

Syllabus

for course at first level

Cell and Molecular Biology, Microbiology and Genetics
Cell- och molekylärbiologi, mikrobiologi och genetik

**30.0 Higher Education
Credits**
30.0 ECTS credits

Course code:	BL3010
Valid from:	Autumn 2022
Date of approval:	2021-12-03
Department	Department of Biology Education
Main field:	Biology
Specialisation:	G1F - First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Decision

This course syllabus was approved by the Board of Science at Stockholm University on 2021-12-15.

Prerequisites and special admittance requirements

For admission to the course, knowledge is required equivalent to Biology 2, as well as Basic Chemistry 15 credits (KZ2012), Organic Chemistry 7,5 credits (KO2003) and Biochemistry 7,5 credits (KB2003).

Course structure

Examination code	Name	Higher Education Credits
DEL1	DNA to protein and eukaryot cell biology	11
DEL2	Prokaryot cell biology, microbiology and genetics	9
DEL3	Methods I	5
DEL4	Methods II	5

Course content

- a. The course covers the following: Module 1: Organisation, conservation and evolution of the genome, including DNA replication, occurrence of mutations and DNA repair. The genetic information flow. Organisation, expression and regulation of genes in bacteria, archaea, eukaryotes and viruses. Synthesis, maturation and sorting of proteins. The functional organization of the eukaryotic cell. The cell nucleus, organelles, fiber structure, biomotor system, plasma membrane, membrane transport, endocytosis, cell adhesion, extracellular matrix, cell wall and cell-cell contacts. Organelles and their function, e.g. organelles in carbohydrate and lipid metabolism. Cell growth control. cell signaling, signal transduction, the cell cycle with mitosis and meiosis, cell differentiation, apoptosis and autophagy. Module 2: Structure, metabolism, nutritional requirements and growth of bacteria and archaeal cells, as well as virus structure and life cycles. Dynamics and adaptation of microbes and interaction between microbes. Pathogenic bacteria and viruses in infections as well as antibiotics and antibiotic resistance mechanisms. Mechanisms of inheritance in different organisms, genetic variation, connection between ploidy and genotype and phenotype. Bacterial genetics, yeast genetics, diploid genetics in plants and animals, gamete formation, Mendelian genetics, allele frequencies, pedigree analyses, sex-linked inheritance, organelle genetics, linkage and gene interaction, gene expression, Quantitative genetics and population genetics and genomics, genetic variation and evolution. Module 3 & 4: Basic methods and experimental tools in microbiology, genetics and molecular cell biology, genetic engineering, genomics and proteomics.
- b. The course consists of the following Modules:
1. DNA till protein samt eukaryot cellbiologi (DNA to protein and eukaryotic cell biology) 11 credits

2. prokaryot cellbiologi, mikrobiologi och genetik (Prokaryote cell biology, microbiology and genetics 9 credits
3. Metoder I (Methods I) 5 credits
4. Metoder II (Methods II) 5 credits

Learning outcomes

After completing the course, the student is expected to be able to:

- Explain the transfer of information in living cells, the central dogma, and describe how the expression of genes is regulated. (module 1)
- Explain how cells are structured, the function of organelles and how cells grow and divide. (module 1)
- Compare pro- and eukaryotic organisms with respect to similarities and differences in cellular processes. (module 1 and 2)
- Describe the organization of bacteria, archaea and viruses, show knowledge of pathogenic microorganisms and interactions between microbes. (module 2)
- Describe the mechanisms behind genetic inheritance, show understanding of the connection between genotype and phenotype as well as the importance of genetic variation and its influence on evolution. (module 2)
- Distinguish how different methods can be used to study cell and molecular biological issues (module 3), microbiological and genetic issues (module 4) and how research with these methods affects society (module 3 and 4).

Education

Teaching consists of lectures, laboratory work, seminars, group discussions and exercises.
The course is offered in English.

Forms of examination

a. The course is examined as follows: Assessment of module 1 and 2 takes place through written tests. Assessment of module 3 and 4 takes place through laboratory reports and oral presentations.
The examiner can decide on adapted or alternative examination formats for students with disabilities.

b. A passing final grade requires participation in laboratory sessions, group discussions, seminars and exercises. If special reasons exist, following consultation with the teacher involved, the examiner may grant the student exemption from the obligation to participate in certain compulsory instruction.

c. Grading: The course's final grade is set according to a seven-point criterion-referenced scale:

A = Excellent

B = Very good

C = Good

D = Satisfactory

E = Adequate

Fx = Fail, some additional work required

F = Fail, much additional work required

Grades of module 1 and 2 will be set according to a seven-point criterion-referenced scale.

Grades of module 3 and 4 will be set according to a two-point grading scale: fail (U) or pass (G).

d. The course's grading criteria are handed out at the start of the course.

e. Students who receive a failing grade on a regular examination are allowed to retake the examination as long as the course is still provided. The number of examination opportunities is not limited. Other mandatory course elements are equated with examinations. A student who has received a passing grade on an examination may not retake the examination to attain a higher grade. A student who has failed the same examination twice is entitled to have another examiner appointed, unless there are special reasons to the contrary. Such requests should be made to the department board. The course includes at least three examination opportunities for each course module per academic year the course is offered. For the academic years that the course is not offered, at least one examination opportunity is offered.

f. There is no possibility to improve the grade Fx to a pass grade in this course.

Interim

Students may request that the examination be conducted in accordance with this course plan even after it has ceased to be valid. However, this may not take place more than three times over a two-year period after the course was discontinued. Requests must be made to the departmental board. The provision also applies in the case of revisions of the course syllabus and revisions of the required reading.

Limitations

This course may not be included in a degree together with the course Cell and Molecular Biology (BL3008).

Misc

This course is part of the Bachelor's programmes in biology, marine biology, molecular biology and nutrition, but may also be taken as a separate course.

Required reading

The required reading is decided by the department board and published on the course page in the course catalogue at least 2 months before the start of the course.