural sciences for the functioning of the human body in health and disease. This includes processes at the molecular, cellular, organ and organism levels and interaction with chemical, physical and biological factors in the environment. The main field of study also includes the foundations and application of the methods used to acquire in-depth knowledge in the area and improve preventive methods, diagnostic methods and methods of treating diseases. Owing to its breadth, extending from fundamental physical principles to applications in clinical medicine, biomedicine is by nature interdisciplinary.

Through studies in biomedicine, students develop knowledge on:

- the natural sciences basis of the principal area of study
- pharmacological treatments and other therapies, and
- significance of individual variations for development of disease

Knowledge in the area is applied in particular in the continued development of biomedicine through research. The knowledge acquired is additionally applied in the development and testing of new medicines and when information on these and other biomedical knowledge is presented to the public and to experts. All application has to take place on the basis of a professional approach and in accordance with accepted ethical principles in biomedicine.

Content and structure

The education is based on - and requires - basic biological knowledge gained at bachelor's degree level. The teaching is primarily based on project work, both individual and in group, and the content focuses consistently on biomedical research.

During the first semester, a course in biomedical communication including philosophy of science and bioethics is given, along with a course in advanced translational medicine with a focus on molecular mechanisms and points of attack for common public diseases.

Semester 2 consists of advanced courses in biostatistics, bioinformatics and laboratory animal science. The opportunity is also provided during the second term to gain deeper knowledge within the field of biomedicine through elective courses of relevance to biomedicine, worth a total of 9 higher education credits. One of the elective courses consists of an individual project course, which allows students to gain further depth in theoretical and practical aspects of research..

Students are given the opportunity during semesters 3 and 4 to specialise and gain further depth in a field of biomedical research through two extended individual projects, whereby they receive sound training in formulating scientific hypotheses, methodology and project planning. One of these is the formal degree project, which provides further training in the ability to analyse, conclude and present, both orally and in writing. Alongside this, research-related advanced elective courses are offered, preferably linked with the project work field.

In order for in-depth methodological and theoretical knowledge to be gained over the course of the education in more than one area, the project performed during semester 3 and the degree project must be carried out within different research groups. In order to provide further training in independent evaluation and the presentation of research, courses including analysis and the presentation of current research data are given alongside other course modules during semesters 2 and 3.

Transitional provisions

Students admitted to the programme in 2011, will after an approved leave from studies follow the study plan for students admitted to the programme in 2012 or later.

Other guidelines

Grading scale

The grades used are Fail, Pass or Pass with Distinction. On the course Applied communication in biomedicine 1 including philosophy of science and bioethics a two-point scale is used, i.e. the grades used are Fail and Pass.

Alternative grading scales may apply to modules within courses, elective courses or cross-programme courses. The grading scale is detailed in the course syllabus.

Language of instruction

The teaching language is English.

Specific eligibility requirements within the programme

See respective course syllabus for course-specific entry requirements.

Contract education

The program is also offered as contract education with the programme code 9BI11.

Study plan with constituent courses

For students starting the programme in 2012 or later:

Semester	Name of the course	Credits	Cycle	Depth of the course
1	Applied communication in biomedicine 1 including philosophy of science and bioethics	8	Second	AV
1	Frontiers in translational medicine	22	Second	AV
2	Laboratory animal science in theory and practice	4,5	Second	AV
2	Biostatistics	6	Second	AV
2	Bioinformatics	5,5	Second	AV
2	Applied communication in biomedicine 2	5	Second	AV
2	Elective courses	9	Second	AV
3	Applied communication in biomedicine 3	2,5	Second	AV
3	Applied communication in biomedicine 4	2,5	Second	AV
3	Research project	16	Second	AV
3	Elective courses	9	Second	AV
4	Degree project in biomedicine	30	Second	AV

For students starting the programme in 2011:

Semester	Name of the course	Credits	Cycle	Depth of the course
1	Advanced preparatory course in biomedical research	8	Second	Av
1	Frontiers in translational medicine	22	Second	Av
2	Laboratory animal science	4,5	Second	Av
2	Biostatistics	6	Second	Av
2	Bioinformatics	5,5	Second	Av
2	Biomedical communication 1	5	Second	Av
2	Elective courses	9	Second	
3	Biomedical communication 2	2,5	Second	Av
3	Research project including research proposal	16	Second	Av
3 and 4	Elective courses	9	Second	
3 and 4	Degree project in biomedicine	30	Second	Av
4	Biomedical communication 3	2,5	Second	Av