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**Appendices for the Master's degree programme(s) in  
 Physics**



## Appendix I Teaching outcomes of the degree programme (art. 1.3)

The master graduate in Physics...

1. Knowledge and understanding
  - 1.1. understands the basic concepts of physics, including the necessary mathematics and computer science, at a level which permits admission a PhD programme;
  - 1.2. is familiar with the quantitative character of physics and with the relevant research methods;
  - 1.3. [Track Advanced Materials] has a thorough understanding of materials science, more specifically of structure, functional properties and characterisation of advanced materials;
  - 1.4. [Track Quantum Universe] has a thorough understanding of main fields of theoretical physics, more specifically in the fields of general relativity, quantum mechanics, particle physics and electromagnetic processes;
  - 1.5. [Track Science, Business and Policy] has operational knowledge of and insight into the functioning of companies and administrations, as well as the relevant legislation;
2. Application of knowledge and understanding
  - 2.1. is capable of carrying out research, aimed at the understanding of physical phenomena and their description in scientific terms;
  - 2.2. is capable of analyzing a (new) complex physical problem, and to develop a structured and well-planned research approach;
  - 2.3. is capable of applying his/her specific knowledge and skills in his/her own and related subject areas;
  - 2.4. is capable of collaborating in a (multi-disciplinary) team;
3. Judgement
  - 3.1. is capable of obtaining relevant information using modern information channels, and to interpret this information critically;
  - 3.2. is capable of judging his/her and others' actions within a scientific context, taking societal and ethical aspects into account;
  - 3.3. is able to draw conclusions on the basis of limited or incomplete information, and is able to realize and formulate the limitations of such conclusions;
4. Communication skills
  - 4.1. is capable of communicating clearly, verbally and in writing, on his/her subject and relevant applications, at a level which is understandable to experts and non-experts, and using modern communication tools;
5. Learning skills
  - 5.1. is capable of addressing issues inside as well as outside his/her main subject area, therefore and thereby gaining new knowledge and skills;



## **Appendix II Tracks of the degree programme (art. 2.2)**

The degree programme has the following tracks:

- Advanced Materials
- Quantum Universe
- Science, Business and Policy



## Appendix III Content of the degree programme (art. 2.3)

### Track Advanced Materials

Course unit	ECTS	Practical	Entry Requirements
Computational Physics	5	X	
Cross-disciplinary Materials Science	5		
Advanced Quantum Mechanics	5		
Functional Properties	5		
Structure at Macro, Meso and Nano Scale	5		
Characterisation of Materials	5		
Statistical Mechanics	5		
Mathematical Methods of Physics	5		
Elective specializing courses	20	See app. IV	See appendix IV
General Physics Colloquium	-		
Scientific Integrity	-		
Master's Research Project (Advanced Materials)	60	X	Passed 35 ECTS of the masters's degree programme

The assessment method of the courses can be found in the assessment plan of the degree programme and on Ocasys

### Track Quantum Universe

Module	ECTS	Practical	Prerequisites
Computational Physics	5	X	
General Relativity	5		
Advanced Quantum Mechanics	5		
Electrodynamics of Radiation Processes	5		
Particle Physics Phenomenology	5		
Statistical Mechanics	5		
Mathematical Methods of Physics	5		
Student Seminar Quantum Universe	5		
Elective specializing courses	20	See app. IV	See appendix IV
General Physics Colloquium	-		
Scientific Integrity	-		
Master's Research Project (Quantum Universe)	60	X	Passed 35 ECTS of the masters's degree programme

The assessment method of the courses can be found in the assessment plan of the degree programme and on Ocasys



**Track Science, Business and Policy**

<b>Course unit</b>	<b>ECTS</b>	<b>Practical</b>	<b>Entry Requirements</b>
Computational Physics	5	X	
Advanced Quantum Mechanics	5		
Statistical Mechanics	5		
Mathematical Methods of Physics	5		
Courses in: - Advanced Materials - Quantum Universe - Applied Physics - Optional courses in Physics	10	See app. III or IV of the corresponding programme	See app. III or IV of the corresponding programme
Introduction Science and Business	10		
Introduction Science and Policy	10		
Internship Science, Business and Policy	40	X	
General Physics Colloquium	-		
Scientific Integrity	-		
Master's Research Project (Science, Business and Policy)	30	X	

The assessment method of the courses can be found in the assessment plan of the degree programme and on Ocasys



## Appendix IV Electives (art. 2.4)

### Optional Courses in Advanced Materials

Course unit	ECTS	Practical	Entry Requirements
Atomic and Molecular Interactions	5		
Micromechanics	5		
Surfaces and Interfaces	5		
Statistical Signal Processing	5		
Mechanical Properties	5		
Non Linear Optics	5		
Physics of Lasers	5	X	
Statistical Methods in Physics	5		
Theoretical Condensed Matter Physics	5		
Many Particle Systems	5		
Mesoscopic Physics	5		
Modern Laser Microscopy	5	X	
Polymer Physics	5		
Ultrafast Time-Resolved Spectroscopy	5	X	
The student is allowed to choose courses in Applied Physics or Quantum Universe, on individual approval of the Board of Examiners (max. 10 ects)		See app. III or IV of the corresponding programme	See app. III or IV of the corresponding programme

The assessment method of the courses can be found in the assessment plan of the degree programme and on Ocasys

### Optional Courses in Quantum Universe

Course unit	ECTS	Practical	Entry Requirements
Introduction to Plasma Physics	5		
Lie groups in Physics	5		
Fundamental Constants	5		
Nuclear Astrophysics	5		
Quantum Field Theory	5		
Statistical Methods in Physics	5		
Big Experiments	5		
Elementary Particles	5		
Formation and Evolution of Galaxies	5		
The student is allowed to choose courses in Applied Physics, Astronomy or Advanced Materials, on individual approval of the Board of Examiners (max. 10 ects)		See app. III or IV of the corresponding programme	See app. III or IV of the corresponding programme
<b>Biennial courses, offered in 2017-2018</b>			
High-energy astrophysics	5		
Dynamics of Galaxies	5		
Geometry and Topology	5		



<i>Biennial courses, offered in 2018-2019</i>			
Stellar Structure and Evolution	5		
Cosmic Structure Formation	5		
Geometry & Differential Equations	5		
Star and planet formation)	5		

The assessment method of the courses can be found in the assessment plan of the degree programme and on Ocasys



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## **Appendix V Entry requirements and compulsory order of examinations (art. 3.4)**

For students admitted to the programme there are no entry requirements for the individual Modules.





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## **Appendix VI Admission to the degree programme and different tracks (art. 5.1.1 + art. 5.2)**

Holders of the following Bachelor's degrees from the University of Groningen are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Physics on that basis:

- BSc Physics



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## **Appendix VII Transitional provisions (art. 7.1)**

There are no transitional provisions for Physics students.



## Appendix VIII

### Application deadlines for admission (art. 5.6.1)

<b>Deadline of Application</b>	<b>Non-EU students</b>	<b>EU students</b>
Physics	May 1st 2018	May 1st 2018

### Decision deadlines (art. 4.6.3)

<b>Deadline of Decision</b>	<b>Non-EU students</b>	<b>EU students</b>
Physics	November 1st 2018	November 1st 2018