



## DEPARTMENT OF CHEMISTRY AND MOLECULAR BIOLOGY

### **BIO906 Molecular genetics and evolution, basic course, 15 credits**

Molekylär genetik och evolution, baskurs, 15 högskolepoäng

*First Cycle*

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#### **Confirmation**

This course syllabus was confirmed by Department of Chemistry and Molecular Biology on 2020-01-28 and was last revised on 2023-03-24 to be valid from 2023-03-27, autumn semester of 2023.

*Field of education:* Science 100%

*Department:* Department of Chemistry and Molecular Biology

*Other participating department*

Department of Biological and Environmental Sciences

#### **Position in the educational system**

This is a basic course that can be part of the Bachelor's programme in Molecular Biology or Biology. The course is also offered as a single subject course.

#### *Main field of studies*

Molecular Biology

Biology

#### *Specialization*

G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

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#### **Entry requirements**

For admission to the course, completed course BIO900, 15 credits is required, or equivalent.

#### **Learning outcomes**

On successful completion of the course the student will be able to:

*Knowledge and understanding*

- have knowledge of how our genome is organized.
- describe how genetic information is stored, decoded and passed from one generation to the next.
- have a general knowledge of mutations, repair and recombination of DNA.
- be able to determine the genetic position of loci based on their segregation among offspring.
- understand relatively complex mechanisms of gene regulation.
- describe fundamental basic principles of developmental biology.
- explain the meaning of key evolutionary concepts such as fitness, selection and adaptation.
- explain the meaning of basic population genetics concepts such as genetic drift, genetic differentiation and inbreeding.
- describe how ecological factors influence the evolution of life history traits.
- explain the theory behind exponential and density-dependent population models.

*Competence and skills*

- have some knowledge and skills in molecular biology methods.
- be able to with own words explain genetic concepts.
- be able to define and use developmental biology terminology.
- apply and interpret simple population ecology and population genetics models.
- analyze and discuss selected ecological and evolutionary problems.
- read course books at high level.

*Judgement and approach*

- be able to identify and discuss ethical issues from a genetic perspective.
- have an increased ability to evaluate the importance of biological knowledge for the community development.
- have an increased ability to critically examine and relate to different scientific and popular science sources.

**Course content**

The course is the second course in a basic block in Biology/Molecular Biology of 60 credits. The course starts with molecular genetics (10 credits) which deals with genes and their role in heredity. We describe the molecular mechanisms for how genetic information is stored, decoded and goes from one generation to the next. The structure and regulation of genes and genomes as well as how genetic changes can influence

developmental biology and disease development will be discussed. Basic molecular evolution at the whole genome level is also included. The course also addresses ethical aspects of genetic diagnosis and modification of humans.

The second module (5 credits) focuses on evolutionary processes and their consequences, including speciation. The course thus highlights how natural selection and genetic drift, in interaction with ecological factors, affect the dynamics, genetic composition and variation, life history and behavior of natural populations.

### **Form of teaching**

The course is based on lectures, laboratory sessions, calculation and computer exercises as well as group assignments. In addition, the students will acquire knowledge in literature search and ethics during the course.

*Language of instruction:* English and Swedish

### **Assessment**

The examination consists of two written exams, one for each module. Compulsory parts of the course are listed in the schedule. To pass the course, approved reports are also required. The number of occasions for compulsory elements is limited. For students who have not passed the regular exam, additional exam opportunities are offered.

Opportunity to complete non-passed compulsory elements can be given, at the earliest, at the next course session and only in case of a vacancy.

If a student, who has failed the same examined element on two occasions, wishes to change examiner before the next examination session, a request is to be submitted to the department in writing and granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In the event that a course has ceased or undergone major changes, students are to be guaranteed at least three examination sessions (including the ordinary examination session) over a period of at least one year, though at most two years after the course has ceased/been changed. The same applies to work experience and VFU, although this is restricted to just one additional examination session.

### **Grades**

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

For Pass (G) on a course module requires at least 60% of the total score on the exam and Pass with distinction (VG) requires 85%. For Pass the whole course also required approved result on all other examination parts. In addition, for the final grade Pass with distinction, VG is required for both course modules.

**Course evaluation**

A written course evaluation is made in the end of the course that is used as a guidance to course development

**Additional information**

The course replace BIO905 (Molecular Genetics) and parts of BIO915 (Ecology and Evolution).

BIO906 and BIO905/916 can not at the same time be included in a degree.