



Course syllabus for

Bioinformatics from a Physiological and Pharmacological Perspective, 7.5 credits

Bioinformatik från ett fysiologiskt och farmakologiskt perspektiv, 7.5 hp

This course syllabus is valid from spring 2023.

Course code	4FF004
Course name	Bioinformatics from a Physiological and Pharmacological Perspective
Credits	7.5 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
Course syllabus valid from	Spring 2023

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.

Objectives

The aim of the course is that the student should obtain an understanding of computer-based (in silico) methods that facilitate handling and analysis of complex data sets and systems that are used in physiological and pharmacological research. During the course, strong emphasis is put on the integration of computer-aided technologies and methods with the experimental models and procedures that are taught in parallel courses during semester 2 of the Master's programme.

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

- Explain how genetic analysis can be used to individually adjust drug treatment (pharmacogenetics) and to better understand the effects of genetic variation on the response of interventions in physiological experiments
- Explain protein engineering, ligand docking and molecular dynamic modelling of proteins

- Give an account of factors that are important for planning and conducting high throughput drug screening
- Describe the principles of artificial intelligence (AI) and discuss how AI can be used in drug development
- Explain the meaning of network medicine and its importance for identification of diseases and drug development
- Use, for the course relevant, bioinformatic databases for in silico analysis
- Carry out graphical production of results of bioinformatic analyses
- Carry out basic in silico modellings for compound validation and effect prediction

Content

The student will obtain basic knowledge in computer-based (in silico) analysis and methodology with a focus on physiological and pharmacological issues. The course contains different aspects of bioinformatics with relevance to understand patient variations in drug response, modelling of pharmacodynamic/pharmacokinetic processes, drug development, validation of pharmaceutical targets and variation in response to physiological stimuli. Protein modelling and ligand docking combined with in silico simulations of molecular, protein dynamic processes provide understanding of molecular details that concern drug interactions. An introduction to relevant databases will be integrated with practical applications.

Teaching methods

Learning activities include lectures, seminars and practical exercises.

Examination

- Written examination (exam). Graded Fail/Pass/Pass with distinction.
- Oral presentation of project work: 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 components of the course is required. To pass the course with distinction, the grade Pass with distinction on the written examination is required.

Compulsory participation

Participation in practical exercises is 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

Students are provided with relevant literature in the form of research and overview articles during the course.