

Faculty of Sciences

Master of Science in Physics and Astronomy

Language of instruction: English

Programme version 1

## 1 General Courses 36 credits

Full-time standard learning track: Students can choose which of these course units will be taken in the first respectively the second year of study; together with the elective courses, a total of 60 credits is taken in the first and a total of 30 credits in the second year of study.

Nr	Course	CRDT	Ref	MT1	Session	Study
1	C004503 Solid State and Nano Physics <i>Christophe Detavernier -- Department of Solid State Sciences</i>	6			A:1	180
2	C004504 Computational Physics <i>Toon Verstraelen -- Department of Physics and Astronomy</i>	6			A:1	180
3	C004502 Subatomic Physics <i>Didar Dobur -- Department of Physics and Astronomy</i>	6			A:1	180
4	C004505 Theoretical and Numerical Astrophysics <i>Maarten Baes -- Department of Physics and Astronomy</i>	6			A:1	180
5	C004506 Quantum Field Theory <i>Thomas Mertens -- Department of Physics and Astronomy</i>	6			A:1	180
6	C004451 General Relativity <i>Archisman Ghosh -- Department of Physics and Astronomy</i>	6			A:1	180

## 2 Elective Courses 54 credits

Subscribe to 54 credit units, with:

- at least 30 credit units from 2.1-2.5
- at least 6 credit units from 2.6-2.7, including at least 4 credits from 2.6, subject to approval by the faculty.

Courses with reference a are taught at VUB.

Please note: some elective courses are offered only every two years or require specific initial competences. Keep this in mind when choosing your elective courses.

### 2.1 Astronomy

Subscribe to no more than 36 credit units from the following list.

Nr	Course	CRDT	Ref	MT1	Session	Study
1	C002349 Astroparticle Physics <i>Archisman Ghosh -- Department of Physics and Astronomy</i>	6			A:2	180
2	C002512 Cosmology and Galaxy Formation [nl] <i>Sven De Rijcke -- Department of Physics and Astronomy</i>	6			A:1	180
3	C004452 Evolution of Stars and Stellar Systems <i>Dany Vanbeveren -- Vrije Universiteit Brussel</i>	6	a		A:2	180
4	C003131 Observational Techniques in Astronomy <i>Arjen van der Wel -- Department of Physics and Astronomy</i>	6			A:2	180
5	C004507 Nuclei: Structure, Synthesis and Interactions <i>Natalie Jachowicz -- Department of Physics and Astronomy</i>	6			A:2	180
6	C003939 Radiative Transfer Simulations in Astrophysics <i>Maarten Baes -- Department of Physics and Astronomy</i>	6			A:2 <sup>a</sup>	180

### 2.2 Solid State Physics

Subscribe to no more than 48 credit units from the following list.

Nr	Course	CRDT	Ref	MT1	Session	Study
1	C003120 Physics and Chemistry of Nanostructures <i>Zeger Hens -- Department of Chemistry</i>	6			A:2	180
2	E006800 Modelling and Engineering of Nanoscale Materials <i>Louis Vanduyfhuys -- Department of Applied Physics</i>	6			A:1	180

3	C003122	<b>Nuclear Methods in Material Research</b> <i>Stefaan Cottelier -- Department of Electromechanical, Systems and Metal Engineering</i>	6			A:2	180
4	C004508	<b>Structure Analysis of Solids</b> <i>Jolien Dendooven -- Department of Solid State Sciences</i>	6			A:2	180
5	C003128	<b>Optical Spectroscopy of Materials</b> <i>Dirk Poelman -- Department of Solid State Sciences</i>	4			A:1	120
6	C003208	<b>Luminescence</b> <i>Jonas Joos -- Department of Solid State Sciences</i>	6			A:1 <sup>a</sup>	180
7	C004509	<b>Nanomagnetism</b> <i>Bartel Van Waeyenberge -- Department of Solid State Sciences</i>	5			A:2	150
8	E024122	<b>Computational Materials Physics</b> <i>Stefaan Cottelier -- Department of Electromechanical, Systems and Metal Engineering</i>	6			B:1	180
9	C004523	<b>Materials for Energy Applications</b> <i>Christophe Detavernier -- Department of Solid State Sciences</i>	6			A:1	180
10	C004511	<b>Thin Films: Physics and Analysis</b> <i>Jolien Dendooven -- Department of Solid State Sciences</i>	6			A:1	180
11	C004512	<b>Thin Films: Atomic Scale Processing and Analysis</b> <i>Jolien Dendooven -- Department of Solid State Sciences</i>	3			A:1	90
12	C004513	<b>The Theory of Metals: from Path Integrals to Experiment</b> <i>Nick Bultinck -- Department of Physics and Astronomy</i>	6			A:1	180

### 2.3 Nuclear and Particle Physics

[Subscribe to no more than 48 credit units from the following list.](#)

Nr	Course	CRDT	Ref	MT1	Session	Study
1	C004507 <b>Nuclei: Structure, Synthesis and Interactions</b> <i>Natalie Jachowicz -- Department of Physics and Astronomy</i>	6			A:2	180
2	C004560 <b>Particle Radiation Detection and Measurement</b> <i>Michael Tytgat -- Department of Physics and Astronomy</i>	6	a		A:1	180
3	C004450 <b>Medical Radiation Physics and Dosimetry</b> <i>Klaus Bacher -- Department of Human Structure and Repair</i>	6			A:2	180
4	C003129 <b>Capita Selecta Particle Physics</b> <i>Didar Dobur -- Department of Physics and Astronomy</i>	6			A:2	180
5	C003212 <b>Extensions of the Standard Model</b> <i>Steven Lowette -- Vrije Universiteit Brussel</i>	6	a		A:1	180
6	C003211 <b>Electroweak and Strong Force</b> <i>Alexandre Sevrin -- Vrije Universiteit Brussel</i>	6	a		A:2	180
7	C003214 <b>Experimental Techniques in Particle Physics</b> <i>Steven Lowette -- Vrije Universiteit Brussel</i>	6	a		A:2	180
8	C002349 <b>Astroparticle Physics</b> <i>Archisman Ghosh -- Department of Physics and Astronomy</i>	6			A:2	180

### 2.4 Theoretical Physics

[Subscribe to no more than 48 credit units from the following list.](#)

Nr	Course	CRDT	Ref	MT1	Session	Study
1	C004514 <b>Quantum Electrodynamics</b> <i>Dimitri Van Neck -- Department of Physics and Astronomy</i>	6			A:2 <sup>a</sup>	180
2	C004515 <b>Many-body Physics</b> <i>Dimitri Van Neck -- Department of Physics and Astronomy</i>	6			A:2	180
3	C003668 <b>Quantum Computing</b> <i>Frank Verstraete -- Department of Physics and Astronomy</i>	6			A:2	180
4	C004516 <b>Holography</b> <i>Michal Heller -- Department of Physics and Astronomy</i>	6			A:2 <sup>a</sup>	180
5	C004561 <b>Quantum Black Holes</b> <i>Thomas Mertens -- Department of Physics and Astronomy</i>	6			(A:2) <sup>d</sup>	180
6	C004071 <b>Strongly Correlated Quantum Systems</b> <i>Jutho Haegeman -- Department of Physics and Astronomy</i>	6			(A:2) <sup>d</sup>	180
7	C004421 <b>Relativistic Hydrodynamics - from Quantum Field Theory to Black Holes</b> <i>Michal Heller -- Department of Physics and Astronomy</i>	6			(A:1) <sup>d</sup>	180

8	C004517	Dynamics: from Newton to Schrödinger <i>Sven De Rijcke -- Department of Physics and Astronomy</i>	6			A:1	180
9	C004513	The Theory of Metals: from Path Integrals to Experiment <i>Nick Bultinck -- Department of Physics and Astronomy</i>	6			A:1	180
10	C004518	Field Theory for Statistical Mechanics <i>Nick Bultinck -- Department of Physics and Astronomy</i>	6			A:2 <sup>a</sup>	180
11	C004106	Complexity and Criticality <i>Jan Ryckebusch -- Department of Physics and Astronomy</i>	6			A:2	180

## 2.5 Interdisciplinary Elective Courses

[Subscribe to no more than 48 credit units from the following list.](#)

Nr	Course	CRDT	Ref	MT1	Session	Study
1	E006900 Plasma Technology and Fusion Technology <i>Rino Morent -- Department of Applied Physics</i>	6			A:1	180
2	E026260 Magnetohydrodynamics of Plasmas <i>Roger Jaspers -- Department of Applied Physics</i>	6			A:2	180
3	C003940 History and Philosophy of Sciences: Physics and Astronomy [nl] <i>Maarten Van Dyck -- Department of Philosophy and Moral Sciences</i>	6			A:2	180
4	C003758 Machine Learning <i>Yvan Saeys -- Department of Mathematics, Computer Science and Statistics</i>	6			A:1	180
5	C001427 Introduction to the Dynamics of Atmospheres [nl] <i>Piet Termonia -- Department of Physics and Astronomy</i>	6			A:1	180
6	E040430 Continuum Mechanics <i>Geert Verdoolaeghe -- Department of Applied Physics</i>	6			A:2	180
7	E006500 Quantum Optics <i>Bart Kuyken -- Department of Information Technology</i>	6			A:1	180
8	E024641 Physics of Semiconductor Devices <i>Benoit Bakeroot -- Department of Electronics and Information Systems</i>	6			B:2	180
9	E029040 Physical Chemistry <i>Iwan Moreels -- Department of Chemistry</i>	6			B:2	180
10	C004453 Modeling Complex Systems <i>Sophie De Buyl -- Vrije Universiteit Brussel</i>	6	a		A:2	180
11	E006400 Wave Physics in Living Matter <i>Wout Joseph -- Department of Information Technology</i>	6			A:2	180
12	C004106 Complexity and Criticality <i>Jan Ryckebusch -- Department of Physics and Astronomy</i>	6			A:2	180
13	C004517 Dynamics: from Newton to Schrödinger <i>Sven De Rijcke -- Department of Physics and Astronomy</i>	6			A:1	180
14	F000920 Networks in Socio-Economic Systems <i>Luis Enrique Correa da Rocha -- Department of Economics</i>	6			A:2	180

## 2.6 Professional Skills and Internships

[Subscribe to at least 4 and no more than 24 credit units from the following list.](#)

Nr	Course	CRDT	Ref	MT1	Session	Study
1	C004519 Professional Skills for Scientists [en, nl] <i>Philippe Smet -- Department of Solid State Sciences</i>	4			A:J	120
2	E076471 Dare to Start <i>Wouter Haerick -- Department of Information Technology</i>	3			A:2	90
3	E076460 Dare to Venture <i>Johan Verrue -- Department of Marketing, Innovation and Organisation</i>	4			A:2	120
4	C004520 Internship A <i>Christophe Detavernier -- Department of Solid State Sciences</i>	4			A:J	120
5	C004521 Internship B <i>Christophe Detavernier -- Department of Solid State Sciences</i>	6			A:J	180
6	C004522 Project Work <i>Sven De Rijcke -- Department of Physics and Astronomy</i>	4			A:J	120

## 2.7 Social and Economic Elective Courses

[Subscribe to no more than 20 credit units from the following list.](#)

Nr	Course	CRDT	Ref	MT1	Session	Study
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1	C004523	Materials for Energy Applications <i>Christophe Detavernier -- Department of Solid State Sciences</i>	6		A:1	180
2	E039060	Sustainable Energy and Rational Use of Energy <i>Filip Strubbe -- Department of Electronics and Information Systems</i>	4		A:2	120
3	E065460	Rational Use of Materials <i>Tom Depover -- Department of Materials, Textiles and Chemical Engineering</i>	5		A:1	150
4	E076320	The Information Society and ICT [nl] <i>Erik Mannens -- Department of Electronics and Information Systems</i>	3		A:2	90
5	F000551	Business Skills <i>Mieke Audenaert -- Department of Marketing, Innovation and Organisation</i>	4		C:2	120
6	A001900	Introduction to Psychology [nl] <i>Wim Notebaert -- Department of Experimental Psychology</i>	3		A:1	90
7	H001977	Coaching and Diversity [nl] <i>Elisabeth De Schauwer -- Department of Special Education</i>	3	UKV	A:J	90
8	E076450	Basic Entrepreneurship [nl] <i>Yannick Dillen -- Department of Marketing, Innovation and Organisation</i>	3	UKV	A:1	90
9	E078010	Technology and Environment <i>Luc Martens -- Department of Information Technology</i>	3		A:1	90
10	F000982	Complexity Economics and Agent-Based Modelling <i>Luis Enrique Correa da Rocha -- Department of Economics</i>	6		A:2	180

## 2.8 Elective Courses UGent or other Universities

Subscribe to maximum 18 credit units from UGent courses, including the [Ghent University elective courses](#), courses from other Flemish Universities or an [Erasmus+ Partner University](#). Maximum 12 credit units can be chosen from Bachelor programmes. Subject to approval by the faculty.

## 3 Master's Dissertation 30 credits

Subscribe for the Master's Dissertation in year 2 of the full-time standard learning track.

Nr	Course	CRDT	Ref	MT1	Session	Study
1	C004524 Master's Dissertation <i>Philippe Smet -- Department of Solid State Sciences</i>	30		2	A:J	900

### Teaching

When a course is not taught (solely) in the programme's language of instruction, the effectively used languages are indicated in square brackets following the course name, using the following ISO codes:

bg: Bulgarian	de: German	es: Spanish	ja: Japanese	pl: Polish	sh: Croatian/Serbian	zh: Chinese
cs: Czech	el: Greek	fr: French	nl: Dutch	pt: Portuguese	sl: Slovene	
da: Danish	en: English	it: Italian	no: Norwegian	ru: Russian	sv: Swedish	

### Semester

Semesters are indicated by their number (1 or 2); semester 3 represents the summer period and J indicates a course spanning semesters 1 and 2. When a capital letter precedes a semester number, the course has multiple offerings. The letter indicates the offering concerned.

When a semester is shown in brackets, the course is not offered this year in the specific offering.

The offering frequency and first year of offering are indicated by the following codes:

a: bi-annually	c: annually, from 2026-2027	f: annually, from 2027-2028	i: annually, from 2028-2029
b: tri-annually	d: bi-annually, from 2026-2027	g: bi-annually, from 2027-2028	j: bi-annually, from 2028-2029
	e: tri-annually, from 2026-2027	h: tri-annually, from 2027-2028	k: tri-annually, from 2028-2029