Exchange programme Vrije Universiteit Amsterdam

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit Amsterdam - 2024-2025

Exchange

Vrije Universiteit Amsterdam offers many English-taught courses in a variety of subjects, ranging from arts & culture and social sciences, neurosciences and computer science, to economics and business administration.

The International Office is responsible for course approval and course registration for exchange students. For details about course registration, requirements, credits, semesters and so on, please visit the exchange programmes webpages.

Evolutionary Genetics

Course Code	AB_1022
Credits	6
Period	P3
Course Level	300
Language Of Tuition	English
Faculty	Faculty of Science
Course Coordinator	dr. V. Kokkoris
Examiner	dr. V. Kokkoris
Teaching Staff	dr. A. Berasategui Lopez, dr. V. Kokkoris
Teaching method(s)	Seminar, Lecture, Computer lab

Course Objective

PROVISIONAL
Course objectives:
At the end of the course, the student

- is able to describe and explain the dynamic nature of genomes and the underlying molecular mechanisms in relation to molecular evolution
- can describe the regular mechanisms of transcriptional and post-transcriptional gene regulation and how genetic variation can affect these processes in relation to new traits and adaptation
- can describe how natural selection, genetic drift, and migration influence the genetic structure of populations and speciation
- is able to explain the various selection mechanisms
- is able to explain the basic concepts of population and quantitative genetics and apply those mathematically
- can interpret and determine phylogenetic relationships and is able to use computer programs for the construction of phylogenetic trees
- is able to describe current hypotheses of 'the origin of life' and to discuss the evidence

Course Content

To achieve the course objectives, the following topics will be
discussed:

- Causes and mechanisms of genetic variation at nucleotide, gene, and chromosomal level in pro- and eukaryotes
- Horizontal DNA transfer
- Evolutionary consequences of genome evolution and sex
- Causes of Speciation
- Molecular evolution of viral and bacterial pathogens
- 'Origin of life' models
- The use of bioinformatics and comparative genomics
- Population genetics: allele frequencies in relation to selection and genetic drift
- Use of genetic variation to examine stochastic and deterministic processes
- Selection mechanisms
- Application of simple mathematical rules to examine the behavior of alleles of one and two loci in ideal populations, and for genes with a quantitative effect.
- Reconstruction of phylogenetic trees using DNA sequences and cladistic computer programs
- Evolution - Development (Evo-Devo)

Additional Information Teaching Methods

PROVISIONAL • Lectures and literature discussions by students (ca 50 hr) • Working groups and assignments (ca 8 hr, mandatory) • Literature presentation (ca 10 hr, mandatory) • Computer practical (ca 12 hr, mandatory) • Weblectures on specific topics • Self study (ca 85 hr)

Method of Assessment

PROVISIONAL

- Written exam; 60% of final grade
- Assignments; 20% of final grade
- Literature presentation on Evolution-related subject; 20% of final grade

To pass, grades for all assessments should be ≥ 5,5

Entry Requirements

Genetics, Molecular genetics, and Developmental Biology are subjects the student should be familiar with.

Literature

• Book: 'Evolutionary Analysis', Scott Freeman and Jon C. Herron, Fifth Edition, 2015, Pearson, Prentice Hall
• Research and overview articles of subjects that are not thoroughly discussed in the book. These will be provided via the Canvas site of the course.

Additional Information Target Audience

Students of the Minor ‘Evolutionary Biology and Ecology’, and other third-year BSc students Biology, Biomedical Sciences, Bioinformatics and Systems Biology, Health and Life Sciences

Additional Information

This minor course requires a minimum of 20 participants to take place.

Custom Course Registration

Enrollment through studentportal: Vunet.vu.nl

Recommended background knowledge

Basic genetics and molecular biology