M Offshore and Dredging Engineering
TU Delft

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Project code P2321

Contents

Summary

Standard 1. Intended learning outcomes

Based on the reviewed documents and discussions during the site visit, the panel concludes that the master's programme Offshore and Dredging Engineering has a well-defined profile, equipping students with in-depth technical expertise as well as professional and personal skills focused on the sustainable use of resources and space within the ocean ecosystem. The panel appreciates the uniqueness of the programme, its strong embedding in the Dutch offshore industry, and its high relevance to future challenges. In addition, it is positive about the recent revision of the programme, which includes a strong emphasis on sustainability. Furthermore, the programme is very attentive to contemporary academic and societal questions, due to its strong connections with the professional and societal field. The panel considers the ILOs to be appropriate to an academic master's level and in alignment with expectations in the academic and professional field.

Standard 2. Teaching-learning environment

The panel considers the curriculum to be well-structured and coherent. The curriculum covers all ILOs and provides students with a comprehensive foundation in offshore and dredging, thus offering a unique Dutch programme for the international industry. The panel is positive about the new, clear structure of the interdisciplinary programme, which has led to a more balanced workload. In addition, it appreciates the integration of learning lines in the curriculum, as well as the attention to ethics and reflective skills. The panel appreciates the synergy among various disciplines and recognizes how the new curriculum enhances this collaboration. At the same time, the panel encourages an evaluation of the programme redesign and emphasizes the importance of keeping incoming students well-informed about any curriculum changes.

The panel appreciates how the curriculum is continuously updated in response to developments in the professional and academic fields. In general, there is a need for improved monitoring through the PDCA (Plan-Do-Check-Act) cycle, particularly in relation to the connection with the ILOs. To facilitate this process, the panel believes that the role of programme directors could be strengthened. While it values the formal and informal evaluation of courses, the panel is of the opinion that more attention could be paid to data driven evaluation and providing feedback on students' feedback.

The panel is positive about the student-centred learning environment, providing opportunities for the development of an academic community, and the active role of the study association. The courses offer varied teaching methods, with a focus on collaborative learning and (multi- and interdisciplinary) project-based education, and an appropriate balance between theoretical knowledge and practical skills. The panel highlights the importance of keeping a focus on AI in the programme. Student awareness could be increased by (further) integrating AI into teaching. The panel appreciates the interdisciplinary focus of the programme, including the Joint Interdisciplinary Project (JIP). The strong ties of the programme with the industry provide students with enriching learning opportunities. According to the panel, students are well-supported throughout the programme, with staff and management actively engaged in this effort. The panel concludes that all students receive adequate guidance and support. Furthermore, the admission criteria, the information provided to students, and the facilities available for students with disabilities are all satisfactory.

The panel considers the curriculum of the programme to be feasible, although it encourages the programme to pay further attention to the study duration, building upon the progress made in recent years. In this context, the panel appreciates the introduction of a progress monitoring system. Additionally, the panel recommends closely monitoring the workload for each course.

The panel is impressed with the quality and enthusiasm of the teaching staff of the programme, who come from a variety of (international) backgrounds. They are all pedagogically qualified and are experts in their field, covering the academic scope of the programme. All staff members engage in research and have strong connections with the professional and societal field through their research activities. In addition, the panel appreciates that lecturers value personal contacts with students; they are easily accessible and are dedicated and responsive towards students. Furthermore, the programme seeks to enhance collaboration among teachers and mutual curriculum development through various activities.

The English-taught programme is internationally oriented, which is reflected in the international community of students and staff. According to the panel, the choice of an English name and language of instruction is well substantiated and aligns well with the international nature of the professional and academic field.

Standard 3. Student assessment

The panel concludes that the assessment system is transparent and well designed. Adequate procedures, such as the four-eyes principle, are in place to ensure and enhance the quality of assessment. The assessment methods used are diverse and appropriate, and include assessment of skills. Amongst others, the panel appreciates the attention for constructive alignment, the standard rubrics for the literature research and MSc thesis, and the support offered by ESA. In addition, the panel appreciates the programme's evolution towards formative feedback, as well as the introduction of an individual reflection portfolio, supporting students in shaping their individual learning objectives. It supports the programme management's efforts to include various forms of (formative) assessment that emphasize student development, including their attitudes. The panel encourages the programme to calibrate more often regarding thesis assessment, to promote consistency.

The graduation project covers all ILOs of the programme at an individual level. The panel appreciates the set-up of the thesis project and the way it is evaluated according to uniform assessment criteria, set out in a clear rubric. The panel considers the assessment procedure to be well thought out and the grades awarded to be sufficiently substantiated. It is positive about the industry's role in accommodating theses. As for the duration of the graduation project, the panel encourages the programme to streamline processes and ensure consistency across supervisors, while pursuing stricter adherence to the thesis rubrics and guidelines. According to the panel, establishing a clear timeline and providing more intensive guidance would help students successfully finish their thesis within 7 months.

According to the panel, the Board of Examiners proactively contributes to the quality of assessment in the programme. It has a clear task and safeguards the quality of the assessment in the programme in various ways, including the continuous evaluation of the quality of examinations.

Standard 4. Achieved learning outcomes

Based on the examination of a selection of 15 theses from the programme, the panel concludes that the level of the theses is appropriate for an academic master's programme. The theses cover various topics, reflecting the broad scope of the programme, and demonstrate the achievement of the ILOs. The documentation and interviews show that alumni are generally content with the programme and are well prepared to perform successfully in the professional field in the Netherlands and abroad.

Score table

The panel assesses the programmes as follows:

Master's programme Offshore and Dredging Engineering

Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	positive

Prof. dr. ir. Tine Baelmans, chair

Carlijn Braam MA, panel secretary

Date: 13 March 2025

Introduction

Procedure

Assessment

On 5, 6 and 7 November 2024, the bachelor's programmes Mechanical Engineering and Marine Technology of the TU Delft, and the master's programmes Mechanical Engineering, Marine Technology, Offshore and Dredging Engineering, and Materials Science and Engineering were assessed by an independent peer review panel as part of the cluster assessment Mechanical Engineering. The assessment cluster consisted of 12 programmes, offered by the University of Twente, the University of Groningen, the TU Delft and the TU Eindhoven. The assessment followed the procedure and standards of the NVAO Assessment Framework for the Higher Education Accreditation System of the Netherlands (April 2024).

Quality assurance agency Academion coordinated the assessment upon request of the cluster Mechanical Engineering. Peter Hildering acted as coordinator and panel secretary. Yannick Slagter and Carlijn Braam also acted as secretaries in the cluster assessment. They have been certified and registered by the NVAO. Carlijn Braam acted as panel secretary in the site visit of the TU Delft.

Preparation

Academion composed the peer review panel in cooperation with the institutions and taking into account the expertise and independence of the members as well as consistency within the cluster. On 27 June 2024, the NVAO approved the composition of the panel. The coordinator instructed the panel chair on her role in the site visit according to the Panel chair profile (NVAO 2016).

The programmes composed a site visit schedule in consultation with the coordinator (see appendix 3). The programmes selected representative partners for the various interviews. They also determined that the development dialogue would be made part of the site visit. A separate development report was made based on this dialogue.

The master's programme Offshore and Dredging Engineering provided the coordinator with lists of graduates over the period between September 2021 and August 2024. In consultation with the coordinator, the panel chair selected 15 theses of the programme. They took the diversity of final grades and examiners into account, as well as the various tracks. This included eleven theses from the single degree track Offshore and Dredging Engineering, and four theses from the dual degree track Offshore Renewable Engineering. Prior to the site visit, the programme provided the panel with the theses and the accompanying assessment forms. They also provided the panel with the self-evaluation report and additional materials (see appendix 4).

The panel members studied the information and sent their findings to the secretary. The secretary collected the panel's questions and remarks in a document and shared this with the panel members. In a preliminary meeting, the panel discussed the initial findings on the self-evaluation reports and the theses, as well as the division of tasks during the site visit. The panel was also informed of the assessment framework, the working method and the planning of the site visits and reports.

Site visit

During the site visit, the panel interviewed various programme representatives (see appendix 3). The panel also offered students and staff members an opportunity for confidential discussion during a consultation

hour. No consultation was requested. The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the panel chair publicly presented the preliminary findings.

Report

The secretary wrote the draft reports based on the panel's findings and submitted them to the coordinator for peer assessment. Subsequently, the secretary sent the reports to the panel for feedback. After processing this feedback, the secretary sent the draft reports to the programmes in order to have them checked for factual irregularities. The secretary discussed the ensuing comments with the panel chair and changes were implemented accordingly. The panel then finalized the reports, and the coordinator sent them to the Faculty of Mechanical Engineering and the TU Delft.

Panel

The following panel members were involved in the cluster assessment:

- Prof. dr. ir. M. (Tine) Baelmans, full professor at the Department of Mechanical Engineering of the KU Leuven (Belgium) [chair];
- Prof. dr. S. (Sören) Östlund, professor of Packaging Technology at the KTH Royal Institute of Technology (Sweden);
- Drs. J.J. (Jan) Steen, independent educational consultant;
- Prof. dr. A. (Atul) Bhaskar, professor in Applied Mechanics at the Department of Mechanical Engineering of the University of Sheffield (United Kingdom);
- Prof. dr. E. (Eilif) Pedersen, professor in Marine Technology at the Department of Marine Technology of the Norwegian University of Science and Technology (Norway);
- Prof. dr. D.J. (Daniel) Rixen, professor in Applied Mechanics at the Technische Universität München (Germany);
- Prof. dr. A.S.J. (Akke) Suiker, professor in Applied Mechanics at the Department of the Built Environment of the TU Eindhoven;
- Prof. dr. K. (Kari) Tammi D.Sc., Lic.Sc., M.Sc., professor in Design of Mechatronic Machines at Aalto University (Finland);
- T.W.C. (Thijs) Haartmans BSc., master's student Mechanical Engineering at the TU Eindhoven [student member];
- M.A. (Maartje) Janszen BSc., master's student Mechanical Engineering at the TU Delft [student member].

The panel assessing the bachelor's programmes Mechanical Engineering and Marine Technology and the master's programmes Mechanical Engineering, Marine Technology, Offshore and Dredging Engineering, and Materials Science and Engineering at the TU Delft consisted of the following members:

- Prof. dr. ir. M. (Tine) Baelmans, full professor at the Department of Mechanical Engineering of the KU Leuven (Belgium) [chair];
- Prof. dr. S. (Sören) Östlund, professor of Packaging Technology at the KTH Royal Institute of Technology (Sweden);
- Drs. J.J. (Jan) Steen, independent educational consultant;
- Prof. dr. E. (Eilif) Pedersen, professor in Marine Technology at the Department of Marine Technology of the Norwegian University of Science and Technology (Norway);
- Prof. dr. D.J. (Daniel) Rixen, professor in Applied Mechanics at the Technische Universität München (Germany);
- Prof. dr. A.S.J. (Akke) Suiker, professor in Applied Mechanics at the Department of the Built Environment of the TU Eindhoven;

- T.W.C. (Thijs) Haartmans BSc., master's student Mechanical Engineering at the TU Eindhoven [student member].

All panel members, the secretary and the institution have signed a statement on impartiality and can confirm that the assessment was carried out in complete independence.

Information on the programme

Name of the institution:	TU Delft
BRIN-number:	21PF
Address:	Postbus 5, 2600 AA Delft
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	M Offshore & Dredging Engineering
ISAT number:	60178
Level:	Master
Orientation:	Academic
Number of credits:	120 EC
Specializations or tracks:	Offshore & Dredging Engineering Offshore Renewables Engineering (dual degree with NTNU (Norway))
Location:	Delft
Mode(s) of study:	Fulltime
Language of instruction:	English
Awarded degree:	MSc.
Submission date NVAO:	1 May 2025

Description of the assessment

Organization

The master's programme Offshore and Dredging Engineering (ODE) is provided by the Faculty of Mechanical Engineering (ME) of Delft University of Technology (TUD). This faculty also offers the bachelor's and master's programmes Mechanical Engineering, the bachelor's and master's programmes Marine Technology and the master's programme Materials Science and Engineering, which are all being assessed in this cluster assessment. The ODE programme is delivered by the ME faculty in collaboration with the Faculty of Civil Engineering and Geosciences (CEG) and contributes to the European Wind Energy Master (EWEM), which is an international double-degree programme. ODE contributes to the Offshore Engineering track of EWEM, which is organized as a dual degree with the Norwegian University of Science and Technology (NTNU). At Delft, this track is known under the name Offshore Renewables Engineering. The ME faculty also offers the bachelor's and master's programmes Technical Medicine and the master's programmes Biomedical Engineering, Robotics and Systems and Control Engineering. Until January 2024, the faculty was known as the Faculty of Mechanical, Maritime, and Materials Engineering (3mE). The new faculty name encompasses the scope and content of all research, application and education disciplines, thus strengthening cohesion in the faculty.

Recommendations previous accreditation panel

The last formal external assessment of the master's programme Offshore and Dredging Engineering of the TUD took place in December 2018. In the self-evaluation report of the current assessment, the programme described the actions undertaken in response to the recommendations. Also, several improvements were discussed in the interviews during the site visit. The improvements include a re-design of the vision on the programme, the exit qualifications and the curriculum, with standardized course sizes and balanced methods of assessment, as well as prioritizing the professional training of the teaching staff. The panel concludes that the recommendations have been seriously acted upon by the programme and is generally satisfied with the improvement measures taken.

Standard 1. Intended learning outcomes

The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings

Profile

The master's programme Offshore and Dredging Engineering (ODE) aims to cultivate offshore and dredging engineers who not only excel in technical proficiency but also possess a deep understanding of societal needs and environmental responsibility. The programme focuses on the sustainable utilization of resources and space within the ocean environment, emphasising the responsible extraction of energy and materials in accordance with multiple United Nations Sustainable Development Goals. This necessitates a system perspective. The ODE programme integrates multiple academic disciplines, with a student population and teaching staff drawn from civil, maritime, and mechanical engineering. The programme's emphasis is on the comprehensive aspects of designing, installing, operating, and maintaining offshore renewable energy systems. Significant advancements in offshore and dredging engineering present new opportunities for sustainable energy production offshore. To navigate these complex challenges, graduates need to be equipped for leadership roles in highly dynamic techno-societal systems. Therefore, the programme

promotes a culture of innovation and collaboration. It aims to provide students with a diverse skill set, combining technological knowledge with professional competences and effective personal attributes. This includes the ability to reflect on their own role within multidisciplinary teams and communicate effectively with both technical and non-technical audiences. The MSc ODE programme is unique in the Netherlands. Within TUD, the ODE programme shares interfaces with the master programmes Civil Engineering, Marine Technology and Mechanical Engineering.

The panel appreciates the uniqueness of the established programme, its strong historical embedding in the Dutch offshore industry and expertise, and its high relevance to future economic and environmental challenges. The programme has recently undergone a significant revision that is in the process of implementation. The resulting objectives, vision, and profile are aligned with a modern direction, as noted by the panel. This approach takes into account advancements in both technical fields and teaching, while also incorporating a clear vision for sustainability as a key aspect. Students informed the panel that they value the broadness of the programme and its focus on renewable energy. Through hands-on projects, fieldwork and industry collaborations, students gain valuable experience and develop the skills needed to succeed in their future careers. In-depth knowledge of the technical-core disciplines geotechnical engineering, hydromechanics, structural and mechanical engineering is highly valued by the industry.

The intake of students in the MSc ODE programme fluctuates between 48 and 61 per year in recent years. With the redesign of the programme, the ambition is to grow towards an annual intake of 80-100 students. The panel appreciates the efforts being made to increase the student influx. In 2023-2024, international students account for around 25% and female students for 17% of the overall enrolment. Although other programmes can attract more female students, the panel considers these figures to reflect an acceptable representation of female and international students, given the continuous efforts by the programme management in this area.

The programme clearly stimulates students to become well-trained professionals and to be adequately prepared to conduct research at PhD level. The panel values the level of self-reflection of the programme. According to the panel, the programme is highly responsive to developments in the dynamic field and contemporary academic and societal debates. The programme is well-connected to the professional field, facilitated by numerous interactions in the context of guest lectures, graduation projects, (interdisciplinary) projects, and career-related events. Further alignment with the field is pursued through the Industrial Advisory Board, which is shared with the MSc Marine Technology. The panel was pleased to learn that the Advisory Board is actively involved in the development of the programme and advises them on developments within the domain as well as the needs of society and the professional field that are relevant to the content of the programme. The professional field representatives that the panel interviewed generally feel that their input is taken into account, and indicated that they value the mutual exposure.

Intended learning outcomes
The final qualifications of the programme are based on the Meijer's Criteria for 4TU programmes, which cover the Dublin descriptors. These criteria are defined in terms of seven broad competence areas, namely: 1) Competence in one or more scientific disciplines, 2) Competence in conducting research, 3) Competence in designing, 4) Scientific approach, 5) Basic intellectual skills, 6) Competence in cooperating and communicating, and 7) Consideration of the temporal and social context.

The final qualifications of the programme have recently been updated, guided by the Meijer's criteria, to incorporate the new vision on the programme and to enhance their specificity and measurability. In the new curriculum, the integration of the final qualifications has been improved; all final qualifications are

addressed in multiple courses throughout the first year of the curriculum. The panel considers the ILOs to be well-defined and appropriate for the academic master's level. They are formulated in accordance with the Dublin Descriptors and the domain-specific framework, and cover all relevant aspects of the master's programme. The panel also appreciates the clear integration of the Sustainable Development Goals in the ILOs.

Considerations

Based on the reviewed documents and discussions during the site visit, the panel concludes that the master's programme Offshore and Dredging Engineering has a well-defined profile, equipping students with in-depth technical expertise as well as professional and personal skills focused on the sustainable use of resources and space within the ocean ecosystem. The panel appreciates the uniqueness of the programme, its strong embedding in the Dutch offshore industry, and its high relevance to future challenges. In addition, it is positive about the recent revision of the programme, which includes a strong emphasis on sustainability. Furthermore, the programme is very attentive to contemporary academic and societal questions, due to its strong connections with the professional and societal field. The panel considers the ILOs to be appropriate to an academic master's level, and in alignment with expectations in the academic and professional field.

Conclusion

The panel concludes that the master's programme Offshore and Dredging Engineering meets standard 1.

Standard 2. Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings

Curriculum

The **MSc ODE programme** consists of 120 EC and is offered as a fulltime two-year English language programme, structured into eight quarters of 15 EC. Up to 2022-2023, the curriculum consisted of a programme core featuring several introductory courses, as well as specialization courses and elective courses. In addition, the students needed to make a mandatory choice between an individual research exercise and a project-based course on offshore renewable energy, and had to elect one course on ethics, offered by the faculty of Technology, Policy and Management. The course size varied from 3 to 6 EC. Consequently, the workload per quarter was not always 15 EC.

During the last accreditation, the programme was advised to further evaluate and adjust the programme. The subsequent gradual programme revision resulted in a new vision on the programme aligned with the faculty's vision on education, new final qualifications and a new curriculum with explicit learning lines, standardized course sizes and balanced methods of assessment. This curriculum was partly initiated in the academic year 2023-2024 and will be implemented in full in 2024-2025. Transferable skills are better reflected in the new final qualifications and integrated throughout the curriculum, including reflective skills development. In a reflection portfolio, students reflect on their personal growth and the development of their ethical intelligence and collaborative problem-solving skills. Furthermore, students are actively engaged in science and research through graduation projects and other curricular projects. The panel is positive about the attractive new curriculum, its alignment with the ILOs, and the inclusion of the concept of a reflective engineer. The clear structure of the new curriculum enhances the feasibility of the programme, with students reporting a more balanced distribution of workload. In addition, the panel values that all final

qualifications have been translated into learning lines, with corresponding learning objectives distributed across the programme's courses. These learning lines are currently being integrated into the technical courses with the collaboration of the responsible lecturers. Also appreciated are the relevant compulsory course in Ethics and Engineering, as well as the module Reflection for Offshore and Dredging Engineering. With the curriculum re-design, a radical shift in focus has taken place towards sustainability, although sustainability and circularity in construction methods could be covered further, according to the programme representatives.

Until now, the programme consisted of two tracks: Offshore & Dredging Engineering, which concerns the regular programme offered at TUD, and Offshore Renewables Engineering (ORE). The ORE-track is embedded in the international double-degree EWEM (European Wind Energy Master) and is organized in the form of a dual degree with Norwegian University of Science and Technology (NTNU). EWEM is a collaboration between TU Delft and three other European Universities (DTU in Denmark, NTNU in Norway and Universität Oldenburg in Germany). EWEM offers four tracks related to wind energy systems, one of which is Offshore Engineering (EWEM-OE), which coincides with the ORE-track of the ODE programme. EWEM-OE -students attend courses at DTU (first semester – joint courses with the other three EWEM-tracks), TU Delft (second semester) and NTNU (third semester). During the second semester in Delft, students follow core courses of the ODE programme together with students of the single degree track. The overall course selection of EWEM-OE is composed so that the content of the semesters is comparable to that of the regular ODE track and covers all the ILOs of the programme. In the fourth semester, students conduct a thesis project at either TU Delft or NTNU, depending on their topic of choice: TU Delft offers projects on Offshore Engineering and NTNU offers projects on Civil and Environmental Engineering. In either case, students are supervised by at least one supervisor from each institution. Afterwards, they defend their thesis for two separate committees: one for the MSc ODE at TU Delft and one of the MSc Marine Technology at NTNU. These committees can overlap in members and usually align their assessment, but each committee is responsible for awarding the diploma of their own institution. Quality assurance of EWEM relies on the participating universities, with each university safeguarding the quality of individual courses. The TU Delft is responsible for quality assurance of EWEM on a curriculum level. This is organized by the faculties involved, with the Faculty ME monitoring the quality of EWEM-OE.

The panel appreciates the opportunity for student mobility and considers the EWEM-OE track to be relevant, well organized and covering the ILOs of the programme. The panel was informed that as of September 2025, the ME faculty will discontinue the collaboration with EWEM and terminate the dual degree, due to challenges in aligning quality assurance procedures. The ORE track may be developed further within the ODE programme, possibly with a new form of international exchanges.

In the new curriculum, the concept of specializations has been eliminated to create a cohesive programme that allows students to diversify through different projects and experiments, all aimed at achieving the same generic learning outcomes. As a result of the redesign, almost all courses in the first year have a workload of 5 EC, while the courses in the fourth quarter are 7 EC. The first year of the curriculum is dedicated to knowledge development and puts specific emphasis on the technical final qualifications, with a focus on the ocean environment in the first quarter, and the analysis of offshore and dredging engineering systems in the second quarter. The third quarter focuses on design, while the fourth quarter is dedicated to research. In project-oriented courses and experiments, students have the opportunity to specialize in their direction of preference. Additional modifications to the curriculum involve eliminating mandatory courses during the first quarter of the second year; in line with the policy of the ME faculty and the TUD, this quarter is reserved for elective courses. Although students express disappointment over the overall reduced availability of elective space in the new curriculum compared to the previous one, the panel notes that students still have

the opportunity to explore a diverse range of subjects, including through project work. As an interfaculty programme, the curriculum combines civil, maritime, and mechanical engineering fields of expertise, featuring several interdisciplinary courses with teachers from different disciplines who have a shared responsibility for these courses. The panel appreciates the interdisciplinary focus and the continuous dialogue with Civil Engineering and Marine Technology, as well as the fact that, as part of their elective options, students are encouraged to participate in courses from other master programmes or in the TUD-wide Joint Interdisciplinary Project (JIP) course, where students from different faculties cooperate to solve an assignment from an industrial partner of the TUD. Nevertheless, the programme acknowledges that the organizational structure poses challenges for faculty collaboration and co-teaching, and interdisciplinary education could be further developed. The panel understands the challenges, but is of the opinion that the programme is progressing in the right direction.

The final three quarters are dedicated to a literature research (10 EC) and a thesis (35 EC), which builds on the literature survey. In the EWEM-OE track, the literature research covers 15 EC and the thesis project 30 EC. While working on their reflection portfolio during the first year, students are requested to shape their objectives regarding their elective courses and graduation work in the second year. In the thesis project, each student is paired with a supervisor from the scientific staff of either the M&TT department or the HE department at the ME faculty or CEG faculty. EWEM-OE students are supervised either at TU Delft or NTNU, depending on their topic of choice. The daily supervisor monitors the progress and quality of the graduation project. Projects are always related to the supervisor's research discipline. Most graduation projects, 90 to 95%, are accommodated by a company. This provides students with the opportunity to do research in real-life settings, while having access to professional experts. Generally, students receive additional supervision from alumni or another external supervisor during their graduation. The panel appreciates the strong involvement of the industry in the curriculum. Throughout the project, multiple meetings are organized during which the students report their progress to both the university and the company supervisors. These meetings typically involve a kick-off meeting, one or two progress meetings, and a green-light meeting, to decide whether the student is ready for the actual graduation.

The panel considers the curriculum to be well-structured and coherent, with strong links between the courses. The curriculum covers all ILOs, as is demonstrated in the tables included in the self-evaluation reports. The design of the curriculum makes sure that courses build upon each other in terms of knowledge and skills. The panel appreciates how the programme continually reflects on the content of the curriculum in light of the professional and academic field. This responsive attitude is also reflected in the ongoing incremental changes implemented in the courses. The panel noted from the interviews during the site visit that although the programme director is highly engaged, the staff has not yet completely internalized the curriculum changes; for example, they are not involved in the self-reflection portfolio, which is coordinated by the programme director. It encourages the continuation of the planned evaluation of the redesign, of which the details still need to be developed. Furthermore, according to the panel, prospective students should receive clearer information about any curriculum changes to help them make an informed decision.

The panel observes that in general, every course is evaluated once every three years. This evaluation, as well as individual feedback from students, serves as a signal for lecturers. At the end of each quarter the study load, amongst others, is assessed through a survey. In addition, midterm panel discussions are arranged with the study associations to collect feedback during each quarter. On the basis of these evaluations, actions are planned and taken. The results and follow-up of evaluations are reported to the study associations, which relay this information to the students. The panel values the formal and informal evaluation of courses. Yet, based on signals from students during the interviews, it recommends that the

programme places greater emphasis on responding to student feedback. For instance, at the beginning of each course, last year's feedback and follow-up steps could be shared with students.

The Education and Student Affairs (ESA) department is currently enhancing its use of various evaluation data for monitoring purposes, supported by a recently implemented dashboard. The panel supports this development, as it thinks that the current PDCA (Plan-Do-Check-Act) cycle, the check and act phases in particular, could benefit from a more structural approach. This includes for instance formulating explicit goals, determining the necessary steps to achieve these and monitoring the impact of measures. According to the panel, the ILOs should be the basis of this approach: all improvements should ultimately contribute towards equipping students better to achieve the learning outcomes. It recommends the programmes to continue onto the path of structural use of evaluation data. To aid programme directors in the continuous improvement of the programme, the panel suggests that their attendance at Board of Studies meetings be established as a standard practice.

Learning environment
Following the faculty's vision on education, the programme strives to offer students a student-centred learning environment, where they take responsibility for their own learning and development as engineers (self-leadership). This occurs in dialogue with developments in society. Design-based learning is therefore integrated into the educational concept of the reflective engineer. In the (multi- and interdisciplinary) project-based education, students learn to apply knowledge, design, collaborate in international teams, and find solutions to societal challenges.

The panel notes that in the new programme, collaborative problem solving is highlighted as a key skill, enhancing the involvement of both students and teachers in dialogical education. Collaborative learning is implemented throughout the curriculum. The panel appreciates the recent introduction of an individual reflection portfolio. In line with the educational vision, group activities are organized in a scaffolded manner, progressing from teacher-guided assignments in the first quarters to more student-centred project work later in the programme. The curriculum integrates theory with practical application; to facilitate application of the acquired knowledge, the programme underscores the importance of scheduling workshop hours for all courses, allowing students to practice actively with course material. Moreover, teachers are encouraged to reduce traditional lectures and concentrate on interactive activities instead. The panel appreciates that as a part of the redesign, lab work has been introduced in the curriculum (from 2024/2025). The ambition is that all students participate in a mandatory hands-on lab experiment using the experimental facilities, as this is crucial in developing their scientific attitude. Thus, the courses combine lectures with workshops, practicals and design, research and development projects. According to the programme, the concept of socialization, emphasized in TUD's educational vision, can be enhanced by strengthening the student community and diversifying the role models among the teaching staff.

The panel values the student centredness of the programme and is positive about the learning environment. It is of the opinion that the programme offers varied teaching methods which are aligned with the learning objectives, and an adequate balance between theoretical knowledge and practical skills. The strong ties of the programme with the industry provide students with additional learning opportunities through guest lectures and projects with leading companies. The panel notes that while the existing AI policy is clear, there is an opportunity to enhance student awareness of it, for example by (further) integrating AI into teaching, to educate students on the use of AI as a tool.

The panel observes that the facilities available are of a high standard, encompassing state-of-the-art equipment, labs and computational resources for teaching and research. The facilities are located in the

M&TT department in the ME faculty and the HE department in the CEG faculty. Both faculties provide ample space for students to study or work on their projects. ODE students also have access to the education facilities in the ME faculty and other locations on campus.

Feasibility
The ODE programme attracts students from the relevant BSc programmes offered at both the ME and CEG faculties, namely the BSc Civil Engineering, BSc Maritime Technology, and BSc Mechanical Engineering. In addition, students from the BSc Aerospace Engineering, Applied Physics and Ocean Engineering (international) are automatically admitted. Students with other BSc degrees or from Dutch universities of applied sciences must fulfil specific requirements and complete a bridging programme. Given the international character of the field, the intake of non-Dutch students is regarded as valuable. For those with international bachelor's degrees, specific requirements are defined at TUD level, and they must demonstrate adequate English proficiency. The panel notes that the success rates for ODE are average compared to other MSc programmes at the ME faculty but are declining, from 74% (students starting in 2016) to 56% (students starting in 2020).

The programme offers the informal opportunity for part-time participation, although this is not actively promoted: students have the opportunity to extend their studies to three years with a reduced number of EC per year, which the panel values. The panel observes that the average study duration until graduation is 2.5 years, which is relatively favourable when compared to other ME programmes. The drop-out rate of ODE is average for an ME MSc programme and varies between 10% and 15%. Regarding the length of the graduation project, the panel learnt that the literature survey and thesis, which together amount to 45 EC, typically require about 9 months to complete, although some students may take longer. The panel notes that in principle, 45 EC should not exceed approximately 7 months, and exceptions should not be supervisor-dependent, which is now sometimes the case. As the panel notes that most of the study delay in the programme can be contributed to a prolonged thesis process, it encourages the programme to further support students in completing their work in time, given the extensive scope of their theses, and to monitor this. In this regard, it is positive that a progress monitoring system (MyCase) is currently being implemented to track student progress during their thesis work and offer targeted support.

The panel considers the curriculum of the programme to be feasible, although actual study duration could benefit from further attention, building upon the progress that has been made in recent years. The panel suggests a more thorough follow-up on the duration of studies, particularly concerning MSc theses, by establishing clear and uniform guidelines for thesis completion. The panel is confident that the assistant master coordinator, appointed in 2024, will assist with this, as their main responsibility is to monitor ODE students and identify causes of study delay. It also appreciates the fact that international students are given special attention during this monitoring process. The panel acknowledges that there is a system in place (Evasys) for monitoring, amongst other things, the perceived workload for each course. Still, it recommends improving the monitoring of workload across courses and academic quarters.

Guidance
The panel views the guidance provided to students during the programme and the accessibility of programme-specific services and facilities positively. These include an introduction week for new students and various information sessions, especially during the first semester, organized by the programme management. Initiatives during the introduction week are designed to foster a sense of community among students. The panel commends the programme management for its highly proactive role in guiding and informing students. According to the panel, the programme is strongly committed to educational reforms and enhancing student well-being, for example by integrating training on diversity, inclusion, and conflict

resolution into its curriculum. Students receive coaching from the staff within the courses and from a supervisor during their graduation project. The few students who are still active in the programme after more than four years receive additional support to help them complete their studies. The panel observes that students feel well-supported throughout the programme and are very positive about the ease of contact with both peers and professors.

The assistant master coordinator serves as a first contact person for students and a bridge towards the faculty student councillors. Academic counsellors play a key role in referring students to the right resources. For example, students with mental health issues can see student psychologists or attend training sessions on personal well-being. Furthermore, the panel noted that the study association Delft Offshore Technology (DOT) takes an active role in supporting students to find their way, amongst others by organizing a variety of academic and social activities. The association is also actively involved in advisory bodies such as the Board of Studies, which advises the director of studies on the quality of the ODE study programme. At the faculty level, the study associations Gezelschap Leeghwater and S.G. William Froude promote the interests of the students.

The panel acknowledges that the programme effectively provides information to students through the digital learning environment Brightspace in an accessible and timely way. This platform also features tools like Buddy Check. Additionally, the programme considers the needs of all students, including those with functional impairments. In alignment with the TUD Note on “Duty of Care”, this includes personal and/or separate provisions such as extra time for exams or separate exam settings, and adjusted schedules.

Teaching staff
The programme is taught by lecturers from the M&TT department or the HE department at the ME faculty or CEG faculty, some of whom have an international background. The staff includes 3 full professors, 8 associate professors, 10 assistant professors and 3 teachers, with a small number of associate professors and one full professor being active in the education. For various courses, teaching assistants and other support staff are hired. All staff members engage in research and actively contribute to the development of their disciplines. Most staff members hold PhDs, aligning with faculty policy. The panel appreciates the synergy among various disciplines and recognizes how the new curriculum enhances this collaboration. It expects that the simplified curriculum may help alleviate the lack of teaching staff, which is one of the current challenges the programme is facing.

In the interviews, the panel has seen experienced, well-organized and engaged faculty who cover the academic scope of the programme. The lecturers have strong connections with the professional and societal field through their own research activities. In addition, the panel appreciates that lecturers cultivate individual contacts with students; students report that they are easily accessible, dedicated and responsive. Moreover, the professional field values the drive and positive attitude of the staff, who are very motivated to improve the programmes. The panel notes with appreciation that teaching quality is ensured through an academic development policy that focuses on both teaching and research qualifications and appreciates the high level of completed UTQ training. The professional training of the teaching staff has been prioritized by the programme. All involved lecturers are in the possession of a University Teaching Qualification (UTQ) or are in the process of achieving that qualification; new staff members are required to complete the UTQ within three years. An Education Day is organized twice per year for all faculty teaching staff, where the latest developments in education and in professional practices are discussed. In addition, the panel observes that the ODE programme seeks to enhance collaboration in teaching by organizing a range of activities, including lecturer workshops to facilitate the exchange of ideas and development sessions. Moreover, quarter representatives have been designated to coordinate curriculum development.

Internationalization

The programme has an inherently international orientation, as the offshore and dredging sector has a global character and increasingly international labour market. The panel approves of the choice and underlying argumentation for an English name and language of instruction. According to the panel, this aligns well with the international nature of the professional and academic field. Through the international focus, students are exposed to different perspectives and gain experience in collaborating within international teams. Thus, they are prepared to work in an international context.

The diverse background of both teachers and students supports a globally oriented educational environment. The university has adequate professionalization policies in place for ensuring lecturers' proficiency in English. Students with international prior education must demonstrate proof of English-language proficiency. The panel appreciates the opportunity for students to follow part of the programme abroad. It is also positive about the attention to intercultural collaboration, and the careful monitoring of English proficiency levels of both staff and students.

Considerations

The panel considers the curriculum to be well-structured and coherent. The curriculum covers all ILOs and provides students with a comprehensive foundation in offshore and dredging, thus offering a unique Dutch programme for the international industry. The panel is positive about the new, clear structure of the interdisciplinary programme, which has led to a more balanced workload. In addition, it appreciates the integration of learning lines in the curriculum, as well as the attention to ethics and reflective skills. The panel appreciates the synergy among various disciplines and recognizes how the new curriculum enhances this collaboration. At the same time, the panel encourages an evaluation of the programme redesign and emphasizes the importance of keeping incoming students well-informed about any curriculum changes.

The panel appreciates how the curriculum is continuously updated in response to developments in the professional and academic fields. In general, there is a need for improved monitoring through the PDCA (Plan-Do-Check-Act) cycle, particularly in relation to the connection with the ILOs. To facilitate this process, the panel believes that the role of programme directors could be strengthened. While it values the formal and informal evaluation of courses, the panel is of the opinion that more attention could be paid to include monitoring data with, amongst others, study progress, student number evolutions and course success rates, and by providing feedback on students' feedback.

The panel is positive about the student-centred learning environment, providing opportunities for the development of an academic community, and the active role of the study association. The courses offer varied teaching methods, with a focus on collaborative learning and (multi- and interdisciplinary) project-based education, and an appropriate balance between theoretical knowledge and practical skills. The panel highlights the importance of keeping a focus on AI in the programme. Student awareness could be increased by (further) integrating AI into teaching. The panel appreciates the interdisciplinary focus of the programme, including the Joint Interdisciplinary Project (JIP). The strong ties of the programme with the industry provide students with enriching learning opportunities. According to the panel, students are well-supported throughout the programme, with staff and management actively engaged in this effort. The panel concludes that all students receive adequate guidance and support. Furthermore, the admission criteria, the information provided to students, and the facilities available for students with disabilities are all satisfactory.

The panel considers the curriculum of the programme to be feasible, although it encourages the programme to pay further attention to the study duration, building upon the progress that has been made in recent

years. In this context, the panel appreciates the introduction of a progress monitoring system. Additionally, the panel recommends closely monitoring the workload for each course.

The panel is impressed with the quality and enthusiasm of the teaching staff of the programme, who come from a variety of (international) backgrounds. They are all pedagogically qualified and are experts in their field, covering the academic scope of the programme. All staff members engage in research and have strong connections with the professional and societal field through their research activities. In addition, the panel appreciates that lecturers value personal contacts with students; they are easily accessible and are dedicated and responsive towards students. Furthermore, the programme seeks to enhance collaboration among teachers and mutual curriculum development through various activities.

The English-taught programme is internationally oriented, which is reflected in the international community of students and staff. According to the panel, the choice for an English name and language of instruction is well substantiated and in alignment with the international nature of the professional and academic field.

Conclusion

The panel concludes that the master's programme Offshore and Dredging Engineering meets standard 2.

Standard 3. Student assessment

The programme has an adequate system of student assessment in place.

Findings

Assessment system

Assessment in the programme is aligned with the Education and Examination Regulations and the educational vision of the TUD as well as the faculty, embracing the constructive alignment principle of education. This includes a combination of formative and summative assessment in each course, with a gradual reduction in the number of formative tests as students take greater control of their own learning. The faculty aims to adjust and align its quality assurance handbook and assessment policy with the TUD assessment framework, published last year, by the end of 2024. In programme-specific assessment plans, all assessments and courses are aligned with the ILOs of the programmes. The panel observes that there is a well-defined university-wide assessment policy and sufficient standardization, for example through standard rubrics for the literature research and MSc thesis. Also, students are properly informed about the examination procedures and assessment criteria.

The programme employs various methods for both formative and summative assessment: written exams, oral exams, such as presentations, individual and group project work, as well as homework assignments. The homework assignments are assessed by teaching assistants and by the students themselves through peer review. Every course contains at least one summative test. To minimize the effects of implicit assessment biases, the programme is focusing on diversifying its assessment methods. In alignment with the learning objectives, the learning line on collaborative problem-solving requires the assessment of group work in each quarter of the first year. Teachers are encouraged to confront student groups on their group dynamics, to avoid so-called 'free rider' behaviour. The panel characterizes the assessment in the programme as well thought out. The panel appreciates the evolution towards formative feedback, fostering students' attitudes and skills, as well as the individual reflection portfolio, which includes two reflective discussions. The portfolio, which is assessed as pass/fail, supports students in shaping their individual objectives regarding their elective courses and graduation project in the second year.

The programme sees opportunities to include other assessment types, such as the use of multi-media for the development of end products. With a transition from assessment of knowledge to development of skills and attitudes, the formative feedback structure could be strengthened, including the use of peer feedback. Instead of primarily assessing students' mastery of content knowledge and skills, the programme aims to include student attitudes as a crucial aspect of evaluation and lifelong learning. The panel agrees with the programme that this integration would provide valuable insights for enhancing programme effectiveness.

The panel considers the assessment system of the programme to be well-designed and coherent, with assessment methods that are appropriate for the courses' learning goals and sufficient attention to skills. It appreciates the assessment plan linked with the ILOs and the diversity in assessment methods used. The panel observes that appropriate procedures are in place to ensure and enhance the quality of assessment. For example, examiners apply the four-eyes principle when constructing tests. Furthermore, the panel notes that new lecturers are not designated as examiners for major courses in their first three years of service and are paired with senior colleagues who act as mentors. An educational advisor with assessment expertise monitors the quality of assessment by providing regular feedback on the assessment for all courses, focusing on issues such as reliability, validity, construction and the safeguarding of learning goals. Additionally, a bi-weekly walk-in session and a two-monthly workshop for teachers were initiated to improve communication with teachers about assessment quality. The panel acknowledges the enhancements that have been implemented and values the assistance provided by ESA in this regard.

Final assessment

The programme is completed with a thesis project of 35 EC. In preparation of the thesis, students perform a literature review (10 EC), resulting in a report. It is assessed separately by the supervisor, according to various criteria, including the content of the report, its structure and style, as well as the transferable skills demonstrated. The thesis project concerns the execution of an experiment, to test a hypothesis or to answer a research question. This project is assessed based on a report, a defence and a presentation, focusing on content, communication and process. The programme informed the panel that it puts a strong emphasis on the quality and level of thesis projects, which the panel appreciates. The panel values that most theses are accommodated by the industry. Students have to write a structured scientific report, present their findings at a public colloquium, and defend their work before a graduation committee. Industrial partners can take part in the committee as guests. The thesis work is assessed according to uniform assessment criteria, set out in the Master Thesis Grading Rubric. This includes criteria about time management and planning (transferable skills). External supervisors have an advisory role in the assessment of students, whereas the formal assessment is conducted by the TUD examiners. As discussed under standard 2, students in the EWEM-OE dual degree (the ORE track) are assessed by two graduation committee: one from TU Delft and one from NTNU. The Delft committee is responsible for assessment according to the MSc ODE-degree regulations. As part of the accreditation process, the panel reviewed a selection of 15 MSc theses, including the corresponding assessment forms. The rubric specifies the assessment criteria based on the ILOs, is well-defined and consistently used; it is also available for students. The panel agrees with the grades awarded to the theses, which are generally of expected quality, and found the grades to be well substantiated.

As for the duration of the graduation project, the panel learnt that faculty management is looking to streamline processes and ensure consistency across programmes and supervisors; stricter compliance with the thesis rubric and guidelines is considered crucial. The panel fully supports the focus on this matter. It finds it essential to pursue further action to avoid a 'grey area'. Currently, extending the graduation project may occasionally result in a higher grade, while in other situations it could lead to a grade reduction, irrespective of the particular circumstances related to the delay. According to the panel, a more defined timeline with specific start and end dates and further intensified guidance would be beneficial for students,

as it would help eliminate prolongation, especially when this is caused by enthusiastic supervisors that focus on project results and lose sight of the envisioned timeline. Furthermore, the panel is of the opinion that there is room for improvement regarding the calibration of thesis assessments. While some calibration appears to exist in specific instances, such as for cum laude distinctions, more frequent discussions about assessment are recommendable to promote consistency.

Board of Examiners

The ME programmes fall under the responsibility of the ME Board of Examiners, one of the two faculty-wide Boards of Examiners. Based on the documentation and the interviews during the site visit, the panel concludes that the Board of Examiners adequately safeguards the quality of assessment in the programme. It proactively controls the quality of assessment in various ways, such as appointing examiners (holding a UTQ or in the process of obtaining a UTQ), and assessing the quality of examinations through a random sampling of exams and final projects (also including the final products of the EWEM-OE dual degree). It inspects the thesis works and accompanying assessment forms twice a year and assesses whether the graduation committees made fair judgements leading to the final grades, as well as the distribution of grades. Furthermore, the Board of Examiners has set strict rules for the compilation of graduation committees and for graduating with distinction. The rules for graduation committees have been revised and now include a mandatory member with experience in assessment. Moreover, one of the staff members needs to be independent, not having been involved in the graduation project. One extra scientific staff member, employed in another department, is added to the committee in cases where the candidate is eligible for the designation cum laude.

The Board of Examiners also deals with reports of suspicions of fraud and complaints. Complaints regarding courses (approximately 30 per year) are forwarded to the responsible lecturers or addressed through mediation. There are virtually no complaints regarding thesis grades. The Board of Examiners believes this is likely connected to the 'green light meetings,' during which students are given a go/no go decision for their thesis; in case of a ‘no go’, students can either make repairs or start over. The Board of Examiners has regular meetings with the Dean, the director of education, the head of the ESA department, the educational advisor on assessment and the quality assurance department. It also meets with other TUD Boards of Examiners to discuss common concerns and to improve assessment. The panel is pleased to see that the Board of Examiners clearly contributes to the quality of assessment in the programme.

Considerations

The panel concludes that the assessment system is transparent and well designed. Adequate procedures, such as the four-eyes principle, are in place to ensure and enhance the quality of assessment. The assessment methods used are diverse and appropriate, and include assessment of skills. Amongst others, the panel appreciates the attention for constructive alignment, the standard rubrics for the literature research and MSc thesis, and the support offered by ESA. In addition, the panel appreciates the programme’s evolution towards formative feedback, as well as the introduction of an individual reflection portfolio, supporting students in shaping their individual learning objectives. It supports the programme management's efforts to include various forms of (formative) assessment that emphasize student development, including their attitudes. The panel encourages the programme to calibrate more often regarding thesis assessment, to promote consistency.

The graduation project covers all ILOs of the programme at an individual level. The panel appreciates the set-up of the thesis project and the way it is evaluated according to uniform assessment criteria, set out in a clear rubric. The panel considers the assessment procedure to be well thought out, and the grades awarded to be sufficiently substantiated. It is positive about the industry’s role in accommodating theses. As for the

duration of the graduation project, the panel encourages the programme to streamline processes and ensure consistency across supervisors, while pursuing stricter adherence to the thesis rubrics and guidelines. According to the panel, establishing a clear timeline and providing more intensive guidance would help students successfully finish their thesis within 7 months.

According to the panel, the Board of Examiners proactively contributes to the quality of assessment in the programme. It has a clear task and safeguards the quality of assessment in the programme in various ways, including the continuous assessment of the quality of examinations.

Conclusion

The panel concludes that the master's programme Offshore and Dredging Engineering meets standard 3.

Standard 4. Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

Theses

The thesis is regarded as the programme's final project in which students demonstrate that they achieved the programme's ILOs at an individual level. In preparation for the site visit, the panel examined a selection of 15 theses: 11 from the regular programme and 4 from the ORE dual degree. In the opinion of the panel, the level of the examined theses for both tracks is appropriate for an academic master's programme. The theses demonstrate the achievement of the ILOs. In general, they are of expected quality. The panel observes that the topics of the theses are quite diverse, reflecting the broad scope of the programme.

Alumni

The panel appreciates how students are stimulated through numerous activities to become more acquainted with the future labour market. These include guest lectures, (interdisciplinary) projects, the thesis, and career-related events organized by the study association, such as an annual career fair. Career orientation is further supported by the Career Centre TUD. Students view their career prospects following the programme positively. A recent survey (2023) shows that the respondents consider the programme a good start for their careers. They particularly value the close relation with the professional field, and the practical experience gained during projects. As the combination of competences is highly sought after by industry, graduates easily find jobs; most already had a position before they graduated. They find employment at, for example, marine contractors and dredging companies in the Netherlands and abroad or pursue an academic career by continuing with PhD research. The panel observes that alumni are generally positive about the programme and often secure relevant positions after graduation. It appreciates the fact that most alumni found professional positions that match the programme's content and level. As they indicated during the site visit and in the most recent alumni survey, alumni developed valuable knowledge and skills during the programmes and feel well prepared for the labour market.

During the site visit, the professional field representatives informed the panel that TUD alumni possess good modelling and problem solving skills as well as a solid knowledge basis. They are highly motivated and show leadership qualities. They do require coaching in time management and collaboration skills, such as engaging with stakeholders. However, according to the panel this is a broader trend that extends beyond just TUD alumni. The panel concurs with the programme that there is an opportunity to improve alumni

engagement and feedback, as they can significantly contribute to the programme's quality. This could be achieved through setting up an alumni database, and initiatives such as mentorships and networking events.

Considerations

Based on the examination of a selection of 15 theses from the programme, the panel concludes that the level of the theses is appropriate for an academic master's programme. The theses cover a variety of topics, reflecting the broad scope of the programme, and demonstrate the achievement of the ILOs. The documentation and interviews show that alumni are generally content with the programme and are well prepared to perform successfully in the professional field in the Netherlands and abroad.

Conclusion

The panel concludes that the master's programme Offshore and Dredging Engineering meets standard 4.

General conclusion

The panel's assessment of the master's programme Offshore and Dredging Engineering is positive.

Recommendations

1. Systematically evaluate the programme redesign, and keep (incoming) students informed of any alterations to the curriculum.
2. Encourage uniformity in assessment practices, including a more defined timeline for the thesis project, by conducting regular calibration sessions.
3. Increase students' awareness of the AI policy by incorporating AI more extensively into the teaching process.
4. Enhance the monitoring of workload across courses and academic quarters.
5. Conduct a more comprehensive follow-up on the duration of studies, especially regarding MSc theses.

Appendix 1. Intended learning outcomes

Final qualifications of the previous curriculum (until 2024-2025)

A graduate in Offshore & Dredging Engineering is able to...

1. Competent in the scientific discipline Offshore & Dredging Engineering
   - 1A ... apply advanced physics, solid mechanics, fluid mechanics, soil mechanics, hydromechanics and control systems and dynamics on offshore & dredging systems.
   - 1B ... design, carry out and evaluate experiments and apply measurement methods to validate physical models.
   - 1C ... identify, model, design and control offshore & dredging systems in relation with operations and the environment.
   - 1D ... relate scientific knowledge to offshore & dredging systems considering their interaction with the environment.
2. Competent in doing research
   - 2A ... study a topic by critically selecting relevant scientific literature.
   - 2B ... write a scientific report about own research.
   - 2C ... analyse offshore & dredging systems at various levels of abstraction.
   - 2D ... generate knowledge within the discipline of Offshore & Dredging Engineering.
3. Competent in designing
   - 3A ... systematically design complex offshore & dredging systems
   - 3B ... generate innovative contributions to the discipline of Offshore & Dredging Engineering.
4. A scientific approach
   - 4A ... apply paradigms, methods and tools to (re)design an offshore & dredging system. 4B. ...manage own scientific research independently.
   - 4B ... manage own scientific research independently.
   - 4C ... analyse problems and use modelling, simulation, design and integration towards solutions.
5. Basic intellectual skills
   - 5A ... analyse and solve technological problems in a systematic way.
   - 5B ... plan and execute research and design in changing circumstances.
   - 5C ... integrate knowledge in an R&D project, considering ambiguity, incompleteness and limitations.
   - 5D ... identify and acquire lacking expertise.
   - 5E ... critically reflect on own knowledge, skills and attitude.
   - 5F ... remain professionally competent.
   - 5G ... take a standpoint with regard to a scientific argument within the research area.
6. Competent in operating and communicating
   - 6A ... work both independently and in multidisciplinary teams.
   - 6B ... present and report in good English.
   - 6C ... explain and defend outcomes from the research area to academia and industry, to specialists and laymen.
7. Considering the temporal and social context
   - 7A ... evaluate and assess the technological, ethical and societal impact of own work.
   - 7B ... act responsibly with regard to sustainability, economy and social welfare.

Final qualifications of the new curriculum (from 2024-2025)

A graduate in Offshore & Dredging Engineering is able to:

Comprehension of first principles
Evaluate offshore & dredging engineering systems[1] considering their interaction with the environment and based on the relevant physics on multiple scales.

Scientific attitude
Develop new and usable knowledge and insights in the domain of offshore & dredging engineering[2] in a purposeful, methodical and reproducible way, using theories, experiments, models and coherent interpretations of data.

Constructive design
Engineer new and modified offshore & dredging engineering systems[3] with the intention of creating value in accordance with both predefined requirements and desires, and technological and societal developments and risks, considering the full lifecycle and using state-of-the art methods and software, as well as basic engineering skills.

Self-development
Reflect on own development as a continuous process, consciously setting individual development goals, to cultivate a basic attitude to be curious, to take nothing for granted, to be inquisitive and develop a lifelong entrepreneurial mindset.

Academic communication
Articulate professional and scientific judgments, based on logical reasoning and arguing, and considering alternative opinions, towards both technical and non-technical audiences and stakeholders.

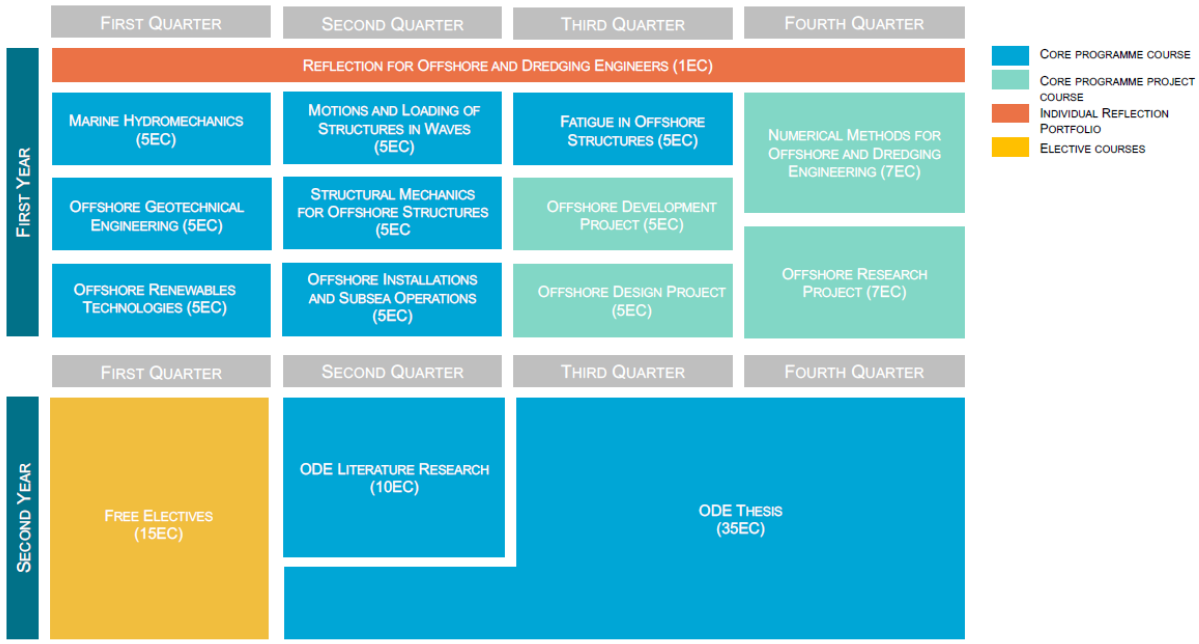
Collaborative problem solving
Collaborate in international, multi-cultural and multi-disciplinary teams, based on effective communication, handling and formulating constructive feedback, responsible behaviour and leadership.

Ethical intelligence
Reflect ethically on the technological, societal and environmental impact of own work, to define and sharpen personal values and guiding principles to act as professional engineer.

1. Offshore renewable energy systems for the ORE track.
2. Offshore renewables engineering for the ORE track.
3. Offshore renewable energy systems for the ORE track.

Appendix 2. Programme curriculum

Curriculum Offshore and Dredging Engineering - track



Curriculum Offshore Renewables Engineering -track

Semester 1: 30 ECTS courses @DTU

- Hydrodynamics 2 (5 EC)
- Offshore Wind Energy (10 EC)
- Wind Turbine Technology and Aerodynamics (10 EC)
- Probabilistic Methods in Wind Energy (5 EC)

Semester 2: 30 ECTS courses @TU Delft

- Fatigue in Offshore Structures (5 EC)
- Numerical Methods for Offshore and Dredging Engineering (7 EC)
- Offshore Research Project (7 EC)
- Reflection for Offshore and Dredging Engineers (1 EC)
- Offshore Development Project (5 EC)
- Offshore Design Project (5 EC)

Semester 3: 30 EC project and electives @NTNU

- Specialization Project (15 EC) – students depending on their thesis project:
  - Wind Turbine Energy - Offshore Engineering
  - Civil and Environmental Engineering, Specialization Project
- Two 7.5 EC electives from the following list:
  - Geotechnical Engineering
  - Fatigue Design
  - Finite Element Methods in Structural Analysis
  - Sea Loads

- Stochastic Theory of Sea Loads
- Advanced Analysis of Marine Structures
- Marine Structures
- Marine Hydrodynamics

Semester 4: 30 EC thesis project
Thesis project on either Offshore Engineering (supervised at TU Delft) or Civil and Environmental Engineering (supervised at NTNU)

Appendix 3. Programme of the site visit

Day 1: Tuesday 5 November

08.45 – 09.00	Welcome
09.00 – 09.30	Preliminary internal panel meeting
09.30 – 10.00	Session faculty management
10.00 – 10.45	Session programme directors
10.45 – 11.15	Break
11.15 – 12.00	Session bachelor's students Maritime Technology
12.00 – 12.45	Session master's students Marine Technology
12.45 – 13.45	Lunch break
13.45 – 14.30	Session teaching staff BSc + MSc MT
14.30 – 14.45	Break
14.45 – 15.30	Session Board of Examiners
15.30 – 15.45	Break
15.45 – 16.15	Theme session BSc Maritime Technology
16.15 – 16.45	Theme session MSc Marine Technology
16.45 – 17.15	Session programme directors BSc + MSc MT
17.15 – 17.45	Internal panel review meeting (BSc + MSc MT)

Day 2: Wednesday 6 November

08.45 – 09.00	Preliminary internal panel meeting
09.00 – 09.45	Session bachelor's students Mechanical Engineering
09.45 – 10.30	Session master's students Mechanical Engineering
10.30 – 11.00	Break
11.00 – 12.00	Session teaching staff BSc + MSc Mechanical Engineering
12.00 – 13.00	Lunch break
13.00 – 14.00	Theme session BSc Mechanical Engineering
14.00 – 14.30	Theme session MSc Mechanical Engineering
14.30 – 15.00	Break
15.00 – 15.45	Faculty tour
15.45 – 16.15	Session programme directors BSc + MSc ME
16.15 – 16.45	Internal panel review meeting (BSc + MSc ME)
16.45 – 17.30	Session alumni / professional field master's programmes (ME, MSE, MT, ODE)
17.30 – 18.00	Internal panel review meeting (BSc + MSc ME)

Day 3: Thursday 7 November

08.45 – 09.00	Preliminary internal panel meeting
09.00 – 09.30	Session master's students Materials Science and Engineering
09.30 – 10.00	Session teaching staff MSc Materials Science and Engineering
10.00 – 10.15	Break
10.15 – 10.45	Theme session MSc Materials Science and Engineering
10.45 – 11.00	Session programme director MSc MSE
11.00 – 11.30	Internal panel review meeting (MSc MSE)
11.30 – 12.00	Session master's students Offshore and Dredging Engineering
12.00 – 12.30	Session teaching staff MSc Offshore and Dredging Engineering
12.30 – 13.15	Lunch break
13.15 – 13.45	Theme session MSc Offshore and Dredging Engineering
13.45 – 14.00	Session programme director MSc ODE
14.00 – 14.30	Internal panel review meeting (MSc ODE)
14.30 – 15.00	Final session faculty management
15.00 – 16.30	Concluding panel session
16.30 – 16.45	Oral feedback session
16.45 – 18.00	Drinks

Appendix 4. Materials

Prior to the site visit, the panel studied 15 theses of the master's programme Offshore and Dredging Engineering. Information on the theses is available from Academion upon request.

The panel also studied other materials, which included:

- Self-evaluation report MSc Offshore and Dredging Engineering, including the following appendices:
    - Overview NVAO and midterm recommendations and measures taken
    - Final Qualifications MSc ODE
    - Relation between final qualifications and ODE curriculum
    - TU Delft Note on "Duty of Care"
    - Results National Student Survey 2023
    - Overview of MSc ODE teaching staff
    - Literature Review Rubric and Master Thesis Grading Rubric

Also included were:

- TU Delft Vision on Education
- Faculty ME Vision on Education
- Annual Report ODE 2022-2023
- Assessment framework TUD
- Assessment in ME (including assessment programme)
- Teaching and Examination Regulations MSc ODE 2023-2024
- Rules and Guidelines Board of Examiners
- Annual reports Board of Examiners
- Overview of master theses
- Selected MSc thesis works and rubrics