Appendices to the Teaching and Examination Regulations for the

Bachelor's degree programme in Applied Physics

2024-2025

Appendix I. Learning outcomes of the Bachelor's degree programme (art. 3.1)

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 investigate 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 (art. 3.7)

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 first year of the degree programme

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

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

Course unit (course code)	ECTS	Remarks
Calculus 1 (for Physics) (WBPH057-05)	5	
Calculus 2 (for Physics) (WBPH058-05)	5	
Computational Methods 1 (WBPH064-05)	5	
Electricity and Magnetism (WBPH033-10)	10	
Linear Algebra (for Physics) (WBPH054-05)	5	
Mathematical Physics (WBPH049-05)	5	
Mechanics and Relativity (WBPH001-10)	10	
Physics Lab: Design Project (WBPH075-05)	5	
Physics Lab: Skills (WBPH077-05)	5	
Physics of Modern Technology (WBPH027-05)	5	

Appendix IV. Course units second and third years of the degree programme

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

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

Course unit (course code)	ECTS	Remarks
Computational Methods 2 (WBPH065-05)	5	
Control Engineering (WMBE024-05)	5	
Device Physics (WBPH037-05)	5	
Digital Signal Processing (WBPH067-05)	5	
Fundamentals of Electronics (WBPH070-05)	5	
Materials Science and Engineering (WBPH071-05)	5	
Physics Lab: Advanced Applications 1 (WBPH072-05)	5	
Physics Lab: Advanced Applications 2 (WBPH066-05)	5	
Physics of Fluids (WBPH042-05)	5	
Applied Physics & Society: Ethical and Professional Aspects (WBPH082-05)	5	
Quantum Physics 1 (WBPH014-05)	5	
Solid State Physics (WBPH068-05)	5	
From Atoms to Solids (WBPH085-10)	10	
Thermal Physics (WBPH002-10)	10	
Waves and optics (WBPH032-05)	5	
Choice: - Solid Mechanics (WBPH015-05) - Optical Spectroscopy (WBPH078-05)	5	
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	
Choice: - Nanoprobing and Nanofabrication (WBPH041-05) - Product Design by the Finite Element Method (WBIE043-05) - Physics Instrumentation and Technology (WBPH069-05)	5	
Bachelor Research Project (Applied Physics) (WBPH902-15)	15	Requires 150 ECTS of the Bachelor's degree programme completed.

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

Appendix V. Contact hours (art. 3.6)

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 VI. 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 VII. Transitional provisions (art. 12.1)

8.1 Transitional arrangement 2024-2025

Discontinued course units				**Substitute course units**				
Course code	*Course name*	*ECTS*	*Final exam*	*Course code*	*Course name*	*ECTS*	*Explanation*	*Equivalent Yes/No*
WBPH034-10	Structure of Matter	10	24/25	WBPH085-10	From Atoms to Solids	10	Substituting course	Yes
WBPH082-05	Physics, Astronomy & Society: Ethical and Professional Aspects	5	23/24	WBPH082-05	Applied Physics & Society: Ethical & Professional Aspects	5	Substituting course	Yes
WBPH051-05	Physics Laboratory 4	5	23/24	WBPH066-05	Physics Lab: Advanced Applications 2	5	Name change	Yes
WBMA045-05	Numerical Mathematics 1	5	N/A	WBPH067-05	Digital Signal Processing	5	Substituting course	Yes

8.2 Transitional arrangement 2023-2024

Discontinued course units				**Substitute course units**				
Course code	*Course name*	*ECTS*	*Final exam*	*Course code*	*Course name*	*ECTS*	*Explanation*	*Equivalent Yes/No*
WBPH013-05	Physics Laboratory 1	5	23/24	WBPH077-05	Physics Lab: Skills	5	Name change	Yes
WBPH050-05	Physics Laboratory 2	5	23/24	WBPH075-05	Physics Lab: Design Project	5	Name change	Yes
WBPH051-05	Physics Laboratory 3	5	23/24	WBPH072-05	Physics Lab: Advanced Applications 1	5	Name change	Yes
WBPH030-05	Solid State Physics 1	5	23/24	WBPH068-05	Solid State Physics	5	Name change	Yes
WBPH005-05	Computational Methods in Science and Technology	5	23/24	WBPH064-05	Computational methods 2	5	Name change	Yes
WBPH038-05	Electronics and Signal Processing	5	23/24	WBPH070-05	Fundamentals of Electronics	5	Name change	Yes

8.3 Transitional arrangement 2022-2023

Discontinued course units				**Substitute course units**				
Course code	*Course name*	*ECTS*	*Final exam*	*Course code*	*Course name*	*ECTS*	*Explanation*	*Equivalent Yes/No*
WBMA003-05	Calculus 1	5	N/A	WBPH057-05	Calculus 1 (for Physics)	5	Substituting course	Yes
WBMA003-05	Calculus 2	5	N/A	WBPH058-05	Calculus 2 (for Physics)	5	Substituting course	Yes
WBMA018-05	Complex Analysis	5	N/A	WBPH059-05	Complex Analysis (for Physics)	5	Substituting course	Yes
WBPH044-05	Python for	5	23/24	WBPH063-05	Computational	5	Name	Yes

	Physicists				methods 1		change	

8.4 Transitional arrangement 2021-2022

No transitional arrangements.

8.5 Transitional arrangement 2020-2021

Discontinued course units				**Substitute course units**				
Course code	*Course name*	*ECTS*	*Final exam*	*Course code*	*Course name*	*ECTS*	*Explanation*	*Equivalent Yes/No*
WILA1-06	Linear Algebra	5	N/A	WBPH054-05	Linear Algebra (for Physics)	5	Substituting course	Yes

The following first-year electives have been removed from the Applied Physics curriculum:
- Introduction to Astronomy
- Introduction to Energy & Environment
- Medical Physics & Biophysics - Nanophysics
- Physics of the Quantum Universe

The course units are not discontinued and will be given for other degree programmes in 2020-2021. Applied Physics students of previous cohorts who still need to pass (one of) these courses will have the possibility to do so.