Programme-specific Section of the
Curriculum for the MSc Programme in
Physics
at the Faculty of Science, University of Copenhagen
2010 (Rev. 2018)

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1 Title, affiliation and language
A shared section that applies to all BSc and MSc Programmes at the Faculty of Science is linked to this programme-specific curriculum.

1.1 Title
If a specialisation in Astrophysics has been chosen, the title awarded is Master of Science in Physics with a specialisation in Astrophysics with the Danish title: Cand.scient. (candidatus/candidata scientiarum) i fysik med en specialisering i astrofysik.

If a specialisation in Bio- and Medical Physics has been chosen, the title awarded is Master of Science in Physics with a specialisation in Bio- and Medical Physics with the Danish title: Cand.scient. (candidatus/candidata scientiarum) i fysik med en specialisering i bio- og medicinsk fysik.

If a specialisation in Computational Physics has been chosen, the title awarded is Master of Science in Physics with the Danish title: Cand.scient. (candidatus/candidata scientiarum) i fysik med en specialisering i komputationel fysik.

If a specialisation in Geophysics has been chosen, the title awarded is Master of Science in Physics with a specialisation in Geophysics with the Danish title: Cand.scient. (candidatus/candidata scientiarum) i fysik med en specialisering i geofysik.

If a specialisation in Physics has been chosen, the title awarded is Master of Science in Physics with the Danish title: Cand.scient. (candidatus/candidata scientiarum) i fysik.

If a specialisation in Quantum Physics has been chosen, the title awarded is Master of Science in Quantum Physics with the Danish title: Cand.scient. (candidatus/candidata scientiarum) i fysik med en specialisering i kvantefysik.

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, Geophysics, Bio- and Medical Physics, Computational Physics and Physics. 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 specialised 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
- Bio- and Medical Physics
- Computational Physics
- Geophysics
- Physics
- 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.
- Petro Physicist in the oil industry.
- 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, national authorities or teaching at the high-school level.
- Various jobs within research and development using physics as the basis of modern technology, for example high-tech companies, software companies and 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

On completion of the programme, a MSc in Physics has acquired the following generic competence profile regardless of the chosen specialisation:

Knowledge about:
- The basic physical laws in classical physics disciplines, i.e. classical mechanics, thermodynamics, electromagnetism, quantum mechanics, and their interrelationships, and within selected fields specialized to the highest level.
- The properties of materials at both macro- and micro-level, and the fundamental principles for the various forces that operate on each length scale for physical systems within a selected field.
- Quantification methodology.
- Up-to-date, specialist knowledge of a given field of research, built up through research based teaching and the thesis.
- Mathematical methods for solving a wide range of problems, both linear and non-linear.
- Numerical methods for data processing and solving mathematical models.

Skills in/to:
- Organising observations and experiments for studies of systems in which physical entities play a role, including electrical, electromagnetic, optical, or thermodynamic entities.
- Engaging in constructive partnerships on the basis of their scientific background in order to solve academic problems.
- Setting up and applying relevant models for a physical system based on the laws of physics.
- Solving complex mathematical problems using both analytical and numerical methods.
- Applying model solutions and methods of quantification in adjacent areas, e.g. biological, geological, chemical and economic systems.
- Explaining and communicating specialist knowledge and the general contexts of physics, both orally and in writing.
- Seeking out and summarising the latest knowledge within a particular subject area.
- Discussing the application of the subject’s results in a wider context, e.g. an industrial or social context.
- Taking independent responsibility for their own academic development, specialisation and skills development.
- Using English as a working language.
- Making use of IT as a tool for both information- and data-processing, and in other contexts where it is academically relevant, e.g. in developing numerical models and experiments.

Competences in/to:
- Setting up and applying models and developing quantification methods for use in physical systems and their adjacent areas, e.g. biological, geophysical, chemical or economic systems.
- A chosen sub-area of physics, and have insight into the relevant methods in this sub-area, i.e. analytical, experimental and numerical methodology. This can be documented by completing one of the physics qualification profiles, or via the choice of thesis topic and course portfolio.
• Work with others, both by playing an active role within research teams and by working closely with fellow students. Working on the thesis and being involved in the day-to-day operations of a research team will provide graduates with solid experience of a research environment’s different methods and forms of work.
• Communicate an issue in plain language, on both a general and a scientific level, both orally and in writing. Graduates with one of the qualification profiles have specific expertise in one of the main areas of physics.
• Applying scientific methods of working to a range of scientific areas.
• A general understanding of scientific methods.

3.2 Astrophysics
On completion of the programme, an MSc in Physics with a specialisation in Astrophysics has in addition to the generic competence profile 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 in 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.
• To build up a far clearer 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 Bio- and Medical Physics
On completion of the programme, an MSc in Physics with a specialisation in Bio- and Medical Physics has in addition to the generic competences profile acquired the following:

Knowledge about:
• How to describe in quantitative terms the physical processes of biological systems at levels down to the individual molecule.
• Setting up models that describe complex biological interactions in complex systems.
• The possibilities and limitations of experimental, modern techniques in biophysics.
• How physics methodology can be used for medical diagnosis and treatment.
• The latest research at the academic interface between physics and molecular biology.

Skills in/to:
• Quantitative descriptions of biological systems.
• Development of theoretical models for life processes, – building blocks and networks.
• Modern, experimental biophysics techniques, including single-molecule techniques.
• Critical evaluation of biological data sets, including identifying the criteria used to identify significant trends.
• Techniques and the background knowledge needed to understand and use physics for medical purposes, e.g. as a hospital physicist or in the medical industry, which are major employers of biophysics graduates.

Competences in/to:
• Have an understanding of the physical characteristics of life's molecular building blocks.
• Have learned to develop testable mathematical-physical models of how the individual parts interact to form working feedback systems.
• They have also built up 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.

3.4 Computational Physics
On completion of the programme, an MSc in Physics with a specialisation in Computational Physics has in addition to the generic competence profile 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 sub-problem.
• 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 in order 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 describe and understand numerical problems relevant to society, industry, companies, and teaching.

3.5 Geophysics
On completion of the programme, an MSc in Physics with a specialisation in Geophysics has in addition to the generic competence profile 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.
- The application and relevance of results from geophysical research in a professional and social context.

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.

3.6 Physics
On completion of the programme, an MSc in Physics with a specialisation in Physics has in addition to the generic competence profile acquired the following:

Knowledge about:
- A broad range of physical systems.
- How methods from physics can be used 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.
- Metropolis simulations, phase transitions, network theory, scale invariant phenomena, working with cellular automata and 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 differential equations, cellular automata, agent based models and stochastic simulations.
• Developing testable mathematical-physical models of systems with internal feedbacks and interactions.

3.7 Quantum Physics
On completion of the programme, an MSc in Physics with a specialisation in Quantum Physics has in addition to the generic competence profile 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
With a Bachelor’s degree in Physics from the University of Copenhagen the student is granted reserved access and guaranteed a place on the MSc Programme in Physics if the student applies before the application deadline during the first application period after the completion of the Bachelor’s degree.

4.1 Applicants with a Bachelor’s degree in Physics
Applicants with a Bachelor’s degree in Physics from the University of Copenhagen or other Danish universities are directly academically qualified for admission to the MSc Programme in Physics.

4.2 Applicants with a Bachelor’s degree in Natural Science and IT
Applicants with a Bachelor’s degree in Natural Science and IT with a specialisation in Physics from the University of Copenhagen are directly academically qualified for admission to the MSc Programme in Physics.

4.3 Applicants with a Bachelor’s degree in Nanoscience, Mathematics, Chemistry or Computer Science
Applicants with a Bachelor’s degree in Nanoscience, Mathematics, Chemistry or Computer Science from the University of Copenhagen, other Danish or Nordic universities, may also be admitted if their 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.**

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

4.5 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 [www.science.ku.dk](http://www.science.ku.dk).

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

However, subject elements passed before the completion of the bachelor’s program 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 program. A maximum of 30 ECTS supplementary subject elements can be included in the overall assessment.

Subject elements passed before completing the BSc programme which are to form part of the MSc programme to which the student has a legal right of admission (§9-courses) cannot be included in the overall assessment.

5 Prioritisation of applicants
If the number of qualified applicants to the programme exceeds the number of places available, applicants will be prioritised as follows:

1) Applicants with a Bachelor’s degree in Physics from the University of Copenhagen seeking admission by way of direct extension of their completed BSc programme.
2) Applicants with a Bachelor’s degree in Physics from the University of Copenhagen.
3) Applicants with a Bachelor’s degree in Physics.
4) Applicants with a Bachelor’s degree Nanoscience, Natural Science and IT, Mathematics, Chemistry and Computer Science from the University of Copenhagen, other Danish or Nordic universities.
5) Other applicants.
If the number of qualified applicants within a category exceeds the number of places available, applicants will be prioritised according to the following criteria (listed below in prioritised order):

- Total number of ECTS credits within the relevant academic field (physics) and the grades obtained. If different grading systems make comparison impossible, applicants will be prioritised on the basis of an individual evaluation by the Admission Committee.

6 Structure of the programme
The compulsory subject elements, restricted elective subject elements and the thesis constitute the central parts of the programme (Section 21 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, 30 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis, 60 ECTS

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

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</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
30 ECTS are to be covered as subject elements from the following list:

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</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>NFYK14018U</td>
<td>Computational Astrophysics: Star and Planet Formation</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16010U</td>
<td>Particle Physics and the Early Universe</td>
<td>Block 2</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>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 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13017U</td>
<td>Interstellar Medium and the Formation of Stars and Planets</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 outside the course scope may be included in the elective section of the programme with up to 7.5 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

6.1.4 Thesis
The MSc Programme in Physics with a specialisation in Astrophysics includes a thesis corresponding to 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.
6.1.5 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 Astrophysics is placed in block 3+4 of the 1st year (thesis, full time).

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, full time).

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 Bio- and Medical Physics
The specialisation is set at 120 ECTS and consists of the following:

- Compulsory subject elements, 15 ECTS.
- Restricted elective subject elements, 30 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis, 60 ECTS

6.2.1 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>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
30 ECTS are to be covered as subject elements from the following list:

<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>NDAK10005U</td>
<td>Medical Image Analysis</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14009U</td>
<td>Physics of Molecular Diseases</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>NFYK16003U</td>
<td>Radiation Physics for Medical Physicists</td>
<td>Block 2</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>NFYK16004U</td>
<td>Medical Physics 2</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15016U</td>
<td>Physics of Biological 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>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>NDAK14007U</td>
<td>Applied Programming</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 outside the course scope may be included in the elective section of the programme with up to 7.5 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.
6.2.4 Thesis
The MSc Programme in Physics with a specialisation in Bio- and Medical Physics includes a thesis corresponding to 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

6.2.5 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 Bio- and Medical Physics is placed in block 3+4 of the 1st year (thesis, full time).

For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Bio- and Medical Physics is placed in block 3+4 of the 1st year (thesis, full time).

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>Subject Code</th>
<th>Subject Name</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>Subject Code</th>
<th>Subject Name</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>NDAK10005U</td>
<td>Medical Image Analysis</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>NFYK14024U</td>
<td>Turbulence</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14018U</td>
<td>Computational Astrophysics: Star and Planet formation</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>
</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 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.

6.3.4 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.

6.3.5 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 Computational Physics is placed in block 3+4 of the 1st year (thesis 60 ECTS, full time).

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 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 60 ECTS, full time).

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYA04020U</td>
<td>Physics of Algorithms</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>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>NFYK18002U</td>
<td>Concurrent and Distributed Systems</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NDAA09009U</td>
<td>Numerical Optimization(NO)</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>NFYK18000U</td>
<td>Big Data Analysis</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>NDAK14007U</td>
<td>Applied Programming</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NMAK15003U</td>
<td>Advanced Mathematical Physics</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16007U</td>
<td>Dynamical Models for Climate and Numerical Weather Prediction (NWP)</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15004U</td>
<td>Advanced Seismology</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14027U</td>
<td>Steady Ocean Circulation</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NDAK12006U</td>
<td>Computational Methods in Simulation</td>
<td>Block 4</td>
<td>7.5 ECTS</td>
</tr>
</tbody>
</table>
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 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.

6.4 Geophysics
The specialisation is set at 120 ECTS and consists of the following:
- Compulsory subject elements, 15 ECTS.
- Restricted elective subject elements, 30 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis, 60 ECTS

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

- NFYK15008U Earth and Climate Physics  Block 1  7.5 ECTS
- NFYA04034U Inverse Problems  Block 2  7.5 ECTS

6.4.2 Restricted elective subject elements
30 ECTS are to be covered as subject elements from the following list:

- NFYK14007U Paleo-Climatology  Block 1  7.5 ECTS
- NFYK15012U General Circulation of the Atmosphere  Block 2  7.5 ECTS
- NFYK14025U Ice Core Glaciology  Block 2  7.5 ECTS
- NFYK14024U Turbulence  Block 2  7.5 ECTS
- NFYK15009U Earth Structure and Processes  Block 3  7.5 ECTS
- NFYK15013U Glacier Dynamics and Modelling  Block 3  7.5 ECTS
- NFYK10005U Continuum Mechanics  Block 3  7.5 ECTS
- NFYK14027U Steady Ocean Circulation  Block 4  7.5 ECTS
- NFYK15004U Advanced Seismology  Block 4  7.5 ECTS
- NFYK16007U Dynamical Models for Climate and Numerical Weather Prediction (NWP)  Block 4  7.5 ECTS

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 outside the course scope may be included in the elective section of the programme with up to 7.5 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

6.4.4 Thesis
The MSc Programme in Physics with a specialisation in Geophysics includes a thesis corresponding to 60 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.
6.4.5 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 Geophysics is placed in block 3+4 of the 1st year (thesis, full time).

For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Geophysics is placed in block 3+4 of the 1st year (thesis, full time).

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
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</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</td>
</tr>
<tr>
<td>NFYK15003U</td>
<td>Advanced Quantum Mechanics (Quant3)</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYA04022U</td>
<td>General Relativity and Cosmology (GR)</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK15006U</td>
<td>Biophysics of Cells and Single Molecules</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK15008U</td>
<td>Earth and Climate Physics</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK13006U</td>
<td>Quantum Optics</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK14011U</td>
<td>Theoretical Astrophysics</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK12009U</td>
<td>Astronomical Data Processing</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYA04034U</td>
<td>Inverse Problems</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK13011U</td>
<td>Applied Statistics: From Data to Results</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYA04036U</td>
<td>Elementary Particle Physics</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK14024U</td>
<td>Turbulence</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK14018U</td>
<td>Computational Astrophysics: Star and Planet formation</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NFYK15007U</td>
<td>Condensed Matter Experiments</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NBIK17001U</td>
<td>Dynamical Models in Molecular Biology</td>
<td>Block 2</td>
<td>7.5</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 outside the course scope may be included in the elective section of the programme with up to 15 ECTS (45 ECTS thesis) or 7.5 ECTS (60 ECTS thesis). The regulations are described in Appendix 5 to the shared section of the curriculum.

6.5.4 Thesis
The MSc Programme in Physics with a specialisation in 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.

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

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

For students admitted in February the academic mobility for the MSc Programme in Physics with a specialisation in Physics is placed in block 3+4 of the 1st year (thesis 45 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, 37.5 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis, 60 ECTS

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

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Block</th>
<th>Credits</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
37.5 ECTS are to be covered as subject elements from the following list:

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Block</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYA04022U</td>
<td>General Relativity and Cosmology (GR)</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16002U</td>
<td>Quantum Magnetism</td>
<td>Block 1</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13006U</td>
<td>Quantum Optics</td>
<td>Block 1</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>NFYK16010U</td>
<td>Particle Physics and the Early Universe</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>NFYK10017U</td>
<td>Condensed Matter Theory 1 (CMT1)</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYA04036U</td>
<td>Elementary Particle Physics</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14029U</td>
<td>Quantum Optics 2</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15007U</td>
<td>Condensed Matter Experiments</td>
<td>Block 2</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NMAK14020U</td>
<td>Quantum Information Theory</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK16009U</td>
<td>Particle Detectors and Accelerators</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYA10009U</td>
<td>Fysiske undervisningsforsøg</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>NFYK14014U</td>
<td>Introduction to String Theory</td>
<td>Block 3</td>
<td>7.5 ECTS</td>
</tr>
<tr>
<td>NFYK13015U</td>
<td>Magnetism and Magnetic Materials</td>
<td>Block 3</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 outside the course scope may be included in the elective section of the programme with up to 7.5 ECTS. The regulations are described in Appendix 5 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 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, full time).

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, full time).

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 www.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 Tables

### Table - Astrophysics (thesis, part time)

<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</td>
<td>Theoretical Astrophysics</td>
<td>Observational Astrophysics</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>year</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thesis</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>year</td>
<td></td>
<td></td>
<td>Thesis</td>
<td></td>
</tr>
</tbody>
</table>

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

### Table – Astrophysics (thesis, full time)

<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</td>
<td>Theoretical Astrophysics</td>
<td>Observational Astrophysics</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td>year</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td></td>
<td>Thesis</td>
<td></td>
</tr>
</tbody>
</table>

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

### Table - Bio- and Medical Physics (thesis, part time)

<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</td>
<td>Biophysics of Cells and Single Molecules</td>
<td>Dynamical Models in Molecular Biology</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>year</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thesis</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>year</td>
<td></td>
<td></td>
<td>Thesis</td>
<td></td>
</tr>
</tbody>
</table>

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

### Table - Bio- and Medical Physics (thesis, full time)

<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</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>year</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td></td>
<td>Thesis</td>
<td></td>
</tr>
</tbody>
</table>

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.
### Table – Computational Physics (thesis 60 ECTS, part time)

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<tr>
<th>1st year</th>
<th>Block 1</th>
<th>Block 2</th>
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</tr>
</thead>
<tbody>
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Compulsory | Restricted elective | Elective | The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.

### Table – Computational Physics (thesis 60 ECTS, full time)

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Compulsory | Restricted elective | Elective | The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.

### Table – Computational Physics (thesis 45 ECTS)

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Compulsory | Restricted elective | Elective | The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.
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### Table – Geophysics (thesis, full time)

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### Table – Physics (thesis 60 ECTS, part time)

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### Table – Physics (thesis 60 ECTS, full time)

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The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.
### Table - Physics (thesis 45 ECTS)

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- Compulsory
- Restricted elective
- Elective

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

### Table - Quantum Physics (thesis, part time)

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- Compulsory
- Restricted elective
- Elective

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### Table - Quantum Physics (thesis, full time)

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- Compulsory
- Restricted elective
- Elective

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

# Table – Astrophysics (thesis, part time)*

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

# Table – Astrophysics (thesis, full time)*

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# Table - Bio- and Medical Physics (thesis, part time)*

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# Table - Bio- and Medical Physics (thesis, full time)*

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Table – Computational Physics* (thesis 60 ECTS, part time)

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Table – Computational Physics* (thesis 45 ECTS)

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Table – Geophysics (thesis, part time)*

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### Table – Geophysics (thesis, full time)*

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### Tabel - Physics* (thesis 45 ECTS)

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### Table - Quantum Physics (thesis, part time)*

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### Table - Quantum Physics (thesis, full time)*

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<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td>year</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

*This table is only relevant for students who begin the MSc Programme in February (block 3)
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 2017/18

Students admitted to the MSc Programme in the academic year 2017/18 must finish the programme as listed in the curriculum above with the following exceptions.

1.1 Specialisations

1.1.1 Astrophysics

Restricted elective subject elements

30 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Astrophysics” in this curriculum (see above)
- NFYK16006U  Observational Astronomy  Discontinued  7.5 ECTS

* See course specific changes below.

1.1.2 Bio- and Medical Physics

Restricted elective subject elements

30 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Bio- and Medical Physics” in this curriculum (see above)
- NFYK15011U  From Idea to Result  Discontinued  7.5 ECTS
- NFYK15018U  Topics in Complex Systems  Discontinued  7.5 ECTS

* See course specific changes below.

1.1.3 Geophysics

Restricted elective subject elements

37.5 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Geophysics” in this curriculum (see above)
- NFYK15011U  From Idea to Result  Discontinued  7.5 ECTS

* See course specific changes below.

1.1.4 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

Compulsory subject elements

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

- NFYK15011U  From Idea to Result  Discontinued  7.5 ECTS

* See course specific changes below.
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)

- Restricted elective subject elements offered as part of the specialisation “Physics” in this curriculum (see above)
- NFYK15018U Topics in Complex Systems Discontinued* 7.5 ECTS

* See course specific changes below.

Competence profile
On completion of the programme, an MSc in Physics with a specialisation in Physics has in addition to the generic competence profile acquired the following:

Knowledge about:
- A broad range of fundamental physical systems.
- How to practically obtain relevant experimental results or observational data, and perform a statistical and physical analysis on real data.
- A range of physical, mathematical and numerical methods, which gives access to a wide range of professions which apply physics, mathematics, statistics and programming.
- How peer-review works in practice.

Skills in/to:
- Perform independent research, and the ability to follow through, from idea to final result.
- Convey and communicate scientific questions and problems in both a scientific as well as public forum.
- Construct quantitative physical models to describe a range of problems relevant to the industry and society.
- Perform a practical data and statistical analysis, and communicate the results both written and orally.

Competences in/to:
- Apply methods and tools from a wide range of physical disciplines, in order to describe and understand problems relevant to society, industry, companies, and teaching.
- Obtain relevant data and perform an objective analysis.
- Apply a range of physical laws and analysis methods to actual problems.

1.1.5 Quantum Physics
Restricted elective subject elements
37.5 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Quantum Physics” in this curriculum (see above)
- NFYK15011U From Idea to Result Discontinued* 7.5 ECTS

* See course specific changes below.

2 General changes for students admitted in the academic year 2016/17
Students admitted to the MSc Programme in the academic year 2016/17 must finish the programme as listed in the curriculum above with the following exceptions.
2.1 Specialisations

2.1.1 Bio- and Medical Physics

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

- NFYK15006U  Biophysics of Cells and Single Molecules  Block 1  7.5 ECTS
- NBIK14012U  Biological Dynamics  Discontinued *  7.5 ECTS

* See course specific changes below.

Restricted elective subject elements
30 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Bio- and Medical Physics” in this curriculum (see above)
- NFYK13018U  Topics in Medical Physics  Discontinued *  7.5 ECTS
- NFYK15018U  Topics in Complex Systems  Discontinued *  7.5 ECTS
- NFYK15011U  From Idea to Result  Discontinued *  7.5 ECTS

* See course specific changes below.

2.1.2 Geophysics

Restricted elective subject elements
30 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Geophysics” in this curriculum (see above)
- NNMA13002U  Origin and Evolution of the Solar System  Discontinued *  7.5 ECTS
- NFYK15011U  From Idea to Result  Discontinued *  7.5 ECTS

* See course specific changes below.

2.1.3 Physics

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

- NFYK15011U  From Idea to Result  Discontinued *  7.5 ECTS

* See course specific changes below.

Restricted elective subject elements
37.5 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Physics” in this curriculum (see above)
- NBIK14012U  Biological Dynamics  Discontinued*  7.5 ECTS
- NFYK13009U  Experimental Nuclear and Particle Physics  Discontinued*  7.5 ECTS
- NFYK15017U  Probabilistic Methods in Geoscience  Discontinued*  7.5 ECTS
- NFYK13018U  Topics in Medical Physics  Discontinued*  7.5 ECTS
- NFYK15018U  Topics in Complex Systems  Discontinued*  7.5 ECTS

* See course specific changes below.

Competence profile
On completion of the programme, an MSc in Physics with a specialisation in Physics has in addition to the generic competence profile acquired the following:

Knowledge about:
- A broad range of fundamental physical systems.
- How to practically obtain relevant experimental results or observational data, and perform a statistical and physical analysis on real data.
• A range of physical, mathematical and numerical methods, which gives access to a wide range of professions which apply physics, mathematics, statistics and programming.
• How peer-review works in practice.

Skills in/to:
• Perform independent research, and the ability to follow through, from idea to final result.
• Convey and communicate scientific questions and problems in both a scientific as well as public forum.
• Construct quantitative physical models to describe a range of problems relevant to the industry and society.
• Perform a practical data and statistical analysis, and communicate the results both written and orally.

Competences in/to:
• Apply methods and tools from a wide range of physical disciplines, in order to describe and understand problems relevant to society, industry, companies, and teaching.
• Obtain relevant data and perform an objective analysis.
• Apply a range of physical laws and analysis methods to actual problems.

2.1.4 Quantum Physics
Restricted elective subject elements
37.5 ECTS are to be covered as subject elements from the following list:

<table>
<thead>
<tr>
<th>Restricted elective subject elements offered as part of the specialisation “Quantum Physics” in this curriculum (see above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK13009U</td>
</tr>
</tbody>
</table>

* See course specific changes below.

3 General changes for students admitted in the academic year 2015/16
Students admitted to the MSc Programme in the academic year 2015/16 must finish the programme as listed in the curriculum above with the following exceptions.

3.1 Specialisations
In the academic year 2015/16 the students had to choose a specialisation from the beginning of the MSc Program and again before the beginning of block 3 in the first year.

On the second choice of specialisation before the beginning of block 3 the students had the following choices:
1. To continue on the chosen specialisation
2. To change to the specialisation in Physics.

From the academic year 2017/18 the student does not have to make the second choice (before block 3) anymore. In case a student enrolled at the MSc Programme in 2015/16 has not yet made the choice of specialisation number 2 the student will automatically continue with the specialisation 2 that correspond to the chosen specialisation 1. In case the student wish to change to the specialisation in Physics the student must apply within the applicable rules and regulations for changing specialisations.

3.1.1 Astrophysics
The specialisation is continued in the present curriculum but has been changed in its composition of the compulsory and restricted elective subject elements.
Structure of the programme
The specialisation is set at 120 ECTS and consists of the following:
- Compulsory subject elements, 7.5 ECTS.
- Restricted elective subject elements, 37.5 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis, 60 ECTS

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

- NFYK14011U Theoretical Astrophysics
  Block 1
  7.5 ECTS

Restricted elective subject elements
37.5 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Astrophysics” in this curriculum (see above)
- NFYA04022U General Relativity and Cosmology (GR)
  Block 1
  7.5 ECTS
- NFYK12009U Astronomical Data Processing
  Block 1
  7.5 ECTS
- NFYK13011U Applied Statistics: From Data to Results
  Block 2
  7.5 ECTS
- NDAK14007U Applied Programming
  Block 4
  7.5 ECTS
- NFYK16006U Observational Astronomy
  Discontinued*
  7.5 ECTS
- NFYK11003U Astrobiology
  Discontinued*
  7.5 ECTS
- NFYA08016U Relativistic Cosmology
  Discontinued*
  7.5 ECTS
- NFYK15010U Exploration from Space
  Discontinued*
  7.5 ECTS
- NFYK14021U Classical Astrophysical Papers
  Discontinued*
  7.5 ECTS
- NFYK14013U Astronomical Instrumentation
  Discontinued*
  7.5 ECTS
- NNMA13002U Origin and Evolution of the Solar System
  Discontinued*
  7.5 ECTS
- NFYK15011U From Idea to Result
  Discontinued*
  7.5 ECTS

* See course specific changes below.

3.1.2 Bio- and Medical Physics

Structure of the programme
The specialisation is set at 120 ECTS and consists of the following:
- Compulsory subject elements, 15 ECTS.
- Restricted elective subject elements, 30 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis, 60 ECTS

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

- NFYK15006U Biophysics of Cells and Single Molecules
  Block 1
  7.5 ECTS
- NBIK14012U Biological Dynamics
  Discontinued*
  7.5 ECTS

* See course specific changes below.

Restricted elective subject elements
30 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Bio- and Medical Physics” in this curriculum (see above)
- NFYK13018U Topics in Medical Physics
  Discontinued*
  7.5 ECTS
- NFYK15011U From Idea to Result
  Discontinued*
  7.5 ECTS
- NFYK15018U Topics in Complex Systems
  Discontinued*
  7.5 ECTS

* See course specific changes below.
### 3.1.3 Geophysics

**Restricted elective subject elements**

30 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Geophysics” in this curriculum (see above)
- NFYA04034U Inverse Problems Block 2 7.5 ECTS
- NFYK13011U Applied Statistics: From Data to Results Block 2 7.5 ECTS
- NFYK13000U Climate Change Mechanisms and Tipping Points Block 3 7.5 ECTS
- NDAK14007U Applied Programming Block 4 7.5 ECTS
- NFYK13022U Climate Models, Observations of the Past and the Present, and Projected Climate Change including Sea Level Rise Discontinued* 7.5 ECTS
- NFYK15010U Exploration from Space Discontinued* 7.5 ECTS
- NFYK15017U Probabilistic Methods in Geoscience Discontinued* 7.5 ECTS
- NFYK13000U Climate Change Mechanisms and Tipping Points Discontinued* 7.5 ECTS
- NFYK14015U Microscale Meteorology Discontinued* 7.5 ECTS
- NFYK14023U Gravity Field of the Earth Discontinued* 7.5 ECTS
- NNMA13002U Origin and Evolution of the Solar System Discontinued* 7.5 ECTS
- NFYK15011U From Idea to Result Discontinued* 7.5 ECTS

* See course specific changes below.

### 3.1.4 Physics

**Restricted elective subject elements**

37.5 ECTS are to be covered as subject elements from the following list:

- Restricted elective subject elements offered as part of the specialisation “Physics” in this curriculum (see above)
- NFYK12009U Astronomical Data Processing Block 1 7.5 ECTS
- NFYK15013U Glacier Dynamics and Modelling Block 3 7.5 ECTS
- NFYA04020U Physics of Algorithms Block 3 7.5 ECTS
- NFYK13000U Climate Change Mechanisms and Tipping Points Block 3 7.5 ECTS
- NFYK14013U Astronomical Instrumentation Discontinued* 7.5 ECTS
- NFYK15010U Exploration from Space Discontinued* 7.5 ECTS
- NFYK14021U Classical Astrophysical Papers Discontinued* 7.5 ECTS
- NFYK14015U Microscale Meteorology Discontinued* 7.5 ECTS
- NFYK15017U Probabilistic Methods in Geoscience Discontinued* 7.5 ECTS
- NFYK15011U From Idea to Result Discontinued* 7.5 ECTS
- NFYK15018U Topics in Complex Systems Discontinued* 7.5 ECTS

* See course specific changes below.

### Competence profile

On completion of the programme, an MSc in Physics with a specialisation in Physics has in addition to the generic competence profile acquired the following:

**Knowledge about:**

- A broad range of fundamental physical systems.
- How to practically obtain relevant experimental results or observational data, and perform a statistical and physical analysis on real data.
- A range of physical, mathematical and numerical methods, which gives access to a wide range of professions which apply physics, mathematics, statistics and programming.
- How peer-review works in practice.
Skills in/to:
- Perform independent research, and the ability to follow through, from idea to final result.
- Convey and communicate scientific questions and problems in both a scientific as well as public forum.
- Construct quantitative physical models to describe a range of problems relevant to the industry and society.
- Perform a practical data and statistical analysis, and communicate the results both written and orally.

Competences in/to:
- Apply methods and tools from a wide range of physical disciplines, in order to describe and understand problems relevant to society, industry, companies, and teaching.
- Obtain relevant data and perform an objective analysis.
- Apply a range of physical laws and analysis methods to actual problems.

3.1.5 Quantum Physics

Restricted elective subject elements
37.5 ECTS are to be covered as subject elements from the following list:

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFYK13009U</td>
<td>Experimental Nuclear and Particle Physics</td>
<td>Discontinued* 7.5 ECTS</td>
</tr>
<tr>
<td>NFYA08016U</td>
<td>Relativistic Cosmology</td>
<td>Discontinued* 7.5 ECTS</td>
</tr>
<tr>
<td>NFYK12003U</td>
<td>Quantum Geometry - A Statistical Field Theory Approach</td>
<td>Discontinued* 7.5 ECTS</td>
</tr>
<tr>
<td>NFYK14012U</td>
<td>Current Topics in Quantum Devices</td>
<td>Discontinued* 7.5 ECTS</td>
</tr>
<tr>
<td>NFYK15011U</td>
<td>From Idea to Result</td>
<td>Discontinued* 7.5 ECTS</td>
</tr>
</tbody>
</table>

* See course specific changes below.

4 General changes for students admitted in the academic year 2014/15 or earlier
Students admitted to the MSc Programme in the academic year 2014/15 or earlier must finish the programme as listed in the curriculum above with the following exceptions.

4.1 Specialisations
Students admitted to the MSc Programme in the academic year 2014/15 or earlier are allowed to finish their programme with one of the four specialisations that were outlined in the curriculum. All students must follow one of the four specialisations.

4.1.1 General Profile in Physics

Structure of the programme
The specialisation is set at 120 ECTS and consists of the following:
- Restricted elective subject elements, 30, 45 or 60 ECTS.
- Elective subject elements, 30 ECTS.
- Thesis, 30, 45 or 60 ECTS

Restricted elective subject elements
30, 45 or 60 ECTS are to be covered by subject elements from the following list:

- All master level courses offered by the Niels Bohr Institute
- Courses elsewhere that are approved by the study board
Elective subject elements
Projects outside the course scope may be included with up to 15 ECTS if the MSc Programme includes a thesis corresponding to 30 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

Projects outside the course scope may be included with up to 7.5 ECTS if the MSc Programme includes a thesis corresponding to 45 or 60 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

Thesis
Students can freely choose the size of the thesis corresponding to 30, 45 or 60 ECTS

4.1.2 Astrophysics
Structure of the programme
The specialisation is set at 120 ECTS and consists of the following:

- Restricted elective subject elements, 45, 60 or 75 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis in Astrophysics, 30, 45 or 60 ECTS.

Restricted elective subject elements
45, 60 or 75 ECTS ECTS are to be covered by subject elements from the following two lists:

1) At least 30 ECTS are to be covered by subject elements from the following list:
   - All master level courses offered as courses in Astrophysics by the Niels Bohr Institute

2) The remaining amount of subject elements – summing up to 45, 60 or 75 ECTS – are to be covered by subject elements from the following list:
   - All master level courses offered by the Niels Bohr Institute

Elective subject elements
Projects outside the course scope may be included with up to 15 ECTS if the MSc Programme includes a thesis corresponding to 30 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

Projects outside the course scope may be included with up to 7.5 ECTS if the MSc Programme includes a thesis corresponding to 45 or 60 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

Thesis
Students can freely choose the size of the thesis corresponding to 30, 45 or 60 ECTS

4.1.3 Biophysics
Structure of the programme
The specialisation is set at 120 ECTS and consists of the following:

- Restricted elective subject elements, 45, 60 or 75 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis in Biophysics, 30, 45 or 60 ECTS.

Restricted elective subject elements
45, 60 or 75 ECTS ECTS are to be covered by subject elements from the following list:

1) At least 30 ECTS are to be covered by subject elements from the following list:
   - All master level courses offered as courses in Biophysics by the Niels Bohr Institute
2) The remaining amount of subject elements – summing up to 45, 60 or 75 ECTS – are to be covered by subject elements from the following list:

- All master level courses offered by the Niels Bohr Institute

**Elective subject elements**

Projects outside the course scope may be included with up to 15 ECTS if the MSc Programme includes a thesis corresponding to 30 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

Projects outside the course scope may be included with up to 7.5 ECTS if the MSc Programme includes a thesis corresponding to 45 or 60 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

**Thesis**

Students can freely choose the size of the thesis corresponding to 30, 45 or 60 ECTS

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**4.1.4 Geophysics**

**Structure of the programme**

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

- Restricted elective subject elements, 45, 60 or 75 ECTS.
- Elective subject elements, 15 ECTS.
- Thesis in Geophysics, 30, 45 or 60 ECTS.

**Restricted elective subject elements**

45, 60 or 75 ECTS ECTS are to be covered by subject elements from the following list:

1) At least 30 ECTS are to be covered by subject elements from the following list:

- All master level courses offered as courses in Geophysics by the Niels Bohr Institute

2) The remaining amount of subject elements – summing up to 45, 60 or 75 ECTS – are to be covered by subject elements from the following list:

- All master level courses offered by the Niels Bohr Institute

**Elective subject elements**

Projects outside the course scope may be included with up to 15 ECTS if the MSc Programme includes a thesis corresponding to 30 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

Projects outside the course scope may be included with up to 7.5 ECTS if the MSc Programme includes a thesis corresponding to 45 or 60 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

**Thesis**

Students can freely choose the size of the thesis corresponding to 30, 45 or 60 ECTS
### 5 Course specific changes

<table>
<thead>
<tr>
<th>Discontinued course</th>
<th>Interim arrangement</th>
</tr>
</thead>
</table>
| **Atmospheric Dynamical Modeling and Numerical Weather Prediction (NWP)** (NFYK15005U), 7.5 ECTS | The course was a restricted elective course on the Specialisation 1 and 2 in Geophysics, Specialisation 1: Physics in the academic year 2015/16.  
The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17.  
The course has changed title and is identical to Dynamical Models for Climate and Numerical Weather Prediction (NFYK16007U), 7.5 ECTS |
| **Astrobiology** (NFYK11003U), 7.5 ECTS                                              | The course was a restricted elective course on the Specialisation 1 and 2 in Astrophysics in the academic year 2015/16.  
The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17. |
| **Astronomical Instrumentation** (NFYK14013U), 7.5 ECTS                              | The course was a restricted elective course on the Specialisations “Astrophysics” and “Physics” in the academic year 2015/16.  
The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18. |
| **Biological Dynamics** (NBIK14012U), 7.5 ECTS                                        | The course was compulsory on the specialisation in Bio- and Medical Physics in the academic year 2016/17.  
The course was restricted elective in the academic year 2016/17 on the specialisation in Physics.  
The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18.  
The course is identical to “Dynamical Models in Molecular Biology” (NBIK17001U), 7.5 ECTS. |
| **Classical Astrophysical Papers** (NFYK14021U), 7.5 ECTS                              | The course was a restricted elective course on the Specialisations “Astrophysics” and “Physics” in the academic year 2015/16.  
The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18. |
| **Climate Models, Observations of the Past and the present, and projected climate change including Sea level rise** (NFYK13022U), 7.5 ECTS | The course was a restricted elective course on the specialisation “Geophysics” in the academic year 2015/16.  
The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18. |
| **Current Topics in Quantum Devices** (NFYK14012U), 7.5 ECTS                           | The course was a restricted elective course on the Specialisation 1 and 2 in Quantum Physics in the academic year 2015/16.  
The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17. |
| **Experimental Nuclear and Particle Physics** (NFYK13009U), 7.5 ECTS                  | The course was a restricted elective course on the Specialisation 1 and 2 in Physics, Specialisation 1 and 2 in Quantum Physics in the academic year 2015/16.  
The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17.  
The course has changed title and is identical to Particle Detectors and Accelerators (NFYK16009U), 7.5 ECTS. |
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration from Space (NFYK15010U), 7.5 ECTS</td>
<td>The course was a restricted elective course on the Specialisations “Astrophysics”, “Geophysics” and “Physics” in the academic year 2015/16. The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2017/18.</td>
</tr>
</tbody>
</table>
| From Idea to Result (NFYK15011U), 7.5 ECTS             | **Final availability**<br>The course was offered for the last time in the academic year 2017/18 and a third exam is offered in the academic year 2018/19.  
**Compulsory subject element**<br>The course was compulsory on the specialisation “Physics” in the academic year 2016/17. Students following the course as a compulsory subject element must replace the course as follows:  
- Students must do an alternative exam in form of a written assignment that fulfils the course’s learning objectives with the course coordinator as supervisor.  
**Restricted elective subject element**<br>The course was restricted elective in the academic year 2016/17 on the following specialisations:  
- Bio- and Medical Physics  
- Geophysics  
- Quantum Physics  

Gravity Field of the Earth (NFYK14023U), 7.5 ECTS      | The course was a restricted elective course on the Specialisation “Geophysics” in the academic year 2015/16. The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18. |
<p>| Microscale Meteorology (NFYK14015U), 7.5 ECTS          | The course was a restricted elective course on the Specialisations “Geophysics” and “Physics” in the academic year 2015/16. The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18. |
| Observational Astronomy (NFYK16006U), 7.5 ECTS          | The course was a restricted elective course on the Specialisation “Astrophysics” in the academic year 2017/18 and earlier. The course was offered for the last time in the academic year 2017/18 and a third exam is offered in the academic year 2018/19. |
| Origin and Evolution of the Solar System (NNMA13002U), 7.5 ECTS | The course was a restricted elective course on the specialisation “Astrophysics” in the academic year 2015/16 and “Geophysics” in the academic year 2015/16 and 2016/17. The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18. |
| Probabilistic Methods in Geoscience (NFYK15017U), 7.5 ECTS | The course was a restricted elective course on the Specialisations “Geophysics” and “Physics” in the academic year 2015/16. The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18. |</p>
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantum Geometry - A Statistical Field Theory Approach (NFYK12003U), 7.5 ECTS</td>
<td>The course was a restricted elective course on the specialisation 1 and 2 in Quantum Physics in the academic year 2015/16. The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17.</td>
</tr>
<tr>
<td>Relativistic Cosmology (NFYA08016U), 7.5 ECTS</td>
<td>The course was offered for the last time in the academic year 2015/16. The course has changed title and is identical to Particle Physics and the Early Universe (NFYK16010U), 7.5 ECTS.</td>
</tr>
<tr>
<td>Topics in Medical Physics (NFYK13018U), 7.5 ECTS</td>
<td>The course was a restricted elective course on the Specialisation in “Physics” in the academic year 2015/16-2016/17 and the specialisation in “Geophysics” in the academic year 2016/17. The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18.</td>
</tr>
<tr>
<td>Topics in Complex Systems (NFYK15018U), 7.5 ECTS</td>
<td>The course was a restricted elective course on the Specialisation ”Bio- and Medical Physics” and the specialisation in Physics in the academic year 2017/18, 2016/17 and 2015/16. The course was offered for the last time in the academic year 2017/18 and a third exam is offered in the academic year 2018/19.</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.