



NVAO • THE NETHERLANDS

INITIAL ACCREDITATION

ACADEMIC MASTER

DATA SCIENCE AND ARTIFICIAL
INTELLIGENCE TECHNOLOGY

TU Delft

SUMMARY REPORT

11 DECEMBER 2023

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.

2 Panel

Peer experts

- Prof. dr. ir. Arend Rensink (chair), Professor in Software Modelling, Verification and Transformation, University of Twente;
- Prof. dr. Lejla Batina, Professor in Digital Security and Director of Education, Institute for Computing and Information Science, Radboud University, Nijmegen;
- Dr. rer-nat. Dirk Fahland, Associate Professor in Process Analytics on Multi-Dimensional Event Data of the Analytics for Information Systems group, Eindhoven University of Technology;
- Sven Goessens (student member), Student (Pre) Master Data Science & Society, Tilburg University.

Assisting staff

- Erik van der Spek MA, secretary
- Michèle Wera MA, NVAO policy advisor and process coordinator

Site visit

Delft, 8 November 2023

3 Outcome

The NVAO approved panel reaches a positive conclusion regarding the quality of the master's programme Data Science and Artificial Intelligence Technology (DSAIT) offered by TU Delft.

The new master's programme DSAIT of TU Delft aims to train students to be technical professionals, who can responsibly engineer AI solutions. The programme has shown a specific and concrete focus on data-driven AI systems. It also shows a clear vision on intelligent software and on the needs of the professional field. The learning objectives are clearly described and show that the students acquire knowledge and competences at a master's level. The professional field has been closely involved in the development of the programme.

The panel has established that the programme has a clear and coherent curriculum. It consists of a core of five mandatory courses and an elective part where the students focus on two content areas (called DSAIT themes) in which they specialize. The panel approves of the freedom of choice this setup offers but warns about the logistical challenge that programming all possible combinations may cause. Real-life challenges are included in the programme; according to the panel, this is one of the strong points in the curriculum. These challenges offer opportunities to explore the contributions of data science and AI in solving actual problems; The programme culminates in an extensive (45 EC) research and thesis project, that may also be done at a company.

The teaching staff of the new programme stands out for their experience and expertise. TU Delft aims to improve diversity among the staff, for instance by offering high-profile tenure track positions to top female scientists. However, gender diversity in the student population is an issue. The panel established that gender is not properly addressed at the entry level. A communication strategy that is geared towards diversity issues might be helpful as well. The panel recommends the programme to get professional advice on how to tackle this issue.

The panel established that both the assessment framework and the assessment plans for the individual courses are satisfactory. The Individual Exam Programme allows for tailor-made assessment. Some improvement might be achieved in finetuning the rubrics and communicating them clearly to the staff and students.

Finally, the panel supports the choice of the programme for a duration of two years (120 EC). This duration is deemed necessary to achieve the intended learning outcomes. Also, the two-year duration aligns with most other technical master's programmes, both in The Netherlands and abroad.

4 Commendations

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

1. **Clear vision:** the programme has shown a specific and concrete focus on data-driven AI systems with a clear vision on intelligent software and on the needs of the professional field.
2. **Coherent curriculum:** the curriculum is well structured with both a solid base of core courses and a number of electives in which the students can follow their own interest.
3. **Detailed and clear assessment plans:** the assessment framework is detailed, the programme offers clear grading criteria, and the quality assurance of the student assessment is well designed.

4. **Involvement professional field:** the contributions of the Industrial Advisory Board and other representatives of the professional field have contributed to a programme that is closely aligned with the practical needs of companies and organizations in the field of AI and data science.
5. **Real-life challenges,** largely supplied by the professional field, allows students to discuss and evaluate real-world problems and to explore how data science and AI can contribute to solving these problems.
6. **Emphasis on ethics:** The programme is aware of the importance of ethics and responsibility when working with AI and gives these topics a firm place in the curriculum.

5 Recommendations

For further improvement to the programme, the panel recommends follow-up actions on the following aspects:

1. **Gender diversity:** seek professional advice on how to better adhere to TU Delft's diversity policy, particularly in addressing the gender issue at the entry level.
2. **Logistical challenges:** address the logistical challenge of executing the programme with reference to scheduling all combinations of theme courses and aligning (anticipated) student interests in specialized subjects and graduation projects with available capacity.
3. **Deepening electives:** expand the offer of deepening electives, since in the current situations the options are somewhat limited (with only three courses listed explicitly).

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/en/>

7 Summary in Dutch

Het panel oordeelt *positief* over de kwaliteit van de wo-master Data Science and Artificial Intelligence Technology van TU 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 op 8 november 2023 gesprekken gevoerd met de opleiding.

De nieuwe masteropleiding Data Science and Artificial Intelligence Technology (DSAIT) van de TU Delft heeft als doel studenten op te leiden tot technische professionals die op verantwoorde wijze AI-oplossingen kunnen ontwikkelen. Het programma richt zich op datagedreven AI-systemen en heeft een duidelijke visie op intelligente software en op de behoeften van het werkveld. De leerdoelen zijn helder omschreven en laten zien dat de studenten kennis en competenties verwerven op masterniveau. Het werkveld is nauw betrokken geweest bij de ontwikkeling van het programma.

Het panel heeft vastgesteld dat de opleiding een helder en samenhangend curriculum heeft. Dit bestaat uit een kern van vijf verplichte vakken en een keuzedeel waarin de studenten zich specialiseren in twee thema's. Het panel is positief over de keuzevrijheid die deze opzet biedt, maar waarschuwt de opleiding voor de logistieke uitdaging die het inroosteren van alle mogelijke combinaties met zich mee kan brengen.

Real-life problemen maken deel uit van het programma en bieden studenten de kans om te verkennen hoe data science en AI kunnen bijdragen aan de oplossing hiervan; volgens het panel is dit een van de sterke punten van het curriculum. Het programma wordt afgerond met een uitgebreid (45 EC) onderzoeks- en afstudeerproject, dat ook bij een bedrijf kan worden uitgevoerd.

De docenten van de nieuwe opleiding zijn ervaren en deskundig. De TU Delft streeft naar meer diversiteit onder het personeel, bijvoorbeeld door de benoeming van topvrouwen op belangrijke posities. De genderdiversiteit binnen de studentenpopulatie behoeft echter verbetering. Het panel stelt vast dat gender niet goed aan de orde komt tijdens de werving- en instroomprocedure. Een communicatiestrategie die meer gericht is op diversiteit zou kunnen helpen. Het panel raadt de opleiding aan om professioneel advies in te winnen over de aanpak van deze kwestie.

Het panel is van mening dat zowel het toetsingskader als de toetsplannen voor de individuele vakken voldoen. Studenten stellen een Individueel Examen Programma op, wat een beoordeling op maat mogelijk maakt. Enige verbetering zou kunnen worden bereikt in het verfijnen van de rubrics van het afstudeerproject en het duidelijk communiceren ervan naar de docenten en studenten.

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

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 master's programme Data Science and Artificial Intelligence Technology of TU Delft.

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