

FACULTY OF SCIENCE

**EDUCATION AND EXAMINATION REGULATIONS
PART B**

Academic year 2014-2015

MASTER'S PROGRAMME PHYSICS

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Chapter 1. General Provisions

Article 1.1 – Definitions

In addition to part A, the following definitions are used in part B

- a. Course Education imparted in a series of lessons or meetings
- b. Personal Education Plan An individual study plan for the student's master programme.
- c. Examiner The person appointed by the Examinations Board for the purpose of holding examinations and determining their results, within the meaning of section 7.12c of the Act

Article 1.2 – General information master's programme

1. The Master's programme Physics, CROHO 60202 is offered on a full-time basis and the language of instruction is English. This means that the Code of Conduct for Foreign Languages at the UvA 2000 and the provisions laid down in Section 7.2 of the Act apply.
2. The programme has a workload of 120 EC.
3. A component of the programme consist of 3 EC or multiples of this number.
4. Within the programme the following tracks are offered:
 - Advanced Matter and Energy Physics
 - Atomic Scale Modelling of Physical, Chemical and Bio-molecular Systems (AtoSim)
 - GRavitation and AstroParticle Physics Amsterdam (GRAPPA) - Particle
 - Physics of Life and Health
 - Science for Energy and Sustainability
 - Theoretical Physics.
5. In each Master track the student may choose a major or a minor from the list below (see Article 4.1).
 - Major Science Communication;
 - Major Science in Society;
 - Major Teaching;
 - Minor Tesla.
6. The student determines the content of the Master's programme in consultation with the coordinator of the Master's programme and according to the rules of Chapter 3. The coordinator of the Master's programme will lay down the content chosen by the student in a Personal Education Programme (PEP). The student submits this PEP, signed as correctly by the programme coordinator to the Examinations Board. If the student wants to change the contents of the study programme, the student promptly consults with the coordinator of the study programme. If this results in a new PEP the student submits this to the Examinations Board.

Article 1.3 – Enrolment

The programme starts at the beginning of the first semester (September) and second semester (February) of the study year. This enrolment date ensures a programme that can be expected to be completed within the official period.

Chapter 2. Aim of the programme and exit qualifications

Article 2.1 – Aim of the programme

The aim of the programme is:

The general objective of the Physics Master's programme is to provide students with such knowledge, skills and insight in the field of physics, including the necessary mathematical,

experimental, computational and communicative skills, to enable them to work as a professional physicist, or to become qualified to pursue advanced training as scientific researcher. The programme also aims at furthering the understanding of the position and role of physics in the sciences and in society, and to further a social sense of responsibility. The aim of the Master's programme in Physics is to:

- a) educate students to become independent academic professionals, through conducting fundamental scientific research as well as working with current scientific knowledge, and applying this knowledge in new and continuously changing practical situations;
- b) actively stimulate interdisciplinary collaboration in the development of science, based on knowledge in the field of physics;
- c) offer students the possibility to develop skills, knowledge and insight in a specialisation in the field of physics, with emphasis on formulating relevant scientific questions and the approach to formulate answers to these questions;
- d) provide student-oriented education that is of a high, internationally recognised quality;
- e) offer students the opportunity to gain knowledge and insight in an international setting;
- f) provide an inspiring academic learning environment, and to offer feasible study specialization programmes to a demanding and heterogeneously composed student population;
- g) develop the ability in students to convey acquired knowledge to others..

Article 2.2 – Exit qualifications

1. The graduate of the Master's programme Physics has:

- a) has a thorough theoretical and practical knowledge of modern physics, including the knowledge of other disciplines required for that purpose;
- b) has a thorough knowledge of theoretical and/or experimental methods and research experience in at least one sub-area within the physics discipline;
- c) is able to become acquainted with other sub-areas of the physics discipline within a reasonable period of time;
- d) is able to formulate a research plan based on a realistic problem definition within the physics discipline;
- e) is able to analyse and formulate research results and to draw conclusions there from;
- f) is able to write a scientific report or an internationally accessible scientific publication and to participate in discussions on (specialised) topics in the field of study;
- g) is able to consult international professional literature in the relevant sub-areas and to apply the knowledge gained from that;
- h) is able to apply one's knowledge of physics in a broader (multidisciplinary) context;
- i) is employable in those positions for which knowledge and research skills in the field of physics are a prerequisite;
- j) has sufficient knowledge of, and insight in the social role of physics to make a sound choice regarding one's own profession, as well as in the exertion of this profession;
- k) is able to cooperate with other people, to convey knowledge to other people, and to give a presentation both to discipline specialists and to a broader audience.

2. The graduate in the regular programme curriculum:

- must be able to, in the case that an experimental Master's programme has been chosen, independently design experiments including the corresponding controls, conducting and evaluating these within a given period of time;
- is able to compare and incorporate obtained research results and conclusions within the framework of the results of other scientists;
- is able to form a vision on the development of scientific research in the field of physics;
- is able to quantitatively and qualitatively analyse physics processes, to incorporate data in existing or new models and to present the results at various levels of abstraction.

3. In addition to paragraph 1 and 2, the student who has completed the track Advanced Matter and Energy Physics has obtained the following track-specific qualifications:
 - a. has a well-founded knowledge of the theoretical background behind experimental physics in the sub-disciplines: (hard and soft) condensed matter physics; atomic and laser physics;
 - b. has a well-founded knowledge of experimental approaches of relevance in modern research into at least one of the following research fields:
 - emergent materials, strongly correlated electron systems and unconventional superconductivity;
 - energy materials and processes for (solar) energy conversion;
 - complex liquids, granular and soft bio-matter;
 - ultracold quantum gases, state-of-the-art lasers, quantum information and simulation with ultracold atoms.
 - c. is proficient in applying the theoretical knowledge learned to enable the interpretation of the results from experimental work - executed by the graduate at least in part as an independent, /principle investigator/ - in a research project in a field within or close to those given in §2 above.
4. In addition to paragraph 1 and 2, the student who has completed the track Atomic Scale Modelling of Physical, Chemical and Bio-molecular Systems (AtoSim) has obtained the following track-specific qualifications:
 - a. has a thorough scientific knowledge of the field of atomic scale modeling;
 - b. is proficient in analyzing and solving scientific problems in the field of atomic scale modeling;
 - c. has the ability to communicate with others about questions and problems in the field of atomic scale modeling.
5. In addition to paragraph 1 and 2, the student who has completed the track GRavitation and AstroParticle Physics Amsterdam (GRAPPA) - Particle has obtained the following track-specific qualifications:
 - a. has a well-founded theoretical knowledge in particle physics and/or astroparticle physics and/or cosmology;
 - b. has a well-founded knowledge of experimental or theoretical approaches in at least one of the following research fields:
 - Standard Model and Beyond the Standard Model Physics;
 - Dark Matter;
 - Gravitational Waves and tests of Gravity;
 - Cosmic Messengers;
 - (Astro-)Particle Physics Detector R&D.
6. In addition to paragraph 1 and 2, the student who has completed the track Physics of Life & Health has obtained the following track-specific qualifications:
 - a. has a well-founded knowledge of the physics background behind processes on a cellular or organ level
 - b. has a well-founded knowledge of experimental or simulation approaches into at least one of the following research fields:
 - Novel imaging modalities;
 - Novel therapeutic applications;
 - Cellular biophysics;
 - Organ biophysics;
 - c. is proficient in applying the theoretical knowledge learned to enable the interpretation of the results from experimental work - executed by the graduate at

least in part as an independent, principal investigator - in a research project in a field within or close to those given in 2.1.2.12 above.

7. In addition to paragraph 1 and 2, the student who has completed the track Science for Energy and Sustainability has obtained the following track-specific qualifications:
 - a. a thorough knowledge of the scientific, technological and societal challenges for our future associated with energy and sustainability problems;
 - b. is proficient in analyzing and evaluating the current energy and sustainability problems;
 - c. is proficient in applying the acquired theoretical and practical insights in day-to-day practice at an institution, company or organization, strongly focused on providing scientific solutions to current and future energy and sustainability problems;
 - d. has good receptive and written productive skills in the English language.
8. In addition to paragraph 1 and 2, the student who has completed the track Theoretical Physics has obtained the following track-specific qualifications:
 - a. has a well-founded and working knowledge of Quantum Field Theory for particle physics as well as many body physics;
 - b. has a thorough knowledge of the fundamental aspects in modern statistical physics and condensed matter theory;
 - c. is informed about basic theoretical concepts as second quantization, path integrals;
 - d. is capable of finding the appropriate theoretical framework for a wide range of physics problems.

Chapter 3. Admission to the programme

Article 3.1 – Entry requirements

1. Students who have successfully completed the following degrees may be admitted:
 - a Bachelor's degree in Physics and Astronomy, in Physics, in Technical Physics, and in Astronomy, awarded by a Dutch University
 - a Bachelor's Degree in Beta-gamma met een Natuurkunde Major (Liberal Arts and Sciences with a Physics Major), awarded by the University of Amsterdam;
2. Without prejudice to the provisions of paragraph 1, the Examination Board may grant admission to the study programme when concluding, that the previous education of the candidate is equivalent to the Bachelor's degree referred to paragraph 1.
3. Without prejudice to the provisions of paragraphs 1 and 2 the Examination Board may grant admission to a student whose previous education does not meet aforementioned requirements for admission to the study programme, when concluding that the candidate is able to meet the admission requirements within a reasonable period of time. At the request of a candidate, and if the Examination Board has decided additional education feasible, the Examination Board may draw up a programme of maximum 30 EC as an admission requirement, a so called 'conversion programme'. After completion of this conversion programme a letter of admission will be issued, exclusively for the stated Master's programme (and track).
4. For admission to the AtoSim track a candidate must have done a research project of at least 24 EC in the subject of Physics.
5. When the programme commences, the student must have fully completed the Bachelor's programme allowing admission to this programme.

Article 3.2 – Premaster's programme

Not applicable

Article 3.3 – Restrictions on the number of students admitted to the Master's programme

Not applicable

Article 3.4 – Intake dates

A request for admission to the programme must be submitted to the Faculty and Master's programme before 1 May in the case of Dutch students, before 1 April in the case of EU students and before 1 February in the case of non-EU students. Under exceptional circumstances, the Examinations Board may consider a request submitted after this closing date.

Article 3.5 – English Language Requirements

1. Admission to the programme requires sufficient command of the English language. A student may take one of the following tests to establish language competence:
 - IELTS: 6.5
 - TOELF paper based test: 580
 - TOEFL internet based test: 92-93
 - Cambridge Advanced English: A, B or C
2. Those possessing a Bachelor's degree from a Dutch university satisfy the requirement of sufficient command of the English language

Article 3.6 – Free curriculum

1. Subject to certain conditions, the student has the option of compiling a curriculum of his/her own choice which deviates from the curricula mentioned in article 4.1 of these Regulations. The concrete details of such a curriculum require permission of the Examinations Board.
2. In order to be considered for a degree of this programme, at least one half of the proposed curriculum has to consist of components of the regular study programme.

Chapter 4. Content and organisation of the programme

Article 4.1 – Organisation of the programme

The study programme is offered in collaboration with the VU University Amsterdam. Depending of the specialization programme the study programme is composed of components according to tables 1 and 2. On the certificate the chosen specialization programme will be stated.

A complete list of courses provided by the Master's programme can be found in Appendix 1. Every component will be tested. Within the Master's programme different types of testing and different types of teaching methods are used. These are described per component in the course catalogue.

Table 1

Components	Regular programme	Major	Minor
Compulsory components	12	Total: 24	12
Elective components discipline	24		18
Compulsory Orientation project/seminar/literature study	6		6
Preparation research project	6*	6	6
Thesis research project	48*	24	42
Master thesis and presentation	6	6	6
Free elective components	12		
Academic skills in the Master	6		

Non-R programme		60	30
Total EC	120	120	120

*These components are combined for the for the specialization programs Advanced Matter and Energy Physics and Physics of Life and Health.

Table 2

Components track AtoSim	EC
Compulsory components	48 EC
Elective components discipline [#]	30 EC
Orientation project/seminar/literature study	12 EC
Research project	30 EC
Total Study Load	120 EC

[#] Total of physics courses has to be at least 36 EC. See study guide for the relevant physics courses.

1. Regarding the majors:

A major consists of 60 EC. It has to be combined with disciplinary components as listed in table 1, with the general compulsory components in order to meet the general requirements of the programme. The exit qualifications of the majors can be found as an appendix to Part B of these Regulations. Students have to go through a separate intake procedure for admission to the majors. Students first have to finish the obligatory research part of the programme before starting one of the major.

2. Regarding the major Teaching:

Students who have completed an Educatieve Minor of 30 EC during their Bachelor's programme may submit a non-standard study programme for approval to the Examinations Board of the Interfacultaire Lerarenopleidingen, after discussing this non-standard study programme with the coordinator of the major Teaching and the coordinator of the Master's programme. The exit qualifications of this major can be found as an appendix to Part B of these Regulations.

3. Regarding the minor Tesla:

The minor Tesla consists of 30 EC. It must be combined with a regular programme, comprising at least 90 EC. The minor consist of a course component and a project- based component. This project-based component has to be supervised by a Faculty of Science examiner and is subject to prior approval of the Examinations Board. An examiner from the research programme has to be appointed as a second assessor. The learning objectives of this minor can be found as an appendix to Part B of these Regulations.

Article 4.2 – Compulsory components

The programme includes compulsory components with a maximum study load of 12 EC. The contents and format of the compulsory components of the various programmes are further described in the Course Catalogue, stating the necessary entry requirements for successful participation in the component.

MSc Physics, Research Variant Advanced Matter and Energy Physics

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Big Issues in Emergent Energy Materials	X_422587	6	1	h	pres	400
Scientific Writing in English	X_400592	3	2,6	h	o	400
Oriëntation Project	X_422580	6	3,5	pro	-	400

Big Issues in Atomic Quantum Physics	X_428508	3	4	-	-	400
Big Issues in Soft Matter	X_428509	3	4	-	-	400
Survival Guide for Scientists	X_428523	3	6	-	-	400
Colloquium and Literature Thesis	X_422536	6	Ac. Year	-	-	600

MSc Physics, Research Variant Particle Physics and Astroparticle Physics

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Particle Physics I	X_420052	6	1	-	-	400
Particle Physics II	X_420053	6	2	-	-	500
NIKHEF Project	X_420115	6	4,5,6	pro	-	600
Colloquium en afstudeerverslag - Particle Physics and Astroparticle Physics	X_422520	6	Ac. Year	-	-	600
Master Project Physics: PP&AP	X_422512	54	Ac. Year	pro	-	600

MSc Physics, Research Variant Physics of Life and Health

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Colloquium and Literature Thesis	X_422538	6	Ac. Year	-	v, pres	600
Literature Study mPhys-PLH	X_422585	6	Ac. Year	-	-	500

MSc Physics, Research variant TP

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Stat. Phy. and Cond. Matter Theory I	X_420083	6	1	-	-	400
Quantum Field Theory	X_420081	6	2	h, pra	t, o	400
Student Seminar Theoretical Physics	X_420200	6	4,5,6	-	-	500
Colloquium en afstudeerverslag - Theoretical Physics	X_422519	6	Ac. Year	-	-	600
Master Project Physics: TP	X_422509	54	Ac. Year	pro	-	600

MSc Physics, Society Oriented Variant for Natural and Life Sciences

Compulsory courses

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Analysis of Governmental Policy	AM_47057 1	6	1	h, w	t, v, pres	500
Qualitative and Quantitative Research Methods	AM_47058 2	6	1	h, w	t, o	400

Communication, Organization and Management	AM_47057 2	6	2	h, w	t, v	500
Internship Science in Society (BIO)	AM_1134	30	Ac. Year	-	-	600

Compulsory courses of at least 6 EC

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Business Management in Health and Life Sciences	AM_47058 4	6	2	H	t, v	500
Disability and Development	AM_47058 8	6	2	h, w	t, v	500
Entrepreneurship in Health and Life Sciences	AM_47057 5	6	2	h, w	t, o	500
Health, Globalisation and Human Rights	AM_47081 8	6	2	h, w	t, pro	500
Policy, Politics and Participation	AM_47058 9	6	2	h, w	v, pres	500
Science in Dialogue	AM_1002	6	2	h, w	t, v, o	500
Clinical development and clinical trials	AM_47058 5	6	3	h, w	t	500

MSc Physics, Specialization Science, Business & Innovation

Naam onderwijsonderdeel	Vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	Niveau
Expertise and coördination in Knowledge Intensive Firms	X_432738	6	1	W	t	400
Management of Sustainable Innovation	X_432739	6	2	H	t, o	400
Networked Organizations and Communication	S_NOC	6	2	h, w	t, v, pres	-
Transdisciplinarity and Transition	X_430604	6	2	H	t, v, o	400
SBI Project & Master Thesis	X_432735	36	Ac. Year	Pro	-	600
Science project	X_422591	24	Ac. Year	Pro	v, pres	-

MSc Physics, Specialization Science for Energy and Sustainability

Naam onderwijsonderdeel	Vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Current Sustainable Energy Technologies	X_422582	6	3	h, w	v, pres	500
Project Sustainable Future	X_432784	6	6	h, w	t, v, pres, o	500
Literature Thesis SES	X_432785	6	Ac. Year	-	v, pres	600

MSc Physics, Communication variant

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Internship Communication Specialisation	AM_47114 8	30	Ac. Year	-	-	600

MSc Physics, Education variant

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Semester	Werkvorm	Toetsvorm	Niveau
Algemene didactiek en Pedagogiek I	O_MLADE PI	6	1+2	h, w	t, v	500
Algemene Didactiek en Pedagogiek II	O_MLADE PII	3	1+2	h, w	t, v	500
Praktijk I	O_MLPRA KI	15	1+2	-	-	500
Praktijk II	O_MLPRA KII	15	1+2	-	-	500
Professionele ontwikkeling en onderzoek I	O_MLVPO OI	3	1+2	h, w	o	500
Professionele ontwikkeling en onderzoek II	O_MLVPO OII	6	1+2	h, w	v, pres	500
Vakdidactiek Natuurkunde I	O_MLVDN AI	3	1+2	w	v	500
Vakdidactiek Natuurkunde II	O_MLVDN AII	6	1+2	w	v	500
Verdieping	O_MLVER D	3	1+2	h, w	o	500

Article 4.3 – Practical components

1. In addition to, or instead of, classes in the form of lectures, the elements of the master's examination programme often include a practical component as defined in article 1.2 of part A. The UvA Course Catalogue contains information on the types of classes in each part of the programme. Attendance during practical components is mandatory.
2. When performing practical components, students must adhere to the faculty's safety regulations.
3. The programme consists of research-related components with a study load of at least 60 EC (36 in the non R-major, 30 in AtoSim track). The research-related components always include the compulsory components:
 - a research assignment with a study load of at least 54 EC (30 in the non R-majors);
 - a final report and a scientific presentation with a study load of 6 EC.

Article 4.4 – Elective components

1. Students choose components in the field of the discipline with a study load of at least 24 EC in consultation with and accordance of the coordinator of the Master's programme and according to the rules stated the Course Catalogue of the study programme.

2. Elective components are considered to be those components in the field of the discipline stated in the Appendix, and included in the Course Catalogue of the discipline, or of components offered by another Dutch or foreign university, being according to the Examination Board of a comparable level.
3. Course components successfully completed elsewhere or that are not included in attachment 1 during the programme may supplement the student's examination programme, subject to prior permission from the Examinations Board.
 - a. The courses have to be followed at an accredited university or institute
 - b. The course has to be relevant to the master chosen.
4. In exceptional cases students may choose Bachelor's-level free elective components as part of their programme. The Examinations Board will determine whether a free elective component at the Bachelor's level will be seen as part of the programme and the number of credits that will be allocated to the elective component.
5. In terms of content, elective components must not show too much similarity to other components of the student's curriculum. The acceptable degree of similarity will be decided by the Examinations Board.
6. A free elective component will only be seen as part of the programme if the Examinations Board has given its prior approval.

MSc Physics, Research Variant Advanced Matter and Energy Physics

Optional courses (24 ec compulsory)

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Stat. Phy. and Cond. Matter Theory I	X_420083	6	1	-	-	400
Statistical Mechanics of Soft Matter	X_422555	6	1	-	t	400
Photovoltaics	X_428516	6	2	-	-	400
Soft Condensed Matter and Biological Physics	X_420167	6	2	h	t, pres, o	400
Mathematica for physicists	X_428533	3	3	-	-	500
Programming C++	X_420141	3	3	-	-	400
Classical and quantum Chaos	X_428534	6	4	-	-	400
Quantum optics	X_428535	6	4	-	-	400
Superconductivity	X_428522	6	4	-	-	500
Photosynthesis and Energy	X_422553	6	5	h	v, pres	500
Ultrafast Laser Physics	X_422556	6	5	h	t	400
Fermi Quantum Gases	X_428514	6	4,5,6	-	-	400
Forensics with complex liquids	X_428538	3	4,5,6	-	-	400
Hydrodynamics	X_428536	6	4,5,6	-	-	500
Nanophotonics	X_428537	6	4,5,6	-	-	500
Summer-school AMEP	X_428521	3	4,5,6	-	-	500
Ultrafast X-ray Physics	X_428524	3	4,5,6	-	-	400

Compulsory Choice Master Project

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Master Project Physics: AMEP	X_422560	30	Ac. Year	pro	-	600
Master Project Physics: AMEP	X_422561	36	Ac. Year	pro	-	600
Master Project Physics: AMEP	X_422562	42	Ac. Year	pro	-	600
Master Project Physics: AMEP	X_422563	48	Ac. Year	pro	-	600
Master Project Physics: AMEP	X_422564	54	Ac. Year	pro	-	600

Compulsory Choice Minor Project

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Minor Project Physics: AMEP	X_422572	6	Ac. Year	pro	-	500
Minor Project Physics: AMEP	X_422573	12	Ac. Year	pro	-	500
Minor Project Physics: AMEP	X_422574	18	Ac. Year	pro	-	500
Minor Project Physics: AMEP	X_422575	24	Ac. Year	pro	-	500

MSc Physics, Research Variant Particle Physics and Astroparticle Physics

Optional courses (24 ec compulsory)

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Group Theory	X_420025	6	1	-	-	400
Statistical Data Analysis	X_420067	6	1	-	-	400
General Relativity	X_420128	6	1,2,3	-	-	400
Quantum Field Theory	X_420081	6	2	h, pra	t, o	400
Programming C++	X_420141	3	3	-	-	400
Astroparticle Physics	X_420005	6	4	-	-	400
Computational Methods Flavour Physics and CP Violation	X_420014	6	4	h	o	400
Strong Interactions 1	X_428539	3	4	h	t	400
Strong Interactions 1	X_420233	3	4	-	-	400
Particles and Fields	X_420112	6	4,5	-	-	500
Strong Interactions 2 Beyond the Standard Model	X_420234	3	5	-	-	500
Strong Interactions 2 Beyond the Standard Model	X_420192	3	4,5,6	-	-	-
CERN Research Project CERN Summer Student Lecture Programme	X_420116	6	4,5,6	pro	-	500
CERN Research Project CERN Summer Student Lecture Programme	X_420122	3	4,5,6	-	-	500
Physics of Anti-matter Gravitational Waves (Selected Topics in Gravitation and	X_428505	3	4,5,6	-	-	400
Physics of Anti-matter Gravitational Waves (Selected Topics in Gravitation and	X_428506	3	4,5,6	-	-	400

Cosmology)

Particle Cosmology	X_420560	6	4,5,6	-	-	-
Particle Detection	X_420051	6	4,5,6	-	-	500

M, C, E Courses or academic Skills (6 ec)

Naam onderwijsonderdeel	Vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Scientific Writing in English	X_400592	3	2,6	h	o	400
Survival Guide for Scientists	X_428523	3	6	-	-	400

MSc Physics, Research Variant Physics of Life and Health

Optional courses (24 ec compulsory)

Naam onderwijsonderdeel	Vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Biomedical Modelling and Simulation	X_430112	6	1	h, w	t, pres, o	400
Lasers and Quantum Optics	X_422539	6	1	h	T	400
Statistical Theory of Complex Molecular Systems	X_428520	6	1	-	-	400
Introductie Medische Beeldbewerking	X_432630	6	2	h, w	t, o	300
Physics of Organs 2: Sensory Organs and Bioelectricity	X_428528	6	2	-	-	400
Biophotonics III: Practical Training	AM_470630	3	3	pra	v, prac	400
Dynamics of Biomolecules and Cells	X_422583	6	4	h	-	400
Medical Imaging Parameter Estimation	X_428526	6	4	-	-	400
Applied to Medical and Biological Sciences	X_432631	6	4	h	T	500
Advanced Medical Technology	X_437026	6	5	h	-	400
Photosynthesis and Energy	X_422553	6	5	h	v, pres	500
From Genome to Physiome	X_420127	6	4,5,6	-	-	400

Compulsory Choice Master Project

Naam onderwijsonderdeel	Vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Master Project Physics: PLH	X_422540	30	Ac. Year	pro	-	600
Master Project Physics: PLH	X_422541	36	Ac. Year	pro	-	600

Master Project Physics: PLH	X_422542	42	Ac. Year	pro	-	600
Master Project Physics: PLH	X_422543	48	Ac. Year	pro	-	600
Master Project Physics: PLH	X_422544	54	Ac. Year	pro	-	600

Compulsory Choice Minor Project

Naam onderwijsonderdeel	Vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Minor Project Physics: PLH	X_422548	6	Ac. Year	pro	-	500
Minor Project Physics: PLH	X_422549	12	Ac. Year	pro	-	500
Minor Project Physics: PLH	X_422550	18	Ac. Year	pro	-	500
Minor Project Physics: PLH	X_422551	24	Ac. Year	pro	-	500

Optional courses (12 ec compulsory)

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Physics of Organs 1: Cardio-Pulmonary Physics	X_428527	6	1	-	-	400
Statistical Mechanics of Soft Matter	X_422555	6	1	-	t	400
Soft Condensed Matter and Biological Physics	X_420167	6	2	h	t, pres, o	400
Biomedical Optics	X_428529	6	5	-	-	400

M, C, E courses or academic skills (6 ec)

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Scientific Writing in English	X_400592	3	2,6	h	o	400
Ethics in Life Sciences	AM_47070 7	3	3	h, w	t, pres	400
Survival Guide for Scientists	X_428523	3	6	-	-	400
Ethics in Public Health	AM_47080 5	3	Ac. Year	h, w	v	-

MSc Physics, Research variant TP

Optional courses (24 ec compulsory)

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Group Theory	X_420025	6	1	-	-	400
General Relativity	X_420128	6	1,2,3	-	-	400
Quantum Field Theory - Extension	X_422554	3	3	-	-	500

Statistical Physics and Condensed Matter Theory 2 - Extension	X_428519	3	3	-	-	500
Computational Methods Flavour Physics and CP Violation	X_420014	6	4	h	o	400
Particles and Fields Beyond the Standard Model	X_428539	3	4	h	t	400
	X_420112	6	4,5	-	-	500
	X_420192	3	4,5,6	-	-	-
Particle Cosmology Stat. Phy. and Cond. Matter Theory II	X_420560	6	4,5,6	-	-	-
	X_420100	6	4,5,6	-	-	500
String Theory	X_400242	6	4,5,6	-	-	500

M, C, E Courses or academic Skills (6 ec)

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Scientific Writing in English	X_400592	3	2,6	H	o	400
Survival Guide for Scientists	X_428523	3	6	-	-	400

Aangeraden keuzevakken

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Advanced Quantum Mechanics	X_420003	6	1	h, w	t	300
Mathematische methoden	X_420105	6	4	h, w	-	300

MSc Physics, Specialization Science, Business & Innovation

Compulsory Choice of 12 ects

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Biomedical Modelling and Simulation	X_430112	6	1	h, w	t, pres, o	400
BioSolar Cells	X_428531	6	1	h	pres, o	400
Chemical Biology	X_432538	6	1	h, w	t, pres, o	400
Green Chemistry	X_430557	6	1	h	t, v, o	300
Principles of Pharmaceutical Sciences / Pharmacochemistry	X_435675 AM_47014	6	1	h, pra	t	400
Protein Science	5	6	1	h, w	t	400
Photovoltaics	X_428516	6	2	-	-	400
Innovation in Medical Technology to Improve the Health Care System	X_430602	6	6	h, w	v, pres	500

Project Sustainable Future	X_432784	6	6	h, w	t, v, pres, o	500
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Compulsory Choice 1 out of 2

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Business, Innovation and Value Creation in the Life Science Industry	X_432723	6	3	h	t, v, pres	500
Current Sustainable Energy Technologies	X_422582	6	3	h, w	v, pres	500

Recommended Choice

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Technology and innovation processes Science and Society in Historical Perspective	E_BA_TIP	6	2	-	-	-
	X_400424	6	5	h	t, v, pres	-

MSc Physics, Specialization Science for Energy and Sustainability

Verplichte keuze van minimaal 24 ec

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Big Issues in Emergent Energy Materials	X_422587	6	1	h	v, pres	400
BioSolar Cells	X_428531	6	1	h	pres, o	400
Environmental Chemistry	X_437004	6	1	-	-	400
Green Chemistry	X_430557	6	1	h	t, v, o	300
Management of Sustainable Innovation	X_432739	6	2	h	t, o	400
Open Innovation in Science	X_430583	6	2	h	t, o	400
Organic Photovoltaic	X_422590	6	2	h	pres	-
Photovoltaics	X_428516	6	2	-	-	400
Heterogeneous Catalysis	X_428013	6	3	-	-	-
Catalysis for sustainable energy	X_437027	6	4	-	-	500
Homogeneous Catalysis	X_435668	6	5	-	-	400
Photosynthesis and Energy	X_422553	6	5	h	v, pres	500

Verplichte keuze Ethics and portfolio academic skills

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Managing Science and Technology in Society	AM_470586	6	1	h, w	t, v, pro	600
Qualitative and Quantitative Research Methods	AM_470582	6	1	h, w	t, o	400
Science and Communication	AM_470587	6	1	h, w	t, o	500
Communication, Organization and Management	AM_470572	6	2	h, w	t, v	500
Science in Dialogue	AM_1002	6	2	h, w	t, v, o	500
Tutoring Students	X_432625	3	2	H	v	400
English Academic Course	X_437028	3	2,3,5,6	-	-	400
Scientific Writing in English	X_400592	3	2,6	H	o	400
Science in Perspective	X_437030	6	4,5	-	-	400
Wetenschaps- communicatie voor Bèta-onderzoekers	AB_470185	6	5	h, w	t	-
Survival Guide for Scientists	X_428523	3	6	-	-	400

Compulsory Choice Master Project

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Master Project SfES	X_422593	30	Ac. Year	pro	-	600
Master Project SfES	X_422594	36	Ac. Year	pro	-	600
Master Project SfES	X_422595	42	Ac. Year	pro	-	600
Master Project SfES	X_422596	48	Ac. Year	pro	-	600
Master Project SfES	X_422597	54	Ac. Year	pro	-	600

MSc Physics, Communication variant

Students can opt for a selection of modules from this group. The following modules are compulsory: Research Methods (AM_470582) and Science and Communication (AM_470587).

Naam onderwijsonderdeel	vakcode	Aantal Studiepunten	Periode of semester	Werkvorm	Toetsvorm	niveau
Qualitative and Quantitative Research Methods	AM_470582	6	1	h, w	t, o	400
Science and Communication	AM_470587	6	1	h, w	t, o	500
Communication, Organization and Management	AM_470572	6	2	h, w	t, v	500
Science in Dialogue	AM_1002	6	2	h, w	t, v, o	500
Science Journalism	AM_471014	6	2	h, w	t, o	500
Science Museology	AM_470590	6	3	h, w	t, pres, o	500

MSc Physics, Education variant

Aangeraden keuzevakken

Naam		Aantal	Periode of			
onderwijsonderdeel	vakcode	Studiepunten	semester	Werkvorm	Toetsvorm	niveau
Speciale						
Relativiteitstheorie	X_422534	1	Ac. Year	-	t	500

Article 4.5 – Sequence and admission requirements

1. Participation in a course may be restricted to students that have completed certain other programme components. Information about sequence and admission requirements can be found in appendix 1.
2. In cases where the result of a component has not been determined within the time periods mentioned in Article 4.4 of part A, this component may not be required as prior knowledge for the subsequent component.

Article 4.6 – Participation practical training and tutorials

Not applicable

Article 4.7 – Exemption

1. At the written request of the student, the Examinations Board may exempt the student from taking one or more examination components, if the student:
 - a. Has passed a component of an academic or higher professional education programme that is equivalent in both content and level;
 - b. Has demonstrated through his/her work and/or professional experience that he/she has sufficient knowledge and skills with regard to the relevant component.
2. This exemption does not apply to the Master's thesis.
3. Exemptions from examinations (or parts thereof), if granted, will be valid for the same period of examinations.
4. A maximum of 30 EC in the programme in case of one-year programmes and 60 EC in the programme in the case of two-year programmes can be accumulated through granted exemptions.

Article 4.8 – Validity period of examinations

1. If programmes are taken on a full-time basis, the validity period of passed examinations is two years in case of one-year programmes and three years in case of two-year programmes. If programmes are taken on a part-time basis, the validity period of passed examinations is three years in case of one-year programmes and four years in case of two-year programmes.
2. In individual cases, the Examinations Board is authorised to extend the validity period of successfully completed examinations for a period that it determines or to decide that an additional or replacement examination must take place.
3. The validity period of passed interim examinations is until the end of the academic year (31 Aug).

Article 4.9 – Degree

A student who passes the final examination of a programme is awarded a Master of Science degree. This can also be a joint degree. The degree awarded is stated on the diploma.

Article 4.10 – Double Master's programme (two-year programmes)

In order to be awarded two Master's degrees or to have stated on the Master's diploma that two Master's programmes have been completed within the discipline, the following requirements must be met:

1. The total programme of the candidate should amount to at least 180 ECTS credits.
2. The candidate's work for the programme (lectures, research work, etc.), must be of such a standard that all the compulsory requirements of each of the two programmes have been met.
3. The candidate must have conducted separate research work for both Master's degrees. This may consist of two separate research projects with supervisors from the respective study programmes. In the case of an integrated research project, this must be supervised by two staff members appointed from the two study programmes. Both staff members must assess the work as a pass.
4. The Examinations Boards of both study programmes must approve the student's double Master's programme before the student commences on the double Master's programme.

Article 4.11 – Participation in courses and rules for priority admission

1. Every student must enrol for every component. To participate in courses, the student must enrol within the period indicated in the UvA Course Catalogue and according to procedures mentioned there. The student may be refused the opportunity to participate if he/she does not enrol or fails to enrol in time.
2. Admission to courses with limited capacity takes place based on previously established and published admission criteria and rules for priority admission, on the understanding that students enrolled in the programme are given priority over others when enrolling for courses in the compulsory part of their programme.
3. Persons who are not enrolled at the University have no right to participate in teaching and examinations.

Article 4.12 – Determining results of examination Academic Skills

1. The Academic Skills in the Master consist of components with a study load of 6 EC.
2. The English Academic Course (5524ENAC3Y) or a comparable course offered by the VU is compulsory; The Examination Board may grant exemption of this rule, e.g., for native English speakers.
3. The student may complete the Academic Skills in the Master by participating in the relevant components as described in the Course Catalogue.

Article 4.13 – Final research project and final report

1. At the end of the final research project and the final report the responsible lecturer checks on the basis of the assessment form, if the student has sufficiently achieved the set exit qualifications.
2. For the assessment of the final research project and the final report the advice of a second staff member is always obtained.
3. Students, proficient in the Dutch language write a short non-specialist summary in Dutch; students who do not have a sufficient command of the Dutch Language write this summary in English.

Chapter 5. Transitional and final provisions

Article 5.1 – Amendments

1. The dean shall establish amendments to the part B of these Regulations by independent decision – having heard the board of studies and with due regard for the authority of the relevant advisory bodies.
2. Amendments to these regulations take place following a recommendation by the board of studies relating to the regulations in their entirety, and with the endorsement of a joint meeting of those sections which do not relate to the subject of Article 7.13 paragraphs 2a to g, and paragraph 3 of the Act and the admission requirements for Master's programmes.
3. Amendments to the part B of these Regulations do not apply to the current academic year unless they can be reasonably assumed not to damage the student's interest.

Article 5.2 – Cancelled programme components

Not applicable

Article 5.3 - Publication

1. The dean shall ensure a fitting publication of part A and B of these Regulations and the rules and guideline referred to in the Act.
2. These regulations can be accessed at the website of the Faculty and the UvA Course Catalogue.

Article 5.4 – Effective date

Part B of these Regulations shall come into force as of September 1st, 2014

Thus drawn up by the Dean of the Faculty of Science on September 19, 2014.

Appendix 1 Description of the content and Study Load of the Components.

This list comprises the curriculum components of the Physics Master's programme tracks in the academic year 2014-2015. The contents of the components are described in the Course Catalogue.

Course	Code	Study load (EC)	Period
Advanced Quantum Mechanics	53548AQM6Y	6	1
Advanced Topics in Theoretical Physics	5354ATTT6Y	6	1, 2
AMEP Lab Project	5354AML6Y	6	1, 2, 3, 4, 5, 6
Big Issues in Emergent Energy Materials	5354BIIE6Y	6	1
Group Theory in Physics	5354GTPH6Y	6	1
Lasers and Quantum Optics	53548LAM6Y	6	1
Master's Thesis and Colloquium	5354MTC06Y	6	1, 2, 3, 4, 5, 6
Modelling and Simulation in Medical Sciences	53548MSM6Y	6	1
Particle Physics I	53541PAP6Y	6	1
Physics of Organs 1: Cardio-Pulmonary Physics	53541PHO6Y	6	1
Preparation Research Project Physics	5354PRPP6Y	6	1
Statistical Data Analysis	5354STDA6Y	6	1
Statistical Mechanics of Soft Matter	53548SMS6Y	6	1
Statistical Physics and Condensed Matter Theory I	53541SPC6Y	6	1
Thesis Research Project Physics	5354TRP48Y	48	1, 2, 3, 4, 5, 6
Bose Einstein Condensates	5354BOEC6Y	6	2
Image Processing	53548IMP6Y	6	2
Particle Detection	5354PADE6Y	6	2
Photovoltaics	5354PHVO6Y	6	2
Physics of Organs 2: Sensory Organs and Bioelectricity	53542PHO6Y	6	2
Quantum Field Theory	5354QUFT6Y	6	2
Soft Condensed Matter and Biological Physics	53548SCM6Y	6	2
Biophotonics 3 - Practical Training	535483BI3Y	3	3
Computational Methods, extension	53548COM3Y	3	3
Group Theory in Physics; extension	5354GTPH3Y	3	3
Mathematica for Physicists	5354MAFP3Y	3	3
Preparation Research Project at CERN	5354PRPC6Y	6	3
Programming C++	5354PROG3Y	3	3
Quantum Field Theory, extension	5354QFTE3Y	3	3
Statistical Physics and Condensed Matter, extension	5354SPCM3Y	3	3
Astroparticle Physics	5354ASPH6Y	6	4

Big Issues in Atomic Quantum Physics	5354BIIA3Y	3	4
Big Issues in Soft Matter	5354BISM3Y	3	4
Biomedical Optics	5354BIOP6Y	6	4
Computational Methods	53548COM6Y	6	4
Dynamics of Biomolecules and Cells	53548DYB6Y	6	4
Einstein	5354EINS6Y	6	4, 5
Flavour Physics and CP Violation	53548CPV3Y	3	4
General Relativity	5354GERE6Y	6	4
Nikhef Project	5354NIPR6Y	6	4, 5, 6
Particle Physics II	53542PAP6Y	6	4
Particles and Fields	5354PAFI6Y	6	4, 5
Physics of Anti-matter	5354PHAN3Y	3	4
Quantum Optics	5354QUOP6Y	6	4
String Theory	5354STTH6Y	6	4
Strong Interactions I	535481ST3Y	3	4
Superconductivity	5354SUPE6Y	6	4
Transport Phenomena	5254TRPH6Y	6	4, 5
Advanced Medical Technology	53548ADM6Y	6	5
Beyond the Standard Model	5354BESM3Y	3	5
Fermi Quantum Gases	5354FEQG6Y	6	5
From Genome to Physiome	5354GETP6Y	6	5
Gravitational Waves	5354GRWA3Y	3	5
Hydrodynamics	5354HYDR6Y	6	5
Medical Imaging	5354MEIM6Y	6	5
Nanophotonics	5354NANO6Y	6	5
Parameter Estimation Applied to Medical & Biological Science	53548PEM6Y	6	5
Particle Cosmology	5354PACO6Y	6	5
Photosynthesis and Energy	53548PHO6Y	6	5
Statistical Physics and Condensed Matter Theory II	53542SPC6Y	6	5
Strong Interactions II	535482ST3Y	3	5
Student Seminar Theoretical Physics	5354SSPH6Y	6	5, 6
Ultrafast Laser Physics	53548ULL6Y	6	5
CERN Research Project	5354CERP6Y	6	6
CERN Summer Student Lecture Programme	5354CSLP3Y	3	6
Forensics with Complex Liquids	5354FWCL3Y	3	6
GRAPPA Student Seminar	5354GRSS6Y	6	6
Literature Review Biophysics	53548LRB6Y	6	6
Particles and Fields; extension	5354PAFE2Y	2	6
Summer-school AMEP	5354SUSA3Y	3	6
Ultrafast X-ray Physics	5354UXRP3Y	3	6