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Faculty of Health, Science and Technology

## Programme Study Plan

Bachelor of Science in Physics

<b>Programme Code:</b>	NGFYA
<b>Programme Title:</b>	Bachelor Programme in Physics Kandidatprogram i fysik
<b>ECTS Credits:</b>	180 ECTS credits
<b>Approval:</b>	The Programme Study Plan was approved by the Faculty Board of Health, Science and Technology on 9 December 2016 and is valid from the autumn semester of 2017 at Karlstad University.
<b>Language of Instruction:</b>	Swedish and English
<b>Degree Level:</b>	Bachelor's
<b>Degree Type:</b>	General
<b>Prerequisites</b>	Field-specific eligibility A9 or 9 (upper secondary school level Mathematics 4/E, Physics 2/B, and Chemistry 1/A), or equivalent

### Introduction

The programme offers foundational knowledge and skills in physics and mathematics and leads to a Bachelor's degree with a Major in Physics, especially theoretical physics. A Bachelor's degree in physics is required to include 90 ECTS credits in physics with progressive specialisation in the field and an independent degree project of 15 ECTS cr.

## **Aims**

The *Higher Education Ordinance, System of Qualifications (SFS 1993:100)* specifies the requirements for a specific qualification. The requirements for a Bachelor's Degree in physics are:

### *Knowledge and understanding*

For a Bachelor's degree students shall

- demonstrate knowledge and understanding in physics, including knowledge of the scientific basis of the field, knowledge of appropriate methods in the field, deeper knowledge of some part of the field, together with insight into current research issues

### *Competence and skills*

For a Bachelor's degree students shall

- demonstrate ability to seek, collect, assess and critically interpret relevant information to a problem and critically discuss phenomena, issues and situations,
- demonstrate ability to independently identify, formulate and solve problems and to carry out tasks within specified time limits,
- demonstrate ability to present and discuss information, problems and solutions in dialogue with different groups, orally and in writing, and
- demonstrate the skills required to work independently in the area of the main field of study.

### *Judgement and approach*

For a Bachelor's degree students shall

- demonstrate ability to make assessments in physics, taking into account relevant scientific, social and ethical aspects,
- demonstrate insight into the role of science in society and people's responsibility for how it is used, and
- demonstrate ability to identify their need of further knowledge and to take responsibility for developing their competence

### *Independent project (degree project)*

For a Bachelor's degree, students shall complete an independent project (degree project) of at least 15 higher education credits in the area of the main field of study.

## **Programme Structure**

The programme comprises six semesters. In the first three semesters, students mainly study mandatory physics, mathematics and programming courses. Semesters four and five include mandatory courses in physics parallel with elective courses providing opportunities to specialise in mathematics or to take courses in other subject areas. The two concluding semesters comprise specialisation courses in a chosen profile area of theoretical physics and a Bachelor's degree project. The programme is research oriented and prepares for Master-level studies. Contacts with researchers, doctoral students and alumni are integrated in the programme. Each student is assigned a tutor, a teacher in physics, for individual support.

## **Internationalisation**

Karlstad University wants to promote cooperation and exchange with other universities. Karlstad University collaborates with many other universities in Sweden and abroad, and encourages students to make the most of such opportunities. Programme students who want to complete some of their courses at foreign institutions, preferably semesters four or five, are supported by the organisation.

### **Programme Curriculum**

The studies in mathematics start with a basic course (7.5 ECTS cr), followed by mandatory courses on one-variable analysis, multi-variable analysis, linear algebra, complex analysis and transformers (30 ECTS cr). Physics starts with an introduction to theoretical physics and basic courses in experimental problem solving and mechanics, and continues with thermodynamics and statistical physics, electro-magnetic field theory, basic and specialised quantum physics, analytical mechanics and solid state physics, totalling 91.5 ECTS cr. A course in programming is also included.

#### *Mandatory courses*

Courses in physics, 76.5 ECTS cr

Courses in mathematics, 37.5 ECTS cr

Courses in programming techniques, 6 ECTS cr

Degree project, 15 ECTS cr

#### *Optional courses*

Courses in physics, 15 ECTS cr.

#### *Elective courses, 30 ECTS cr*

Students are free to choose any course, for instance in mathematics or other subject areas, provided that they meet the prerequisites.

### **Degree Title**

Bachelor of Science in Physics

### **Credit Transfer**

Students have the right to transfer credits from previously completed university courses in Sweden or abroad, subject to approval according to the current regulations.

### **Additional Information**

The local regulations for first and second cycle education at Karlstad University stipulate the obligations and rights of students and staff.