



**Karolinska  
Institutet**

Course syllabus for

# **Physiological and Pharmacological Mechanisms and Experimental Approaches, 15 credits**

Fysiologiska och farmakologiska mekanismer och experimentella metoder, 15 hp

This course syllabus is valid from spring 2024.

Please note that the course syllabus is available in the following versions:

Spring2023 , Spring2024

Course code	4FF002
Course name	Physiological and Pharmacological Mechanisms and Experimental Approaches
Credits	15 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Translational Physiology and Pharmacology
Level	AV - Second cycle
Grading scale	Pass with distinction, Pass, Fail
Department	Department of Physiology and Pharmacology
Decided by	Education committee FyFa
Decision date	2021-11-22
Revised by	Education committee FyFa
Last revision	2023-10-12
Course syllabus valid from	Spring 2024

## **Specific entry requirements**

A Bachelor's degree or a professional degree worth at least 180 credits in biomedicine, biotechnology, cellular and molecular biology, pharmaceuticals, health care, medicine, or the equivalent. Proficiency in English equivalent to the Swedish upper secondary school course English 6/English B is required.

## **Objectives**

The overarching aim of the course is to deepen students understanding of integrated physiology, pathology and pharmacology; from molecule and cell to whole body. The aim is to equip the student with broad knowledge in experimental methodology and relevant model systems as pertains research in translational physiology and pharmacology.

On completion of the course, the student should be able to:

Regarding knowledge and understanding

- Give an account of models used when studying different physiological processes and pharmacological mechanisms
- Explain choice of animal models and cell models to study physiological functions, disease mechanisms and pharmacological treatments and include aspects on age, sex, circadian rhythm and ethics
- Give an account of methods, apparatus and technologies that are used to measure and analyse different parameters in pre-clinical and clinical research in for the course relevant fields
- Integrate knowledge of normal physiological functions with mechanisms related to disease development and treatment
- Evaluate how data from trials with different models/methods can be translated to humans

Regarding skills and abilities

- Structure and complete a research plan

With respect to judgement and approach

- Evaluate, interpret and discuss relevant research in relation to the subject areas of the course
- Reflect on ethical aspects of research in relation to humans and animals

## Content

The course extends knowledge in integrated physiology and pharmacology with examples from fields such as metabolic diseases, neurological diseases and cancer from the course Integrated physiology and pharmacology (semester 1). The course will provide the student with knowledge in experimental methodology and considerations regarding how one chooses relevant model systems in translational physiology and pharmacology. The student will also be able to critically evaluate results with regard to the chosen model.

The course is divided into two parts:

### Experimental models, 7.5 hp

Grading scale: VU

Part 1 includes:

- Principles of control and regulation of specific body functions, organs and tissues
- In vivo, in vitro and in situ models for studying physiological, pharmacological and pathophysiological mechanisms
- Factors such as age, sex and circadian rhythm that influences the effect of a pharmacological treatment.

### Project design, Journal clubs and laboratory practicals, 7.5 hp

Grading scale: GU

Part 2 includes:

- Research plan with included components; i) formulate aim ii) formulate hypotheses iii) design of trial/experiments, iv) choice of statistical methods for the analysis of data
- Journal Clubs
- Laboratory experiments

## Teaching methods

This is a master's level course, where the students are assumed be familiar with the most common study methods in higher education. Particular emphasis is placed on peer learning and self-study in groups and on an individual level. As discussions and analyzes are central components of the course, the teaching takes place on site on campus.

## Examination

### Part 1: Experimental models, 7.5 credits

Examination:

Written examination (exam). Graded Fail/Pass/Pass with distinction.

### Part 2: Project design, Medical record clubs and laboratory sessions, 7.5 credits

Examinations:

Written assignments Graded Fail/Pass.

Oral presentation of assignments. Graded Fail/Pass.

Written assignments should be submitted before the end of the course according to the specification in the schedule. To pass the course (the grade Pass or higher), at least passed on all parts of the course is required. To pass the course with distinction, the grade Pass with distinction in Part 1 is required.

### Compulsory participation

Participation in seminars and group exercises are compulsory. The examiner assesses if, and how, absence from compulsory course elements can be made up for. Study results cannot be reported until the student has participated in compulsory course elements or compensated for any absence in accordance with instructions from the examiner. Absence from a compulsory course element could mean that the student can not retake the element until the next time the course is offered.

### Limitation of number of tests or practical training sessions

The students that have not passed after regular examination session have the right to participate at further five examination sessions. If the student has carried out six failed examinations/tests, no additional examination or new course admission is approved.

Each occasion the student participates in the same test counts as an examination. Submission of a blank examination is regarded as an examination. In case a student is registered for an examination but does not attend, this is not regarded as an examination.

In the event of special circumstances, or if a student with a disability is in need of certain adjustments, the examiner may decide to depart from the syllabus' regulations on examination form, number of examination opportunities, possibility of completion or exemption from compulsory educational elements, etc. Content and intended learning outcomes as well as the level of expected skills, knowledge and abilities must not be altered, removed or lowered.

## Other directives

The course is given in English, and the examinations are in English.

A course evaluation will be carried out in accordance with the guidelines established by the Board of Higher Education.

## Literature and other teaching aids

### *Mandatory literature*

#### **Rang and Dale's Pharmacology**

*Ritter, James; Flower, R. J.; Henderson, Graeme; Loke, Yoon Kong; Rang, Humphrey Peter; Dale, M. Maureen*

Ninth edition : Amsterdam : Elsevier, 2019 - 789 pages  
ISBN:9780702074486 LIBRIS-ID:bl06m44b809mw1mz

*Or later edition.*

[Library search](#)

### **Medical physiology**

*Boron, Walter F.; Boulpaep, Emile L.*

Third edition. : Philadelphia, PA : Elsevier, [2016] - xii, 1297 pages

ISBN:9781455743773 LIBRIS-ID:19496717

*Or later edition.*

[Library search](#)

Supplementary study material and reference articles will be provided during the course.