



Board of Teacher Education
Biology

Syllabus

Scientific Literacy for Teaching 2

Course Code:	BIGNK2
Course Title:	Scientific Literacy for Teaching 2 <i>Naturkunskap med ett didaktiskt perspektiv 2</i>
Credits:	30
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:

Course Approval

The syllabus was approved by the Board of Teacher Education 2018-08-29, and is valid from the Spring semester 2019 at Karlstad University.

Prerequisites

BIGNK1 with at least 7.5 ECS cr completed, or equivalent.

Learning Outcomes

The aim of the course is that students acquire basic knowledge in central natural science areas such as the human body, health, evolution, and biological diversity in preparation for developing skills in stimulating pupils' interest in living organisms and the conditions of life. Students are also expected to develop basic skills in planning, performing and evaluating teaching and assessment.

Module 1: Cell Biology, 15 ECTS cr

Upon completion of the module, students should be able to:

1. give an account of cell and virus structures, different cellular processes and functions such as protein synthesis, genetic and metabolic functions, and cell cycle and cell signal functions,
2. use sterilisation techniques, cell and molecular biological and microbiological methods of analysis,
3. analyse the possibilities and limitations of using verbal and visual communicative tools,
4. discuss different teaching strategies and the ability to reflect on how these contribute to pupils' learning,
5. seek, critically assess and discuss a problem relevant to the subject area from different perspectives, and
6. reflect on the possibilities and problems in using societal issues with a natural science content in teaching.

Module 2: Elementary Chemistry I, 7.5 ECTS cr.

Upon completion of the module, students should be able to:

1. explain important concepts in basic chemistry,
2. perform basic chemical calculations using correct units,

3. define and apply the law of mass action to simple chemical reactions,
4. give an account of some chemical classifications in organic chemistry and their functional groups,
5. reflect on the occurrence and use of organic and inorganic substances in society, and
6. plan, conduct and defend a minor independent project and present it orally with digital support, and review a fellow-student's project.

Module 3: Humans, Nature and Evolutionary Perspectives 7.5 ECTS cr

Upon completion of the module, students should be able to:

1. give an account of human anatomy and physiology and factors affecting human health,
2. explain the biology of sexuality and reflect on human relationship issues,
3. give an account of the photosynthesis and the importance of metabolism for life on earth, the cycle of matter and energy flows, some eco systems and discuss how these are affected by human activities, and give examples of different measures to create a sustainable society,
5. give an account of how organisms are classified and describe the origin of life and its evolution,
6. give an account of the difference between scientific explanations of evolution and the origin of life, on the one hand, and non-scientific creationist explanations, on the other, and
7. discuss how an exploratory approach can be applied in teaching natural science.

Content

Module 1 Cell Biology, 15 ECTS cr

The course centres on cell biology theory instructed in the form of lectures, discussions and study questions. Areas treated are biomolecules, virus structure and prokaryotic and eukaryotic cell structures. A number of different cellular processes and functions such as DNA replication, gene regulation, cell cycle regulation, mitosis and meiosis, cell signalling, protein synthesis and prokaryotic and eukaryotic metabolism.

The practical and methods-oriented part of the course involves laboratory experiments and report writing and treats sterilisation techniques, cell and molecular biological and micro biological analysis methods. The teaching methodological part of the course deals with how biological phenomena are communicated verbally and visually. On the basis of genetics problems and possibilities with different models are discussed. Teaching methods and teaching approaches are discussed. Students also develop skills in seeking information of societal relevance in the area, critically and ethically assessing, compiling and presenting it, as well as reflecting on how to use the information in teaching.

Module 2 Elementary Chemistry I, 7.5 ECTS cr

The module comprises a theoretical part and an independent project. Matter and its forms of aggregation, elements, chemical compounds, pure and mixed substances, acids and bases, pH scale, and neutralisation are treated, along with units, metrics and quantities, such as amount of substance, molar mass, mass and molarity. Also treated are proportions of solutions, mass proportions, replacement, dilution, inhibitor reactants, general gas law, molecular formula and empirical formula, balancing reaction formula and equivalent substance amount, as well as different organic substance groups and their structures. Students present an independent project at a mandatory seminar and review a fellow-student's project.

Module 3: Humans, Nature and Evolutionary Perspectives 7.5 ECTS cr

Human anatomy and physiology are treated along with different factors affecting health, sex and relationship issues. The course also treats basic ecology and the processes of photosynthesis and metabolism and their importance to life on earth. The cycle of matter and energy flows in eco systems and how human activities impact on them and measures required for a sustainable society are treated. The classification and organisation of organisms are studied from an evolutionary perspective, as well as the origin of life and its evolution. Non-scientific theories of evolution are compared with natural science theories of evolution through natural selection. The course includes discussions on how to use exploratory approaches in teaching natural science.

Reading List

See separate document.

Examination

Assessment is based on:

Module 1 Cell Biology, 15 ECTS cr

Learning outcome 1: written exam

Learning outcome 2: laboratory sessions and lab reports

Learning outcomes 3-6: hand-in assignments and seminar performance.

Module 2 Elementary Chemistry I, 7.5 ECTS cr

Learning outcomes 1-4: hand-in assignments, marked by a fellow-student and re-submitted. The assessment of a hand-in assignment is based on a total appraisal of the first and final submission and the peer marking of an assignment.

Learning outcomes 5-6: report, oral seminar presentation with digital support and peer marking of an assignment.

Module 3: Humans, Nature and Evolutionary Perspectives 7.5 ECTS cr

Learning outcomes 1, 3-5: written exam.

Learning outcome 2: hand-in assignment and seminar performance.

Learning outcomes 6-7: seminar performance.

Grades

One of the grades Distinction (VG), Pass (G) or Fail (U) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.

Teacher education: secondary schools