



NVAO  THE NETHERLANDS

PEER REVIEW NEW PROGRAMME
ACADEMIC MASTER
ENVIRONMENTAL ENGINEERING
Delft University of Technology

SUMMARY REPORT
21 March 2022



1 Peer Review

The quality of a new programme is assessed by means of peer review. A panel of independent peers including a student reviews the plans during a site visit to the institution. A discussion amongst peer experts forms the basis for the panel's final judgement and the advisory report. The focus is on the curriculum, the teaching and learning environment, and student assessment.

The Accreditation Organisation of the Netherlands and Flanders (NVAO) takes a formal decision on the quality of the new programme based on the outcome of the peer review. This decision can be positive, conditionally positive or negative. Following a positive NVAO decision with or without conditions the institution can proceed to offer the new programme. Upon completion of the programme graduates are entitled to receive a legally accredited degree.

This summary report contains the main outcomes of the peer review. A full report with more details including the panel's findings and analysis is also available. NVAO bases an accreditation decision on the full report.

Both the full and summary reports of peer reviews are published on NVAO's website www.nvao.net. There you can also find more information on NVAO and peer reviews of new programmes.

Because of COVID-19 temporary measures apply for this peer review.

2 Panel

Peer experts

1. Prof. dr. Wim Hafkamp (chair)
Hoogleraar Milieukunde, Erasmus School of Social and Behavioral Sciences, Erasmus University Rotterdam
2. Prof. ir. Hans van Dijk
Commissaris van NV Waterleidingbedrijf Limburg WML
3. Prof. dr. Paolo Burlando
Professor of Hydrology and Water Resources Management, Swiss Federal Institute of Technology (ETH Zurich), Zurich, Switzerland
4. Ir. Wietske Rem
Recently graduated Master Mechanical Engineering, University of Twente

Assisting staff

- Yulia Krijthe Ed.M., MA, secretary
- Lotte Ninaber van Eijben, NVAO policy advisor and process coordinator

Site visit (online)

Delft, 28 January 2022

3 Outcome

The NVAO approved panel reaches a positive conclusion regarding the quality of the academic master Environmental Engineering offered by Delft University of Technology (TU Delft).

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The TU Delft MSc programme in Environmental Engineering (ENV) has evolved from the MSc tracks Water Management and Environmental Engineering offered in the current master programmes of Civil Engineering and Applied Earth Sciences. The programme clearly answers to a call from academia and industry for interdisciplinary engineers who can execute research in the field of environmental science and create sustainable solutions for problems related to environmental challenges. Representatives of the professional field whom the panel spoke to echoed this call. The panel ascertains that the ambition to educate adaptive and socially involved environmental engineers is a distinctive character of the programme. The panel advises the programme to refine its professional profile to tie it in with the programme's international orientation. The panel considers that the intended learning outcomes are sufficiently concrete and coherently formulated in line with the profile and orientation.

The panel considers that the didactic approach is well developed and viable. The programme creates diverse opportunities for collaborative learning such as modules' practical assignments, cross-over modules and inter- and multidisciplinary projects. The problem- and project-based learning facilitates the integration and application of acquired knowledge, understanding and multidisciplinary skills in the context of environmental challenges. Students conclude the programme with a master thesis, which can be carried out at TU Delft, research institutes or companies in the Netherlands or abroad. The programme thus offers many opportunities for interaction with industry, academia and/or participation in the (inter)national R&D and engineering community.

The design and content of the programme are well thought through: modules address current and relevant issues, and the option to specialise in one of the three tracks befits the relatively broad influx of students. The panel concludes that the curriculum structure is coherent. The combination of core and electives modules, the flexibility through learning and inter- and multidisciplinary projects, overall, reflect the distinctive character of the ENV programme. The panel has established that the curriculum content adequately reflects the ENV vision and enables students fully to achieve a broad skill set of the envisioned graduate profile. The MSc ENV offers three specialisations or tracks intended to deepen the knowledge of students in a sub-field related to the domains of water resources, resource and waste and atmospheric sciences. The programme is supported by adequate facilities and elaborate student counselling services; they all create a conducive learning environment for students. The panel acknowledges that the staff have an array of broad educational and engineering expertise enabling them to realise the curriculum in the offered tracks; they are clearly committed to the success of the programme.

The ENV programme applies a varied mix of assessment forms and methods to evaluate students' academic knowledge, transferable skills, and professional attitude. However, it has remained uncertain how the programme guarantees assessment of the individual contribution through the portfolio aimed to facilitate a student's path to become an environmental engineer professional. The panel is positive about the provided assessment programme and the quality of assessments that are safeguarded by active and well-qualified committees in place.

The programme is proposed to have a duration of two years with the study load of 120 European Credits. The arguments of the programme management for this duration lie in the (inter)national engineering standards, as well as in the elaborate content of the curriculum with respect to required knowledge, skills, research, and engineering experience. The panel agrees that the qualifications graduates should have for them to be competitive in the (inter)national job market are unachievable in a programme of shorter than two years. The panel supports the programme management arguments and advises to grant the programme the right to offer a two-year master programme (120 EC).

In conclusion, the panel is convinced of the quality of the proposed programme and trusts the TU Delft MSc Environmental Engineering will be a robust, academically feasible programme.

4 Commendations

The programme is commended for the following features of good practice.

1. Professional vision and orientation – This TU Delft master programme has a novel orientation in Environmental Science and Technology towards training environmental engineers able to develop scientific approaches and sustainable engineering solutions for environmental challenges. The programme strives to educate adaptive and socially involved engineering professionals in this regard.
2. Nascent discipline profiles – The programme aspires to educate environmental engineers with well-developed, multidisciplinary practical skills, who can become specialists in the chosen nascent disciplinary profile attained through the education in Water Resources Engineering, Resource and Waste Engineering or Atmospheric Environmental Engineering.
3. Programme Learning Outcomes - The intended learning outcomes constitute a coherent set of learning outcomes that reflect the programme's ambitions for both scientific approaches and engineering solutions for environmental challenges and tie in with the TU Delft and Faculty CEG visions on education.
4. Rigorous curriculum structure - The curriculum is designed around clear and solid learning outcomes, which develop from consolidated academic strengths and incorporate project- and problem-based teamwork, with the purpose of broadening and enriching the students' learning experience as well as balancing disciplinary with inter-, multidisciplinary knowledge and skills.
5. Collaborative effort - The development of the programme is a truly collaborative effort by highly qualified teaching staff and programme management. The programme staff are committed to delivering a robust and academically feasible programme and have developed into a close-knit community that is very supportive of this master programme.
6. Student ownership of learning– The programme offers students a good degree of flexibility in shaping their individual learning trajectories and personal profiles of future environmental engineers. Students are trained to work in complex, inter- and multidisciplinary environments and have a generally varied elective programme enabling to expand their knowledge and skills through in-depth and cross-over modules, or study experience abroad or work placement.

5 Recommendations

For further improvement to the programme, the panel recommends a number of follow-up actions.

1. Intake and selection procedure – Carefully reassess the criteria and prior knowledge background applied in the intake for the intended target groups and selection procedure for students who are not directly admissible to the programme.
2. International orientation – Refine the programme’s ambitions in relation to the international orientation and incorporate them explicitly in the intended learning outcomes and curriculum.
3. Track Interconnectivity – Ensure that the interconnection between the three tracks is fully developed throughout the curriculum, teaching methods and assessment thus optimising student ownership of learning.
4. Curriculum Content - Secure that the latest know-how and new staff expertise keep finding their way into the curriculum, particularly in the nascent tracks of Resource and Waste Engineering and Atmospheric Environmental Engineering.
5. Portfolio Assessment – Bring into uniformity the assessment criteria and levels of attainment of the learning outcomes. Ensure rigor and alignment among teaching staff during the portfolio guidance.

6 What comes next?

NVAO grants initial accreditation to a new programme on the basis of a panel’s full report. The decision is valid for a maximum of six years. For conditional accreditation other regulations apply. Upon accreditation the new programme will follow the NVAO review procedures for existing programmes. NVAO publishes the accreditation decision together with the full report and this summary report.¹

Each institution has a system of quality assurance in place ensuring continuous follow-up actions and periodic peer-review activities. Peer reviews help the institution to improve the quality of its programmes. The progress made since the last review is therefore taken into consideration when preparing for the next review. The follow-up activities are also part of the following peer-review report. For more information, visit the institution’s website.²

¹ <https://www.nvao.net/nl/besluiten>

² <https://www.tudelft.nl/>

7 Summary in Dutch

Het panel oordeelt positief over de kwaliteit van de wo-master Environmental Engineering van de Technische Universiteit Delft. Dit is de uitkomst van de kwaliteitstoets uitgevoerd door een panel van *peers* op verzoek van de Nederlands-Vlaamse Accreditatieorganisatie (NVAO). Voor deze beoordeling heeft het panel gesprekken gevoerd met de opleiding op 28 januari 2022.

De masteropleiding Environmental Engineering heeft een uitdagend en inspirerend programma uitgewerkt, dat voorbereid op een scala aan banen in de milieuwetenschap en -techniek. Bij de ontwikkeling van de opleiding waren diverse stakeholders betrokken, waaronder studenten, alumni en vertegenwoordigers uit het werkveld. Het panel adviseert de opleiding om de internationale oriëntatie binnen het professionele profiel in meer detail te beschrijven, en deze expliciet in de beoogde leerresultaten en het curriculum te verwerken.

Het panel vindt het positief dat de opleiding focust op het brede vakgebied van milieuwetenschap en een nieuw perspectief op milieuwetenschap en -techniek biedt: het opleiden van milieu-ingenieurs die in staat zijn om wetenschappelijke benaderingen en duurzame technische oplossingen voor milieu-uitdagingen te ontwikkelen. Ook verwelkomt het panel het opleiden van adaptieve en sociaal betrokken technische professionals.

Het panel vindt de curriculumstructuur over het algemeen duidelijk en samenhangend. Het verplichte deel van het curriculum, inclusief het afstudeerprogramma, is goed ontwikkeld. De opleiding biedt drie specialisaties aan die bedoeld zijn om de kennis van een subdiscipline, gerelateerd aan het gekozen milieudomein, verder uit te diepen. Het programma creëert diverse mogelijkheden voor samenwerkend leren, waaronder praktische opdrachten, cross-over modules en inter- en multidisciplinaire projecten.

De master opleiding Environmental Engineering heeft voldoende faciliteiten en uitgebreide studiebegeleiding die een bevorderlijke leeromgeving creëren voor studenten. Het panel heeft vastgesteld dat het onderwijs wordt verzorgd door vakinhoudelijk gedreven docenten. Het panel beveelt aan dat de meest recente knowhow en de expertise van nieuwe docenten hun weg naar het curriculum blijven vinden.

Het panel is positief over het systeem van toetsing en de kwaliteit van de beoordelingen, die wordt geborgd door actieve en deskundige interne commissies. De opleiding past verschillende toetsingsvormen toe om de academische kennis, overdraagbare vaardigheden en professionele houding van studenten te beoordelen. Het was echter niet helemaal duidelijk hoe het programma de beoordeling van de individuele bijdrage via het portfolio garandeert. Daarom verzoekt het panel de beoordelingscriteria en de leerresultaten op elkaar af te stemmen, en om tijdens de portfoliobegeleiding voor een goede afstemming tussen de docenten te zorgen.

De TU Delft stelt voor dat de opleiding een studieduur van twee jaar heeft (120 EC). Het panel adviseert om de opleiding het recht te geven om een tweejarig masterprogramma aan te bieden, rekening houdend met de breedte en complexiteit van het curriculum.

Meer informatie over de NVAO-werkwijze en de toetsing van nieuwe opleidingen is te vinden op www.nvao.net. Voor informatie over de Technische Universiteit Delft verwijzen we naar de website van de instelling.³

Als gevolg van de beperkende omstandigheden door COVID-19 geldt voor deze kwaliteitstoets een tijdelijke procedure.

³<https://www.tudelft.nl/>

The summary report was written at the request of NVAO and is the outcome of the peer review of the new programme academic master Environmental Engineering of Delft University of Technology

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