Programme-specific Section of the Curriculum for the MSc Programme in Physics
at the Faculty of Science, University of Copenhagen
2010 (Rev. 2024)

Contents

1 Title, affiliation and language ........................................................................................................... 2
2 Academic profile ................................................................................................................................. 2
  2.1 Purpose ......................................................................................................................................... 2
  2.2 General programme profile ........................................................................................................... 2
  2.3 General structure of the programme ............................................................................................ 2
  2.4 Career opportunities ...................................................................................................................... 3
3 Description of competence profiles ................................................................................................. 3
  3.1 Competence profile – Generic competences .................................................................................. 3
  3.2 Astrophysics ................................................................................................................................. 4
  3.3 Biophysics ..................................................................................................................................... 4
  3.4 Computational Physics .................................................................................................................. 5
  3.5 Earth and Climate Physics ............................................................................................................ 6
  3.6 Physics of Complex Systems ........................................................................................................ 6
  3.7 Quantum Physics ......................................................................................................................... 7
4 Admission requirements .................................................................................................................... 7
  4.1 Bachelor’s degrees that automatically fulfil the academic requirements .................................... 7
  4.2 Other Bachelor’s degrees .............................................................................................................. 7
  4.3 Other applicants ............................................................................................................................ 8
  4.4 Language requirements ................................................................................................................ 8
  4.5 Supplementary subject elements ............................................................................................... 8
5 Prioritisation of applicants ................................................................................................................. 8
6 Structure of the programme ................................................................................................................ 9
  6.1 Astrophysics ............................................................................................................................... 9
  6.2 Biophysics .................................................................................................................................. 10
  6.3 Computational Physics .............................................................................................................. 12
  6.4 Earth and Climate Physics .......................................................................................................... 13
  6.5 Physics of Complex Systems ...................................................................................................... 15
  6.6 Quantum Physics ....................................................................................................................... 17
7 Exemptions ....................................................................................................................................... 18
8 Commencement etc............................................................................................................................. 19
Appendix 1 The recommended academic progression ........................................................................ 20
Appendix 2 Interim arrangements ...................................................................................................... 26
  1 General changes for students admitted in the academic year 2023/24 ........................................ 26
  2 General changes for students admitted in the academic year 2022/23 ........................................ 26
  3 General changes for students admitted in the academic year 2021/22 ........................................ 27
  4 General changes for students admitted in the academic year 2020/21 ........................................ 30
Appendix 3 Description of objectives for the thesis .......................................................................... 34
1 Title, affiliation and language
A shared section that applies to all BSc, part-time MSc and MSc Programmes at the Faculty of Science is linked to this programme-specific curriculum.

1.1 Title
The MSc Programme in Physics leads to a Master of Science (MSc) in Physics with the Danish title: Cand.scient. (candidatus/candidata scientiarum) i fysik.

1.2 Affiliation
The programme is affiliated with the Study Board of Physics, Chemistry and Nanoscience, and the students can both elect, and be elected, to this study board.

1.3 Corps of external examiners
The following corps of external examiners is used for the central parts of the MSc Programme:
• Corps of External Examiners for Physics (fysik).

1.4 Language
The language of this MSc Programme is English.

2 Academic profile
2.1 Purpose
The overall goal of the 2 year MSc education in Physics is to train the students to a level where they can work, think and act independently as a physicist. In order to achieve this goal, the Master of Science Programme in Physics is a research based education that allows the student to specialise within a certain area of physics as chosen by the student. The student follows a curriculum composed partly by high level academic courses in theoretical and experimental physics and partly by a large independent thesis project with experimental content. This way the student obtains a general insight into a broader area of physics in combination with in-depth insight and practical experience within a highly specialised area at the research forefront.

2.2 General programme profile
The MSc Programme in Physics is a research-based education composed by 60 ECTS courses and a 60 ECTS thesis project. The MSc Programme in Physics has six specialisations: Quantum Physics, Astrophysics, Earth and Climate Physics, Biophysics, Computational Physics and Physics of Complex Systems. Each specialisation has one or two mandatory courses, introducing to the chosen field of specialisation, and a range of specialisation courses. The course component of the education will give the student a profound overview of the state of the art established knowledge within the chosen specialisation area. The thesis will allow the student to specialise further within a topic of physics. The student will perform independent research of experimental nature and this way, by the end of the studies, be in a position where he/she can challenge and further contribute to the established knowledge within a chosen area of physics.

Physics is the key subject area of the programme. Mathematics and computer science are also subject areas of the programme.

2.3 General structure of the programme
The MSc Programme is set at 120 ECTS.

The MSc Programme in Physics consists of the following elements:
• Specialisation, 120 ECTS, including the thesis.

The student must choose one of the following:
• Astrophysics
• Biophysics
• Computational Physics
• Earth and Climate Physics
• Physics of Complex Systems
• Quantum Physics

2.4 Career opportunities
The MSc Programme in Physics qualifies students to become professionals within business functions and/or areas such as:
• PhD-student in different profession directions at science and medical science faculties or in industry
• High school teacher
• Specialist in the consultancy industry, eg. datascience, wind and natural resources
• Biophysicist in the pharmaceutical industry
• Hospital physicist
• Meteorologist
• Risk Manager or Analyst in the bank sector or insurance companies
• A wide range of job opportunities within Danish and international high-tech companies, international agencies and national authorities
• Various jobs within research and development using physics as the basis of modern technology and a sustainable development, for example in high-tech companies and the consultancy industry.

3 Description of competence profiles
Students following the MSc Programme acquire the knowledge, skills and competences listed below. Students will also acquire other qualifications through elective subject elements and other study activities.

3.1 Competence profile – Generic competences
Graduates holding an MSc in Physics have acquired the following regardless of the chosen specialisation:

Knowledge about:
• State-of-the-art within a particular specialization in physics.
• Current problems within astrophysics, biophysics, geophysics, quantum physics, complex physics or computational physics relevant to industry and society and their possible solutions.
• State-of-the-art mathematical, digital and numerical methods for quantifying and solving problems within physics, to obtain, analyse and visualize quantified data, and for numerical modelling of physical systems.

Skills in/to:
• Apply the most recent and advanced experimental or theoretical techniques, measuring methods and equipment in the field and/or in the laboratory.
• Select and critically evaluate theoretical, experimental, and numerical methods for quantified analyses of data and scientific problems within the field of physics.
• Summarise a research subject based on original scientific literature and own work, both in written and oral form, and using the English language.
• Apply appropriate IT-solutions and digital tools for information and data processing, communication and presentations within the field of physics.

**Competences in/to:**
- Manage, advise on, and conduct research on problems within the field of physics, based on thorough knowledge of the relevant physical properties and the laws of physics.
- Independently formulate scientific problems within the subject area, develop and conduct investigations using theoretical, experimental or numerical methods, to explain, communicate and put into perspective the scientific problem, both orally and in writing.
- Combine and further develop advanced methods and techniques to solve complex problems within the field of physics, including competences required to evaluate the validity of the theoretical framework, the limitations of the experimental or numerical set-up, the complexity of the results, sources of error and methodological uncertainties.
- Apply concepts and methods from physics to suggest innovative sustainable solutions for relevant problems in industry and society.
- Disseminate knowledge about the subject area in both academic and non-academic contexts.
- Research-based work with others, both with peers and within a research group.

### 3.2 Astrophysics

In addition to the generic competence profile, graduates holding an MSc in Physics with a specialisation in Astrophysics have acquired the following:

**Knowledge about:**
- Key disciplines, methods, theories and concepts in astronomy, including phenomena such as stars, galaxies, and the substances between them.
- The links between astronomy and other scientific disciplines.
- Advanced technological methods for astronomical observation.

**Skills in/to:**
- Independently planning and running astronomical and astrophysical projects.
- Setting up relevant analytical or numerical models for an astronomical system and using observed data for analyses and for verification of the models.
- Working independently on astrophysics subjects.
- Explaining and communicating, both orally and in writing, specialized knowledge of general astrophysical principles.

**Competences in/to:**
- Study signals over most of the electromagnetic spectrum.
- Build up a clear and up-to-date picture of what the universe contains and how it is constructed.
- Master elements of multiple disciplines, from classical physics to quantum mechanics, and to be well versed in the methodology of mathematical physics.
- Apply scientific theory and methodology in an astronomy context.

### 3.3 Biophysics

In addition to the generic competence profile, graduates holding an MSc in Physics with a specialisation in Biophysics have acquired the following:
Knowledge about:
- How to describe in quantitative terms the physical processes of biological systems at levels down to the individual molecule.
- The possibilities and limitations of experimental, modern techniques in biophysics.
- The latest research at the academic interface between physics and biology.

Skills in/to:
- Quantitative descriptions of biological systems.
- Modern, experimental biophysics techniques, including single-molecule techniques and scattering techniques.
- Critical evaluation of biological data sets, including identifying the criteria used to identify significant trends.

Competences in/to:
- Understand the physical characteristics of life's molecular building blocks.
- A solid academic grounding in the border zone between physics and molecular biology, and insight into both biophysical and molecular biological experimental techniques, e.g. single-molecule techniques and super-resolution microscopy and X-ray and Neutron Scattering.

3.4 Computational Physics
In addition to the generic competence profile, graduates holding an MSc in Physics with a specialisation in Computational Physics have acquired the following:

Knowledge about:
- General techniques and ideas found in professionally written numerical software.
- General concepts needed for applying suitable software in a qualified manner to problems in computational physics.
- Simple mathematical models from science and numerical analysis of them.
- The ideas behind and the motivation for fundamental numerical methods for the solution of linear and nonlinear equations, linear and nonlinear optimization, eigenvalue problems initial value problems for ordinary differential equations, partial differential equations, the Fast Fourier Transform, and the use of Monte Carlo methods.

Skills in/to:
- Choosing an appropriate numerical method for the solution of the problem or subproblem.
- Evaluate the numerical method with respect to potential accuracy, computational efficiency, robustness, and memory requirements.
- Evaluate the quality of the solution with respect to the accuracy obtained and the sensitivity to model parameter variations.
- Describe and quantify data uncertainties and modeling errors.
- Describe available information using probabilistic/statistical models and methods.

Competences in/to:
- Performing numerical analysis of simple mathematical models of physical system to solve concrete problems and to evaluate the results obtained.
- Treating data uncertainties and evaluating the accuracy and resolution of the solution.
- Apply methods and tools from a wide range of physical disciplines, in order to describing and understanding numerical problems relevant to society, industry, companies, and teaching.
3.5 Earth and Climate Physics
In addition to the generic competence profile, graduates holding an MSc in Physics with a specialisation in Earth and Climate Physics have acquired the following:

Knowledge about:
- The basic physical principles of geophysics and their mathematical formulations in studies of the atmosphere, the oceans, the ice caps, Earth’s interior and Earth's climate system in general.
- The structure of geophysical systems on different scales in space and time, and the fundamental principles and processes that operate on each scale.
- Methods of quantification for the study of geophysical systems.
- Numerical methods for solving a wide range of problems, using both linear and non-linear methods for data analysis.

Skills in/to:
- Planning and execution of geophysical experiments and observation campaigns, including numerical experiments.
- Setting up appropriate analytical or numerical models for a geophysical system based on the laws of physics and using observed data for analyses and for verification of the models.
- Explaining and communicating, both orally and in writing, specialist knowledge of geophysical phenomena.

Competences in/to:
- Use exact quantitative scientific methodology in conjunction with data from field work, laboratory experiments and/or satellite-based measurements to describe both basic and specialized problems related to the Earth and its climate.
- Use geophysical models and principles in the study of the Earth and other planets.
- Assess and apply the relevance of results from geophysical and climate research to understand climate change and contribute to a sustainable development, as well as in a general professional and social context.

3.6 Physics of Complex Systems
In addition to the generic competence profile, graduates holding an MSc in Physics with a specialisation in Physics of Complex Systems have acquired the following:

Knowledge about:
- A broad range of complex phenomena and dynamical systems from physics and other disciplines.
- How methods from physics can be used to study complex phenomena in other disciplines.
- A range of physical, mathematical and numerical methods and models, which gives access to a wide range of professions which apply physics, mathematics, statistics and programming.

Skills in/to:
- Construct physical models to describe a variety of systems where interaction of many simple parts give rise to new phenomena larger scale.
- Construct quantitative models of problems relevant to industry and society.
- Simulations of stochastic systems, phase transitions, network theory, scale invariant phenomena, working with dynamical models of spatially extended systems.
Competences in/to:
- Using methodology from physics to model a variety of systems where phenomena emerge from the interaction of many simple parts.
- Apply a range of physical laws, methodology and analysis methods to actual problems in our surrounding world.
- Building and understanding quantitative models by use of mathematical and numerical methods.
- Developing testable mathematical-physical models of systems with internal feedbacks and interactions.

3.7 Quantum Physics
In addition to the generic competence profile, graduates holding an MSc in Physics with a specialisation in Quantum Physics have acquired the following:

Knowledge about:
- Key disciplines, methods, theories and concepts in quantum physics, including phenomena in solid state physics, atomic physics, and sub-atomic physics.
- The links between quantum physics and other scientific disciplines.
- Advanced technological methods in quantum physical experiments.

Skills in/to:
- Independently planning and running projects within quantum physical topics.
- Setting up relevant analytical or numerical models for a quantum physical system and using experimental data for analyses and for verification of the models.
- Working independently on quantum physical subjects.
- Explaining and communicating, both orally and in writing, specialized knowledge of the nano-scale, atomic, and sub-atomic world.

Competences in/to:
- Build up a far clearer picture of what the nano-scale, atomic, and sub-atomic world contains and how it is constructed.
- Master elements of multiple disciplines and to be well versed in the methodology of mathematical physics.
- Apply scientific theory and methodology in context of quantum physics.

4 Admission requirements
4.1 Bachelor's degrees that automatically fulfil the academic requirements
Applicants with one of the following Bachelor’s degrees automatically fulfil the academic requirements for admission to the MSc Programme in Physics:

- Physics (fysik) from University of Copenhagen (reserved access)
- Natural Science and IT (naturvidenskab og IT) with a specialisation in Physics from University of Copenhagen

4.2 Other Bachelor’s degrees
Applicants with a Bachelor's degree, Professional Bachelor’s degree or equivalent from Danish or international universities other than those listed in 4.1 are qualified for admission to the MSc Programme in Physics if the programme includes the following:
• **A Basic requirements:**
  • Mathematics (linear algebra, differential equations) (min. 20 ECTS credits).
  • Classical mechanics (min. 10 ECTS credits).
  • Thermodynamics (min. 10 ECTS credits).
  • Electromagnetism (min. 10 ECTS credits).

**B Advanced requirements (min. 30 ECTS credits):**
• Advanced physics within one or more of the following subjects: Quantum Physics, Modern Physics, Geophysics, Biophysics, Medical Physics and/or Astrophysics.

• **The combined total of A and B must be min. 120 ECTS credits.**

4.3 **Other applicants**
The Faculty may also admit applicants who, after an individual academic assessment, are assessed to possess educational qualifications equivalent to those required in Subclauses 4.1-3.

4.4 **Language requirements**
Applicants must as a minimum document English language qualifications comparable to a Danish upper secondary school English B level or English proficiency corresponding to the tests and scores required. Accepted tests and required minimum scores are published online at science.ku.dk.

4.5 **Supplementary subject elements**
The qualifications of an applicant to the MSc programme are assessed exclusively on the basis of the qualifying Bachelor’s degree. Supplementary subject elements passed between the completion of the Bachelor’s programme and the admission to the MSc programme cannot be included in the overall assessment.

However, subject elements passed before the completion of the Bachelor’s programme may be included in the overall assessment. This includes subject elements completed as continuing education as well as subject elements completed as part of a former higher education programme. A maximum of 30 ECTS supplementary subject elements can be included in the overall assessment.

Subject elements passed before completing the Bachelor’s programme which are to form part of the MSc programme to which the student has a legal right of admission (§15-courses) cannot be included in the overall assessment.

5 **Prioritisation of applicants**
With a Bachelor’s degree in Physics from University of Copenhagen the student is granted reserved access and guaranteed a place on the MSc Programme in Physics if the student applies in time to begin the MSc Programme within three years of the completion of the Bachelor's degree.

If the number of qualified applicants to the programme exceeds the number of places available, applicants will be prioritised according to the following criteria:

• Total number of ECTS within courses in physics
• Grades within courses in physics.
6 Structure of the programme
The compulsory subject elements, restricted elective subject elements and the thesis constitute the central parts of the programme (Section 30 of the Ministerial Order on Bachelor and Master’s Programmes (Candidatus) at Universities).

6.1 Astrophysics
The specialisation is set at 120 ECTS and consists of the following:
- Compulsory subject elements, 15 ECTS
- Restricted elective subject elements
  - 45 ECTS (thesis, 45 ECTS)
  - 30 ECTS (thesis, 60 ECTS)
- Elective subject elements, 15 ECTS
- Thesis, 45 or 60 ECTS

6.1.1 Compulsory subject elements
All of the following subject elements are to be covered (15 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK14011U</td>
<td>Theoretical Astrophysics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16001U</td>
<td>Observational Astrophysics</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

6.1.2 Restricted elective subject elements
45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK12009U</td>
<td>Astronomical Data Processing</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYA04022U</td>
<td>General Relativity and Cosmology</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK21004U</td>
<td>Computational Astrophysics</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16008U</td>
<td>Exoplanets and Astrobiology</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15002U</td>
<td>Advanced Methods in Applied Statistics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15014U</td>
<td>Gravitational Dynamics and Galaxy Formation</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13017U</td>
<td>The Interstellar Medium and the Formation of Stars and Planets</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK18003U</td>
<td>Fundaments of High-Energy Astrophysics and Particle Astrophysics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

6.1.3 Elective subject elements
15 ECTS are to be covered as elective subject elements.
- All subject elements at MSc level may be included as elective subject elements in the MSc Programme.
- BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme.
- Projects. See 6.1.4 Projects.

6.1.4 Projects
Projects outside the course scope, projects in practice and thesis preparation projects may not exceed 45 ECTS of the programme if the programme includes a thesis corresponding to 45 ECTS or 30 ECTS of the programme if the programme includes a thesis corresponding to 60 ECTS.
- Projects outside the course scope may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.
• Projects in practice may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.
• Thesis preparation projects may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 6 to the shared section of the curriculum.

6.1.5 Thesis
The MSc Programme in Physics with a specialisation in Astrophysics includes a thesis corresponding to 45 or 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

6.1.6 Academic mobility
The curriculum makes it possible to follow subject elements outside the Faculty of Science.

For students admitted in September the academic mobility for the MSc Programme in Physics with a specialisation in Astrophysics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Astrophysics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

Academic mobility requires that the student follows the rules and regulations regarding pre-approval and credit transfer.

In addition, the student has the possibility to arrange similar academic mobility in other parts of the programme.

6.2 Biophysics
The specialisation is set at 120 ECTS and consists of the following:
• Compulsory subject elements, 15 ECTS.
• Restricted elective subject elements
  o 45 ECTS (thesis, 45 ECTS)
  o 30 ECTS (thesis, 60 ECTS)
• Elective subject elements, 15 ECTS.
• Thesis, 45 or 60 ECTS

6.2.1 Compulsory subject elements
All of the following subject elements are to be covered (7.5 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK15006U</td>
<td>Biophysics of Cells and Single Molecules</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NBIK17001U</td>
<td>Dynamical Models in Molecular Biology</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>
### 6.2.2 Restricted elective subject elements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK18005U</td>
<td>Complex Physics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13011U</td>
<td>Applied Statistics: From Data to Results</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NBIK16001U</td>
<td>NMR Spectroscopy</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK24002U</td>
<td>Physics of Nonequilibrium Systems</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10005U</td>
<td>Continuum Mechanics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13013U</td>
<td>Experimental X-ray Physics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14039U</td>
<td>Radioactive Isotopes and Ionizing Radiation</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10006U</td>
<td>Diffusive and Stochastic Processes</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13021U</td>
<td>Neutron Scattering</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14009U</td>
<td>Physics of Molecular Diseases</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

#### 6.2.3 Elective subjects

15 ECTS are to be covered as elective subject elements.
- All subject elements at MSc level may be included as elective subject elements in the MSc Programme.
- BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme.
- Projects. See 6.1.4 Projects.

#### 6.2.4 Projects

Projects outside the course scope, projects in practice and thesis preparation projects may not exceed 45 ECTS of the programme if the programme includes a thesis corresponding to 45 ECTS or 30 ECTS of the programme if the programme includes a thesis corresponding to 60 ECTS.
- Projects outside the course scope may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.
- Projects in practice may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.
- Thesis preparation projects may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 6 to the shared section of the curriculum.

#### 6.2.5 Thesis

The MSc Programme in Physics with a specialisation in Biophysics includes a thesis corresponding to 45 or 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

#### 6.2.6 Academic mobility

The curriculum makes it possible to follow subject elements outside the Faculty of Science.

For students admitted in September the academic mobility for the MSc Programme in Physics with a specialisation in Biophysics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).
For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Biophysics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

Academic mobility requires that the student follows the rules and regulations regarding pre-approval and credit transfer.

In addition, the student has the possibility to arrange similar academic mobility in other parts of the programme.

6.3 Computational Physics
The specialisation is set at 120 ECTS and consists of the following:
- Compulsory subject elements, 15 ECTS.
- Restricted elective subject elements
  - 45 ECTS (thesis 45 ECTS)
  - 30 ECTS (thesis, 60 ECTS)
- Elective subject elements, 15 ECTS.
- Thesis, 45 or 60 ECTS

6.3.1 Compulsory subject elements
All of the following subject elements are to be covered (15 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDAA07012U</td>
<td>Scientific Computing</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYA04034U</td>
<td>Inverse Problems</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

6.3.2 Restricted elective subject elements
45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK18005U</td>
<td>Complex Physics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15003U</td>
<td>Advanced Quantum Mechanics (Quant3)</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15006U</td>
<td>Biophysics of Cells and Single Molecules</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15008U</td>
<td>Earth and Climate Physics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14011U</td>
<td>Theoretical Astrophysics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13011U</td>
<td>Applied Statistics: From Data to Results</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK21004U</td>
<td>Computational Astrophysics</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NBIK17001U</td>
<td>Dynamical Models in Molecular Biology</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10005U</td>
<td>Continuum Mechanics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NDAA09027U</td>
<td>Signal and Image Processing</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15002U</td>
<td>Advanced Methods in Applied Statistics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK18001U</td>
<td>High Performance Parallel Computing</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK20002U</td>
<td>Applied Machine Learning</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10006U</td>
<td>Diffusive and Stochastic Processes</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK22001U</td>
<td>Advanced Computational Geophysics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK22003U</td>
<td>Computational Atmosphere and Ocean Dynamics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

6.3.3 Elective subject elements
15 ECTS are to be covered as elective subject elements.
- All subject elements at MSc level may be included as elective subject elements in the MSc Programme.
- BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme.
- Projects. See 6.3.4 Projects.
6.3.4 Projects
Projects outside the course scope, projects in practice and thesis preparation projects may not exceed 45 ECTS of the programme if the programme includes a thesis corresponding to 45 ECTS or 30 ECTS of the programme if the programme includes a thesis corresponding to 60 ECTS.

- Projects outside the course scope may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.
- Projects in practice may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.
- Thesis preparation projects may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 6 to the shared section of the curriculum.

6.3.5 Thesis
The MSc Programme in Physics with a specialisation in Computational Physics includes a thesis corresponding to 45 or 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

6.3.6 Academic mobility
The curriculum makes it possible to follow subject elements outside the Faculty of Science.

For students admitted in September the academic mobility for the MSc Programme in Physics with a specialisation in Computational Physics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Computational Physics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

In addition, the student has the possibility to arrange similar academic mobility in other parts of the programme.

6.4 Earth and Climate Physics
The specialisation is set at 120 ECTS and consists of the following:
- Compulsory subject elements, 15 ECTS.
- Restricted elective subject elements
  - 45 ECTS (thesis, 45 ECTS)
  - 30 ECTS (thesis, 60 ECTS)
- Elective subject elements, 15 ECTS.
- Thesis, 45 or 60 ECTS

6.4.1 Compulsory subject elements
All of the following subject elements are to be covered (15 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK15008U</td>
<td>Earth and Climate Physics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYA04034U</td>
<td>Inverse Problems</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>
### 6.4.2 Restricted elective subject elements

45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS).

30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK14007U</td>
<td>Paleo-Climatology</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NDAA07012U</td>
<td>Scientific Computing</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK17002U</td>
<td>Climate Models and Observations</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13011U</td>
<td>Applied Statistics: From Data to Results</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10005U</td>
<td>Continuum Mechanics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13000U</td>
<td>Climate Change Mechanisms and Tipping Points</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16008U</td>
<td>Exoplanets and Astrobiology</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK22001U</td>
<td>Advanced Computational Geophysics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK22003U</td>
<td>Computational Atmosphere and Ocean Dynamics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

### 6.4.3 Elective subject elements

15 ECTS are to be covered as elective subject elements.
- All subject elements at MSc level may be included as elective subject elements in the MSc Programme.
- BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme.
- Projects. See 6.4.4 Projects.

### 6.4.4 Projects

Projects outside the course scope, projects in practice and thesis preparation projects may not exceed 45 ECTS of the programme if the programme includes a thesis corresponding to 45 ECTS or 30 ECTS of the programme if the programme includes a thesis corresponding to 60 ECTS.
- Projects outside the course scope may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.
- Projects in practice may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.
- Thesis preparation projects may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 6 to the shared section of the curriculum.

### 6.4.5 Thesis

The MSc Programme in Physics with a specialisation in Earth and Climate Physics includes a thesis corresponding to 45 or 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

### 6.4.6 Academic mobility

The curriculum makes it possible to follow subject elements outside the Faculty of Science.

For students admitted in September the academic mobility for the MSc Programme in Physics with a specialisation in Earth and Climate Physics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).
For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Earth and Climate Physics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

Academic mobility requires that the student follows the rules and regulations regarding pre-approval and credit transfer.

In addition, the student has the possibility to arrange similar academic mobility in other parts of the programme.

6.5 Physics of Complex Systems

The specialisation is set at 120 ECTS and consists of the following:

- Compulsory subject elements, 7.5 ECTS.
- Restricted elective subject elements
  - 52.5 ECTS (thesis 45 ECTS)
  - 37.5 ECTS (thesis, 60 ECTS)
- Elective subject elements, 15 ECTS.
- Thesis, 45 or 60 ECTS

6.5.1 Compulsory subject elements

All of the following subject elements are to be covered (7.5 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK18005U</td>
<td>Complex Physics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

6.5.2 Restricted elective subject elements

52.5 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS) 37.5 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDAA07012U</td>
<td>Scientific Computing</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15003U</td>
<td>Advanced Quantum Mechanics (Quant3)</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15006U</td>
<td>Biophysics of Cells and Single Molecules</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15008U</td>
<td>Earth and Climate Physics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14011U</td>
<td>Theoretical Astrophysics</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYA04034U</td>
<td>Inverse Problems</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13011U</td>
<td>Applied Statistics: From Data to Results</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK21004U</td>
<td>Computational Astrophysics</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK23008U</td>
<td>Condensed Matter Experiments</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NBIK17001U</td>
<td>Dynamical Models in Molecular Biology</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10017U</td>
<td>Condensed Matter Theory 1 (CMT1)</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK17002U</td>
<td>Climate Models and Observations</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYB10021U</td>
<td>Condensed Matter Physics 2 (CMP2)</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK23005U</td>
<td>Physical Implementations of Quantum Information Processing</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16001U</td>
<td>Observational Astrophysics</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13013U</td>
<td>Experimental X-ray Physics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10005U</td>
<td>Continuum Mechanics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13000U</td>
<td>Climate Change Mechanisms and Tipping Points</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK24002U</td>
<td>Physics of Nonequilibrium Systems</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15014U</td>
<td>Gravitational Dynamics and Galaxy Formation</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK24003U</td>
<td>Quantum Nanoelectronics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10003U</td>
<td>Condensed Matter Theory 2</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Block</td>
<td>ECTS</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>NFYK15002U</td>
<td>Advanced Methods in Applied Statistics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10006U</td>
<td>Diffusive and Stochastic Processes</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13021U</td>
<td>Neutron Scattering</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14009U</td>
<td>Physics of Molecular Diseases</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK22003U</td>
<td>Computational Atmosphere and Ocean Dynamics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK22001U</td>
<td>Advanced Computational Geophysics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13017U</td>
<td>The Interstellar Medium and the Formation of Stars and Planets</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK20002U</td>
<td>Applied Machine Learning</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

**6.5.3 Elective subject elements**

15 ECTS are to be covered as elective subject elements.
- All subject elements at MSc level may be included as elective subject elements in the MSc Programme.
- BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme.
- Projects. See 6.5.4 Projects.

**6.5.4 Projects**
Projects outside the course scope, projects in practice and thesis preparation projects may not exceed 45 ECTS of the programme if the programme includes a thesis corresponding to 45 ECTS or 30 ECTS of the programme if the programme includes a thesis corresponding to 60 ECTS.
- Projects outside the course scope may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.
- Projects in practice may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.
- Thesis preparation projects may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 6 to the shared section of the curriculum.

**6.5.5 Thesis**
The MSc Programme in Physics with a specialisation in Physics of Complex Systems includes a thesis corresponding to 45 or 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

**6.5.6 Academic mobility**
The curriculum makes it possible to follow subject elements outside the Faculty of Science.

For students admitted in September the academic mobility for the MSc Programme in Physics with a specialisation in Physics of Complex Systems is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Physics of Complex Systems is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).
Academic mobility requires that the student follows the rules and regulations regarding pre-approval and credit transfer.

In addition, the student has the possibility to arrange similar academic mobility in other parts of the programme.

### 6.6 Quantum Physics
The specialisation is set at 120 ECTS and consists of the following:
- **Compulsory subject elements**, 7.5 ECTS.
- **Restricted elective subject elements**
  - 52.5 ECTS (thesis 45 ECTS)
  - 37.5 ECTS (thesis, 60 ECTS)
- **Elective subject elements**, 15 ECTS.
- **Thesis**, 45 or 60 ECTS

#### 6.6.1 Compulsory courses
All of the following subject elements are to be covered (7.5 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK15003U</td>
<td>Advanced Quantum Mechanics (Quant3)</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

#### 6.6.2 Restricted elective subject elements
52.5 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
37.5 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDA06006U</td>
<td>Quantum Optics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13013U</td>
<td>Experimental X-ray Physics (X-ray)</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK10003U</td>
<td>Condensed Matter Theory 2</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK24003U</td>
<td>Quantum Nanoelectronics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13004U</td>
<td>Quantum Field Theory 1</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15002U</td>
<td>Advanced Methods in Applied Statistics</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16000U</td>
<td>Modern Methods for Particle Scattering</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK18004U</td>
<td>Advanced Quantum Optics and Photonics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13021U</td>
<td>Neutron Scattering</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK18003U</td>
<td>Fundamentals of High-Energy Astrophysics and Particle Astrophysics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14014U</td>
<td>Introduction to String Theory</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK20002U</td>
<td>Applied Machine Learning</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>
**6.6.3 Elective subject elements**

15 ECTS are to be covered as elective subject elements.

- All subject elements at MSc level may be included as elective subject elements in the MSc Programme.
- BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme.
- Projects. See 6.5.4 Projects.

**6.5.4 Projects**

Projects outside the course scope, projects in practice and thesis preparation projects may not exceed 45 ECTS of the programme if the programme includes a thesis corresponding to 45 ECTS or 30 ECTS of the programme if the programme includes a thesis corresponding to 60 ECTS.

- Projects outside the course scope may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.
- Projects in practice may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.
- Thesis preparation projects may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 6 to the shared section of the curriculum.

**6.6.4 Thesis**

The MSc Programme in Physics with a specialisation in Quantum Physics includes a thesis corresponding to 45 or 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

**6.6.5 Academic mobility**

The curriculum makes it possible to follow subject elements outside the Faculty of Science.

For students admitted in September the academic mobility for the MSc Programme in Physics with a specialisation in Quantum Physics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Quantum Physics is placed in block 3+4 of the 1st year (thesis 45 or 60 ECTS).

Academic mobility requires that the student follows the rules and regulations regarding pre-approval and credit transfer.

In addition, the student has the possibility to arrange similar academic mobility in other parts of the programme.

**7 Exemptions**

In exceptional circumstances, the study board may grant exemptions from the rules in the curriculum specified solely by the Faculty of Science.
8 Commencement etc.
8.1 Validity
This subject specific section of the curriculum applies to all students enrolled in the programme – see however Appendix 2.

8.2 Transfer
Students enrolled on previous curricula may be transferred to the new one as per the applicable transfer regulations or according to an individual credit transfer by the study board.

8.3 Amendment
The curriculum may be amended once a year so that any changes come into effect at the beginning of the academic year. Amendments must be proposed by the study board and approved by the Dean.

Notification about amendments that tighten the admission requirements for the programme will be published online at science.ku.dk one year before they come into effect.

If amendments are made to this curriculum, an interim arrangement may be added if necessary to allow students to complete their MSc Programme according to the amended curriculum.
**Appendix 1 The recommended academic progression**

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.

### Table - Astrophysics (thesis, 45 ECTS)

<table>
<thead>
<tr>
<th></th>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Theoretical Astrophysics</td>
<td>Observational Astrophysics</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>2nd year</td>
<td>Restricted elective</td>
<td></td>
<td></td>
<td>Thesis</td>
</tr>
</tbody>
</table>

### Table – Astrophysics (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th></th>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Theoretical Astrophysics</td>
<td>Observational Astrophysics</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>2nd year</td>
<td></td>
<td></td>
<td></td>
<td>Thesis</td>
</tr>
</tbody>
</table>

### Table - Biophysics (thesis, 45 ECTS)

<table>
<thead>
<tr>
<th></th>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Biophysics of Cells and Single Molecules</td>
<td>Dynamical Models in Molecular Biology</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>2nd year</td>
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### Table – Physics of Complex Systems (thesis, 45 ECTS)

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Tables for students admitted to the programme in February (winter):

**Tabel – Astrophysics (thesis, 45 ECTS)**

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*This table is only relevant for students who begin the MSc Programme in February (block 3)*

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Appendix 2 Interim arrangements

The Shared Section of the BSc and MSc Curricula for Study Programmes applies to all students.

The interim arrangements below only consist of parts where the current curriculum differs from the rules and regulations that were previously valid. Therefore, if information about relevant rules and regulations are missing, it can be found in the curriculum above.

1 General changes for students admitted in the academic year 2023/24
Students admitted to the MSc Programme in the academic year 2023/24 must finish the programme as listed in the curriculum above with the following exceptions.

1.1 Biophysics

Restricted elective subject elements
45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Restricted elective subject elements offered as part of the specialisation in Biophysics in this curriculum (see above)</th>
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<tr>
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1.2 Physics of Complex Systems

Restricted elective subject elements
52.5 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
37.5 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
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<td>NFYA04022U</td>
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<td>NFYK12005U</td>
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<tr>
<td>NFYK15016U</td>
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1.3 Quantum Physics

Restricted elective subject elements
52.5 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
37.5 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS):

<table>
<thead>
<tr>
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<tr>
<td>NFYK12005U</td>
</tr>
</tbody>
</table>

2 General changes for students admitted in the academic year 2022/23
Students admitted to the MSc Programme in the academic year 2022/23 must finish the programme as listed in the curriculum above with the following exceptions.

2.1 Astrophysics

Restricted elective subject elements
45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

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### 2.2 Biophysics

**Restricted elective subject elements**

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30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Subject Elements</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Physics of Biological Nonequilibrium Systems</td>
<td>Discontinued*</td>
</tr>
</tbody>
</table>

### 2.3 Physics of Complex Systems

**Restricted elective subject elements**

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<tr>
<th>Subject Elements</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics of Biological Nonequilibrium Systems</td>
<td>Discontinued*</td>
</tr>
</tbody>
</table>

### 3 General changes for students admitted in the academic year 2021/22

Students admitted to the MSc Programme in the academic year 2021/22 must finish the programme as listed in the curriculum above with the following exceptions.

### 3.1 Astrophysics

**Restricted elective subject elements**

45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)

30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Subject Elements</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Statistics: From Data to Results</td>
<td>Block 2</td>
</tr>
<tr>
<td>Particle Physics and the Early Universe</td>
<td>Discontinued*</td>
</tr>
</tbody>
</table>
### 3.2 Biophysics
**Restricted elective subject elements**
45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDAK10005U</td>
<td>Medical Image Analysis</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NBIK22002U</td>
<td>Advanced Protein Science 1 – Biophysical Methods</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>NDAK14007U</td>
<td>Applied Programming</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>NPLK17000U</td>
<td>Biological Imaging</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>NBIK10024U</td>
<td>Advanced Protein Science 2 – Protein Structure Determination</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK20001U</td>
<td>Particle Detectors and Beams: Fundamentals and Developments in Physics and Life Science</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NBIK10023U</td>
<td>Advanced Protein Science 1 - Protein Interactions and Sequences</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15016U</td>
<td>Physics of Biological Nonequilibrium Systems</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

*See discontinued courses below.

### 3.3 Computational Physics
**Restricted elective subject elements**
45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK14024U</td>
<td>Turbulence</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NDAA09009U</td>
<td>Numerical Optimisation (NO)</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>NDAK14007U</td>
<td>Applied Programming</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK15003U</td>
<td>Advanced Mathematical Physics (AdvMathPhys)</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>NDAK12006U</td>
<td>Computational Methods in Simulation (CMIS)</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK16007U</td>
<td>Dynamical Models for Climate and NWP</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15004U</td>
<td>Advanced Seismology</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK20000U</td>
<td>Ocean Dynamics and Carbon Cycle</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

*See discontinued courses below.

### 3.4 Earth and Climate Physics
**Restricted elective subject elements**
45 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
30 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK14024U</td>
<td>Turbulence</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK15012U</td>
<td>General Circulation of the Atmosphere</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16007U</td>
<td>Dynamical Models for Climate and NWP</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15004U</td>
<td>Advanced Seismology</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK20000U</td>
<td>Ocean Dynamics and the Carbon Cycle</td>
<td>Discontinued*</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>

*See discontinued courses below.
3.5 Physics
Students admitted to the MSc Programme in the academic year 2021/22 must finish the specialisation as listed in the specialisation Physics in Complex Systems in the curriculum above with the following exceptions.

Restricted elective subject elements
52.5 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
37.5 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS)

<table>
<thead>
<tr>
<th>Restricted elective subject elements offered as part of the specialisation Physics in Complex Systems in this curriculum (see above)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ID</strong></td>
</tr>
<tr>
<td>NFYK12009U</td>
</tr>
<tr>
<td>NFYK14024U</td>
</tr>
<tr>
<td>NDAA09007U</td>
</tr>
<tr>
<td>NFYK13004U</td>
</tr>
<tr>
<td>NDAK14007U</td>
</tr>
<tr>
<td>NDAK12006U</td>
</tr>
<tr>
<td>NFYK14014U</td>
</tr>
<tr>
<td>NFA04036U</td>
</tr>
<tr>
<td>NFYK13006U</td>
</tr>
<tr>
<td>NFYK23009U</td>
</tr>
<tr>
<td>NFYK16007U</td>
</tr>
<tr>
<td>NFYK13005U</td>
</tr>
<tr>
<td>NFA04022U</td>
</tr>
<tr>
<td>NFYK13006U</td>
</tr>
<tr>
<td>NFYK23009U</td>
</tr>
<tr>
<td>NFA04002U</td>
</tr>
<tr>
<td>NFYK13006U</td>
</tr>
</tbody>
</table>

*See discontinued courses below.

3.6 Quantum Physics
Restricted elective subject elements
52.5 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)
37.5 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS):

<table>
<thead>
<tr>
<th>Restricted elective subject elements offered as part of the specialisation in Quantum Physics in this curriculum (see above)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ID</strong></td>
</tr>
<tr>
<td>NMAK14020U</td>
</tr>
<tr>
<td>NFYK23009U</td>
</tr>
<tr>
<td>NMAK15003U</td>
</tr>
<tr>
<td>NFYK15015U</td>
</tr>
<tr>
<td>NFYK20001U</td>
</tr>
<tr>
<td>NFYK13010U</td>
</tr>
<tr>
<td>NFYK14010U</td>
</tr>
<tr>
<td>NFYK21000U</td>
</tr>
<tr>
<td>NFYK13005U</td>
</tr>
<tr>
<td>NFA04002U</td>
</tr>
<tr>
<td>NFYK15007U</td>
</tr>
<tr>
<td>NFYK15016U</td>
</tr>
<tr>
<td>NFYK12005U</td>
</tr>
</tbody>
</table>

*See discontinued courses below.
4 General changes for students admitted in the academic year 2020/21

Students admitted to the MSc Programme in the academic year 2020/21 must finish the programme as listed in the curriculum above with the following exceptions.

4.1 Physics

Students admitted to the MSc Programme in the academic year 2020/21 must finish the programme as listed in the curriculum above with the following exceptions:

**Restricted elective subject elements**

52.5 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)

37.5 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS):

<table>
<thead>
<tr>
<th>Subject Elements</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astronomical Data Processing</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>Turbulence</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>Computability and Complexity</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>Quantum Field Theory 1</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>Applied Programming</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>Computational Methods in Simulation (CMIS)</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>Introduction to String Theory</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>Elementary Particle Physics</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>General Relativity and Cosmology</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>Quantum Optics</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>Fysiske undervisningsforsøg</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>Computational Astrophysics: Star and Planet Formation</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Quantum Information</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Computational Astrophysics: Star and Planet Formation</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Quantum Information Theory</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>Fysiske undervisningsforsøg</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>Advanced Mathematical Physics</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>Particle Physics Phenomenology</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Particle Detectors and Beams: Fundamentals and Developments in Physics and Life Science</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Particle Physics at the Energy Frontier</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Advanced Topics in Condensed Matter Theory*</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Advanced Topics in QFT &amp; Gravity</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Quantum Information</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Fysiske undervisningsforsøg</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
</tbody>
</table>

*See discontinued courses below.

4.2 Quantum Physics

**Restricted elective subject elements**

52.5 ECTS are to be covered as subject elements from the following list (thesis, 45 ECTS)

37.5 ECTS are to be covered as subject elements from the following list (thesis, 60 ECTS):

<table>
<thead>
<tr>
<th>Subject Elements</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantum Information</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>Advanced Mathematical Physics</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
<tr>
<td>Particle Physics Phenomenology</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Particle Detectors and Beams: Fundamentals and Developments in Physics and Life Science</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Particle Physics at the Energy Frontier</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Advanced Topics in Condensed Matter Theory*</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Advanced Topics in QFT &amp; Gravity</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Quantum Information</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
<tr>
<td>Fysiske undervisningsforsøg</td>
<td>Discontinued*</td>
<td>7.5</td>
</tr>
</tbody>
</table>
Restricted elective subject elements offered as part of the specialisation in Quantum Physics in this curriculum (see above)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>ECTS</th>
<th>Interim arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK15007U</td>
<td>Condensed Matter Experiments</td>
<td>7.5</td>
<td>Discontinued*</td>
</tr>
<tr>
<td>NFYK16010U</td>
<td>Particle Physics and the Early Universe</td>
<td>7.5</td>
<td>Discontinued*</td>
</tr>
<tr>
<td>NFYK16005U</td>
<td>Introduction to Gauge-Gravity Duality*</td>
<td>7.5</td>
<td>Discontinued*</td>
</tr>
<tr>
<td>NFYK12005U</td>
<td>Nanophysics 1 – Quantum Electronics</td>
<td>7.5</td>
<td>Discontinued*</td>
</tr>
</tbody>
</table>

*See discontinued courses below.

### 5 Discontinued courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>ECTS</th>
<th>Interim arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBIK10023U</td>
<td>Advanced Protein Science 1 – Protein Interactions and</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Biophysics in the academic year 2021/22.</td>
</tr>
<tr>
<td></td>
<td>Sequences</td>
<td></td>
<td>Offered for the last time: 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The course is identical to Advanced Protein Science 1 – Biophysical Methods (NBIK22002U), 7.5 ECTS</td>
</tr>
<tr>
<td>NBIK10024U</td>
<td>Advanced Protein Science 2 – Protein Structure</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Biophysics in the academic year 2021/22.</td>
</tr>
<tr>
<td></td>
<td>Determination</td>
<td></td>
<td>Offered for the last time: 2022/23.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2023/24.</td>
</tr>
<tr>
<td>NFYK15004U</td>
<td>Advanced Seismology</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisations Computational Physics and Earth and Climate Physics in the academic year 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Offered for the last time: 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.</td>
</tr>
<tr>
<td>NFYK21000U</td>
<td>Advanced Topics in QFT &amp; Gravity</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Quantum Physics in the academic year 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Offered for the last time: 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.</td>
</tr>
<tr>
<td>NFYK14010U</td>
<td>Advanced Topics in Condensed Matter Theory</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation in Quantum Physics in the academic year 2020/21 and 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Offered for the last time: 2021/22.</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>ECTS</td>
<td>Interim arrangement</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------</td>
<td>------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>NFYK15007U</td>
<td>Condensed Matter Experiments</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Physics of Complex Systems, Physics and Quantum Physics in the academic year 2022/23 and earlier. Offered for the last time: 2022/23. Last exam if applicable (cf. SCIENCE’s Teaching and exam rules): 2023/24.</td>
</tr>
<tr>
<td>NFYK16007U</td>
<td>Dynamical Models for Climate and NWP</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisations Computational Physics, Earth and Climate Physics and Physics in the academic year 2021/22. Offered for the last time: 2021/22. Last exam if applicable (cf. SCIENCE’s Teaching and exam rules): 2022/23.</td>
</tr>
<tr>
<td>NFYA10009U</td>
<td>Fysiske undervisningsforsøg (FUF)</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Quantum Physics in the academic year 2022/23 and earlier. Offered for the last time: 2022/23. Last exam if applicable (cf. SCIENCE’s Teaching and exam rules): 2023/24.</td>
</tr>
<tr>
<td>NFYK15012U</td>
<td>General Circulation of the Atmosphere</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Earth and Climate Physics Physics in the academic year 2021/22. Offered for the last time: 2021/22. Last exam if applicable (cf. SCIENCE’s Teaching and exam rules): 2022/23.</td>
</tr>
<tr>
<td>NFYK16005U</td>
<td>Introduction to Gauge-Gravity Duality</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Quantum Physics in the academic year 2023/24 and earlier. Offered for the last time: 2023/24. Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2024/25.</td>
</tr>
<tr>
<td>NFYK12005U</td>
<td>Nanophysics 1 – Quantum Electronics</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisations in Physics/Physics of Complex Systems and Quantum Physics in the academic year 2023/24 and earlier. Offered for the last time: 2021/22. The course is identical to Quantum Nanoelectronics (NFYK24003U), 7.5 ECTS</td>
</tr>
<tr>
<td>NFYK20000U</td>
<td>Ocean Dynamics and Carbon Cycle</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisations Computational Physics and Earth and Climate Physics in the academic year 2021/22. Offered for the last time: 2021/22. Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>ECTS</td>
<td>Interim arrangement</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>NFYK20001U</td>
<td>Particle Detectors and Beams: Fundamentals and Developments in Physics and Life Science</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisations Biophysics and Quantum Physics in the academic year 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Offered for the last time: 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.</td>
</tr>
<tr>
<td>NFYK16010U</td>
<td>Particle Physics and the Early Universe</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Astrophysics and Quantum Physics in the academic year 2022/23 and earlier.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Offered for the last time: 2022/23.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2023/24.</td>
</tr>
<tr>
<td>NFYK13010U</td>
<td>Particle Physics at the Energy Frontier</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Quantum Physics in the academic year 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Offered for the last time: 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2022/23.</td>
</tr>
<tr>
<td>NFYK15015U</td>
<td>Particle Physics Phenomenology</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Quantum Physics in the academic year 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Offered for the last time: 2021/22.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The course is identical to Modern Particle Physics (NFYK22002U)</td>
</tr>
<tr>
<td>NFYK15016U</td>
<td>Physics of Biological Nonequilibrium Systems</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Biophysics and Physics/Physics of Complex Systems in the academic year 2023/24 and earlier.</td>
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<td>Offered for the last time: 2023/24.</td>
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<td>The course is identical to Physics of Nonequilibrium Systems (NFYK24002U), 7.5 ECTS</td>
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<td>NFYK13005U</td>
<td>Quantum Information</td>
<td>7.5</td>
<td>The course was restricted elective on the specialisation Quantum Physics in the academic year 2022/23 and 2021/22.</td>
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<td>Offered for the last time: 2022/23.</td>
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<td>Last exam if applicable (cf. SCIENCE's Teaching and exam rules): 2023/24.</td>
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</table>
Appendix 3 Description of objectives for the thesis

After completing the thesis, the student should have:

Knowledge about:
- Scientific problems within the study programme’s subject areas.
- A suitable combination of methodologies/theories based on international research for use in his/her work with the problem formulation.
- Theories/models on the basis of an organised value system and with a high degree of independence.

Skills in/to:
- Apply and critically evaluate theories/methodologies, including their applicability and limitations.
- Assess the extent to which the production and interpretation of findings/material depend on the theory/methodology chosen and the delimitation chosen.
- Discuss academic issues arising from the thesis.
- Draw conclusions in a clear and academic manner in relation to the problem formulation and, more generally, considering the topic and the subject area.
- Discuss and communicate the academic and social significance, if any, of the thesis based on ethical principles.

If the thesis includes experimental content/own data production, the student will also be able to:
- Substantiate the idea of conducting experimental work/producing own data in order to shed light on the topic as formulated in the problem formulation.
- Process data through a choice of academic analysis methods and present findings objectively and in a concise manner.
- Assess the credibility of own findings based on relevant data processing.

Competences in/to:
- Initiate and perform academic work in a research context.
- Solve complex problems and carry out development assignments in a work context.