

**Accreditatierapport en -besluit met een positieve beoordeling van de
accreditatieaanvraag voor de opleiding European Master of Science in Nuclear
Fusion Science and Engineering Physics (master) van de Universiteit Gent**

datum	1. Inleiding
15 september 2011	Bij brief van 1 februari 2011 heeft het instellingsbestuur van de Universiteit Gent te Gent
onderwerp	een accreditatieaanvraag ingediend bij de Nederlands-Vlaamse Accreditatieorganisatie
Accreditatierapport en -besluit	(NVAO) voor de opleiding European Master of Science in Nuclear Fusion Science and
(#4858)	Engineering Physics (master). Het betreft een interuniversitaire masteropleiding
bijlage	georganiseerd te Gent (Universiteit Gent), Nancy (Université Henri Poincaré Madrid
1	(Universidad Complutense de Madrid en Universidad Carlos III de Madrid) en Stuttgart
	(Universität Stuttgart). ¹ Deze aanvraag is ontvangen op 3 februari 2011 en ontvankelijk
	verklaard op 22 februari 2011.

De accreditatieaanvraag steunt op het visitatierapport van een externe beoordeling uitgevoerd door een visitatiecommissie ingesteld door de Vlaamse Interuniversitaire Raad (VLIR).

De visitatiecommissie kende de volgende samenstelling:

Voorzitter:

- prof. dr. Ignas Niemegeers, hoogleraar Mobile and Wireless Communication, TU Delft;

Leden:

- prof. dr. Paul Regtien, hoogleraar Elektrische Metingen en Instrumentatie, Universiteit Twente;
- prof. dr. Peter Baltus, hoogleraar en hoofd van het Centre for Wireless Technology, TU Eindhoven;
- prof. dr. Tony Donné, adjunct-directeur FOM-instituut voor plasmafysica, Rijnhuizen;
- prof. dr. Christian Eugène, emeritus hoogleraar Elektrotechniek UCL, directeur Formation Continu des Ingenieurs aan de UCL en bestuurslid European Association for Education in Electrical and Information Engineering;
- dhr. Benjamin Baert, student Bachelor of Science in de ingenieurswetenschappen: werktuigkunde, met nevenrichting Elektrotechniek, K.U. Leuven.

Secretaris:

- mevr. Ilse De Vooght, stafmedewerker kwaliteitszorg VLIR.

¹ De aanvragende instelling meldt dat vanaf het academiejaar 2011/2012 de Kungliga Tekniska högskolan (Stockholm) en de Universidad Politécnica de Madrid (Madrid) niet meer betrokken zijn bij de organisatie van de opleiding, hoewel oorspronkelijk wel vermeld in de aanvraag.

2. Formele overwegingen

De NVAO komt tot de volgende vaststellingen:

- De externe beoordeling is opgesteld en onderbouwd overeenkomstig het toepasselijke Accreditatiekader bestaande opleidingen hoger onderwijs Vlaanderen van de NVAO en volgens de daarbij behorende beslisregels;
- De visitatiecommissie heeft voor de externe beoordeling het door de VLIR vastgestelde visitatieprotocol gevolgd;
- De externe beoordeling verschaft inzicht in de samenstelling van de visitatiecommissie;
- De externe beoordeling bevat een onderzoek ten gronde naar de aanwezigheid van voldoende generieke kwaliteitswaarborgen

De NVAO is in het licht van het vorenstaande tot de slotsom gekomen dat de externe beoordeling over de voorliggende opleiding regelmatig en gedegen tot stand is gekomen.

3. Inhoudelijke overwegingen

De NVAO steunt haar inhoudelijke besluitvorming in hoofdzaak op de onderstaande elementen uit het visitatierapport.

Doelstellingen

The panel finds that the objectives of the programme are in accordance with the Flemish Higher Education Act (article 58); the objectives are described very well and in a detailed way. According to the panel, all competences are formulated on master's level. A survey about the programme shows that the students are satisfied with the transparency of the formulated objectives.

The panel notes that the programme is developed as a research master and aims to train academic engineers for research and development with high potential to be employed by companies and research centres, based on the specific research attitude and skills and thorough knowledge and insight of physics in general and nuclear fusion technology in particular. The panel finds that the domain-specific requirements of the objectives are very well in line with the requirements set by international peers and the academic practice. The panel also observed that the domain-specific requirements of the programme objectives correspond very well with the reference framework of the assessment panel. The alignment of the domain-specific requirements with the needs and requirements of the professional field are excellent.

Programma

The panel established that students obtain significant factual knowledge, become familiar with basic and advanced concepts, problem solving, synthesising abilities, and general science and logic skills. The interaction with scientific research is strong, especially in the lab projects. During his or her studies the student comes frequently in direct contact with frontline scientific research with advanced research methods in many disciplines. The panel believes that the most important present-day fusion oriented research items are covered by the program: theory and modelling of fusion plasmas, characterisation and control of plasma turbulence, plasma-wall interaction, atomic physics and waves.

Pagina 3 van 10 The panel finds that the quality of the programme is good, and that the formulated objectives are adequately translated in the design of the master's programme. The programme design guarantees that the students are able to attain the formulated final qualifications. The compulsory courses give all students a general engineering physics education, and prepare them for their advanced track courses. The panel has studied the ECTS-files and concludes that the objectives of the programme are adequately translated into learning goals. The The students are familiar with the programme and know what they have to do within the context of the different course modules.

The panel is of the opinion that the partner universities have succeeded in building up a coherent and logically structured programme. The compulsory courses are offered at each university and are organised during the first year. Each partner schedules a course, which is considered by the consortium to cover a particular topic, operating under a generic course title. The panel observes that there is a good consistency between the course modules of the programme. Overlaps or gaps in the programme are rare.

In theory, students should spent 1800 hours of work during the first year, 900 hours in the third semester and 900 for their dissertation. The programme responsables have no reliable or statistical significant results about the study time. Based on the study of the self-evaluation report and the meetings during its visit, the panel states that the effective study time corresponds with the estimated study time of 60 ECTS credits per year. The study time is well divided over the two years. The programme is demanding on the students but the panel considers the programme to be feasible.

The panel notes that required for admission to the programme are a bachelor degree in engineering physics, applied physics, physics or an equivalent degree. Sufficient bachelor level knowledge in classical and modern physics is mandatory together with the necessary mathematical and computer programming skills. For students who still need additional training in quantum physics and/or statistical physics, elective courses can be replaced by preparatory courses in quantum physics and statistical physics. The panel finds that the Steering Committee succeeds well in selecting the right students and, once selected, to bring them to a common level in the first year. The panel finds that the form and the content of the programme is well aligned to the qualifications of the incoming students. Nevertheless, the panel is of the opinion that the selection procedure can still be optimised, by means of an extensive interview with the candidates. Furthermore, the panel doesn't find it very logical that possible lacks in quantum physics and statistical physics are remediated during the second semester in the preparatory courses while basic courses on quantum physics and statistical physics are programmed in the first semester. The panel advises the committee to remediate this.

The panel finds that the educational vision is in accordance with the objectives of the programme. The courses of the programme offer the student a wide variety of educational approaches and different types of study materials, reinforced by the students' participation in three different educational cultures. Virtually all lecturers in the programme choose to use traditional lectures as the basis for knowledge transfer. The panel finds that there is a good alignment between the work forms on the one hand and the educational vision and the formulated programme objectives on the other hand. According to the panel, the quality of the didactical materials is good.

Pagina 4 van 10 The panel has noticed that the periodic evaluations take various forms depending on the university. At UGent a commonly used form is the oral exam with written preparation. Permanent evaluations are set up to realise a more adequate and balanced study regime and load during the semesters. The permanent evaluation forms are very diverse: home assignments, project works or lab activities or reports. The panel has studied the ECTS-files and a selection of the examination questions and copies - also from the partner universities - and is of the opinion that the examinations are aligned with the learning goals (objectives) of the programme and the different courses. Both knowledge and skills are evaluated. The panel finds that the procedures concerning the learning assessment (the evaluation process) are transparent. Every partner university organises its evaluation independently. However, the programme surveys prove that the evaluation procedure is clear and transparent at all partner universities and no complaints are expressed. The students with whom the panel spoke showed their satisfaction about the learning assessments and the examination process at all partner universities.

The panel has established that the master's thesis counts for 30 credits, which complies with the Flemish regulations. In the Summer Event of the programme, the student chooses for a particular tracks and a dissertation topic. For each topic at least one supervisor is put forward. The supervisor(s) do(es) most of the daily supervision; the two promotors follow the master's thesis work from a greater distance. In many cases the student is doing research at a research group in an internationally renowned research institute (like CIEMAT in Madrid, FZ-Jülich and IPP Garching in Germany, CEA in France, SCK-CEN in Belgium) at close proximity to the partner universities. The first evaluation occurs at one of the partner institutes in collaboration with the local coordinator and the supervisors. Then at the Summer Event the student defends his dissertation in front of the Board of Examiners formed by the Steering Committee members. The panel considers the simultaneous assessment of all master's theses during the summer event as excellent. The panel, after consulting some sample copies of master's theses, finds that those documents are of high scientific quality. They are all related to 'state of the art' research and reflect the student's independent problem-solving competences at an advanced academic level. The master's theses also demonstrate the critical research attitude of the students. The supervision is adequately organised without being too rigidly imposed upon the students and the assessment is correct and transparent.

Inzet van personeel

After consulting the research output of the staff, the panel finds that the quality of the research performed at the UGent and at the partner institutions is of very high quality. Every partner institution has its own specific expertise domain and this contributes to the quality of the programme. The research teams of the lecturers are internationally recognised as high level due to the close links with many international research institutions and universities. Most ZAP members that are involved in teaching within the master programme have a link with the professional environment.

The panel finds that there are 138 lecturers involved over the seven universities and two research centres (CIEMAT and CSIC): 20 at UGent, 18 at KTH, 17 at Stuttgart, 26 at UHP, and 56 at Madrid. This means roughly that there are 138 lecturers available for an average of 40 students. At UGent 18 ZAP members, 5 AAP members, 4 OAP members and 1 ATP member are involved. All teaching personnel is appointed full-time. The panel believes that the number of academic staff members is in accordance with the number of enrolled

Pagina 5 van 10 students. The panel finds that the staff members are not overloaded by teaching duties and that the distribution of these duties is well managed among the different staff members.

The panel has assessed the quality of the staff. No didactic problems were signalled by the students with whom the panel spoke. The students are also satisfied about the quality of the English language of the teachers. Regarding the educational professionalisation academic staff members have the opportunity to attend training sessions. The panel believes that all staff members should be encouraged to attend these sessions. The research groups of the UGent are responsible for the practical organisation and the staff policies of the education offered. All academic staff members were very pleased with the staff policies of the different research groups, including a fair distribution of the teaching duties among the different staff members. New assistants are very well prepared for their teaching duties by their more experienced colleagues or ZAP-members.

Voorzieningen

The panel has visited the educational facilities of UGent, auditoria, pc-rooms as well as laboratoria. The students prepare their labs at home or in a seminar room of the department. A large part of the dissertation students at UGent go to the state-of-the-art research facilities of Forschungszentrum Jülich in Germany or of the Belgian Nuclear Research Centre SCK-CEN in Mol. In the student library of the programme, students can consult the course syllabi, the reference books in use and recent issues of a number of journals. The libraries of the different departments host specialised literature and master and PhD theses. The panel states that the facilities of the programme of the UGent are good, and that the facilities of the partner institutions are of the same high level. The panel applauds that students have the opportunity to conduct research at renowned research centres. The classes are well-equipped and the libraries are up to date, the panel observed. A survey shows that most of the students are very satisfied with the facilities in the different institutions.

The panel finds that the students are well informed and that they receive sufficient study support. Extensive guidance is given to incoming (international) students. Students can find counselling at the Advisory Centra for Students of the UGent and the programme study advisor. Because the group of students staying each semester at UGent is relatively small, and most students are involved in ongoing research project for their master dissertation, there is a close cooperation between students and their lecturers, their supervisors and the other researchers in the laboratories.

Interne kwaliteitszorg

The Steering Committee monitors the programme and organises several surveys. First a series of general questions on the different facets of the courses then course-related surveys per university and secondly more detailed surveys per consortium partner and per university.

The panel observed that the Steering Committee takes sufficient measures to guarantee the quality of the programme. The panel has studied the goals and the measures the Steering Committee has taken and supports them.

The panel finds that the Steering Committee comprises all the relevant stakeholders and observed that the different stakeholders show a strong commitment to the programme. The Steering Committee is composed of all local coordinators in each partner university, and of

Pagina 6 van 10 a representative of the alumni association. One of the members is always an industrial member. Furthermore, each lecturer involved in the programme, can be added temporally as an advisory member to the committee. Students also have informal contacts with the teaching staff to discuss problems. The programme, the panel states, is characterised by its remarkably open and interactive culture.

Resultaten

The panel concludes that the programme realises all its objectives, which are very ambitious. This is illustrated by the quality of the dissertations and the exams. The limited data available on the employment profile of alumni show that 8 out of 13 respondents continued in fusion related research, which is a high proportion. All respondents continued in research and development at least in the physics domain. The students and alumni told the panel that the programme is of an excellent quality, that they could reach the formulated goals, and that the link between research and education is a very strong point of the programme.

The panel has assessed the study progress of the students. In 2008–2009 29 students enrolled in the first year of the programme. 28 of them took more than 53 study points. 15 of 28 gained all the credits, 11 gained from 75 to 99% of the study points, two gained more than 25 and less than 50% of the credits. In 2007-2008 one student graduated in one year, 16 students graduated in two years. Since the start of the programme, there were two drop-outs. The drop-outs and failures were mainly caused by a weak basic knowledge from the bachelor years or due to language problems or cultural differences. The panel believes that the study progress is good.

Conclusie

De NVAO is in het licht van het vorenstaande tot de slotsom gekomen dat het eindoordeel van de commissie deugdelijk is gemotiveerd. De NVAO kan zich dan ook aansluiten bij de bevindingen en overwegingen voor alle facetten en onderwerpen, zoals verwoord in het visitatierapport. De eindconclusie uit het visitatierapport wordt gevolgd.

De tabel geeft per onderwerp en per facet het oordeel van de visitatiecommissie weer.

ONDERWERP	ORDEEL	FACET	ORDEEL
1 Doelstellingen opleiding	voldoende	1.1 niveau en oriëntatie	goed
		1.2 domeinspecifiek referentiekader	excellent
2 Programma	voldoende	2.1 eisen gerichtheid	excellent
		2.2 relatie doelstellingen - programma	goed
		2.3 samenhang programma	goed
		2.4 studielast	goed
		2.5 toelatingsvoorwaarden	goed
		2.6 studieomvang	ok
		2.7 afstemming vormgeving - inhoud	goed
		2.8 beoordeling en toetsing	goed
		2.9 masterproef	excellent
3 Inzet van personeel	voldoende	3.1 eisen gerichtheid	excellent
		3.2 kwantiteit	goed
		3.3 kwaliteit	goed
4 Voorzieningen	voldoende	4.1 materiële voorzieningen	goed
		4.2 studiebegeleiding	goed
5 Interne kwaliteitszorg	voldoende	5.1 evaluatie resultaten	goed
		5.2 maatregelen tot verbetering	goed
		5.3 betrokkenheid	excellent
6 Resultaten	voldoende	6.1 gerealiseerd niveau	excellent
		6.2 onderwijsrendement	goed

Eindoordeel NVAO: positief

De onderstaande tabel geeft per onderwerp het globaal oordeel van de NVAO weer.

ONDERWERP	OORDEEL
1 Doelstellingen	voldoende
2 Programma	voldoende
3 Inzet personeel	voldoende
4 Voorzieningen	voldoende
5 Interne kwaliteitszorg	voldoende
6 Resultaten	voldoende

Eindoordeel NVAO: positief

betreffende de accreditatie van de European Master of Science in Nuclear Fusion Science and Engineering Physics (master), aangevraagd door de Universiteit Gent. Het betreft een interuniversitaire masteropleiding georganiseerd te Gent (Universiteit Gent), Nancy (Université Henri Poincaré), Madrid (Universidad Complutense de Madrid en Universidad Carlos III de Madrid) en Stuttgart (Universität Stuttgart).

De NVAO,
Na beraadslaging,
Besluit :


Met toepassing van het decreet van 4 april 2003 betreffende de herstructurering van het hoger onderwijs in Vlaanderen, wordt het accreditatierapport en –besluit met positief eindoordeel voor de opleiding European Master of Science in Nuclear Fusion Science and Engineering Physics (master) van de Universiteit Gent goedgekeurd en wordt de opleiding geaccrediteerd. Het betreft een opleiding zonder afstudeerrichtingen die te Gent, Nancy, Madrid en Stuttgart wordt georganiseerd.

De in het eerste lid bedoelde accreditatie geldt vanaf de aanvang van het academiejaar 2011-2012 tot en met het einde van het academiejaar 2018-2019.

Den Haag, 15 september 2011

Voor de NVAO,

Guido Langouche
(vicevoorzitter)



² Het ontwerp van accreditatierapport werd aan de instelling bezorgd voor eventuele opmerkingen en bezwaren. De instelling heeft bij brief van 7 september 2011 van de gelegenheid gebruik gemaakt om te reageren. Dit heeft geleid tot een tekstuele aanpassing.

– naam instelling	Universiteit Gent
– adres instelling	Sint-Pietersnieuwstraat 25 9000 Gent
– aard instelling	ambtshalve geregistreerd
– graad, kwalificatie	European Master of Science in Nuclear Fusion
– specificatie	Science and Engineering Physics of Science
– niveau en oriëntatie	master
– studieomvang	120 studiepunten
– opleidingsvarianten	
– afstudeerrichtingen:	geen
– studietraject voor werkstudenten:	geen
– vestiging opleiding	Gent, Nancy, Stockholm, Madrid en Stuttgart
– onderwijstaal	Engels
– (delen van) studiegebieden	Toegepaste wetenschappen
– bijkomende titel	burgerlijk ingenieur