university of groningen / faculty of science and engineering / applied physics

Appendices to the Teaching and Examination Regulations

2022-2023

Bachelor's degree programme in Applied Physics

Appendix I Learning outcomes of the Bachelor's degree programme (Article 3.1.1)

A. Generic learning outcomes – Knowledge

A1. Bachelor's graduates have general knowledge of the foundations and history of mathematics, natural sciences and technology, in particular those of their own discipline.

A2. Bachelor's graduates have mastered the basic concepts of their own discipline (see Appendix 1.1 for further specification) to a certain extent and are familiar with the interrelationships of these concepts within their own discipline as well as with other disciplines.

A3. Bachelor's graduates have in-depth knowledge of several contemporary topics within their own discipline.

A4. Bachelor's graduates are familiar with the quantitative character of the fields of mathematics and natural sciences and have an understanding of the methods used in these fields, and particularly within their own discipline, including computer-aided methods.

A5. Bachelor's graduates have sufficient knowledge and understanding of mathematics and natural sciences to successfully complete a follow-up Master's degree programme in their own discipline.

A6. Bachelor's graduates are aware of the societal, ethical and social aspects involved in the fields of mathematics and natural sciences, and act accordingly.

B. Generic learning outcomes – Skills

B1 (Research) Bachelor's graduates are able to draw up a research question, design, plan and conduct research and report on it independently with an appropriate degree of supervision. Bachelor's graduates are able to evaluate the value and limitations of their research and assess its applicability outside their own field.

B2 (Designing and Modelling) Bachelor's graduates are able to translate a physics problem, in particular a design problem, into a plan of approach and – taking into account the requirements of the client and/or practical boundary conditions – find a solution.

B3 (Gathering information) Bachelor's graduates are able to gather relevant information using modern means of communication and to critically interpret this information.

B4 (Collaborating) Bachelor's graduates are able to collaborate in teams on technical-scientific problems.

B5 (Communicating) Bachelor's graduates are able to communicate in English, both orally and in writing in academic and professional contexts, with both colleagues and others. They are familiar with the relevant means of communication.

B6 (Reflecting) Bachelor's graduates are able to assess their own actions and those of others in a natural sciences context, bearing in mind the social/societal and ethical aspects.

B7 (Learning skills) Bachelor's graduates are able to apply learning skills that enable them to pursue a follow-up degree and acquire knowledge in new fields with a high level of autonomy.

B8 Additional subject-specific skills are listed in Appendix 1.2.

1.1 Degree programme-specific learning outcomes – Basic Knowledge

The Bachelor's graduate in Applied Physics has:

1.1.1 knowledge of the most important subjects in the field of
- a) Classical and Relativistic Mechanics
- b) Electromagnetism
- c) Quantum Physics
- d) Thermodynamics
- e) Statistical Physics
- f) Wave phenomena, Oscillations and Optics
- g) Structure and Properties of Matter
- h) Calculus, Linear Algebra and Numerical Mathematics

1.1.2 knowledge of
- a) Principles of design
- b) Continuum Mechanics

1.2 Degree programme-specific learning outcomes – Skills

The Bachelor's graduate in Applied Physics is able to:

1.2.1 estimate the orders of magnitude of various physical processes;

1.2.2 use specific software, such as a programming language or a (symbolic) software package;

1.2.3 measure mechanical, electric, magnetic and optical properties of materials, while taking into account safety and environmental issues;

1.2.4 apply insights in the fundamental workings of nature for science-based design.

Appendix II Majors and Minors of the degree programme (Article 3.6.4)

1. The programme consists of the major Applied Physics
2. The programme consists of a deepening minor Applied Physics

Appendix III Course units in the propaedeutic phase

- **List of course units; Article 4.1.1**
- **Compulsory order of examinations; Article 9.3**

The assessment method(s) of the courses below can be found in the assessment plan of the degree programme and on Ocasys.

Course unit (course code)	**ECTS**	**Practical**	**Remarks**
Calculus 1 (*TBA*)	5	X	
Calculus 2 (*TBA*)	5		
Electricity and Magnetism (WBPH033-10)	10	X	
Python for Physics (WBPH044-05)	5	X	
Mathematical Physics (WBPH049-05)	5		
Physics Laboratory 2 (WBPH050-05)	5	X	
Linear Algebra (WBPH054-05)	5		
Physics Laboratory 1 (WBPH013-05)	5	X	
Physics of Modern Technology (WBPH027-05)	5		
Mechanics and Relativity (WBPH001-10)	10		

Appendix IV Course units in the post-propaedeutic phase

- **List of course units; Article 7.1.1**
- **Compulsory order of examinations; Article 9.3**

The assessment method(s) of the courses below can be found in the assessment plan of the degree programme and on Ocasys.

Course unit (course code)	ECTS	Practical	Remarks
Computational Methods in Science and Technology (WBPH005-05)	5	X	
Control Engineering (WMBE024-05)	5	X	
Device Physics (WBPH037-05)	5		
Electronics and signal processing (WBPH038-05)	5	X	
Materials Science (WBPH020-05)	5	X	
Numerical Mathematics 1 (WBMA045-05)	5	X	
Physics Laboratory 3 (WBPH051-05)	5	X	
Physics Laboratory 4 (WBPH026-05)	5	X	
Physics of Fluids (WBPH042-05)	5		
Physics, Astronomy & Society: Ethical and Professional Aspects (WBPH053-05)	5		
Product Design by the Finite Element Method (WBIE043-05)	5	X	
Quantum Physics 1 (WBPH014-05)	5		
Solid Mechanics (WBPH015-05)	5		
Solid State Physics 1 (WBPH030-05)	5		
Structure of Matter (WBPH034-10)	10		
Thermal Physics (WBPH002-10)	10		
Waves and optics (WBPH032-05)	5	X	
Choice: - Atoms & Molecules (WBPH003-05) - Ionizing Radiation in Medicine (WBPH007-05) - Nuclear Energy (WBPH010-05)	5		
Choice: - Nanophysics and Nanotechnology (WBPH025-05) - Principles of Measurement Systems (WBPH029-05) - Solar Cells (WBCH018-05) - Introduction to Science Communication[1] (WBEC001-05) - Oriëntatie op Onderwijs in de Bètawetenschappen (WBEC002-05) [2]	5	X	
Bachelor Research Project (Applied Physics) (WBPH902-15)	15	X	Requires 150 ECTS of the Bachelor's degree programme completed.

[1] Additional programme specific requirements apply.
[2] Additional programme specific requirements apply.

Appendix V Admission to the post-propaedeutic phase (Article 6.1.1)

The following candidates will be admitted to the post-propaedeutic phase:

a. Students who have been issued a positive study advice from the degree programme in question;
b. Students who have been issued a positive study advice from one of the degree programmes:
    - Physics

Appendix VI Contact hours propaedeutic and post-propaedeutic phase (Article 3.5.3)

Bachelor's year 1	
Structure contact hours	**Contact hours per year**
Lectures	319
Tutorial/practicals	371
Projects	38
Tutoring	8
Examinations	45
Other structured hours	24

Bachelor's year 2	
Structure contact hours	**Contact hours per year**
Lectures	305
Tutorial/practicals	247
Projects	51
Tutoring	0
Examinations	40
Other structured hours	20

Bachelor's year 3	
Structure contact hours	**Contact hours per year**
Lectures	184
Tutorial/practicals	151
Projects	560
Tutoring	0
Examinations	40
Other structured hours	20

Appendix VII Additional Requirements Open degree Programmes (Art. 7.3)

Students wishing to pursue an open degree programme may file a request with the Board of Examiners of Physics and Applied Physics. The Board of Examiners will evaluate whether the proposed curriculum meets the learning outcomes of the degree programme.

Appendix VIII Transitional arrangement (article 12.1)

There are no transitional arrangements this year.