

## Analytical Techniques in Experimental Biosciences

Analytiska tekniker för experimentell biovetenskap

7.5 credits

Programme course

8MEA02

Valid from: 2022 Spring semester

<b>Determined by</b>	<b>Main field of study</b>	
Chairman of The Board for First and Second Cycle Programmes	Medical Biology	
<b>Date determined</b>	<b>Course level</b>	<b>Progressive specialisation</b>
2012-12-07	Second cycle	A1X
<b>Revised by</b>	<b>Disciplinary domain</b>	
	Social sciences	
<b>Revision date</b>	<b>Subject group</b>	
2014-10-06; 2021-05-03	Medical Biology	
<b>Offered first time</b>	<b>Offered for the last time</b>	
Autumn semester 2013		
<b>Department</b>	<b>Replaced by</b>	
Institutionen för biomedicinska och kliniska vetenskaper		

## Course offered for

- Master's Programme in Experimental and Medical Biosciences

## Entry requirements

- Bachelor's degree in a major subject area with relevance for biomedical sciences, equivalent to a Swedish Kandidatexamen with at least 90 ECTS credits in the following subjects:
  - biochemistry
  - cell biology
  - molecular biology
  - genetics
  - gene technology
  - microbiology
  - physiology
  - immunology
  - histology
  - anatomy
  - pathology
- English corresponding to the level of English in Swedish upper secondary education (Engelska 6/B)  
(Exemption from Swedish)

## Intended learning outcomes

The aim of the course is for the student to obtain a more advanced knowledge of theoretical aspects of study design as well as data collection, data analysis and general statistics used within the field of biosciences and of epidemiology. The student will also gain deeper knowledge in bioinformatics, scientific methodologies including the philosophical and scientific aim of research, quantitative and qualitative methodologies, and the educational methodology problem-based learning. The course is compulsory in semester one in Master's Programme in Experimental and Medical Biosciences.

By the end of the course the student will be able to:

Knowledge and understanding

- Describe and analyze different strategies for study design, data sampling, data collection, and statistical analysis to be used in qualitative and quantitative research

Competence and skills

- Design research studies within the field of biosciences and epidemiology
- Use and interpret common statistical methods for rates and proportions, multivariate statistics and regression analysis
- Use internet-based tools and computer programs to be able to identify, compare and analyze biological molecules

Judgement and approach

- Critically evaluate statistical findings and their interpretations in epidemiological and biomedical studies
- Demonstrate a knowledgeable and critical attitude regarding scientific investigations and articles
- Interpret and evaluate results from databank searches in a biomedical relevant context

## Course content

- Philosophy of science, research design, data collection and analysis, as well as qualitative and quantitative methodologies
- Basic statistical principles and common methods applicable for biomedical studies
- Design of studies in biomedicine and epidemiology
- Reasoning on causality, precision, validity and bias that could have an impact on data
- Computer-based methods for studies of biological molecules
- Application of Problem-based learning (PBL) as pedagogical methodology

## Teaching and working methods

General: Linköping University Master's Programme in Experimental and Medical Biosciences applies student-centered learning among which Problem Based Learning (PBL) is one pedagogical philosophy and method. To prepare the students for future employment, practical and experimental work in laboratory settings are important parts of the programme in courses as well as in individual projects.

Specific: In this course lectures, tutorial groups and seminars are used.

## Examination

### Compulsory items

Active participation in the compulsory parts is necessary to pass the course, and assessment of them is carried out continuously. Compulsory parts in this course are: tutorial groups and seminars.

### Examination

Individual written examination.

Individual written reports and oral presentation of them.

### Grades

The grades for the course are either fail (F), pass (G) or pass with distinction (VG). The grade for the individual written exam (F, G, VG) forms the basis for the final grade of the course.

If special circumstances prevail, and if it is possible with consideration of the nature of the compulsory component, the examiner may decide to replace the compulsory component with another equivalent component.

### Application for examination

Instructions on how to apply for examinations are given prior to the beginning of each course.

### Re-examination

The date for re-examination should normally be announced by the date of the regular examination at latest; in which case the scope must be the same as at the regular examination.

### **Examination for students with disabilities**

If the LiU coordinator for students with disabilities has granted a student the right to an adapted examination for a written examination in an examination hall, the student has the right to it.

If the coordinator has recommended for the student an adapted examination or alternative form of examination, the examiner may grant this if the examiner assesses that it is possible, based on consideration of the course objectives.

An examiner may also decide that an adapted examination or alternative form of examination if the examiner assessed that special circumstances prevail, and the examiner assesses that it is possible while maintaining the objectives of the course.

### **Nomination of another examiner**

A student who has taken two examinations in a course or a part of a course without obtaining a pass grade is entitled to the nomination of another examiner, unless there are special reasons to the contrary.

## **Grades**

Three-grade scale, U, G, VG

## **Other information**

Planning and implementation of the course is to be based on the wordings in the course syllabus. A course evaluation is compulsory for each course and should include how the course is in agreement with the course syllabus. The course coordinator will analyse the course evaluation and propose appropriate development of the course. The analysis and proposal will be returned to the students, the Director of Studies, and as needed to the Education Board, if related to general development and improvement.

The course is carried out in such a way that knowledge of gender, gender identity/expression, ethnicity, religion or other belief system, disability, sexual orientation and age is addressed, highlighted and communicated as part of the programme.

If the course is cancelled or undergoes major changes, examination is normally offered under this course syllabus, at a total of three occasions, within/in connection to the two following semesters, of which one in close proximity to the first examination.