Faculty of Science

BIOR98, Biology: Pharmacology, 15 credits

Biologi: Farmakologi, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2023-06-11. The syllabus comes into effect 2023-06-11 and is valid from the spring semester 2024.

General information

The course is an optional second-cycle course for a degree of Bachelor or Master of Science in Biology and Molecular Biology. The course is also offered as a single subject course.

Language of instruction: English

Main field of study	*Specialisation*
Biology	A1N, Second cycle, has only first-cycle course/s as entry requirements
Molecular Biology	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is for the students to acquire basic knowledge in pharmacology including related areas such as e.g. pathobiology and toxicology. The course also aims to provide an introduction to different model systems in pharmacology such as in vitro models and the use of animal experiments.

Knowledge and understanding

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

- explain pharmacodynamic, pharmacokinetic and pharmacotoxicology basic principles

- explain cellular and physiological responses in adrenergic and cholinergic transmission in the peripheral nervous system and how these can be affected by pharmaceuticals
- explain known and possible underlying molecular and cellular pathophysiological mechanisms for selected diseases
- describe existing and possible strategies for pharmacological intervention at the molecular, cellular, and systemic level of studied disease states
- identify laws and ethical regulations for handling laboratory animals in Sweden and the EU
- outline theoretical and practical pharmacological and animal experimental methodology

Competence and skills

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

- formulate hypotheses about pathological causes of diseases and principles for existing or planned pharmacological treatment of these
- find and synthesize relevant scientific information from subject-specific original and overview articles and compile the information in a written essay corresponding to an overview article in the field with special regard to scientific content, structure, language and reference management.
- evaluate information from different sources and be able to present orally and in writing to fellow students (peers) using language appropriate for the subject at the level of the course literature
- perform basic pharmacokinetic calculations and interpret data from such calculations
- process pharmacological problems through evaluation and reporting of results
- work constructively in a group
- give and receive constructive feedback from fellow students (peer-review) and reflect on how the process affects the content and quality of the written essay
- discuss ethical and legal aspects of animal husbandry and animal experiments in connection with research and drug development

Judgement and approach

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

- reflect on how research and development in pharmacology contributes to disease treatment
- discuss and argue around questions related to ethical issues and opinions regarding animal testing in drug development

Course content

The course begins with an introduction to general concepts and mechanisms within receptor theory, pharmacokinetics, pharmacodynamics, signal transduction and dose-response relationships. The principles of Administration, Distribution, Metabolism and Elimination (ADME) concerning medicines are also covered. The basic pharmacology of the peripheral nervous system is used as a model to show the importance of

receptor distribution linked to the effect and side effect of pharmacological intervention. The introduction serves as a basis for the rest of the course, where weekly themes aim to highlight a selection of disease states including, for example, autoimmunity and inflammatory states, metabolic and cardiovascular diseases. Ethical issues within the subject are integrated with subject theory.

Laboratory animal knowledge is a central part of the course and it is treated both theoretically and practically through studies of animal environments, animal quality, handling of animals as well as sampling and injection techniques as well as simpler surgical techniques. Legislation and regulations in the field are penetrated. In parallel with experimental animal knowledge, in vitro techniques are also discussed, theoretically and practically.

Course design

Teaching consists of lectures, labs, exercises, seminars, group work, assignments and a literature project. Active participation in labs, exercises, seminars, group work, assignments, literature project and associated elements is compulsory.

The course is largely based on group work with often week-long themes. A typical week includes one or more support lectures. During the week, the course participants work both individually and in groups with theme-specific questions or "cases", which enables both their own knowledge acquisition and joint discussion to reach a consensus. Through group participants jointly discussing and reporting on acquired knowledge, training is also provided in constructive group work. In association with the group work, individual knowledge tests are preformed.

Certain elements are discussed during exercises based on both teacher activity and activity from the course participants. Knowledge of laboratory animals and discussion of legal and ethical issues related to this are treated in seminar-like forms where great importance is placed on highlighting both complexity and difficulties in the field. Demonstration laboratories are used, for example, to show the complexity of pharmacological intervention of organ-wide diseases. Own laboratory work is used both as support for anchoring theory and for skills training.

In parallel with the weekly themes, an individual literature project is carried out within a well-defined area within pharmacology or a related discipline. The project is presented orally and in writing, as a report corresponding to a literature review. During the implementation of the project, course participants are trained in constructive feedback.

Assessment

Examination takes place through a written examination during the latter part of the course and orally and in writing through laboratory work, exercises, seminars, group work, assignments and a literature project during the course. For students who do not pass the written examination during the course, an additional examination in close connection to this is offered. Students who do not pass other compulsory components will be offered an opportunity to complete these during the course. If this is not possible, the students will be referred to the next time the course is given.

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.

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction

To pass the entire course, approved written examination, approved written assignments and literature project report, as well as approved participation in labs, exercises, seminars and group work, are required.

The grading scale for labs, exercixes, seminars och group work is Fail, Pass. The grading scale for written exam, the assignments and the literature project is Fail, Pass, Pass with distinction.

The final grade is decided through a weighing of the results of the written exam, the assignments and the literature project.

Entry requirements

For admission to the course, 120 credits of scientific studies including knowledge corresponding to BIOA10 Cell and Microbiology 15 credits, BIOA11 Genetics and Evolution 15 credits, BIOC01 Human Physiology 15 credits/Human and Animal Physiology 15 credits, MOBA03 Molecular Biology 15 credits and chemistry 15 credits, as well as English 6, are required.

Further information

The course is replacing BIOR14 Pharmacology 15 credits and may not be included in a degree together with this course.

The course is given by the Department of Biology, Lund University.