



Approved by the Board of the Faculty of  
Medicine 20 September 2011  
Valid from autumn semester 2012

**LUND UNIVERSITY**  
Faculty of Medicine

Faculty Board

## Master of Medical Science in Biomedicine

120 credits      Second cycle      LADOK code VABME

### Programme description

The Master's programme contains courses in the main field of biomedicine. It is designed to provide students with a broad range of knowledge and enable them to acquire in-depth knowledge and specialisation through combinations of compulsory and elective courses. The programme results in a degree of Master of Science (120 credits) in Biomedicine.

The aim of the programme is to train students to acquire cutting-edge skills in biomedicine, qualifying them to participate independently and in leading functions in medical research and development, in the university context as well as in business and industry and in the public sector. A completed Master's programme can, if approved by a relevant authenticating body, be included as part of a third-cycle programme.

Second-cycle courses in a range of current research and technology fields (such as cell and tissue culture, transgenic animal technology, immunology, neurobiology, tumour biology and pathobiology, genomics and proteomics) are intended to prepare students for modern experimental medical research and development. There are also opportunities for specialisation in adjacent and complementary subjects in the programme, for example in the field of laboratory medicine and through cooperation with other faculties at Lund University.

### Learning outcomes

On completion of the programme the student shall have achieved the outcomes specified in the Higher Education Act and the qualifications ordinance of the Higher Education Ordinance (SFS 1993:100 with amendments, Annex 2):

#### *Knowledge and understanding*

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

- demonstrate knowledge and understanding in the main field of biomedicine, 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 field of biomedicine.

#### *Competence and skills*

For a 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
- demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity
- demonstrate the ability to participate in and lead team work with other professional categories in the field of biomedicine
- demonstrate the ability to communicate and apply biomedical knowledge in an accessible way.

#### *Judgement and approach*

For a 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.

#### **Specific outcomes for the Master of Science in Biomedicine at Lund University**

The graduate student shall be able to

- immediately find his/her role in a research group or equivalent and actively contribute to its operations
- apply sophisticated and relevant methodology for experimental research in biomedicine
- independently address scientific issues and propose ways of solving them, theoretically or practically
- independently apply and critically review biostatistical methods of relevance for biomedical research.

Independent project (degree project)

A requirement for the award of a Master of Science (120 credits) is completion by the student of an independent project (degree project) for at least 30 credits in the main field of study. The

degree project may comprise less than 30 credits, however no less than 15 credits, if the student has already completed an independent project in the second cycle for at least 15 credits in the main field of study or the equivalent from a programme of study outside Sweden.

The independent project is to be presented in a written research report including a popularised summary. The project is also to be presented orally at a seminar in which each student is examined individually by a previously appointed examiner. The student shall also critically examine the degree project of a fellow student.

#### Course details

##### Year 1 – Semester 1: *Advanced methodology in biomedicine*

In this block of courses students acquire in-depth knowledge and skills in modern experimental laboratory work and the most relevant methodology for biomedical research. The course work includes applied biostatistics that is adapted to the issues and data generated by the students in laboratory exercises.

##### Year 1– Semester 2: *Individual focus*

In semester 2 and 3 students are given the opportunity to create an individual focus to their studies by freely selecting from a broad range of courses, both from within the programme and from second-cycle courses offered by higher education institutions in Sweden or abroad. Several different combinations of courses can be made to achieve this individual focus.

##### Year 2 – Semester 3: *Preparatory courses for professional life or research*

In this block also, students have the opportunity to choose freely among the courses offered; some courses are primarily intended to prepare for research whereas other courses are oriented towards professional practice in, for example, the pharmaceuticals industry or other private enterprises. As in semester 2, students also have the opportunity to select courses offered by other faculties or higher education institutions.

##### Year 2 – Semester 4: *Project work*

The last semester of the programme is made up of the independent project (degree project) of 30 credits. Normally, the project is experimental in character and can be completed at another higher education institution or private company in Sweden or abroad.

Appendix 1 provides a schematic layout of the courses included in the programme. In addition to the courses listed under each semester, students may also select “Second-cycle project work 15 credits” and/or “Project planning – theory study 7.5 credits”. These courses can be completed at any stage during the programme and also, if needed, as part-time studies at a rate of 50% or 25%, but each course must be completed in one semester.

## Degree

For a degree of Master of Science in Biomedicine students must have completed a degree project of at least 30 credits and other courses within the programme corresponding to at least 30 credits. The other courses must be clearly specialised in biomedicine or science. A maximum of 15 credits may be from courses in other subjects. On completion of the programme, students are awarded a degree of Master of Science (120 credits) in Biomedicine.

## Admission requirements and selection criteria

In order to be admitted to the programme, students must have:

- basic eligibility and a Bachelor's degree of at least 180 credits in biomedicine, biotechnology, cell and molecular biology or medicine, including a degree project of 15 credits in a biomedical or science subject. The degree must include 30 credits of basic chemistry of which at least 15 credits are in biochemistry, cell chemistry or the equivalent, 45 credits of basic cell biology comprising cell biology, molecular biology, microbiology, immunology, genetics or developmental biology, at least 10 credits of physiology and at least 30 credits of molecular medicine, pathobiology, toxicology and/or pharmacology.
- proficiency in English corresponding to a pass in English B from Swedish upper secondary school or the equivalent.

## Selection

An assessment is made of the quality of the applicants' previous studies, relevant professional or research experience and stated reasons for applying to the programme. Applicants are to submit a statement of purpose, the degree project and/or employer's certificate.

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Course structure for the Master's programme in Biomedicine (120 credits)

Appendix 1

	Study period 1	Study period 2	Study period 3	Study period 4
Year 1	<b>Advanced methodology in biomedicine Compulsory courses semester 1 (autumn)</b>		<b>Individual focus Elective courses semester 2 (spring)</b>	
Courses	Cell and tissue culture, including biostatistics 15 credits	Experimental animal models in biomedical research, including biostatistics 15 credits	Tumour biology 15 credits	Tumour genomics 15 credits
			Clinical microbiology and clinical immunology 7.5 credits	Innate immunity 7.5 credits Molecular and experimental neurobiology 15 credits

	Study period 1	Study period 2	Study period 3	Study period 4
Year 2	<b>Preparatory courses for professional life or research Elective courses semester 3 (autumn)</b>			<b>Project work Compulsory courses semester 4 (spring)</b>
Courses	Human genetics 7.5 credits	Clinical neurobiology 7.5 credits	Biomedicine – the profession (including theory of science and courses corresponding to faculty PhD courses) 15 credits	Independent project/degree project 30 credits
	Clinical chemistry including pharmacology 7.5 credits	Protein design and structural biology for pharmaceuticals development 7.5 credits		
	Molecular endocrinology 7.5 credits			
	Entrepreneurship 7.5 credits			

Courses offered as part-time studies and at any stage of semesters 1–3:  
Second-cycle project work, 15 credits  
Project planning – theory study, 7.5 credits