Faculty of Medicine

BIMA82, Biomedicine: Developmental Biology and Genetics, 15 credits

Biomedicin: Utvecklingsbiologi och genetik, 15 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by The Master's Programmes Board on 2016-12-15 to be valid from 2017-01-01, autumn semester 2017.

General Information

The course is a compulsory component of the Bachelor of Medical Science programme in Biomedicine and is included in semester 5.

Language of instruction: English

Main field of studies	*Depth of study relative to the degree requirements*
Biomedicine	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

Knowledge and understanding

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

- explain basic concepts of inheritance and population genetics and master basic molecular principles of genetic inheritance
- explain the processes that enable fertilisation and cell division
- explain the basic mechanisms that control the development of an early embryo?
- describe the most important mechanisms of cell-cell communication and the signalling pathways routes involved in the early development of the embryo
- explain the principles of the development and differentiation of the nervous system
- explain the processes that lead to limb development and regeneration

- explain the most important principles of how organs are formed during early development
- account for substances in our environment that affect the development of the embryo and may affect human behaviour.

Competence and skills

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

- analyse inheritance data, and perform basic linkage analysis and genetic calculations
- search for and present relevant information from research publications dealing with issues of developmental biology, place it in its biological context and assess its relevance
- apply critical thinking in the assessment and explanation of developmental biology issues

Judgement and approach

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

- reflect on ethical issues concerned with the use and analysis of genetic/genomic data,
- reflect on the societal implications of developmental biology research and knowledge and discuss these with individuals at the same level of education

Course content

The course presents basic principles of developmental biology and genetics, focusing especially on model systems such as *Drosophila* and mice. It starts with an introduction to genetics covering meiosis, Mendelian crosses, linkage analysis and population genetics. Furthermore, the course includes elementary hypothesis testing and discussion of the ethical aspects of using genomic tools in medicine. In the following weeks, the course deals with the most important processes of early embryonic development, such as fertilisation, early cell division including cleavage patterns and asymmetries, axis formation, gastrulation, development of the nervous system, limb development and regeneration, organ formation, and the impact of the environment on embryonic development. Moreover, the course provides insights into the use of knowledge from developmental biology for the establishment of animal models in studies of disease and drug effects.

Course design

The entire course is based on problem-based learning (PBL) and consists of weekly themes. A typical week starts with two supporting lectures and concludes with a summarising seminar. In between, the students work in PBL groups (two meetings/week) but also individually. Some components are illustrated by method introductions and demonstrations, or short laboratory sessions and discussions that take place in a developmental biology research laboratory. Lectures on genetics are complemented with calculation exercises during the first two weeks. Article presentations enable the students to practise reading, extracting relevant content and

orally presenting research articles within the field. At each article session, two students present articles and the discussion is led by two other students acting as peer reviewers. The week is concluded with a summarising seminar at which the problems identified in the PBL groups or reading are addressed.

PBL work, laboratory sessions, article presentations and summarising seminars are all compulsory components.

Assessment

The assessment is based on three components: a written exam, a course portfolio and a biostatistics portfolio.

The written exam is used to assess the learning outcomes of knowledge and understanding.

The course portfolio is used to assess the learning outcomes of competence and skills and judgement and approach. For a grade of Pass on the course portfolio, students must have passed the calculation exercises, participated actively in the PBL sessions, passed the laboratory report and passed the article presentations.

The biostatistics portfolio is used to assess the learning outcomes of competence and skills concerning statistical calculations of inheritance and genetic data. For a grade of Pass on the biostatistics portfolio, students must participated actively in the calculation exercises and passed the exam.

Other forms of assessment can be used, if there are special reasons.

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

Grades

Marking scale: Fail, Pass.

Entry requirements

To be admitted the course. students must have completed two years of study on the Bachelor of Medical Science programme in Biomedicine including the courses Physiology and Pathobiology &Pharmacology or passed 90 credits including at least 30 credits of chemistry (of which at least 15 credits of biochemistry), 30 credits of cell biology and 15 credits of physiology.

Further information

The course largely corresponds to the previous course BIMA52.

Subcourses in BIMA82, Biomedicine: Developmental Biology and Genetics

Applies from H17

1601 Written Exam, 9,0 hp
Grading scale: Fail, Pass
1602 Course Portfolio, 4,5 hp
Grading scale: Fail, Pass
1603 Biostatistical Portfolio, 1,5 hp
Grading scale: Fail, Pass