

# Molecular Physiology and Cell Signaling Mechanisms

Programme course

6 credits

Molekylärfysiologi och cellsignaleringsmekanismer

NBID64

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Chemistry, Biology  
and Biotechnology

**Date determined**

2017-01-25

**Offered for the last time**

Spring semester 2024

## Main field of study

Biology, Chemical Biology

## Course level

Second cycle

## Advancement level

A1N

## Course offered for

- 
- Chemical Biology
- Protein Science, Master's programme

## Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites

120 ECTS including 90 ECTS in biology and a course in Molecular Genetics.

## Intended learning outcomes

The student will increase her/his understanding of the role of selected molecules on the function of the human body by focusing on the relationship between molecular structure and intracellular function.

The student will develop a proficiency in finding, evaluating and compiling primary and secondary research literature on a specific topic.

The student will improve her/his skills in summarizing and communicating the results of her/his own experimental results and those of others in both written and oral form.

## Course content

The course is centered around different molecules or families of molecules that are relevant to the function of the human body and also its pathology, namely:

- Erythropoietin and nitric oxide involved in oxygen transport and vascular regulation
- Voltage gated potassium channels involved in neuronal and cardiac excitability and associated to long QT syndrome and sudden death
- Voltage gated calcium channels and calcium pumps (ryanodine receptor and sarcoplasmic reticulum calcium ATPase) involved in muscle contraction and relaxation and associated to malignant hyperthermia
- G-protein coupled receptors, with special emphasis on beta-adrenergic receptors and angiotensin receptors. Involved in cardiovascular regulation and fluid homeostasis
- Epithelial sodium channels, involved in cardiorenal regulation
- Transient-receptor potential channels (TRP) involved in sensory transduction of temperature, pain and mechanical stimulus

## Teaching and working methods

The course is composed by formal lectures, laboratory exercises and seminars, each with its own evaluation scheme. The lectures are based on primary research articles and reviews of which the most relevant ones (between 1-3 per 2h lecture) will be provided as study material. All lectures will be available to the students through Blackboard, the Learning Management System used at Linköping universitet. The laboratory exercises are linked to some of the lectures and require the writing of a lab report using quantitative methods. Attendance to the labs is compulsory. The seminars deal with generic aspects in modern biomedical research namely the use of model species and the need to balance reductionistic studies with systems biology approaches. The seminars require the discussion in smaller groups of scientific articles related with the topics.

## Examination

UPG2	Report of laboratory exercises	3 credits	U, 3, 4, 5
UPG1	Seminar attendance and discussion	1 credits	U, 3, 4, 5
TEN1	Written examination	2 credits	U, 3, 4, 5

The final grade is a combination of all grades where TEN1 counts for 40 %, UPG3 10% and UPG5 50%.

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Department

Institutionen för fysik, kemi och biologi

## Director of Studies or equivalent

Agneta Johansson

## Examiner

Jordi Altimiras

## Course website and other links

## Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

## Course literature

Som rekommenderad kursbok, föreslås följande: Boron, W. F. & Boulpaev, E. L. Medical Physiology. A cellular and molecular approach 2nd edition (Saunders, Elsevier Science, Philadelphia, 2008).

## Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at [http://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).