Faculty of Science

BIOR84, Biology: Cellular and Molecular Neurobiology, 15 credits

Biologi: Cellulär och molekylär neurobiologi, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2017-08-21 to be valid from 2017-08-21, spring semester 2018.

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. The language of instruction is English.

Language of instruction: English

Main field of studies	*Depth of study relative to the degree requirements*
Molecular Biology	A1N, Second cycle, has only first-cycle course/s as entry requirements
Biology	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

Knowledge and understanding

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

- explain the underlying principles of neuron development and determination of cell type, axon guidance, the signaling and survival of neurotrophin cells, synaptogenesis as well as neural plasticity
- account for how ion channels and receptors in excitatory cells and membranes generate relevant electric responses of neurons as well as the cellular and molecular mechanisms of transfer of responses between synapses

- describe classical and emerging technologies, including optogenetics and gene editing, for studies of neuronal development, expression and function at cellular and molecular level

Competence and skills

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

- search and compile relevant information from scientific articles
- independently design, plan, carry out and document experiments in cellular and molecular neurobiology
- analyse and interpret experimental results or observations in cellular and molecular neurobiology
- present experiments in molecular and cellular neurobiology orally and in writing

Judgement and approach

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

- critically review and evaluate scientific information and development in cellular and molecular neurobiology
- assess his/her need of knowledge and take responsibility for his/her knowledge development within the subject area

Course content

The course gives an overview of the most important principles and technologies in cellular and molecular neurobiology. An important aim of the course is that the students should understand the methods that are used to increase our knowledge and be able to relate this to current research in the subject area.

The course starts with an introduction to important methods for studies on molecular and cellular neurobiology, as well as basic practical exercises. The course is thereafter divided into modules, in which the theoretical background is presented in the form of scientific articles and lectures. The course also includes detailed studies of the mechanisms that underlie neuronal signaling and cell function, and how these are activated during development and neuronal plasticity. A central part of the course is application of technologies that push the research forward, including optogenetic manipulation and gene editing to manipulate neural circuits and identify neural functions.

Course design

The teaching consists of lectures, group work, laboratory sessions and project work. The laboratory work is carried out in small groups, with short and well defined projects, during which a limited selection of methods is applied. The projects are supervised from design to analysis, and are connected to shorter exercises and written assignments. The projects are presented in the form of individually written methods

reports and scientific summaries, as well as in the form of a poster from each group. Laboratory sessions, group work, project work as well as presentations of the projects, and thereby all integrated teaching, are compulsory parts of the course.

Assessment

Examination takes place in the form of written examinations as well as through compulsory parts. For students who have not passed the regular examination, an additional examination in close connection to this is offered.

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.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
To pass the entire course, approved examinations and approved compulsory parts are required.

The final grade is decided through a joining of written examinations, project reports and presentations.

Entry requirements

For admission to the course, 120 credits of scientific or technical studies, including knowledge corresponding to at least 7.5 credits in cell biology and 7.5 credits in zoology or physiology, is required English 6/English B.

Subcourses in BIOR84, Biology: Cellular and Molecular Neurobiology

Applies from V18

1701 Theory, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction
1702 Seminars, 2,0 hp
Grading scale: Fail, Pass, Pass with distinction
1703 Laboratory work, 5,5 hp
Grading scale: Fail, Pass