



## DEPARTMENT OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES

### **BIO214 Dynamics of natural populations - from individuals to ecosystems, 15 credits**

Dynamik i naturliga populationer - från individ till ekosystem, 15 högskolepoäng  
*First Cycle*

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#### **Confirmation**

This course syllabus was confirmed by Department of Biological and Environmental Sciences on 2014-03-31 and was last revised on 2021-02-12 to be valid from 2021-02-12, spring semester of 2021.

*Field of education:* Science 100%

*Department:* Department of Biological and Environmental Sciences

*Other participating department*

Department of Marine Sciences

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

This is a course in biology at basic level. The course can be part of the Bachelor programs in biology, marine sciences or environmental sciences. The course is also offered as a separate course.

The course can be part of the following programme: 1) Marine Science, Bachelor's Programme (N1MAV)

#### *Main field of studies*

Biology

Environmental Science

Marine Sciences

#### *Specialization*

G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

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### Entry requirements

Admission to the course requires one of the following options:

- 1) Basic courses in biology encompassing 60 credits and including the areas cell biology, molecular genetics, evolution, botanical and zoological physiology, ecology, and biodiversity and systematics, or the equivalent. At least 45 credits must be passed. Furthermore, a basic course in evolution or ecology must be approved.
- 2) Approved courses within the first and second year of the bachelor program in marine sciences, or the equivalent. At least 90 of the 120 credits must be passed.
- 3) Approved courses within the first year of the bachelor program in environmental sciences and one additional 15 credits basic biology course, or the equivalent. At least 60 of the 75 credits must be passed.

### Learning outcomes

After a completed course, the student is expected to be able to:

#### *Knowledge and understanding*

- analyze population growth, basic life tables, and simple matrix models,
- account for theories for competition and predation,
- account for classical models of bio-economic exploitation,
- describe metapopulation dynamics and extinction risk,
- account for population genetic processes and how these can be used in ecology and conservation,
- describe determinants of ecosystem structure, function and dynamics, including how humans may disturb the systems,

#### *Competence and skills*

- demonstrate acquired skills from literature studies, field and laboratory work for quantifying populations and ecosystem components,
- use population growth models, basic life tables and simple matrix models,
- apply methods for studying ecosystem structure and function,
- apply and evaluate population genetic methods,
- demonstrate skills in searching and critically evaluating scientific literature relevant for the course content,

#### *Judgement and approach*

- evaluate the status of populations and ecosystems based on own collected data and the literature,
- evaluate how the ecosystem approach can be used in the management of populations and ecosystems.

The course is sustainability-focused, which means that at least one of the learning outcomes clearly shows that the course content meets at least one of the University of Gothenburg's confirmed sustainability criteria. The content also constitutes the course's main focus.

### **Course content**

- Initially, population ecology is treated with one or more species. We use models to describe population development, considering the environment, risk of extinction, and other factors. We also touch upon spatial structure and investigate how hunting and fishing affect a population.
- During two weeks we study the function of two marine ecosystems, shallow eelgrass meadows and the pelagic ecosystem. We focus on processes and the importance of environmental factors, including human impact.
- The theoretical part continues with population genetics, including genetic variation, natural selection, and gene flow, and the impact these processes have on natural populations. Conservation genetics is an important part and the course gives an introduction to molecular methods in ecology.
- The course ends with a number of mini-projects where methods from the course are applied during a week's group work.

### **Form of teaching**

The course is divided in two parts. The first part contains population ecology and genetics presented as lectures and exercises (10 credits). The second part contains ecosystem dynamics and population biology in the field or as exercises (5 credits), comprising two weeks at a marine research station with laboratory analyses of interactions and carbon flows, and one week with mini projects in Gothenburg.

*Language of instruction:* English

### **Assessment**

The first part of the course (see above) is examined by a written exam (10 credits), and the second part by written reports and oral presentations (5 credits).

A student who has failed an exam 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). For the grade Pass 60% of the written exam is usually required, as well as approved written reports and oral presentations. For the grade Pass with Distinction 85% of the written exam is usually required, as well as approved written reports and oral presentations.

**Course evaluation**

Opportunity to submit a written course evaluation is usually given at the end of the course. A summary of the results is presented on the Canvas page for the course, as well as to the participants of the next course.

**Additional information**

The course is given entirely in English, unless all students are proficient in Swedish, in which case parts of the course may be given in Swedish.

Two weeks of the course are placed at a marine research station. Lodging is free at the station, but cost for food and travel should be paid by the students.