



## DEPARTMENT OF CHEMISTRY AND MOLECULAR BIOLOGY

### **BIO442 Evolutionary Genomics, 15 credits**

Evolutionär genomik, 15 högskolepoäng

*Second Cycle*

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#### **Confirmation**

This course syllabus was confirmed by Faculty of Science on 2012-05-24 and was last revised on 2022-05-06 by Department of Chemistry and Molecular Biology to be valid from 2022-05-13, autumn semester of 2022.

*Field of education:* Science 100%

*Department:* Department of Chemistry and Molecular Biology

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

This is a course in biology at advanced level that is designed to provide an advanced knowledge in evolutionary processes as well as an understanding why organisms vary as a consequence of variations in their genetic material and the environment. The course can be included as part of a Bachelor's degree in Biology or Molecular Biology, or as part of a Master's degree in Biology, Molecular Biology or Genomics and Systems Biology. The course can also be taken as a freestanding course.

#### *Main field of studies*

Molecular Biology with Specialization in Genomics and Systems Biology  
Biology

Molecular Biology

#### *Specialization*

A1N, Second cycle, has only first-cycle course/s as entry requirements

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#### **Entry requirements**

Passed basic courses in biology comprising 60 credits in the subject areas of cell biology, molecular genetics, evolution, botanical and zoological physiology, ecology and biodiversity and systematics, or equivalent courses.

English proficiency is required to the level of English 6/English Course B from Swedish Upper Secondary School, or be certified by an international recognized test, for example TOEFL, IELTS. In addition, a passed advanced course in Biology is required, one of the courses Bioinformatics and Functional Genomics (e.g. 210), Advanced Functional Genomics (e.g. BIO406), Advanced Bioinformatics (e.g. BIO403) or Genetics (e.g. BIO555) is recommended.

### **Learning outcomes**

After completing the course students will be able to;

#### *Knowledge and understanding*

- Describe and understand the composition, organization and structure of genomes and how these change under the effect of different evolutionary forces.
- Describe and understand central principles in evolutionary genomics, population genetics and genomics, molecular evolution and phylogeny.
- Describe and understand common methods that are used in these fields, including their advantages and drawbacks.

#### *Competence and skills*

- Present, explain and discuss current topics, research results and questions in evolutionary genomics, population genetics and genomics, molecular evolution and phylogeny.
- Design and analyse artificial selection experiments.
- Interpret sequence information in common display formats.
- Identify and analyze variations in genomes.

#### *Judgement and approach*

- Critically review and evaluate scientific literature in evolutionary genomics, population genetics and genomics, molecular evolution and phylogeny.
- Reason around how our ability to understand genomes affect society, environment and health.

### **Course content**

The course provides a detailed understanding of the forces that act on genome content and organization, and the capacity to draw conclusions from genetic variation between and within species. You will acquire tools such as variant analysis, experimental evolution and phylogenetic analysis. Subjects in the course include genome size and composition, structural evolution, population genetics and genomics, phylogeny,

comparative genomics and molecular evolution. The acquired knowledge is central within microbiology, genetics, bioinformatics, and systematics, and have important applications in medicine, biotechnology, and ecology.

**Form of teaching**

The course is divided into lectures, group exercises, seminars, and wet lab and in silico practicals. All moments are obligatory, except for lectures.

*Language of instruction:* English

**Assessment**

The student's knowledge is assessed during the course. Compulsory parts are case studies, individual project works, laborations and exercises.

Missed compulsory sessions can be made up during the course if possible but otherwise the next time the course runs.

A student who has failed a test twice has the right to change examiner, if it is possible. A written application should be sent to the Department.

**Grades**

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

**Course evaluation**

A written evaluation is done at the end of the course. The results of the evaluation will be communicated to the students and will function as a guide for the development of the course.

**Additional information**

The course is given in cooperation with the Department of Biology and Environmental Sciences.