MSc Physics

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This report was finalized on 24 June 2014

Report on the master's programme Physics of VU University Amsterdam

This report takes the NVAO's Assessment Framework for Limited Programme Assessments as a starting point.

Administrative data regarding the programme

Master's programme Physics

Name of the programme:	Physics
CROHO number:	60202
Level of the programme:	master's
Orientation of the programme:	academic
Number of credits:	120 EC
Specializations or tracks:	Advanced Matter and Energy Physics, Particle and Astroparticle Physics, Physics of Life and Health, Theoretical Physics;
Location(s):	Amsterdam
Mode(s) of study:	fulltime
Expiration of accreditation:	31-12-2014

The visit of the assessment committee Physics & Astronomy to the Faculty of Sciences of VU University Amsterdam took place on 2-4 April 2014.

Administrative data regarding the institution

Name of the institution:	VU University Amsterdam
Status of the institution:	publicly funded
Result institutional quality assurance assessment:	pending

Quantitative data regarding the programme

The required quantitative data regarding the programme are included in Appendix 5.

Composition of the assessment committee

The committee that assessed the master's programme Physics consisted of:

- Prof. dr. Daan Lenstra, professor emeritus of Electrical Engineering at Delft University of Technology and fellow at Eindhoven University of Technology (chair);
- Prof. dr. Elias Brinks, professor of Astrophysics at the University of Hertfordshire (UK);
- Prof. dr. Martin Goedhart, professor of Mathematics and Science Education at University of Groningen;
- Dr. ir. Harald Tepper, chief strategy officer at the Dutch Forensic Institute;

- Lisanne Coenen BSc, master student Applied Physics at Delft University of Technology.

Dr. J. Corporaal, who acted as secretary, supported the committee. She was supervised by Kees-Jan van Klaveren MA.

Appendix 1 contains the curricula vitae of the members of the committee.

Working method of the assessment committee

The assessment of the master's programme Physics of University of Amsterdam/VU University Amsterdam is part of a cluster assessment. In the context of this cluster visitation, in the time period between November 2013 and April 2014, twenty eight programmes at nine different institutions were assessed.

Appendix 2 contains the framework of reference.

The committee Physics and Astronomy is composed of in total sixteen members:

- Prof. dr. Daan Lenstra, professor emeritus of Electrical Engineering at Delft University of Technology and fellow at Eindhoven University of Technology (chair);
- Prof. dr. Wim de Boer, professor of Physics at the University of Karlsruhe (DE);
- Prof. dr. Elias Brinks, professor of Astrophysics at the University of Hertfordshire (UK);
- Prof. dr. Tom Theuns, reader in Astrophysics at Durham University (UK) and part time professor of Astrophysics at University of Antwerp (BE);
- Prof. dr. Gustaaf Borghs, professor emeritus of Physics at KU Leuven (BE) and senior fellow at the Interuniversity MicroElectronics Centre (IMEC);
- Dr. ir. Jaap Flokstra, retired associate professor Nanotechnology at University of Twente;
- Prof. dr. ir. Guido van Oost, full professor Plasma Physics at the Department of Applied Physics of Ghent University (BE);
- Dr. Henk Blok, retired associate professor at the Faculty of Sciences of VU University Amsterdam;
- Prof. dr. Martin Goedhart, professor of Mathematics and Science Education at University of Groningen;
- Christianne Vink MSc, didactic coach, educational advisor/trainer and partner of Academic Factory;
- Dr. Jan Hoogenraad, owner of Spoorgloren BV for change management and quantitative service in public transport;
- Dr. ir. Harald Tepper, chief strategy officer at the Dutch Forensic Institute;
- Sander Breur MSc, PhD candidate at Nikhef, University of Amsterdam;
- Lisanne Coenen BSc, master student Applied Physics at Delft University of Technology;
- Carmen van Schoubroeck, bachelor student Mathematics and bachelor student Physics and Astronomy, Radboud University Nijmegen;
- Jelmer Wagenaar MSc, PhD candidate in Physics at Leiden University.

Preparation
The committee held a preliminary meeting on October 8, 2013. During this meeting the committee was instructed about the accreditation framework and the programme of the upcoming assessments. A vice chair for each visit was appointed and the Domain Specific Framework for Physics and Astronomy was set.

To prepare the contents of the site visits, the coordinator first checked the quality and completeness of the critical reflections prepared by the programmes. After establishing that the reports met the demands, they were forwarded to the participating committee members. The committee members read the reports and formulated questions on their contents.

Apart from the critical reflections, the committee members read a selection of ten master theses. The theses were randomly chosen from a list of graduates of the last two completed academic years within a range of grades.

Site visit
A preliminary programme of the site visit was made by the coordinator and adapted after consultation of the coordinator of VU University Amsterdam. The timetable for the visit in Amsterdam is included as Appendix 6.

Prior to the site visit, the committee asked the programmes to select representative interview partners. During the site visit, meetings were held with panels representing the faculty management, the programme management, alumni, the educational committee and the Board of Examiners. Meetings were also held with representatives of the students and teaching staff.

During the site visit, the committee examined material it had requested; an overview of this material is given in Appendix 7. The committee gave students and lecturers the opportunity – outside the set interviews – to speak informally to the committee during a consultation hour. No requests were received for this option.

The committee used the final part of the visit for an internal meeting to discuss the findings. The visit was concluded with a public oral presentation of the preliminary impressions and general observations by the chair of the committee.

Report
Based on the committee's findings, the secretary prepared a draft report. This report was presented to the committee members involved in the site visit. After receiving approval, the draft report was sent to the Faculty with the request to check it for factual inaccuracies. The comments received from the Faculty were discussed with the committee chairman. Subsequently, the definitive report was approved and sent to VU University Amsterdam.

Decision rules
In accordance with the NVAO's Assessment Framework for Limited Programme Assessments (as of 22 November 2011), the committee used the following definitions for the assessment of both the standards and the programme as a whole.

Generic quality
The quality that can reasonably be expected in an international perspective from a higher education bachelor's or master's programme.

Unsatisfactory
The programme does not meet the current generic quality standards and shows serious shortcomings in several areas.

Satisfactory
The programme meets the current generic quality standards and shows an acceptable level across its entire spectrum.

Good
The programme systematically surpasses the current generic quality standards across its entire spectrum.

Excellent
The programme systematically well surpasses the current generic quality standards across its entire spectrum and is regarded as an (inter)national example.

Summary judgement

Standard 1: Intended learning outcomes
The assessment committee assesses Standard 1 as **satisfactory**

The main goal of the programme is to provide students with a good knowledge basis in physics, including the necesarry mathematical, experimental, computational and communicative skills and insight in the latest developments in physics, to optimally prepare them for a career in scientific research or other positions in society requiring an academic master's title in physics. The programme is divided in eight tracks: four 'regular' tracks, and four tracks which are offered in collaboration with other master's programmes or universities.

On a national scale, the master's programme Physics positions itself as a programme that offers students the benefits resulting from the collaboration between UvA and VU: research expertise and facilities from two universities, as well as networks and collaborative projects at both universities and related research institutes. Regarding the programme's international position the management refers to the international scientific reputation of its research groups.

The committee concludes that the master's programme Physics has a clear profile that sets it apart from similar master's programmes in The Netherlands and abroad. The programme is primarily geared towards preparing students for a career in (academic) research and consequently has a strong research-focus. The aim and focus of the programme are reflected in the various tracks and in eleven intended learning outcomes.

The committee has taken notice of the plans expressed by the management to decrease the number of tracks in the master's programme. The committee supports this decision, pointing out that the programme, with eight different tracks and four variations, currently does have a complicated structure.

The committee is of the opinion that the intended learning outcomes of the programme, although slightly generic because they cover many different tracks, are adequately formulated and meet international academic standards. The committee advises the programme to formulate track-specific learning outcomes to help make clear how these tracks relate to the requirements of the job market.

Standard 2: Teaching-learning environment
The assessment committee assesses Standard 2 as **satisfactory**

The master's programme Physics consists of 120 EC, divided over two years. Most of the first year is filled with track and profile specific courses. The second year is entirely spent on a master's research project and (in the non-research profiles) a compulsory internship.

The assessment committee concludes that the master's programme Physics succeeds in offering a coherent and challenging set of courses, which offer ample opportunities for students to follow their interests while they specialize in one particular subfield of physics. Together, the tracks and profiles cover a wide range of subfields of physics as well as different approaches within these subfields. The programme ties in well with a bachelor's programme in physics and with the research field towards which the programme is geared. Finally, the study load is evenly spread over the year because of the structure of the academic

year in two blocks of 8-8-4 weeks. Students follow no more than two 6 EC courses at the same time.

The committee is pleased to hear that the programme seems well aware of students' wishes with respect to a future career in research. However, the committee also finds it important that students are informed about opportunities on the job market outside (academic) research. The committee concludes that within the programme more attention could be paid to job orientation outside research.

With an annual intake of approximately 90 students, the programme succeeds in attracting enough students. Some tracks are more popular than others. The committee supports the aim of the programme to try and attract at least twenty students per year for each track. The committee concludes that there are no major stumbling blocks which might prevent students from succesfully finishing the programme within two years. Currently, the programme success rate (nominal +1) is 65%. The average study duration is considerably lower than three years, but could, according to the committee, probably be further improved if stricter deadlines were imposed for the research project.

The committee is satisfied with the academic staff delivering the programme, in both quantitative and qualitative terms. Although the number of lecturers in possession of a teaching qualification is not yet at the programme's target of 90%, it has made significant improvements over the last year.

The programme has adequate facilities, including study guidance, and an adequate system of quality control in place. The committee concludes that the Programme Committee of the VU fulfils its task to a sufficient standard, but should pay more attention to the master's programme. Also, the committee is pleased to hear that the collaboration with the Programme Committee at the UvA will be intensified.

Standard 3: Academic level achieved
The assessment committee assesses Standard 3 as **good**

The committee concludes that the assessment policy is adequate. The exams in the programme are of a high level and match the learning objectives of the courses. The quality control of assessment at the VU is also of a high standard. The committee was impressed with the active role adopted by both the Board of Examiners and a separate Toetscommissie, which checks the quality and achievability of exams.

To assess the level achieved by the students, the committee examined a range of master's theses. In general, it was impressed with the theses and it agrees with the marks that have been given. The committee concludes that the level of the theses matches what can be expected of a graduate of an academic master's programme.

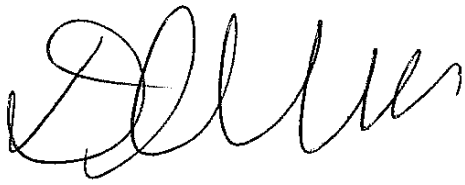
The committee concludes that graduates have acquired the learning outcomes. This is also reflected in the fact that after graduating students have no trouble in finding a job. On average they manage to do so within a period of 0.8 months. The committee is pleased with this statistic and concludes that graduates clearly meet the expectations of the job market.

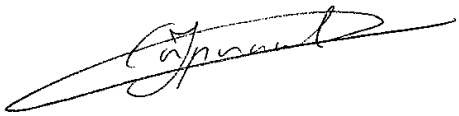
The committee assesses the standards from the Assessment framework for limited programme assessments in the following way:

Standard 1: Intended learning outcomes	satisfactory
Standard 2: Teaching-learning environment	satisfactory
Standard 3: Assessment and achieved learning outcomes	good
General conclusion	satisfactory

The chair and the secretary of the committee hereby declare that all members of the committee have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 24 June 2014





Prof. dr. Daan Lenstra

dr. Joke Corporaal

Description of the standards from the Assessment framework for limited programme assessments

Standard 1: Intended learning outcomes

The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.

Explanation:
As for level and orientation (bachelor's or master's; professional or academic), the intended learning outcomes fit into the Dutch qualifications framework. In addition, they tie in with the international perspective of the requirements currently set by the professional field and the discipline with regard to the contents of the programme.

Findings

In this paragraph the findings of the committee with regard to the Domain Specific Framework of Reference and intended learning outcomes, the level and orientation of the programme, and the organizational embedding of the programme are described. After considering the findings the committee comes to a conclusion on Standard 1.

1.1 Organizational embedding

The two-year master's degree programme Physics is a joint programme offered by the Vrije Universiteit Amsterdam (VU) and the University of Amsterdam (UvA). By working together, students can benefit from research facilities and research expertise at both universities and at neighboring research institutes.

The VU-programme is embedded in the Faculty of Sciences, and the education director is a board member of the faculty. At the University of Amsterdam, the programme is part of the Graduate School of Sciences. Notwithstanding the differences in the formal embedding at both universities, the curriculum itself is fully integrated: students form one group and courses are provided by lecturers from both the VU and the UvA.

With the start of a joint bachelor's programme Physics and Astronomy in September 2014, the programme management will apply for a Joint Degree for both the bachelor's and master's programme, which will mean a further merger of the administrative framework of the master's programme. In its current form, however, the programme has to meet certain legal requirements. At both the VU and the UvA, the programme has a different Programme Committee, Board of Examiners and Onderwijs- en Examenregeling (Teaching and Examination Regulations, OER), containing all the rules pertaining to admission for courses, course descriptions and assessment procedures. Due to small differences between the two universities, different requirements for UvA and VU-students may still apply. The committee wholeheartedly supports the decision to apply for a Joint Degree, which will lead to a further unification implying simplification of the administrative procedures and the establishment of one Programme Committee and Board of Examiners.

1.2 Profile and orientation

The main goal of the programme is to provide students with a good knowledge base in physics, including the necessary mathematical, experimental, computational and communicative skills and insight in the latest developments in physics, to optimally prepare them for a career in scientific research or other positions in society requiring an academic

master's title in physics. The programme is divided in eight tracks: four 'regular' tracks, and four tracks which are offered in collaboration with other master's programmes or universities. The four regular tracks coincide with a specific specialization area of physics: (1) Advanced Matter and Energy Physics, (2) Particle and Astroparticle Physics, (3) Physics of Life and Health, (4) Theoretical Physics. The remaining four tracks are:

5. Gravitation Astroparticle Physics Amsterdam (GRAPPA). This track is listed as an excellence track because students have to apply to be accepted. The GRAPPA-track can either be followed as part of the master's programme Physics (track: Theoretical Physics or Particle and Astroparticle Physics) or the master's programme Astronomy and Astrophysics at the UvA.
6. Science for Energy and Sustainability (in collaboration with the master's programme Chemistry)
7. Science, Business and Innovation (in collaboration with the master's programme Chemistry)
8. Atomic Scale Modeling of Chemical, Physical and Biological Systems (ATOSIM); a one-year Erasmus Mundus track offered in collaboration with the University of Sapienza (Rome, Italy) and the University of Lyon (France). Master's students Physics or Chemistry can apply for the programme after finishing their first year.

As well as choosing one track, students opt for a specific variant within their track: research-oriented (R), society-oriented (S), communicational (C) or educational (E).

At a national scale, the master's programme Physics positions itself as a programme that offers students the benefits resulting from the collaboration between the UvA and the VU: research expertise and facilities from two universities, as well as networks and collaborative projects at both universities and related research institutes such as Nikhef and AMOLF. Regarding the programme's international positioning, the management refers to the international scientific reputation of its research groups. These research groups, and the fact that the programme is taught in English, allow the programme to successfully attract international students.

The assessment committee concludes that the programme has a distinctive profile that clearly sets it apart from similar programmes in the Netherlands and abroad. The Physics programme offers a broad choice to students in the form of different research tracks and variations within tracks (research, communication, education, et cetera). At the same time, the committee has expressed concern about the proliferation of tracks. In the period 2003-2012, the number of tracks increased from three to ten. Recently, due to the merging of two tracks and the discontinuation of another track, the number has gone down to eight. The assessment committee considers eight tracks still a considerable number, especially when taking into account that some tracks attract less students than others (see standard 2). It is pleased to hear that the programme management has taken action to further rationalise the number of tracks. For instance, the track Science, Business and Innovation will continue as a separate master's programme (if accredited).

1.3 Intended learning outcomes

The main goal of the programme has been translated into eleven intended learning outcomes (see appendix 3). These learning outcomes have been based upon the domain-specific framework of reference and they are anchored in the OER. For some tracks or profiles (both called 'majors' in the OER) specific learning outcomes have been formulated. That applies for

the majors (1) Research, (2) Science Communication/Education, (3) Management, Policy Analysis & Entrepreneurship, (4) Science, Business and Innovation and (5) Science and Software Engineering (this last major has recently been discontinued). A matrix provided in the critical reflection shows how the generic and track/profile-specific learning outcomes relate to those of the domain-specific framework of reference.

The assessment committee has studied the intended learning outcomes in relation to the learning goals of the programme and the domain-specific framework of reference. It concludes that the learning outcomes match the level that may be expected from an academic master's programme in physics. The committee does note, however, that the learning outcomes could be formulated less generic and more track-specific, to give a clearer idea of how the learning outcomes relate to the individual courses and to the demands of the professional field.

Considerations
The committee concludes that the master's programme Physics has a clear profile that sets it apart from similar master's programmes in The Netherlands and abroad. The programme is primarily geared towards preparing students for a career in (academic) research and consequently has a strong research-focus. The aim and focus of the programme are reflected in the various tracks and in eleven intended learning outcomes.

The committee has taken notice of the plans expressed by the management to decrease the number of tracks in the master's programme. The committee supports this decision, pointing out that the programme, with eight different tracks and four variants, currently has a complicated structure.

The committee is of the opinion that the intended learning outcomes of the programme, although slightly generic because they cover many different tracks, are adequately formulated and meet international academic standards. The committee advises the programme to formulate track-specific learning outcomes to help make clear how these tracks relate to the requirements of the job market.

Conclusion
Master's programme Physics: the committee assesses Standard 1 as 'satisfactory'.

Standard 2: Teaching-learning environment

The curriculum, staff and programme-specific services and facilities enable the incoming students to achieve the intended learning outcomes.

Explanation:
The contents and structure of the curriculum enable the students admitted to achieve the intended learning outcomes. The quality of the staff and of the programme-specific services and facilities is essential to that end. Curriculum, staff, services and facilities constitute a coherent teaching-learning environment for the students.

Findings

The committee has studied the curriculum of the programme and has seen course material, the digital learning environment and results of course evaluations. In this standard the findings of the committee concerning the content, orientation and structure of the programme (2.1), intake and study load (2.2), teaching staff (2.3), facilities (2.4), and system of internal quality assurance (2.5) are discussed.

2.1 Contents, structure and orientation of the programme

The curriculum of the two-year master's programme Physics (120 EC) has a few common features for all tracks and variants, research and non-research. In all tracks and variants students follow a set number of track-specific courses, and they conclude the programme with a research project resulting in a master's thesis and presentation.

In the non-research variants (communication, education or society-oriented), the amount of compulsory track-specific courses adds up to 24 EC. The research project, thesis and presentation account for 36 EC. The remaining 60 EC are spent on profile-specific courses and a compulsory internship (30 or 36 EC).

The research variant has fewer compulsory track-specific courses (12 EC), but offers more room for specialization in the form of discipline-specific elective courses (24 EC). The research project takes twice as long and accounts for 60 EC including thesis and presentation. Instead of an internship, students spend the remaining 24 EC on academic skills (6 EC), a compulsory small research project (6 EC) and free elective courses (12 EC). This last category was also used when students lacked certain knowledge or skills and needed to repair deficiencies. Currently, students with deficiencies are no longer admitted (see 2.2).

The research project is performed at one of the two universities' research groups, depending on the subject matter. In the research-profile, the project (54 EC) is carried out over a period of ten months. In the non-research profiles, this period is five months (30 EC). The project is supervised by a faculty member and concluded with a thesis and oral presentation (together 6 EC).

At the University of Amsterdam and the Vrije Universiteit, the academic year is structured in six teaching periods divided into two blocks of 8-8-4 weeks each. As a result, all courses are given in a block of seven or three weeks. The last week is reserved for exams. Each course is concluded with an exam or with a report, oral presentation or practical assignment.

The committee has studied the various study programmes for each track and variant; it also studied the course materials of a selection of courses. It concludes that the overall structure of the curriculum is coherent and that the curriculum enables students to obtain the

programme's learning outcomes. Especially the research variant offers ample opportunities for students to develop their talents and pursue personal interests. The committee finds it reasonable that there is more attention for profile-specific courses in the education, communication and management variants. It worries the committee, however, that these profiles seem to have difficulties in attracting students. The committee is happy to hear that the programme management shares its concern and has taken a few measures to address this problem, such as the addition of a new education major (60 EC) and an education minor (30 EC) for the educational profile.

As mentioned previously, another point of concern for the committee are the many tracks which students can choose from, resulting in an abundance of courses. The critical reflection recognizes that the downside of so many courses is that students find it harder to see which courses fit in well with their track. The committee thinks that students should be better informed about the choices available and advises the programme management to compose a list with all available courses, with an indication for which track/profile the courses are intended.

The committee is enthusiastic about the compulsory internship in the non-research profiles, and advises the programme management to facilitate this opportunity for students in the research majors as well.

During the site visit, the committee asked the programme management its motivation for offering different tracks, instead of letting students specialize in a certain area of physics by a choice of elective courses. The programme management pointed out that for students to specialize in one subfield, such as for instance Theoretical Physics, a few courses are compulsory. As a consequence, the amount of optional courses has to be restricted. Also, management put forward the argument that students form one group within a track, which allows them to feel a closer connection with the programme. From the students, the committee learned that they also find it important to be part of a group, but that it is not always clear to them which students follow the same track. The committee suggests that the programme could facilitate contacts between different students within a particular track.

The programme has a strong research focus, which is clearly reflected in the curriculum of the research profile. From talking to the students and graduates, the committee concludes that more attention could be paid to job orientation, both in and outside (academic) research. The graduates noted for instance that they initially lacked the communication skills needed in a corporate environment. They suggested that the development and assessment of such skills could have played a bigger role in the master's programme. They also advised the programme to pay more attention to personal skills. Finally, the graduates suggested that the programme might exhibit more job orientation activities. The assessment committee supports these recommendations.

2.2 Intake, study load and study guidance

The master's programme Physics is aimed at students who have successfully completed a bachelor's degree in physics. A distinction is made between two categories of applicants. Direct access to the programme is granted to students who have received a bachelor's degree in physics or physics and astronomy from a Dutch university. Applications of the second category are assessed by the track coordinator, who advises the Board of Exams. The Board of Examens decides about acceptance of the students. These are international students with a bachelor's degree in physics obtained at a foreign university, students with a Dutch, professional (HBO) bachelor's degree in physics and students with a bachelor's degree in

another discipline comparable to physics. Until recently, if students did not (completely) fulfil the entry requirements, they could be required to take remedial courses during the first year. Currently, students with deficiencies are no longer admitted.

In the period 2006-2011, the number of students who started the programmes fluctuated between 35 and 61. Over the last two years, these numbers have gone up. In 2012/2013, 84 students entered the programme, compared to 94 in 2013/2014. In the period 2006-2011, 10-15% of students came from abroad. This number has also gone up. Currently, international students form almost one third of the total intake.

The programme management aims at an intake of approximately 20 students per track. The committee notes that these numbers have not yet been achieved for the Particle and Astroparticle Physics track, the track Physics of Life and Health, and the track Science for Energy and Sustainability. Most students choose for either Theoretical Physics (31 applicants in 2013) or Advanced Matter and Energy Physics (22 applicants). Furthermore, as mentioned above, most students choose a research profile.

The committee asked the lecturers how the knowledge and skills of international students relate to those of students who had previously studied at a Dutch university. Lecturers stated that, although there are differences, students are very capable of making the 'gear change' from a bachelor's to a master's degree, in which the study rate and level are higher. The lecturers are of the opinion that students quickly make up for gaps in knowledge and/or skills, especially when they realise they need those for a particular research project. Finally, the lecturers argued the case that the programme as a whole would benefit from more often granting scholarships to talented international students. The committee agrees that this could be an efficient way to influence the motivation in a group.

From talking to the students, the committee concludes that the study load is realistic. The programme connects well with a bachelor's programme in physics and can be completed in two years. The students informed the committee that the structuring of the academic year in blocks of eight, eight and four weeks leads to an even spread of the study load. The structure works well for courses that are conceptually not too challenging. For courses that are more demanding, for example 'String Theory', students would prefer them to be split in half and offered in two blocks of eight weeks. The committee advises the programme management to take these suggestions on board.

There appear to be no major stumbling blocks in the programme. The students explained that the course 'Scientific English' is compulsory for UvA-students and not for VU-students. The committee considers it undesirable that different rules apply for students within one programme. Furthermore, the committee observed that this course is less popular with students, allegedly because the quality of the teachers involved differs much. The committee advises programme management to consider organizing this course in a different way. Another and more serious obstacle that the students identified is that students are discouraged from starting the track Theoretical Physics of the master's programme in February. Due to the 'harde knip' between bachelor's and master's programme, not being able to start in February sometimes causes a big delay. From talking to the staff, the committee understood that even though it is technically possible to start in February, this option is not encouraged and is therefore not advertised. The committee advises programme management to be more open about the possibility of starting in February, while underlining that this is not the preferred option.

Of the students graduating in 2011/2012, the average study duration was 31 months for students who had previously studied at the UvA or VU, and 24 for students from other universities. On average, 65% of students finish the programme in three years. Of the graduates with whom the committee had a meeting, none had finished the research project in one year. One of the reasons students gave for taking longer to graduate was that they found it hard to make the transition from following courses to setting up and performing their own research project. For such a project, different personal skills (such as perseverance and discipline) are needed. Furthermore, students were very inclined to work towards a good result, because the project forms the last part of the study. Even though the numbers are not worrying, the committee does advise programme management to make students more aware of the need to finish the final research project in one year.

Finally, the committee concludes that, even though there is an adequate system of study guidance in place, students would benefit from more support in the process of choosing a track, choosing a variant and especially in finding a research project.

2.3 Academic staff

The staff of the master's programme consists of 70 lecturers: 20 lecturers from VU and 50 from UvA. The student-staff ratio in the master's programme is estimated at 1:15. From studying the information provided in the critical reflection, the committee concludes that the scientific staff are all experienced, distinguished researchers, who are able to teach students about and involve them in the latest developments in their field.

Lecturers are obliged to obtain a teaching qualification: the Basis Kwalificatie Onderwijs (BKO). In addition, they can follow workshops at the Centrum voor Nascholing (UvA) or Centrum voor Didactiek (VU). The critical reflection states that in 2014 90% of the lecturers must have acquired the teaching qualification. At the time of the site visit, approximately 60% had succesfully finished the BKO-trajectory. The committee finds these results disappointing and thinks that both universities have started the trajectory fairly late.

Master's students are satisfied with their teachers. They are particularly pleased that the lecturers are accessible and that they are willing to introduce students to laboratory facilities and to their own research.

The committee concludes that the academic staff is more than sufficiently capable of delivering the programme, both in terms of quantity and quality.

2.4 Facilities

The master's programme Physics is situated in the Faculty of Science(s) of both the UvA and the VU. At the UvA, the programme has recently moved to a new building at the Science Park. The research facilities and various research groups and institutes are nearby. At the VU, the programme is situated at the VU-campus, also in close proximity to the research groups and research institutes there. The committee concludes that the facilities at both universities are adequate. Those at the VU are somewhat dated, those at the UvA very modern. Together they provide plenty of research opportunities for the students following the programme.

The two study associations for Physics and Astronomy students at the UvA (NSA) and the VU (AIK) both play an active role in the master's programme. As well as organizing job orientation activities, they play an important role in the communication between the

programme management and the master's students. The committee is enthusiastic about the active role the study associations play and concludes that this shows that students feel dedicated to the programme. For a further integration of the programmes, the committee thinks it would be benficial if both student associations met regularly or, better still, merged.

A point that was raised in various meetings are the administrative hurdles related to the fact that the programme is integrated between two universities. From talking to the students and lecturers the committee learned that the problems stem from the fact that there are two 'onderwijsbureaus' (educational offices) involved, one at the UvA and one at the VU, which deal with student registration, course admissions, scheduling of classes, study credits obtained, etc. Both offices work with different ICT-systems (CIS and Vunet), and passing on information from one system to another has proven to be problematic. As a result, VU-students have had difficulties signing up for classes at the UvA. For lecturers, it was often unclear how many students had enrolled for their courses, which made it hard to book the right size lecture room. According to the programme management and the teachers, these problems have been solved. The committee is confident that further collaboration between both faculties will provide a more permanent solution to this type of problems.

The committee concludes that the facilities of the programme are adequate and ensure that students can obtain the intended learning outcomes.

2.5 Internal quality assurance

The committee has verified to what extent students and lecturers are involved in the shaping and evaluation of the programme. The critical reflection makes a distinction between three types of evaluations of the programme: 1. evaluations of individual courses, 2. evaluations of each track, and 3. of the quality of the curriculum as a whole. The first two evaluations are carried out by using evaluation forms that are processed electronically, the third one is done by means of meetings with supervisors of internships, employers of graduates (mostly PhD-supervisors) and the Programme Committees ('Opleidingscommissies'). In addition to course evaluations with evaluation forms, the programme uses a specific way of evaluating courses after each block: the Semester Response System (SRS). These are twice-yearly meetings in which students and lecturers meet to discuss and evaluate all courses of the past semester. The committee is enthusiastic about the set-up of the SRS-meetings and concludes that they can play a useful role in the process of quality control. The committee does concur with the lecturers that to have a fruitful and representative discussion it is important that sufficient students are present. Therefore, SRS might work less well for master's courses that attract fewer students. Finally, the committee advises the programme to start evaluating the master's research project and to ask graduates to evaluate the programme as a whole.

The various kinds of evaluations are collected by and discussed in the two Programme Committees of the programme, the 'OC' at the UvA and the 'OLC' at the VU. The Programme Commitee of the VU has six members: three lecturers and three master's students. The assessment committee concludes that this committee fulfils its task sufficiently, but should pay more attention to the master's programme. Currently, the Programme Committee pays considerably more attention to the bachelor's programme.

A recurring issue in meetings of the Programme Committee are the Teaching and Examinations regulations (OER). This document is composed by the VU Faculty of Sciences and is subsequently provided to the Programme Committee. Every year, the OER arrives late, making it hard for the Programme Committee to give well-founded advice upon its contents.

The Programme Committee would like to see this recurring problem solved. The assessment committee agrees that this is an important issue. In addition, the Programme Commitee noted that the response rate of course evaluations has gone down dramatically since the feedback forms are no longer filled in on paper, but digitally. When the response rate is too low, evaluation forms will not be processed, making it difficult for the Programme Committee to check the quality of those courses. The assessment committee finds it important that course evaluations provide sufficient information for the Programme Committee to check the quality of the courses and strongly urges the programme management to find a solution to this problem.

As from next year, the Programme Comittee will be organized differently. This committee will be separated in two, one Programme Comittee for the bachelor's programme and one for the master's programme. Furthermore, the Programme Comittee will hold all its meetings together with the Programme Comittee of the master's programme at the UvA, and eventually merge within a Joint Degree programme.

The assessment committee was somewhat surprised to learn that there was so litte contact between the two Programme Committees of the master's programme. It is glad to hear that this situation will now finally change. The programme already had an adequate system of quality control in place. The committee concludes that this cycle will become even stronger with the close cooperation between the two Programme Committees.

Considerations
The assessment committee concludes that the master's programme Physics succeeds in offering a challenging set of courses, which offers ample opportunity for students to follow their interests while they specialize in one particular subfield of physics. Together, the tracks and profiles cover a wide range of subfields of physics as well as different approaches within these subfields. The programme ties in well with a bachelor's programme in physics and with the research area towards which the programme is geared. The study load is evenly spread over the year because of the structure of the academic year in two blocks of 8-8-4 weeks. Students follow no more than two 6 EC courses in parallel. Finally, the committee concludes that the courses offered enable students to obtain the learning outcomes of the programme.

The committee is pleased to hear that the programme seems well aware of students' wishes with respect to a future career in research. However, the committee also considers it important that students are informed about possibilities on the job market outside research and/or academia. From talking to students and graduates, the committee concludes that within the programme more attention could be paid to job orientation outside research.

Students can choose courses within and outside of their own track. A disadvantage of such a broad choice is that students have trouble identifying which courses form a coherent set and fit in well with their track. The committee suggests that programme management could give an indication in each course description as to how the course relates to other courses in the programme and for which track/profile it is recommended.

The committee is enthusiastic about the fact that students in the communication, education or society-oriented track are required to follow a three-month internship. It regrets that these profiles are less popular than the research profile.

With an annual intake of approximately 90 students, the programme succeeds in attracting enough students. Some tracks are more popular than others. The committee supports the aim

of the programme to try and attract at least twenty students per year for each track. The committee concludes that there are no major stumbling blocks which might prevent students from successfully finishing the programme within two years. Currently, the programme success rate (nominal +1) is 65%. The average study duration is considerably lower than three years, but could, according to the committee, probably be further improved if more strict deadlines are imposed for the research project.

The committee is satisfied with the academic staff delivering the programme, in both quantitative and qualitative terms. Although the number of lecturers in possession of a teaching qualification is not yet at the programme's target of 90%, it has significantly increased over the past year.

Master's students physics are able to make use of the facilities that both universities have to offer. The committee concludes that the facilities are good, they ensure that students can indeed obtain the learning outcomes.

The programme has an adequate system in place of quality control. The Programme Committee of the VU fulfils its task sufficiently, but should pay more attention to the master's programme. Also, the committee is pleased to hear that the collaboration with the Programme Committee at the UvA will be intensified.

Conclusion
Master's programme Physics: the committee assesses Standard 2 as 'satisfactory'.

Standard 3: Assessment and achieved learning outcomes

The programme has an adequate assessment system in place and demonstrates that the intended learning outcomes are achieved.

Explanation:
The level achieved is demonstrated by interim and final tests, final projects and the performance of graduates in actual practice or in post-graduate programmes. The tests and assessments are valid, reliable and transparent to the students.

Findings

This section deals with the assessment policy, the procedures regarding testing and examination and the assessment methods of the programme. To this end various assessment materials have been evaluated, such as exams and assessment forms. To assess whether graduates have obtained the intended learning outcomes, the committee studied a selection of master's theses and talked to graduates about the learning outcomes of the programme in relation to the requirements of the job market. Finally, the assessments and assessment system were discussed with students, staff, the Board of Examiners and programme management. Section 3.1 deals with the assessment system and the Board of Examiners, 3.2. focuses on the academic level achieved.

3.1 Assessment system and Board of Examiners

In accordance with statutory regulations, the master's programme Physics has laid down its assessment system in the Teaching and Examination Regulations (OER) of the programme. This document provides students with information on, for instance, the admission criteria for exams, exam dates and assessment forms. The individual assessment procedure for each course is made clear in the course manual on Blackboard and can also be found in the study guide. Results have to be reported to the students within 15 working days. The Board of Examiners is responsible for drawing up and enforcing the rules and regulations, and monitors the quality of exams and assessments within the programme.

The programme makes use of various assessment forms. Most courses are concluded with a written exam at the end of the course, but oral presentations and assignments are also used. Research skills are assessed on the basis of research performance and attitude. The committee has seen exam material related to courses and assessment forms, such as research training contracts, and concludes that the various ways in which the programme tests knowledge and skills match the learning outcomes of the courses.

The master's research project forms a considerable part of the programme and determines whether or not students have acquired the intended learning outcomes. Consequently, the assessment committee has paid special attention to the assessment procedures of this assignment. The research project culminates in a written report and an oral presentation. The final assessment is done by three people: the supervisor, the daily supervisor and a second, independent reviewer. An assessment form shows which aspects are assessed. They relate to the research proper, to the quality of the thesis and to the presentation. The second reviewer only judges the presentation and the thesis. The three examiners fill in one assessment form together, but give their marks independently. The committee was impressed with the form for assessing the master's research project. According to the committee, this form gives students a good insight into how their final marks were arrived at.

The Board of Examiners is responsible for checking the quality of exams. They also guarantee that graduates have acquired the intended learning outcomes of the programme and meet the requirements to obtain their master's certificate. The VU Faculty of Sciences has one central Board of Examiners, in which five subcommittees participate. Each subcommittee is responsible for a number of bachelor's and/or master's programmes. The Board of Examiners Physics and Astronomy (two members) is responsible for the master's programme Physics and the bachelor's programme Physics and Astronomy. A separate, faculty-wide 'Toetscommissie' (Assessment Committee) checks the quality and achievability of exams, not only those with a deviating success rate, but also at random (two to three courses per programme per year). The Toetscommissie also sets up new initiatives, such as checking the quality of marking of exams. One of the members of the Board of Examiners is also a member of the Toetscommissie.

The Board of Examiners sees to it that the Rules and Regulations are adequately implemented, that students who graduate have obtained the intended learning outcomes, and that problems of individual students are solved.

From talking to the Board of Examiners at the VU, the committee concludes that the quality assurance of testing is very well organized. Having one central Board of Examiners and various subcommittees has proven to be a good way of benefitting from each other's expertise while embarking on new initiatives. The committee was particularly impressed with the active role adopted by the Toetscommissie. The committee concludes that the Board of Examiners is strongly geared towards the bachelor's programme. It finds it important , however, that the quality of master's theses and exams are checked at random just as often.

3.2 Academic level achieved

The committee has assessed to what extent graduates have obtained the learning outcomes of the programme. To this end, it has studied exams and read ten master's theses. It concludes that these exams and the master theses were of a high level. It struck the committee that the assessment had been done in a precise and consistent manner. The committtee members arrived at grades for the theses that were not far off from the grades they had been given. They perceived no differences between students registered at the VU or UvA.

From talking to the graduates selected for an interview, the committee concludes that the programme has prepared them well for their current jobs. The graduates were enthusiastic about the high level of the programme and the good contacts with lecturers. Most of them now work in the corporate world, one had continued his career pursuing a PhD and one had become a physics teacher. The graduates stressed that their current positions are not necessarily representative: most master's students physics continue their education as PhD-student, either in Amsterdam or elsewhere.

This statement is backed up by information provided in the critical reflection: all graduates find a job, most often in research. The average period in which graduates find a job is 0.8 months after graduation. The committee concludes that the fact that graduates find a job very easily, plus the fact that graduates seem to perform well in their work, shows that graduates have achieved the learning outcomes.

Considerations
The committee concludes that the assessment policy is adequate. The exams in the programme are of a high level and match the learning outcomes of the courses. The quality control of testing and assessment at the VU is also of a high standard. The committee was impressed with the active role of both the Board of Examiners and the Toetscommissie.

To assess the level achieved by the students, the committee examined a range of master's theses. In general, it was impressed with the theses and it agrees with the marks that have been given. The committee concludes that the level of the theses matches what can be expected of a graduate of an academic master's programme.

The committee concludes that graduates have acquired the learning outcomes. This is also reflected in the fact that after graduating students have no trouble finding a job. All of them do so, on average within a period of 0.8 months. The committee is pleased with these numbers and concludes that graduates clearly meet the expectations of the job market.

Conclusion
Master's programme Physics: the committee assesses Standard 3 as 'good'.

In the committee's judgement, the master's degree programme Physics at the Vrije Universiteit Amsterdam fulfils the criteria for accreditation. It has noted many positive aspects and suggested several points for improvement. Weighing up those points and the individual assessment of each standard, the committee concludes that the programme 'meets the current generic quality standards and shows an acceptable level across its entire spectrum' and consequently can be assessed as 'satisfactory'.

General Conclusion

Conclusion
The committee assesses the *master's programme Physics* as 'satisfactory'.

Appendices

Appendix 1: Curricula Vitae of the members of the assessment committee

Prof. dr. D. (Daan) Lenstra studied Physics at the University of Groningen and got his PhD at the Delft University of Technology on the subject 'Polarization effects in gas lasers'. Since 1979 his research is focuses on the broad area of quantum electronics. He was professor at the VU University Amsterdam from 1991-2006. Between 2000 and 2006 Lenstra was also professor at Eindhoven University of Technology. From 2004-2006 he was scientific director of the COBRA Research Instituut was. From November 2006 until his retirement in 2010 he was dean of the Faculty Electrical Engineering, Mathematics and Computer Sciences at Delft University of Technology. Since 2012 Lenstra is honorary advisor for the Faculty Electrical Engineering of Eindhoven University of Technology.

Prof. dr E. (Elias) Brinks earned his doctorate in 1983 at Leiden University with a study of the neutral hydrogen distribution in Messier 31, the Andromeda galaxy. Following a postdoctoral fellowship at the European Southern Observatory (ESO) in Garching and an employment as Senior Research Associate at the former Royal Greenwich Observatory in the UK, he spent nearly six years as Associate Scientist at the National Radio Astronomy Observatory's Very Large Array (NRAO-VLA) in Socorro, New Mexico (USA). He then moved to "Old" Mexico to help set up the Department of Astronomy at the University of Guanajuato and subsequently was appointed as staff scientist at the Instituto Nacional de Astronomía, Óptica y Electrónica (INAOE) in Puebla, where he contributed to efforts to build the Large Millimeter telescope. Since September 2004 he is back in Europe, as Full Professor at the University of Hertfordshire. Upon retuning to the UK he was elected Secretary of the European Astronomical Society (2006-2012). His research focuses on nearby normal and dwarf galaxies, galaxy interactions, and their formation and evolution.

Prof. dr. M.J. (Martin) Goedhart is trained as a biochemist and, from 1982 to 1992, worked as a teacher in chemistry in vocational education. In 1990, he got his PhD at Utrecht University with a thesis on chemical didactics. Between 1992 and 2004, he was teacher and primary teacher at the University of Amsterdam (UvA), as course didactic of chemistry at the academic teacher training, among other things. Since 2004, he has been a professor of Didactics of Math and Natural Sciences at University of Groningen and as head of education, responsible for the master's programme Education and Communication in Math and Natural Sciences. He leads the research group IDO (Institute for Didactics and Development of Education), which researches the didactics of math and natural sciences in secondary education and University. He is editor and member of the editorial committee of national and international magazines, member of the programme comittee DUDOC (programme focussed on PhD research by secondary education teachers in beta subjects), coordinator of the network chemistry/pharmacy of ICAB (Innovation Centres Academic Beta Education) and chair of the facultary BKO assessment comittee. He was a member of the visitation committee of the master's programme Science Education and Communication at the 3TU.

Dr ir. H.L. (Harald) Tepper studied Chemical Technology at the University of Twente and in 2001 got his PhD in 'computational physics' at the same university. From 2002 until 2007, Tepper was postdoctoral researcher at the University of Utah (USA), and VENI-researcher at the AMOLF Institute in Amsterdam. Since 2007 he has worked in industry. He was management consult at the consultancy firm McKinsey & Company, where he worked, among other things, at large scale change processes, audits and benchmarking of organizations, and the strategy of an academic business school. Since September 2013 he works as Chief Strategy Officer at the Netherlands Forensic Institute. During his studies, he also obtained a diploma as teaching musician (clarinet) at the conservatoire. Tepper was co-

founder and chairman of 'De Nationale DenkTank', a foundation which adds a multidisciplinary experience to the curricula for students and PhD students.

L. (Lisanne) Coenen BSc graduated from the bachelor's programme Applied Physics at Delft University of Technology in 2013. At the same time, she finished her pre master Philosophy of Natural Sciences at Leiden University. Since September 2013, she follows the master's programme Applied Physics (track 'Quantumnanoscience'), also at Delft University of Technology. Additionally, she follows the master's programme Philosophy of Natural Sciences at Leiden University. During her bachelor's programme, she was a board member of the student union for Applied Phyiscs in Delft and in 2012 she was a member of the educational committee for Applied Physics.

Appendix 2: Domain-specific framework of reference

The goal of a university programme is to prepare students for an independent practise of the profession of the relevant discipline, and to give them the ability to apply the knowledge and skills they have acquired. Dutch university programmes in the domain of (applied) physics and astronomy are required to reach a level which allows the graduate to be competitive in the international research or job market, in particular with respect to countries which have a high profile in these areas. The domain-specific reference frame is meant to be a gauge for reaching this goal.

The framework is based on the one used in the Teaching Programme Assessment (Onderwijsvisitatie) of 2007. The basis for that framework was derived from the qualifications as formulated in the document '*Reference points for the design and delivery of degree programmes in physics',* which was a product of the so-called *Tuning Project*. The frame of reference to be presented below has been updated by also making use of the more recent '*A European Specification for Physics Master Studies'* of the European Physical Society (2009). The descriptors for the programmes have been formulated in terms of competences acquired by the graduating student, which leads to specific requirements for the curriculum. Programmes with the same name at different (Dutch) universities will in general not be identical. Different specialisations in the research staff or focus on particular subjects leads to differences in the eligible part of the programmes, and there is a structural difference between (the goals of) general universities and universities of technology. As a consequence, there are different ways to comply with the requirements of the reference frame. It is essential, however, that the local choices for, and colouring of the programme fits the internationally accepted standards.

Programme descriptors
Very similar to the BSc programmes, the descriptors for the MSc programmes can be described with three types of competences, as is done below. The sequence within each category is, with few exceptions, taken from what is called the 'Rating of Importance Order' in the Tuning document. The basic difference with the descriptors for the BSc programmes is the different emphasis. While a BSc programme aims at including some aspects of the forefront of knowledge, an MSc programme aims at providing a basis (or opportunity) for originality.

(a) Discipline-related cognitive competences.

	Specific competence	**Description. On completion of the degree course, the student should**
1	Modelling skills	be able to identify the essentials of a process/situation and to set up a working model of the same; be able to perform the required approximations; i.e. critical thinking to construct physical models
2	Problem solving skills	be able to evaluate clearly the orders of magnitude in situations which are physically different, but show analogies, thus allowing the use of known solutions in new problems
3	Knowledge and understanding of Physics	have a good understanding of the important physical theories (logical and mathematical structure, experimental support, physical phenomena described);

4	Familiarity with basic and applied research	acquire an understanding of the nature and ways of physics research and of how physics research is applicable to many fields other than physics, e.g. engineering; be able to design experimental and/or theoretical procedures for: (i) solving current problems in academic or industrial research; (ii) improving the existing results
5	Frontier research	have a good knowledge of the state of the art in (at least) one of the presently active physics specialties
6	Human / professional skills	be able to develop a personal sense of responsibility, given the free choice of elective/optional courses; be able to gain professional flexibility through the wide spectrum of scientific techniques offered in the curriculum
7	Physics culture	be familiar with the most important areas of physics and with those approaches, which span many areas in physics.
8	Absolute standards	have become familiar with highly regarded research in the field with respect to physical discoveries and theories, thus developing an awareness of the highest standards

(b) Discipline-related practical skills.

	Specific competence	**Description. On completion of the degree course, the student should**
9	Mathematical skills	be able to understand and master the use of the most commonly used mathematical and numerical methods
10	Computer skills	be able to perform calculations independently, even when a small PC or a large computer is needed, including the development of software programmes
11	Experimental skills	have become familiar with most important experimental methods and be able to perform experiments independently, as well as to describe, analyse and critically evaluate experimental data; and to be able to scientifically report the findings

(c) Discipline-related generic competences.

	Specific competence	**Description. On completion of the degree course, the student should**
12	Literature search	be able to search for and use physical and other technical literature, as well as any other sources of information relevant to research work and technical project development; have good knowledge of technical English.
13	Learning ability	be able to enter new fields through independent study
14	Ethical behaviour (relevant to physics)	be able to understand the socially related problems that confront the profession, and to comprehend the ethical characteristics of research and of the professional activity in physics and its responsibility to protect public health and the environment
15	Specific communication skills	be able to listen carefully and to present difficult ideas and complex information in a clear and concise manner to professional as well as to lay audiences; be able to work in an interdisciplinary team.

16	Managing skills	be able to work with a high degree of autonomy, even accepting responsibility in (project) planning, and in the managing of structures.
17	Updating skills	enjoy the ability to remain informed of new developments and methods, and be able to provide professional advice on their possible impact or range of applications.
18	Foreign language skills	be able to gain command of foreign languages through, usually elective, participation in courses taught in foreign language.

Note that in the generic competences in particular, learning ability and managing and updating skills receive more attention than in the description for the BSc programmes.

2. Programme

The variation in MSc programmes within the domains of Physics, Applied Physics, or Astronomy can be substantial. A general requirement is that the programme aims at teaching the student how to practice their profession in an independent manner. Central to the programme is therefore the individual research assignment, in which the student becomes acquainted with the daily research practice at a frontier of science. Similar requirements apply to Applied Physics programmes, with the understanding that the individual assignment can have a more applied character, and that a project can also have a focus on design. In all cases, the graduation assignment should preferentially be performed within a research group, and the student should be able to function as a fully-fledged member of the group. This requires a workplace which allows daily (social) contacts, and regular exchange of ideas, questions and thoughts with colleagues. This ensures the acquisition of a broad range of research skills.

These days, it is almost inevitable that physicists and astronomers operate in an international setting. The required level of the programme can therefore be indicated by referring to the exchange of information as occurs at scientific conferences and in scientific journals. The graduation work, delivered in the form of a thesis, should therefore link to that level. It should enable the student to enter the international market in a credible way, and research performed during the Master should regularly lead to, or be part of, a scientific publication. Apart from that, the research also has to be presented in oral manner.

In view of their future practicing of a profession, it is important that students learn to work with time constraints. The traditionally large freedom which Dutch students had and partly still have, can easily lead to the neglect of this aspect in study programmes. As this freedom is currently becoming less, it is the more important that the programmed safeguards and stimulates the progress of the student. Time management should be an explicit part of elements of the programme, in particular for a research project or an internship.

Apart from the research practice, the student should deepen his/her knowledge of physics by studying more specialised subjects, often through formal lecture series or study groups. Study programmes will probably want to offer a common core, but much of the direction for study will be furnished by the local research specialisations, and can therefore by quite different in focus.

An increasingly important facet of a disciplinary Master programme is that it can be combined with a different specialization in order to broaden the scope of professions which are open to the graduated student. Prime examples are specializations in the direction of

education (leading to the profession of high school teacher, among others), science communication, or science-based business. In the latter case, study elements aiming more specifically at management or governance may be important. It can be expected from a programme that it allows students to orient themselves on the possibilities and ways to match their talents and interests with the job market. In the current Dutch system of a 2-year (120 EC) programme, the minimal requirement for a master's degree in Physics, Applied Physics or Astronomy is deemed to be one year of disciplinary studies. This leaves up to a year for such other specializations.

Appendix 3: Intended learning outcomes

The graduate:

X1. has a thorough theoretical and practical knowledge of modern physics, including the knowledge of other disciplines required for that purpose;
X2. has a thorough knowledge of theoretical and/or experimental methods and research experience in at least one sub-area within the physics discipline;
X3. is able to become acquainted with other sub-areas of the physics discipline within a reasonable period of time;
X4. is able to formulate a research plan based on a realistic problem definition within the physics discipline;
X5. is able to analyse and formulate research results and to draw conclusions therefrom;
X6. is able to write a scientific report or an internationally accessible scientific publication and to participate in discussions on (specialized) topics in the field of study;
X7. is able to consult international professional literature in the relevant sub-areas and to apply the knowledge gained from that;
X8. is able to apply one's knowledge of physics in a broader (multidisciplinary) context;
X9. is employable in those positions for which knowledge and research skills in the field of physics are a prerequisite;
X10. has sufficient knowledge of, and insight in the societal role of physics to make a sound choice regarding one's own profession, as well as in the exertion of this profession;
X11. 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.

For some variants and tracks, there are additional exit qualifications:

The graduate in the major Research is able to:

R1. independently design experiments including the corresponding controls, conducting and evaluating these within a given period of time;
R2. compare and incorporate obtained research results and conclusions within the framework of the results of other scientists;
R3. form a vision on the development of scientific research in the field of physics;
R4. quantitatively and qualitatively analyse physics processes, to incorporate data in existing or new models and to present the results at various levels of abstraction.

The graduate in the major Science Communication/Education is able to:

CE1. acquire new expertise in the field of communication or education and apply this in a profession in communication or education.
CE2. transfer in oral and written form acquired knowledge and insight to a broad audience or students.

The graduate in the major Management, Policy Analysis & Entrepreneurship is able to:

M1. develop a vision with respect to the contribution of scientific knowledge and methods in solving problems in society related to physics.
M2. deduce from this vision a solution-oriented scientific problem definition.
M3. derive from this problem definition actual research questions / projects.
M4. present scientific results at different scales and levels of abstraction.
M5. participate in a multi-disciplinary team.
M6. formulate a vision how physics may contribute to a sustainable society.

The graduate in the major Science, Business and Innovation is able to:

SB1. develop a vision with respect to inventions, products and services in physics.
SB2. integrate scientific, organizational and business aspects of new developments in physics.
SB3. participate in a trans-disciplinary team.
SB4. formulate a vision how physics may contribute to a sustainable society.

The graduate in the major Science and Software Engineering is able to:

S1. develop individually a vision with regard to ICT applications in a scientific research;
S2. deduce from this vision a problem solving scientific question;
S3. implement this vision in cooperation with scientists, thus creating a bridge between scientific researchers and ICT;
S4. participate in a multi-disciplinary project team.

Appendix 4: Overview of the curriculum

Programme	R-major EC
Compulsory courses	12
Elective courses	24
Compulsory orientation project/seminar/literature study	6
Free elective courses/deficiencies	12
Research project (incl. preparation)	54
Master's thesis and presentation	6
Academic skills in the Master	6
Total	**120 EC**

Communication/Education-variant:

Programme	EC's
Compulsory and constraint courses	24
Research project (inclusive preparation)	30
Master's thesis and presentation	6
C/E programme	60
Total	**120**

Track Atomic Scale Modeling of Physical, Chemical and Biomolecular Systems (ATOSIM):

Components for AtoSim	EC's
Compulsory components	48
Elective components discipline	30
Orientation project/seminar/literature study	12
Research project	30
Total EC	**120**

Track Advanced Matter and Energy Physics (AMEP):

	Semester 1						Semester 2					
Physics, track Advanced Matter and Energy Physics (AMEP)	**Block 1**		**Block 2**		**Block 3**		**Block 4**		**Block 5**		**Block 6**	
	Course	**EC**	**Course**	**EC**	**Course**	**EC**	**Course**	**EC**	**Course**	**EC**	**Course**	**EC**
2012-2013 Compulsory	Big Issues in Emergent Energy Materials	6					Big Issues in Atomic Quantum Physics	3				
							Big Issues in Soft Matter	3				
Constraint choice courses	Statistical Physics and Condensed Matter Theory I	6	Bose Einstein Condensates	6			Superconductivity	6				
	Statistical Mechanics of Soft Matter	6	Photovoltaics	6								
			Soft Condensed Matter and Biological Physics	6								
Optional courses					Mathematica for Physicists	3	Classical and Quantum Chaos	6	Fermi Quantum Gases	6	Forensics with Complex Liquids	3
					Understanding Molecular Simulation	6	Quantum Optics	6	Hydrodynamics	6	Summer-school AMEP	3
									Nanophotonics	6	Ultrafast X-ray Physics	3
									Physics of Photosynthesis	6		
									Ultrafast Laser Physics	6		
Academic Skills	Academic English	3	Academic English	3			Academic English	3	Academic English	3		

	Semester 1						Semester 2					
Physics of Life and Health	**Block 1**		**Block 2**		**Block 3**		**Block 4**		**Block 5**		**Block 6**	
	Course	**EC**	**Course**	**EC**	**Course**	**EC**	**Course**	**EC**	**Course**	**EC**	**Course**	**EC**
2012-2013												
Compulsory	Physics of Organs 1: Cardio-Pulmonary Physics	6	Soft Condensed Matter and Biological Physics	6			Biomedical Optics	6			Literature Review Biomedical Physics (OR)	6
	Statistical Mechanics of Soft Matter	6									Literature Review Biophysics	6
Optional courses	Lasers and Molecular Photonics	6	Image Processing	6	Biophotonics 3 - Practical Training	3	Biomedical Optics	6	Advanced Medical Technology	6		
	Physics of Organs 1: Cardio-Pulmonary Physics	6	Physics of Organs 2: Sensory Organs and Bioelectricity	6			Dynamics of Biomolecules and Cells	6	From Genome to Physiome	6		
	Modelling and Simulation in Medical Sciences	6							Medical Imaging	6		
	Statistical Mechanics of Soft Matter	6							Parameter Estimation Applied to Medical & Biological Science	6		
	Statistical Theory of Complex Molecular Systems	6							Physics of Photosynthesis	6		
Academic Skills	Academic English	3	Academic English	3			Academic English	3	Academic English	3	Academic Skills: Survival Guide for scientists	3

Appendix 5: Quantitative data regarding the programme

Data on intake, transfers and graduates

Cohort		UvA	VU	Total	%
2006/2007	Enrolled	36	11	47	
	Cohort (Oct 1)	20	6	26	55%
	Graduated after 3 years	17	3	20	76%
2007/2008	Enrolled	28	7	35	
	Cohort (Oct 1)	20	6	26	74%
	Graduated after 3 years	15	3	18	51%
2008/2009	Enrolled	46	15	61	
	Cohort (Oct 1)	39	7	46	75%
	Graduated after 3 years	28	7	35	76%
2009/2010	Enrolled	35	8	43	
	Cohort (Oct 1)	28	5	33	77%
	Graduated after 3 years	24	5	29	88%
2010/2011	Enrolled	50	11	61	
	Cohort (Oct 1)	40	6	46	75%
	Graduated after 2 years	17	4	21	-
2011/2012	Enrolled	45	11	56	
	Cohort (Oct 1)	40	6	46	82%
	Graduated after 1 year	5	0	5	-

Qualifications of teaching staff

Grade	MA	PhD	BKO
Percentage	100%	100%	45%

Teacher-student ratio achieved

Ratio	1:15

Average amount of face-to-face instruction per stage of the study programme

Year	1	2
Hours	12-16	n/a*

*During the second year, students are working on internships and/or master thesis project.

Appendix 6: Programme of the site visit

Dag 0:		
18.00	21.00	Voorbereidend overleg commissie UvA

Dag 1:		
9.00	10.30	Leestafel UvA, intern overleg
10.30	11.30	**Opleidingsmanagement UvA** Naam / Functie / Universiteit dhr. dr. M. (Marcel) Vreeswijk — Opleidingsdirecteur Natuur- & Sterrenkunde — UvA dhr. prof.dr. H.B. (Ben) van Linden van den Heuvell — Opleidingsdirecteur Physics — UvA mevr. dr. S (Sera) Markoff — Opleidingsdirecteur Astronomy and Astrophysics — UvA dhr.dr. W. (Wim) Vassen — Opleidingsdirecteur Natuur- & Sterrenkunde — VU dhr. prof.dr. P (Piet) Mulders — Coordinator master Physics — VU
11.30	12.15	**Bachelorstudenten Natuur- en Sterrenkunde UvA** Naam / Rol mevr. F. (Floor) Broekgaarden — 1e jaar student Natuur- & Sterrenkunde (en wiskunde) mevr. Emma Loos — 1e jaar student Natuur- & Sterrenkunde dhr. Bart Auée — 2e jaar student Natuur- & Sterrenkunde dhr. Nigel van Herwijnen — 2e jaar student Natuur- & Sterrenkunde mevr. Monica van Santbrink — 3e jaar student Natuur- & Sterrenkunde dhr. Thom Pijnenburg — 3e jaar student Natuur- & Sterrenkunde
12.15	13.00	**Docenten Bachelor Natuur- en Sterrenkunde UvA** Naam / Rol dhr. dr. E (Erik) van Heumen — Docent (WZI) dhr. prof.dr. E.P. (Erik) Verlinde — Docent (ITFA) dhr. dr. I.B. (Ivo) van Vulpen — Docent (NIKHEF) dhr. drs. C.L. (Paul) Vlaanderen — Practicumleider mevr. drs. J.G.H. (Joëlle) Kessels — Vaardighedencoördinator dhr. prof.dr. R (Ralph) Wijers — Docent (API)
13.00	14.00	Lunch/intern overleg commissie
14.00	14.45	**Studenten Master Physics (gedeeld)** Naam / Rol mevr. C. (Cyriana) Roelofs — Master student Physics VU mevr. J. (Judith) van Santen — Master student Physics VU dhr. J. (Jonas) Voorzanger — Master student Physics VU dhr. L. (Ludo) Nieuwenhuizen — Master student Physics UvA dhr. T. (Tony) Hubert — Master student Physics UvA mevr. A. (Annemarie) Berkhout — Master student Physics UvA
14.45	15.30	**Docenten Master Physics (gedeeld)** Naam / Rol dhr. prof.dr. F.C. (Fred) MacKintosh — Docent Physics VU dhr. dr. J.P. (Jan) Dekker — Docent Physics VU dhr. prof.dr.ir. G.J.L. (Gijs) Wuite — Docent Physics VU

		dhr. prof.dr. M.S. (Mark) Golden	Docent Physics UvA
		dhr. dr. R.J.C. (Robert) Spreeuw	Docent Physics UvA
		dhr. prof.dr. J-S. (Jean-Sébastien) Caux	Docent Physics UvA
15.30	16.15	Spreekuur/Intern overleg commissie	
16.15	16.45	**Studenten M Astronomy & Astrophysics UvA**	
		Naam	Rol
		dhr. Emmanouil Zapartas	Masterstudent A&A
		mevr. Laura Ootes	Masterstudent A&A
		dhr. Abel Schootemeijer	Masterstudent A&A
		mevr. Samayra Straal	Masterstudent A&A
		mevr. Mieke Paalvast	Masterstudent A&A
		dhr. Omer Tzuk	Masterstudent A&A
16.45	17.15	**Docenten M Astronomy & Astrophysics UvA**	
		Naam	Rol
		dhr. dr. D. (David) Berge	Docent A&A
		dhr. dr. P. (Phil)Uttley	Docent A&A
		dhr. prof.dr. C. (Carsten) Dominik	Docent A&A
		dhr. dr. J. (Jason) Hessels	Docent A&A
		dhr. prof.dr. A. (Alex) de Koter	Docent A&A
17.15	17.30	Pauze	
17.30	18.00	**Alumni UvA**	
		Naam	Rol
		Vincent Dekker	Alumnus AA
		Peter van Ham	Alumnus AA
		Arthur La Rooij	Alumnus Physics
		Auke Akkerman	Alumnus Physics
		Paul Voskuilen	Alumnus Physics
19.00		Diner (alleen commissie)	

Dag 2:			
9.00	9.30	Intern overleg commissie	
9.30	10.15	**Opleidingscommissie UvA**	
		Naam	Rol
		dhr. prof.dr. L. (Lex) Kaper	Voorzitter
		dhr. dr. A.P. (Auke Pieter) Colijn	Docent
		dhr. dr. G.F. (Gerard) Helminck	Docent
		dhr. dr. N.J. (Klaasjan) van Druten	Docent
		dhr. Tim Barenbrug	Masterstudent
		mevr. Sidoeri Dekker	Masterstudent
		dhr. Danne van Roon	Bachelorstudent
		mevr. Chelsea Kaandorp	Bachelorstudent
		dhr. Manus Visser	Vice-voorzitter / masterstudent
		dhr. Yuri van Nieuwkerk	Ambtelijk secretaris
10.15	11.15	**Examencommissie + studieadviseur(s) UvA**	
		Naam	Rol
		dhr. dr. R.A.D. (Rudy) Wijnands	Voorzitter
		dhr. prof. dr. ir. P.J. (Paul) de Jong	Vice-voorzitter
		dhr. dr. R. (Rudolf) Sprik	Lid
		mevr. M.E. (Margaret) Jans	Ambtelijk secretaris
		mevr. drs. I. (Iris) Weitjens-Hettelingh	Studieadviseur bachelor
		mevr. drs. A.M.L. (Anja) Zoomer	Studieadviseur master

11.15	12.45	Slotvergadering commissie UvA
12.45	13.30	[Reistijd]
13.30	16.00	Voorbereidend overleg commissie, leestafel VU
16.00	17.00	**Opleidingsmanagement VU** Naam – Rol dhr. ir. Johan Vermeer – Onderwijsdirecteur FEW dhr. dr. Wim Vassen – Opleidingsdirecteur afdeling Natuur- en Sterrenkunde dhr. dr. Rick Bethlem – Bachelorcoördinator dhr. drs. Jaap Buning – Coördinator Practicum en Didactiek
17.00	17.45	**Studenten B Natuur- en Sterrenkunde VU** Naam – Rol dhr. Mitch Vonk – 1e jaar student Natuur- & Sterrenkunde dhr. Vito van Osch – 2e jaar student Natuur- & Sterrenkunde dhr. Jim Visschers – 2e jaar student Natuur- & Sterrenkunde dhr. Kees Ligtenberg – 3e jaar student Natuur- & Sterrenkunde dhr. Tom Veeken – 3e jaar student Natuur- & Sterrenkunde mevr. Francien Bossema – 3e jaar student Natuur- & Sterrenkunde en Wiskunde
17.45	18.15	**Alumni VU** Naam – Rol Drs. Joost Alons – Student Msc BA Drs. Joost van Barneveld – Student BSc Drs. Ineke Brouwer – Student MSc, PhD Physics Drs. Guus Harms – Student MSc Drs. Joris van Leeuwen – Student MSc Dr. Sven de Man – Student MSc, PhD Physics
19.00		Diner (alleen commissie)

Dag 3:		
9.00	9.30	Intern overleg commissie
9.30	10.15	**Docenten B Natuur- en Sterrenkunde VU** Naam – Rol dhr. prof.dr. Johannes de Boer – Docent Natuurkunde en Sterrenkunde dhr. prof.dr. Kjeld Eikema – Docent Natuurkunde en Sterrenkunde dhr. dr. Gerrit Kuik – Docent Natuurkunde en Sterrenkunde dhr. prof.dr. Piet Mulders – Docent Natuurkunde en Sterrenkunde dhr. dr. Rinke Wijngaarden – Docent Natuurkunde en Sterrenkunde dhr. prof.dr. Gijs Wuite – Docent Natuurkunde en Sterrenkunde
10.15	11.00	Spreekuur, intern overleg commissie
11.00	11.45	**Opleidingscommissie VU** Naam – Rol dhr. prof.dr. Fred MacKintosh – Voorzitter dhr. dr. Rick Bethlem – Docentlid dhr. dr. Henk Jan Bulten – Docentlid dhr. Ruud van der Beek – Studentlid dhr. Bram Mooij – Studentlid mevr. Manon Wigbers – Studentlid
11.45	12.30	Lunch

<table>
<tr><td>12.30</td><td>13.30</td><td>Examencommissie + studieadviseurs VU
<table>
<tr><td>Naam</td><td>Rol</td></tr>
<tr><td>Prof.dr. Jaap Heringa</td><td>Voorzitter Examencommissie FEW</td></tr>
<tr><td>Dr. Ivo van Stokkum</td><td>Voorzitter Examencommissie onderdeel Natuurkunde en Sterrenkunde</td></tr>
<tr><td>Prof.dr. Gerhard Raven</td><td>Secretaris Examencommissie onderdeel natuurkunde en Sterrenkunde</td></tr>
<tr><td>Dr. Aniel Bhulai</td><td>Studieadviseur Natuurkunde en Sterrenkunde</td></tr>
</table></td></tr>
<tr><td>13.30</td><td>14.00</td><td>Intern overleg commissie</td></tr>
<tr><td>14.00</td><td>15.00</td><td>Management UvA/VU
<table>
<tr><td>Naam</td><td>Rol</td></tr>
<tr><td>mevr. prof.dr. Karen Maex</td><td>Decaan VU – UvA Beta Faculteit</td></tr>
<tr><td>dhr. prof.dr. Hubertus Irth</td><td>Vice Decaan FEW, VU</td></tr>
<tr><td>dhr. prof.dr. Wim Ubachs</td><td>Afdelingshoofd Natuurkunde en Sterrenkunde, VU</td></tr>
<tr><td>dhr. ir. Johan Vermeer</td><td>Onderwijsdirecteur FEW, VU</td></tr>
<tr><td>dhr.dr. Wim Vassen</td><td>Opleidingsdirecteur Natuur- & Sterrenkunde en Physics, VU</td></tr>
<tr><td>dhr. prof. dr. M.A. (Michel) Haring</td><td>Portefuilehouder onderwijs FNWI, UvA</td></tr>
<tr><td>dhr. prof. dr. J. (Jan) de Boer</td><td>Onderwijsdirecteur Graduate School of Science, UvA</td></tr>
<tr><td>dhr. dr. J.B. (Jeroen) Goedkoop</td><td>Onderwijsdirecteur College of Science, UvA</td></tr>
<tr><td>dhr. dr. M. (Marcel) Vreeswijk</td><td>Opleidingsdirecteur Natuur- & Sterrenkunde, UvA</td></tr>
<tr><td>dhr. prof.dr. H.B. (Ben) van Linden van den Heuvell</td><td>Opleidingsdirecteur Physics, UvA</td></tr>
<tr><td>mw. dr. Sera Markoff</td><td>Opleidingsdirecteur Astronomy and Astrophysics, UvA</td></tr>
<tr><td>dhr. prof.dr. R (Ralph) Wijers</td><td>Insituutsdirecteur API, UvA</td></tr>
<tr><td>dhr. prof. dr. D. (Daniel) Bonn</td><td>Insituutsdirecteur IoP, UvA</td></tr>
</table></td></tr>
<tr><td>15.00</td><td>17.45</td><td>Slotvergadering commissie VU, voorbereiding eindpresentatie</td></tr>
<tr><td>17.45</td><td>18.15</td><td>Eindpresentatie (alle opleidingen)</td></tr>
</table>

Appendix 7: Theses and documents studied by the committee

Prior to the site visit, the committee studied the theses of the students with the following student numbers:

1881698	1356844	223026*	440965*	5902304*
1640291	306231*	5976065*	5621313*	6349676*

* Theses written by UvA-students

During the site visit, the committee studied, among other things, the following documents (partly as hard copies, partly via the institute's electronic learning environment):

- Yearly report and plan of the Boards of Examiners
- Rules and regulations of the Boards of Examiners
- Organogram of the organisation of education
- Information about the TESLA minor
- Example of the Semester Response System-discussions, final report
- Minutes of the Programme committee and the Education Quality committee
- Minutes of the SRS meetings
- Study material: books and syllabi, readers, study manuals;
- Tests and assignments with the assessment criteria and standard answers;
- Regulations and manuals for internships and thesis;
- Information and documentation for students.

Furthermore, the committee has requested al available course materials for a selection of courses of the past academic year. The following courses have been selected:

Big Issues in Emergent Energy Materials
Particle Physics I
Statistical Mechanics of Soft Matter
Quantum Field Theory

Appendix 8: Declarations of independence

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nederlands - vlaamse accreditatieorganisatie

ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: D. LENSTRA

PRIVÉ ADRES: HUIZERWEG 58

1261 AZ BLARICUM

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

DESKUNDIGE

AANGEVRAAGD DOOR DE INSTELLING:

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

1

nvao
nederlands - vlaamse accreditatieorganisatie

VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: UTRECHT DATUM: 8 oktober 2013

HANDTEKENING:

nvao
nederlands - vlaamse accreditatieorganisatie

ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: ELIAS BRINKS

PRIVÉ ADRES: CENTRE FOR ~~ASTROPHYSICS~~ RESEARCH
UNIVERSITY OF HERTFORDSHIRE, COLLEGE LANE
HATFIELD AL10 9AB, UNITED KINGDOM

IS ALS DESKUNDIGE / ~~SECRETARIS~~-GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

NATUUR- EN STERRENKUNDE

AANGEVRAAGD DOOR DE INSTELLING:

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

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nvao
nederlands - vlaamse accreditatieorganisatie

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VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Utrecht DATUM: 8 OKTOBER 2013

HANDTEKENING:

nvao
nederlands-vlaamse accreditatieorganisatie

ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: H. L. Tepper

PRIVÉ ADRES: p/a Nederlands Forensisch Instituut
Laan van Ypenburg 6
2497 GB Den Haag

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Natuurkunde / Sterrenkunde

AANGEVRAAGD DOOR DE INSTELLING:

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

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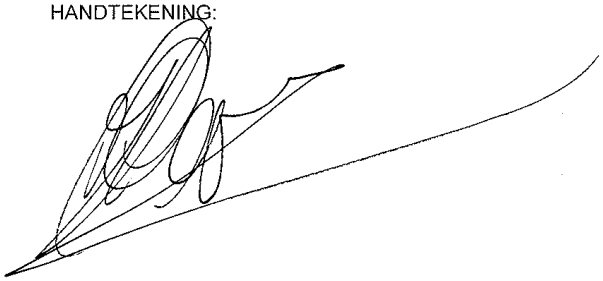
VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Utrecht

DATUM: 8 oktober 2013

HANDTEKENING:



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nederlands - vlaamse accreditatieorganisatie

ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: M.J. Goedhart

PRIVÉ ADRES: Botanicuslaan 55
9751 AB Haren

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

natuurkunde (B+M)
sterrenkunde (B+M)

AANGEVRAAGD DOOR DE INSTELLING:

Universiteit Leiden

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

1

VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

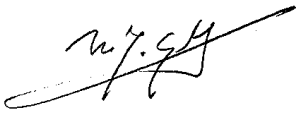
VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Groningen

DATUM: 10 - 12 - 2013

HANDTEKENING:



Q436

ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: Lisanne Coenen

PRIVÉ ADRES:

Stil Gezicht 9, 2612 RV Delft

IS ALS DESKUNDIGE / ~~SECRETARIS~~ GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Natuurkunde bij verschillende universiteiten

AANGEVRAAGD DOOR DE INSTELLING:

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

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nederlands - vlaamse accreditatieorganisatie

VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Delft DATUM: 30 / 10 / 13

HANDTEKENING: 

2

Q436

ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: John Cornaal

PRIVÉ ADRES: Weerenhof 8207
6536 CA, Nijmegen

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

Natuur- en Sterrenkunde (BA en MA)

AANGEVRAAGD DOOR DE INSTELLING:

Universiteit van Utrecht, Universiteit Twente,
Universiteit van Amsterdam, Vrije Universiteit Amsterdam

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

1

nvao
nederlands - vlaamse accreditatieorganisatie

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VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Nijmegen DATUM: 28/1/'14

HANDTEKENING: