

Besluit Besluit strekkende tot het verlenen van accreditatie aan de opleiding wo-bachelor Technische Aardwetenschappen van de Technische Universiteit Delft

Gegevens

	Naam instelling	: Technische Universiteit Delft
datum	Naam opleiding	: wo-bachelor
9 oktober 2013		Technische Aardwetenschappen (180 ECTS)
onderwerp	Datum aanvraag	: 18 december 2012
Besluit	Variant opleiding	: voltijd
accreditatie wo-bachelor	Locatie opleiding	: Delft
Technische	Datum goedkeuren	
Aardwetenschappen van de	panel	: 22 mei 2012
Technische Universiteit Delft	Datum locatiebezoek	: 17 september 2012
(001696)	Datum visitatierapport	: januari 2013
ons kenmerk	Instellingstoets kwaliteitszorg	: positief besluit d.d. 21 november 2011
NVAO/20133017/LL		
bijlage		

3 Beoordelingskader

Beoordelingskader voor de beperkte opleidingsbeoordeling van de NVAO (Stcrt. 2010, nr 21523).

Bevindingen

De NVAO stelt vast dat in het visitatierapport deugdelijk en kenbaar is gemotiveerd op welke gronden het panel de kwaliteit van de opleiding voldoende heeft bevonden. Het visitatierapport geeft de bevindingen en overwegingen weer van het panel over de bacheloropleiding Technische Aardwetenschappen en masteropleiding Applied Earth Sciences van de Technische Universiteit Delft. Het panel heeft beide opleidingen gezamenlijk beoordeeld.

Advies van het visitatiepanel

Samenvatting bevindingen en overwegingen van het panel (hierna ook: the committee).

This report provides the findings and considerations of the Earth Sciences committee on the bachelor's programme in Earth Sciences at the Delft University of Technology (TUD). The committee assessment is based on information in the critical reflection, interviews during the site visit and a selection of theses. In general, the committee concludes that the programme is unique in the Netherlands in focusing on Applied Earth Sciences with a technical component. Through the strong connection with industry, students are well acquainted with the professional field. The main points requiring attention are the objectivity and transparency of the assessment system, the improvement of the students' progress towards

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Standard 1: Intended learning outcomes

The bachelor's programme in Earth Sciences at TUD has, as other academic programmes in Earth Sciences, the planet Earth as the object of study, and consider its genesis and its quality of life. These sciences are strongly interdisciplinary, with interaction between various factors, such as humans, fauna, relief, soil, water, lithology, atmosphere, hydrosphere and vegetation. Knowledge is gathered about its origin, current and former composition, and structure and the processes acting in and between the components of geosphere, hydrosphere, atmosphere and biosphere. Equally important is knowledge of how to manage and responsibly use the Earth's resources and understand the influence of human activity on the terrestrial system. It takes into account society's rapidly growing demand for well-trained Earth Scientists prepared to tackle scientific and societal issues. The bachelor's programme at TUD focuses on Applied Earth Sciences with a strong technical component. The programme is characterized by the strong synergy between the disciplines of geology and geophysics on one hand and petroleum engineering, geo-engineering and resources engineering on the other hand. The committee concludes that this focus is unique in the Netherlands.

The bachelor's programme aims to enable students to recognise, analyse and answer questions in the Applied Earth Sciences. Graduates are prepared as all-round engineers for the global market or a subsequent master's programme. Most of the graduates enrol into a master's programme. The committee understands this choice, although it notes that bachelor graduates are frequently recruited by companies in other countries. Therefore, the committee encourages the bachelor's programme to develop a more internationally oriented perspective, in order to also meet the requirements of international companies. Furthermore, in general, a programme with an international character is necessary to achieve the intention of preparing students for the global market.

The committee concludes that the bachelor's programme closely relates to the domain-specific framework of reference. The framework is an effective and meaningful representation of Earth Sciences and offers enough anchor points for programmes to establish their own objectives. Derived from this framework of reference, the programme has formulated intended learning outcomes. The intended learning outcomes are in line with the Dublin descriptors. The committee confirmed that the intended learning outcomes are in line with this framework and reflect the level and orientation of the bachelor's programme. The committee nevertheless wishes to direct one comment to the bachelor's programme. The intended learning outcomes do not fully cover the intention to prepare students to act and communicate in an international society. The committee advises that several learning outcomes relating to this aspect should be reformulated more precisely, taking into account of the fact that bachelor graduates in Applied Earth Sciences should be able to communicate with society with great sensitivity.

Standard 2: Teaching-learning environment

The bachelor's programme consists of 180 ECTS distributed over three years. The first two years of the programme consist of five different learning lines, which are brought together in the final semester of the third year. These lines consist of the basic sciences (i.e. geology, mathematics, physics, and chemistry) and their integration into the Applied Earth Sciences, along with reporting and societal skills. During the first two years, courses specific to the

Pagina 3 van 9 multidisciplinary domain of Applied Earth Sciences are of an introductory nature. During these years, students become acquainted with the disciplinary sub-domains of applied geology, geophysics and petrophysics, fluid-flow through porous media and the mechanics of porous media, as well as the engineering subdomains of petroleum and reservoir engineering, resource engineering (including mining and processing/metallurgy), and geo-engineering. In the final period of the second year, students participate in a geological field assignment, in which they must synthesise and apply their knowledge, in addition to sharpening their observational skills. In the third year, a minor (30 ECTS) and a thesis project (8 ECTS) are included in the programme. The minor provides the opportunity to study a topic that is completely different from the major of choice.

To lessen the heavy workload that students experienced in the past, improvements to the curriculum have been made. In the improved curriculum, that started this year (2012-2013), physics and mathematics courses are distributed better, and the total study load is more evenly balanced over all teaching periods. In addition, lecturers from the new department of Geosciences & Remote sensing are incorporated, in order to increase their visibility within the programme. The committee concludes that the new curriculum is seen as an improvement, especially in terms of the more logical scheduling of the physics and mathematics courses.

The committee holds the opinion that the old curriculum was composed in a well-developed and structured way and that the new curriculum offers an even more balanced and effective structure. The courses cover the domain of Earth Sciences well and provide bachelor graduates with a good grounding in Applied Earth Sciences. The committee is pleased to observe that in the new curriculum the thesis project is extended to 10 ECTS, although it would prefer 12 ECTS.

The committee is convinced that the curriculum pays sufficient attention to the societal aspects of Applied Earth Sciences but that these societal aspects should be identified more visibly in the programme. Furthermore, the committee suggests that the bachelor's programme should be taught in English. This would attract more students from abroad and provide increased exchange opportunities for their own students.

The committee concludes that the moderate number of students enrolling annually during the last years (47) is a point of concern. It is pleased to note that the number of students doubled in 2012-2013, which can be seen as an encouraging sign.

The committee stresses the importance of improving students' study progress. Of all the bachelors students, 20-25% graduates within four years. The committee noted that in order to improve the success rate, the didactic concept will be changed in several ways per September 2013. Firstly, the total number of contact hours (+/- 800 hours each year) will be reduced per week to allow students more time for self-study. Secondly, more mid-term assessment periods during courses are being introduced in the current programme of 2012-2013 and will remain in the new programme per September 2013. Thirdly, a stronger integration of mathematics, chemistry and physics will be accomplished. The committee questions the didactics and the recent decision to decrease the number of contact hours per week by more self-study. The committee appreciates that self-study is accompanied by more individual-based feedback, but wants to draw attention to the risk that students can squeeze through. The committee strongly supports the introduction of the mid-term assessments.

Pagina 4 van 9 The committee concluded that the programme is provided by motivated lecturers who are both willing and able to pay close attention to the students. It is positive about the research qualities of the lecturers and very positive about the strong connections between master lecturers and industry. The committee further concludes that the educational quality of the lecturers is clearly apparent. However, it suggests that this quality should be further guaranteed, by encouraging lecturers to follow courses and take advantage of the educational desk within the university.

Students receive support from lecturers, a tutor-mentor system and study advisor. Nevertheless, given the slow progress of many students, it seems that some students slip through the net of support. The committee therefore suggests to evaluate the support system and to organise it more proactively and effectively if needed.

The committee noticed that students and staff profit from excellent facilities. The laboratories are equipped in such way that research and educational goals are achieved.

The programme includes fieldwork and practical training. The committee learned that the programme has no legally based safety assurance system for fieldwork. Although the programme has a travel insurance policy and use well written guidelines, the overall legal signature is missing. Responsibilities are not clear and first aid courses are not obligatory. The committee strongly recommends that a safety assurance system should be developed as a matter of urgency, to legally protect faculty, staff and students. The committee suggests that a national system should be developed in cooperation with the other academic Earth Sciences programmes in the Netherlands. Furthermore, the committee advises obligatory first aid courses for both students and lecturers.

Standard 3: Assessment and achieved learning outcomes

The committee has evaluated the assessment system and methods of the bachelor's programme as well as the achievement of intended learning outcomes by students.

The main concern of the committee is the lack of a clear assessment protocol for written exams that guarantees transparency and objectivity. It is therefore pleased to see that the Board of Examiners has already formulated such a protocol and is now in the process of fine-tuning and implementing. Nevertheless, it stresses the urgency of implementing such a system as soon as possible to underpin the grading and content of assignments in an appropriate manner.

For the thesis project, the committee appreciates the appointment of a committee to supervise students during the thesis project. However, it is concerned by the absence of a form that guarantees a transparent and objective grading. The committee has noted that the programme has already started to develop such a form. The committee has formulated several recommendations for this thesis evaluation form, including the use of a standard weighting for individual grading criteria for all students, the inclusion of rubrics and provision of a narrative explanation of the grading.

To assess the achievement of the learning outcomes, the committee reviewed 15 bachelor theses. Based on the theses and the information gathered about progress and success rates, the committee established that the level of the bachelor theses is adequate but not outstanding. The committee holds the opinion that this situation is likely to reflect the small

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Aanbevelingen

De NVAO onderschrijft de aanbevelingen van het panel om

- de kwaliteitszorg van de opleidingen te formaliseren om de kwaliteit en coherentie van het programma te borgen;
- in samenwerking met andere opleidingen een adequaat veiligheidsprotocol voor veldwerk in te stellen zoals in het visitatierapport is omschreven.

Daarnaast wijst de NVAO specifiek op de aanbevelingen van de commissie ten aanzien van het verbeteren van de transparantie en objectiviteit van de toetsing en beoordeling. De commissie verwijst daarbij naar in gang gezette verbeteringen als het opstellen van een toetsplan. De NVAO wijst tevens met nadruk op de aanbeveling van de commissie ten aanzien van het lage rendement van de opleiding, hetgeen in een eerdere visitatie ook tot aanbevelingen heeft geleid. De commissie is daarbij positief over de curriculumherziening maar raadt de opleiding aan de invloed van het nieuwe didactisch concept op de ontwikkeling van studieduur en rendement nauwgezet te monitoren.

De NVAO gaat er vanuit dat de instelling middels haar interne kwaliteitszorg zorgdraagt voor het volgen van de realisatie en effectiviteit van deze maatregelen. In een eerstvolgende beoordeling verwacht de NVAO het resultaat van deze aanpak te kunnen vaststellen.

Ingevolge het bepaalde in artikel 5a.10, derde lid, van de WHW heeft de NVAO het college van bestuur van de Technische Universiteit Delft te Delft in de gelegenheid gesteld zijn zienswijze op het voornemen tot besluit van 26 augustus 2013 naar voren te brengen. Bij e-mail van 16 september 2013 heeft de instelling van die gelegenheid gebruik gemaakt om te reageren. Dit heeft geleid tot een aanvulling in bijlage twee.

De NVAO besluit accreditatie te verlenen aan de wo-bachelor Technische Aardwetenschappen (180 ECTS; variant: voltijd; locatie: Delft) van de Technische Universiteit Delft te Delft. De NVAO beoordeelt de kwaliteit van de opleiding als voldoende.

Dit besluit treedt in werking op 1 januari 2014 en is van kracht tot en met 31 december 2019.

Den Haag, 9 oktober 2013

De NVAO
Voor deze:



Lucien Bollaert
(bestuurder)

Tegen dit besluit kan op grond van het bepaalde in de Algemene wet bestuursrecht door een belanghebbende bezwaar worden gemaakt bij de NVAO. De termijn voor het indienen van bezwaar bedraagt zes weken.

Onderwerp	Standaard	Beoordeling door het panel <i>voltijd</i>
1. Beoogde eindkwalificaties	De beoogde eindkwalificaties van de opleiding zijn wat betreft inhoud, niveau en oriëntatie geconcretiseerd en voldoen aan internationale eisen	V
2. Onderwijsleeromgeving	Het programma, het personeel en de opleidingsspecifieke voorzieningen maken het voor de instromende studenten mogelijk de beoogde eindkwalificaties te realiseren	V
3. Toetsing en gerealiseerde eindkwalificaties	De opleiding beschikt over een adequaat systeem van toetsing en toont aan dat de beoogde eindkwalificaties worden gerealiseerd	V
Eindoordeel		V

De standaarden krijgen het oordeel onvoldoende (O), voldoende (V), goed (G) of excellent (E).
Het eindoordeel over de opleiding als geheel wordt op dezelfde schaal gegeven.

Aangevuld op verzoek NVAO (16 september 2013)

Tabel 1: uitval na 1, 2, en 3 jaar (cumulatief)

Cohort	2005	2006	2007	2008	2009	2010	2011
Uitval na 1jr	17%	16%	19%	7%	19%	23%	23%
Uitval na 2jr	20%	22%	19%	12%	26%	23%	
Uitval na 3jr	26%	29%	28%	14%	26%		

Tabel 2: rendement VWO-instroom (cumulatief)

Cohort	2005	2006	2007	2008	2009
Rendement na 3jr	4%	15%	4%	12%	-%
Rendement na 4jr	24%	26%	12%	24%	
Rendement na 5jr	48%	52%	24%		
Rendement na 6jr	64%				

Tabel 3: rendement totale instroom (cumulatief)

Cohort	2005	2006	2007	2008	2009
Rendement na 3jr	7%	15%	3%	10%	-%
Rendement na 4jr	28%	27%	14%	13%	
Rendement na 5jr	48%	50%	27%		
Rendement na 6jr	66%				

Tabel 4: Docentkwaliteit

Graad	Ma	PhD	BKO
Percentage	10%	90%	10%

Tabel 5: Student-docentratio

Ratio student:docent	21:1
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Tabel 6: Contacturen

Studiejaar	1	2	3
Contacturen	27	23	20

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- Prof. M.A. Herber (chair), professor of Geo-Energy, University of Groningen, the Netherlands;
- Prof. M. Landrø, professor of Applied Geophysics, NTNU Trondheim (Norwegian University of Science and Technology), Norway;
- Prof. J.W. Hopmans, professor of Vadose Zone Hydrology, University of California (Davis), USA;
- Prof. Emeritus D.E. Walling, hydrologist/geomorphologist, University of Exeter, UK;
- Drs. R.L. Prenen, Msc, independent educational advisor;
- M.M. Cazemier MSc (student member), master's graduate of Earth Sciences, Hydrology and Water Quality, Wageningen University.

Het panel werd ondersteund door dr. Willemijn van Gastel, secretaris (gecertificeerd).