Faculty of Health, Science and Technology
Physics

# Syllabus

## Science and Technology for Primary teachers in grades 4-6, Physics

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| **Course Code:** | FYGL10 |
| **Course Title:** | Science and Technology for Primary teachers in grades 4-6, Physics<br>*Naturvetenskap och teknik för grundlärare i årskurs 4-6, fysik* |
| **Credits:** | 7.5 |
| **Degree Level:** | Undergraduate level |
| **Progressive Specialisation:** | First cycle, has at least 60 credits in first-cycle course/s as entry requirements (G2F) |

**Major Field of Study:**

**Course Approval**
The syllabus was approved by the Faculty of Health, Science and Technology 2017-09-08, and is valid from the Spring semester 2018 at Karlstad University.

**Prerequisites**
At least 60 completed course credits for the primary school (1-7) teacher education programme including at least 30 credits in mathematics, teaching in primary school without formal qualifications for at least eight years.

**Learning Outcomes**
The aim of the course is that students develop the knowledge and skills required to conduct, develop and evaluate teaching activities in physics in primary education (grades 4-6).

Upon completion of the course, students should be able to:
1. explain and identify physical phenomena in everyday life and use the concepts of force, pressure, density and velocity and describe electrical and magnetic phenomena in relation to everyday situations,
2. give an account of the origin and evolution of the universe, the celestial bodies of the solar system and their movements in relation to one another and how these affect day, night, months, year, and seasons,
3. describe different aspects of light and sound in relation to the eye and ear and perform simple experiments in optics and acoustics,
4. give an account of the concept energy, the properties of substances and matter and describe the differences between energy and matter,
5. describe differences and similarities in various electromagnetic waves such as light, radio waves and radioactive radiation,
6. describe simple weather phenomena and make weather observations with the help of measurements over time,

7. discuss community energy sources and electricity production, describe sustainable energy systems and conduct experiments illustrating energy issues,
8. describe and assess pupils' achievements in science and technology in relation to national curricula.

**Content**
Throughout the course, issues of diversity, gender, subject-specific teaching methodology and sustainable development are treated.

The course treats various parts of the subject physics.

The astronomy part describes the origin and evolution of the universe, celestial bodies in the solar system and their relational movements, and how day, night, months, year and seasons can be explained.

The mechanical part centres on the concepts of force and motion and how they are experienced and can be described in everyday situations. Pressure in solid substances, liquids and gases and density and the principle of Archimedes are described. The concepts of energy and energy quality, the meaning of the energy principle and conversions between different forms of energy are discussed. The energy flow between objects of different temperature is demonstrated as well as methods to influence the flow.

The origin and expansion of sound and its perception by the ear are discussed in the acoustics part and in the optics part the expansion of light from common sources and its perception by the ear are discussed along with how this can explain light areas and the form and size of shadows.

In the electricity part the concepts of electricity and magnetism are introduced. The electric circuit, how it can be used in daily electrical equipments, and the properties and use of magnets are studied.

In addition, common weather phenomena and their causes are discussed and weather observations are made with the help of measurements over time. Our energy supply and our dependence on electricity are treated and sustainable energy systems discussed.

From a subject teaching perspective, grading and assessing in science and technology are discussed.

From an aesthetic and pedagogical perspective different types of narration for exploring and visualising the subject areas are tested.

**Reading List**
See separate document.

**Examination**
Learning outcomes 1, 4 and 5 are assessed on the basis of a written exam.
Learning outcome 2 is assessed on the basis of creative group performance
Learning outcomes 3 and 6 are assessed on the basis of laboratory work.
Learning outcome 7 is assessed on the basis of group seminar and laboratory work.
Learning outcome 8 is assessed on the basis of group seminar.

All examination components are mandatory. All presentations or submissions for assessment must clearly indicate individual contributions.

**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.