

## **BIMM02, Biomedicine: Biomedical Methods and Experimental Animal Models, 15 credits**

*Biomedicin: Biomedicinska metoder och experimentella  
djurmodeller, 15 högskolepoäng*  
Second Cycle / Avancerad nivå

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### **Details of approval**

The syllabus was approved by The Master's Programmes Board on 2020-03-31 to be valid from 2020-04-01, autumn semester 2020.

### **General Information**

The course is compulsory in the Master's programme in Biomedicine and is included in semester 1.

*Language of instruction:* English

*Main field of studies*

Biomedicine

*Depth of study relative to the degree  
requirements*

A1F, Second cycle, has second-cycle  
course/s as entry requirements

### **Learning outcomes**

#### **Knowledge and understanding**

On completion of the course, the students shall be able to

- identify laws and ethical regulatory frameworks for the handling of laboratory animals in Sweden and the EU
- describe the reproduction and embryonic development of rodents
- describe how to genetically modify and breed mice, and the genotype and phenotype analysis of laboratory animals
- explain how environmental factors and common infections among laboratory animals can influence experiment results
- give an account of the theoretical principles of biomedical image analysis and bioinformatics, and give examples of areas of application.

## Competence and skills

On completion of the course, the students shall be able to

- formulate an application for ethical approval of laboratory animal testing according to current guidelines
- calculate statistical strength, population size and selection to minimise the use, and maximise the benefit, of experiments involving laboratory animals
- justify the choice of species in the planning of animal testing
- plan, carry out and interpret biomedical image analysis at a photon source or neutron source facility
- provide collegial feedback on research plans
- independently carry out structured searches in databases containing bioinformatics, use analysis and predictive tools, and interpret the results.

## Judgement and approach

On completion of the course, the students shall be able to

- reflect on ethical issues concerning animal testing and databases containing sensitive data
- based on ethics, environmental aspects and sustainable development, evaluate the possibilities and limitations of animal models in biomedical research and propose alternative methods to animal testing
- argue for and discuss the limitations of the biomedical analytical methods that are discussed in the course
- evaluate the scientific and social benefit, as well as the consequences, of the biomedical methods that are discussed in the course.

## Course content

In the course, the students enhance their knowledge and skills with respect to biomedical methods such as image analysis, bioinformatics and experimental animal models.

Through an introduction to different image analysis methods and practical training at photon source and neutron source facilities, the course will guide the students regarding how image analysis experiments at the advanced facilities MAX IV and ESS can be designed, carried out and used to answer biomedical research questions.

In addition to image analysis and bioinformatics, the course also includes general laboratory animal science, which includes knowledge of laws and regulatory frameworks as well as the handling of laboratory animals. Training in practical skills and special tests are offered to students who want to obtain a permit to work with mice and rats in animal sections. Furthermore, training is provided in ethical standpoints and how to write an application for ethical approval of animal testing. In the course, there is a focus on the mouse's reproduction and embryogenesis with a particular emphasis on the practical aspects of collecting preimplantation embryos. The most common methods of generating gene-modified mice are covered in detail. The course concludes with genotype and phenotype analysis. The course includes a literature assignment that is presented in writing and orally.

## Course design

The working methods in the course mainly involve active learning for students, which sets requirements for the students to prepare before the teaching components. The course contains several practical components that entail both individual training and cooperation in groups to solve problems.

Participation is compulsory for all practical components and components involving group work.

## Assessment

The examination consists of three different test components:

1. Course portfolio containing article discussion, collegial feedback, application for ethical approval of animal testing, literature assignment, research plan and an image analysis project. (9 credits)
2. Bioinformatics assignment (3 credits)
3. Written examination (3 credits)

Other forms of examination may be used if there are special reasons.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

*Subcourses that are part of this course can be found in an appendix at the end of this document.*

## Grades

Marking scale: Fail, Pass, Pass with distinction.

To achieve the grade of Pass as a final grade requires a grade of Pass in all test components. To achieve the grade of Pass with distinction as a final grade requires the grade of Pass with distinction for the research plan and the literature assignment in the portfolio.

## Entry requirements

Admitted to the Master's programme in Biomedicine and completion of the course BIMM01.

## Subcourses in BIMM02, Biomedicine: Biomedical Methods and Experimental Animal Models

Applies from H20

- 2001 Course portfolio, 9,0 hp  
Grading scale: Fail, Pass, Pass with distinction
- 2002 Bioinformatics, 3,0 hp  
Grading scale: Fail, Pass
- 2003 Written exam, 3,0 hp  
Grading scale: Fail, Pass