

# PROGRAMME DESCRIPTION

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## Master in Technology and Safety in the High North

120 credits

Tromsø

The programme has been approved by the Board of education at the Faculty of Science and Technology on 23.10.2018

Study programme name	Bokmål: Master i Teknologi og sikkerhet i nordområdene Nynorsk: Master i Teknologi og tryggleik i nordområda Engelsk: Master in Technology and Safety in the High North
Qualification awarded	Master of Science in Technology and Safety in the High North
Target group	This is an interdisciplinary Master of Science programme founded on engineering science. The programme aims at candidates with interest in technological and safety related aspects of the industrial development in the Arctic. The program is well suited for engineering students from automation, process and gas technology, nautics and safety and environment, but also other technological study programs on bachelor lever as e.g. mechanical engineers. Maritime university college candidates are also the target groups of this programme.
Admission requirements, required prerequisite, recommended prerequisite knowledge	<p>Admission to the Master in Technology and Safety in the High North requires a Bachelor's degree in engineering (180 credits), or similar education of not less than three years duration approved in accordance with the Norwegian Universities Act section 3-4. Relevant field of study may be automation, process and gas technology, nautical, mechanical, processing, safety, nautical or civil engineering. Other fields of study may be considered upon individual assessment.</p> <p>Admission to the programme normally requires a BSc. average grade of "C" or higher. The lectures are based on prerequisites similar to the course "MAT-2050 Matematikk 3 for ingeniører".</p> <p>All educational activities will be in English. In order to read academic literature and profit from lectures, it is a prerequisite that the students have thorough competence in the use of English, orally as well as in writing.</p>
The study programme's Learning Outcome	<p>The aim of the program is to focus on the existing knowledge, issues, challenges, and theories of safety and technology with the focus on cold climate condition.</p> <p>After passing the program, the candidate has the following learning outcomes:</p> <p><b>Knowledge:</b> The candidate</p> <ul style="list-style-type: none"> <li>• has a solid basis in engineering in general and advanced level of knowledge in one of the disciplines offered</li> <li>• has knowledge about technical and safety challenges and solutions related to industrial activities in the Arctic</li> <li>• has knowledge about appropriate methods and tools for managing and controlling complex technical systems and operations in a harsh environment.</li> </ul>

	<ul style="list-style-type: none"> <li>• has thorough knowledge of the scientific theory and methods of technology.</li> <li>• Can apply their knowledge to new areas of safety and</li> <li>• can analyze academic problems based on the history, traditions and uniqueness of technology.</li> </ul> <p><b>Skills:</b></p> <p>The candidate</p> <ul style="list-style-type: none"> <li>• can analyze existing theories, methods and interpretations within technology and safety</li> <li>• can critically read and analyze miscellaneous sources of information, and use the information for structuring and formulating academic argumentation</li> <li>• can work independently with problem solving</li> <li>• can carry out an independent, limited research or development project under supervision and in accordance with applicable norms for research ethics.</li> </ul> <p><b>General competence:</b></p> <p>The candidate</p> <ul style="list-style-type: none"> <li>• can demonstrate a good working habits, follow the code of ethics, and continue a career within research, production, development and technical professions.</li> <li>• can displays good communication skills, orally and in writing, for presentation of her/his work for both general public and specialists in the field.</li> <li>• can displays the ability to use his/her knowledge and skills in new areas, for solving advanced working tasks and for contribution to innovation.</li> </ul>
<p>Academic content and description of the study programme</p>	<p>The programme is a 2 years, full-time study at the department of Technology and Safety of UiT The Arctic university of Norway in Tromsø.</p> <p>The program gives a comprehensive understanding of aspects and challenges related to both onshore and offshore activities in a vulnerable and harsh environment. Special attention is given to technical and operational solutions, as well as safety related issues.</p> <p>The Master's programme offer specialization in three disciplines</p> <ul style="list-style-type: none"> <li>• Risk and reliability</li> <li>• Nautical science</li> <li>• Automation</li> </ul> <p>The common compulsory courses in this master programme are</p> <ul style="list-style-type: none"> <li>- TEK-3002 Reliability engineering, 10 ECTS</li> <li>- TEK-3006 Cold climate engineering, 10 ECTS</li> <li>- TEK-3004 Project paper, 10 ECTS</li> <li>- TEK-3901 Master thesis in technology, 30 ECTS</li> </ul>

The two first of these courses gives the candidate an overall understanding of Arctic engineering knowledge. Knowledge of how to operate in harsh climate with Polar Low pressure systems, icing conditions and in dark winter season are given with connection to on- and offshore installations.

The degree program is 120 credits. Updated subject descriptions for the program are available online.

Table: Programme structure

Semester	10 ECTS	10 ECTS	10 ECTS
<b>Specialization: Risk and reliability</b>			
1. semester	TEK-3002 Reliability Engineering, 10 ECTS	STA-2001 Stochastic processes 10 ECTS	Specialization/ optional course, 10 ECTS
2. semester	TEK-3006 Cold climate engineering, 10 ECTS	TEK-3001 Operation and maintenance management 10 ECTS	Specialization/ optional course, 10 ECTS
3. semester	TEK-3004 Project paper, 10 ECTS	TEK-3008 Marine engineering (optional course) 10 ECTS	Specialization/ optional course, 10 ECTS
4. semester	TEK-3901 Master thesis in engineering 30 ECTS		
<b>Specialization: Nautical science</b>			
1. semester	TEK-3002 Reliability Engineering, 10 ECTS	TEK-3011 Ship stability 10 ECTS	Specialization/ optional course, 10 ECTS
2. semester	TEK-3006 Cold climate engineering, 10 ECTS	TEK-3010 Marine operations in the Ocean Space 10 ECTS	Specialization/ optional course, 10 ECTS

	3. semester	TEK-3004 Project paper, 10 ECTS	TEK-3014 Navigation Systems 10 ECTS	Specialization/ optional course, 10 ECTS
	4. semester	TEK-3901 Master thesis in engineering 30 ECTS		
	<b>Specialization: Automation</b>			
	1. semester	TEK-3002 Reliability Engineering, 10 ECTS	FYS-2006 Signal processing 10 ECTS	FYS-2008 Measurement techniques 10 ECTS
	2. semester	TEK-3006 Cold climate engineering, 10 ECTS	TEK-3013 Advanced Control 10 ECTS	Specialization/ optional course, 10 ECTS
	3. semester	TEK-3004 Project paper, 10 ECTS	TEK-3012 Embedded systems 10 ECTS	Specialization/ optional course, 10 ECTS
	4. semester	TEK-3901 Master thesis in engineering 30 ECTS		
Learning activities, examination and assessment	<p>The teaching is based on relevant research within safety and technology, as well as professional development work and experience related to operations in the high north. The learning activities are adapted to candidates with different bachelor degrees within engineering and technology. This provides both an additional knowledge within their specialization and a more general understanding of safety and technology in the high north.</p> <p>The study program uses a variety of teaching methods, and includes lectures, projects, student presentations, teamwork and mandatory assignments. These methods will help students to take an active role in the learning process by writing tasks and project reports in order to achieve the total learning outcome of the study programme. It is emphasized that learning activities will contribute to professional development of students and their skills for collaboration, communication and practical problem solving through working in groups.</p> <p>Lectures are organized either as blocks or regularly, on a weekly basis. In some courses, seminars may be arranged. Some courses may include compulsory lectures, exercises, excursion and approval</p>			

	<p>of exercises/fieldwork or semester reports. This will be stated in the course descriptions.</p> <p>Assessment methods will vary between written exam, home exam, group assignments, project submission and oral exam. In some cases, the assessment will be a combination of different assessment methods. For a more detailed description of the assessment forms, see subject descriptions.</p> <p>Professional achievements are assessed either with letter marks or passed / failed. If no assessment is required, "completed / non-completed" can be used.</p>
The study programme's relevance	<p>The program qualifies for various positions in private or public sector that require competence in safety and technology. Relevant occupations include jobs in the oil and gas industry, maritime industry and public administration. Operations control and maintenance of industrial facilities, risk and safety related issues as well as emergency planning are relevant tasks. Research, education, and further study on Ph.D. level is the other options.</p>
Work scope	<p>In order to reach the learning goals, students must expect to work 37.5 hours a week with the studies. The learning activities will consist of lectures, seminars, group work, semester assignments, exercises, exams and self-study. It will be required both to work independently and in groups. Learning activities are based on relevant research and professional development work.</p> <p>For learning activities associated with individual subjects, see subject descriptions.</p>
For master's theses/independent work in master's degrees	<p>In the fourth semester, the students will carry out a mandatory, independent and individual master's thesis, equivalent to 30 ECTS. The students should choose an in-depth study within their field of study from their Bachelor degree, or base the thesis on one or more of the topics included in the programme, e.g. maritime operations and preparedness, reliability engineering or operation and maintenance.</p> <p>The thesis can be written at the department, at another university, or in cooperation with another institution. The Dept. will provide a supervisor for the students. It is the responsibility of the students to propose the academic problem and to initiate the project. The students are encouraged to establish contacts with clients and to get projects from the industry. Working on the Master thesis, the student should demonstrate knowledge about the research methodology presented in the programme, as well as skills in scientific reflection and analysis.</p>

	The master thesis is censored with letters A-F. The grade scale is used according to the definitions and guidelines developed by the national professional councils.
Language of instruction and examination	Lectures and examination will be in English. Exercises, assignments and reports are to be made in English. All formal information regarding this study programme is to be given in English.
Internationalization	This is an international master program, where both the study plan and course curriculum are in English. The study programme is well suited for international students. Courses are based on research fields that are well known internationally, and students will be introduced to current research topics and projects by the scientific staff or international guest lectures.
Student exchange	<p>Students are encouraged to participate in exchange programmes abroad, and the Department offers assistance for students who will participate in exchange programmes.</p> <p>Recommended exchange institutions are:</p> <ul style="list-style-type: none"> <li>- Politecnico di Milano, Italy</li> <li>- University of Tasmania, Australia</li> <li>- Tokyo University of Marine Science and Technology, Japan</li> </ul> <p>High North universities are also of special interest, and students may also apply for other exchange programmes.</p> <p>It is possible to take part of the study in other Norwegian universities. The programme co-operates with University of Stavanger (UiS) and the University Centre at Svalbard (UNIS).</p> <p>The exchange courses will substitute the courses in relevant semester of the programme and will be included in the diploma. Student exchange may be carried out in the 2nd, 3rd or 4th semester.</p>
Administrative responsibility and academic responsibility	The Department of technology and safety is administratively responsible for the program. The Program Board for Safety and technology in High north at the Department of Engineering has professional responsibility.
Quality assurance	The study program is evaluated annually according to the UiT's evaluation system. The evaluation takes place in meetings between students and employees. It can also include an anonymous questionnaire.
Andre bestemmelser/ Other regulations	Complementary regulations for two-year master's degree (120 credits) at the Faculty of Natural Science and Technology