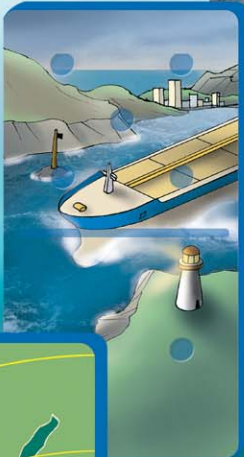
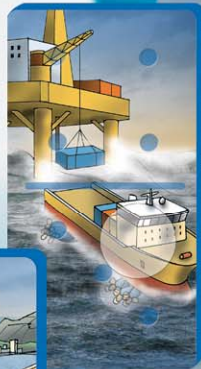


MSc Degree in Marine Technology

Programme in Nautical Science



Nautical Science represents a broad area that combines multi-disciplinary science and practical issues. Primarily it is concerned with the safe navigation and safe handling and operation of ships, including the protection of life and the environment. Other key elements of this science is shipboard administration and the handling, loading and care of cargoes. The fundamental aim of nautical activities can thus be said to be to navigate a vessel from one place to another, safely and efficiently, without causing any accidents.

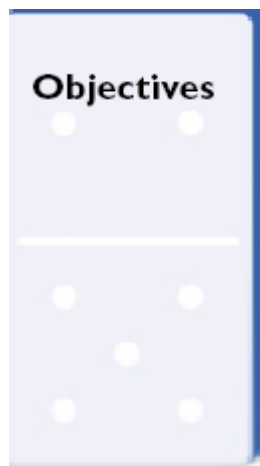
The MSc study in Marine Technology, specialization programme in Nautical Science, provides an advanced education tailored to provide students with the basic skills and knowledge required to cope with the technological and operational challenges at sea or in the international maritime industries. The programme is designed for students with a BSc-degree in maritime/marine transport, nautical/ naval science, marine navigation or the equivalent. An additional entrance qualification requirement is relevant experience

at sea, preferably of 12 months or more. The study is appropriate for students who have an analytical mind (a minimum of 21 ECTS in mathematics is required) and who are motivated by and interested in relating theoretical knowledge and techniques to practical situations. The MSc degree aims to provide the graduates with the educational platform required to obtain interesting and challenging opportunities in international employment and also qualifies for further PhD-studies in related areas

Background

Norway has a great maritime history and long traditions as a nation of sea farers and explorers. Norwegian shipping and offshore companies and landbased maritime businesses are among the frontrunners in the maritime world. Against these maritime traditions and anticipated future technological developments, a technology-based nautical science programme was established at the Department of Marine

Technology in 1980 in order to target students from Norwegian maritime Colleges and the Naval Academy. The international MSc study programme in Nautical Science at the Norwegian University of Science and Technology (NTNU), is a further development and improvement of this previous nautical science programme.



The MSc programme in Nautical Science is designed to develop knowledge and skills in the nautical field at a recognised international level. It takes advantage of NTNU's cutting edge expertise in the field of marine technology. The programme concentrates on formulating,

analysing and solving nautical science problems related to the planning, testing and performing of complex marine operations. Special emphasis is on the nautical safety aspects of marine operations and application of electronic navigating systems and technologies. A core element in the teaching programme is to utilize approximations and simplified methods for critical assessment of safe navigation at sea and evaluation of the operational efficiency of nautical operations.

The programme is designed to contribute to the development of analytical skills, a holistic view and a sense of responsibility and interest in the subject. Graduates from the programme should be able to utilize these skills to develop and operate new and improved technology to further enhance

navigational safety and operational efficiency.

Specific skills and knowledge include:

- The ability to work with developers and users of advanced maritime IT systems
- Determining the accuracy of track keeping using different combinations of navigation tools
- Knowing how marine operations are executed and how they are influenced by environmental conditions (waves, wind, current, restrictions of operational areas)
- Participating in the development of maritime control and guidance systems, developing and applying technology and methods related to maritime operations



The MSc programme in Nautical Science has a duration of four semesters covering a total of nine compulsory and two elective subjects in addition to a project and the master thesis.

During the first semester (autumn) students are required to take compulsory subject in basic navigation and marine hydrodynamics in addition to advanced subjects in mathematics and sea loads on marine vehicles in

order to provide a solid basis of knowledge for their specialization and elective subjects in the following semesters.

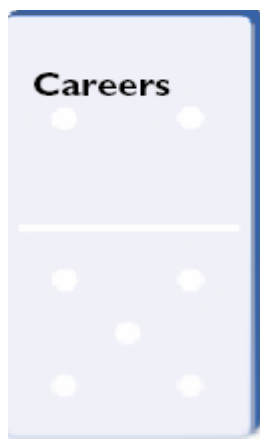
In the second semester (spring), students take three compulsory subjects on navigation systems, nautical science and a basic course in marine dynamics. One additional elective subject is mandatory. (The choice of electives depends on the specialization in the third semester. Examples are: marine control systems, marine operations, oceanography or naval hydrodynamics).

The third semester (autumn) offers one elective specialization subject in addition to a compulsory course in advanced nautical science a specialisation subject which allows the student to add in-depth knowledge related to the thesis. The project work is compulsory.

The last semester (spring) is dedicated to the MSc thesis.

Successful completion of all subjects + project and Master thesis, result in an MSc degree in Marine Technology, Nautical Science, from the Norwegian University of Science and Technology (NTNU).





An MSc-degree in Marine Technology from the Department of Marine Technology, NTNU, is recognized and accepted by the maritime and shipping industries and academic institutions. Graduates from the earlier programme in Nautical Science have found positions in a wide range of areas. Examples are in maritime administration and classification societies, offshore, shipping and ship management companies, the Royal Norwegian Navy, maritime educational and research institutions, oil companies and consulting services.

Increasing international focus on the safe and efficient operations of ships and offshore units, combined with closer cooperation with cargo owners/charterers will increase the need for MSc graduates in Nautical Science. Numerous employers have recognized that such graduate's skills are transferable to many career areas due to the combination of operational experience and theoretical knowledge at a high academic level.



Lars Markusson was one of the first nautical science students at NTNU. He graduated in 1981. Since then he has held different positions within maritime education (NTNU and Vestfold University College) and in Norcontrol/ Kongsberg.

Since 1995 he has been Senior Project Manager/Product Advisor for ship's bridge simulator in Kongsberg Maritime Ship Systems. He is the secretary of International Marine Simulator Forum (IMSF), and both his job and this function have given him many interesting contacts in the international maritime simulator community. Markusson states that: "The study at NTNU was a prerequisite for the position as senior lecturer, and I would not have had the position I have today if it had not been for the study at NTNU. Specially the hydrodynamic part has been important as part of my job is dealing with mathematical models for ship handling simulators".



Norvald Kjerstad graduated from NTNU in 1990, and has since then worked with research and education. International research programs has given Norvald Kjerstad the possibility to take part in several expeditions on ships in the arctic. He possesses a scientific position at

Ålesund University College at which he has been responsible for designing a variety of simulators, such as ship-handling, dynamic positioning, high speed craft and anchor- handling. He has published a comprehensive textbook on electronic and acoustic navigation systems. His activity and maritime background has brought him into project work for IMO and other regulatory bodies. Kjerstad has also spent a semester as visiting scientist at Singapore Polytechnic. He states that "My work would have been impossible without the graduation from NTNU. I can therefore recommend the Nautical Study at NTNU to other ambitious students with navigator background".



Karl-Johan Reite graduated December 1999 and was then employed by SINTEF Fisheries and Aquaculture which is part of the SINTEF Group. Here he has been involved in applied research for the Norwegian fishing fleet. Since 2001 he has been working on his PhD focusing on active control

of trawl systems by means of actuators on trawl doors and net. When asked about the former Nautical Study at NTNU he states: "The tasks I have been given have often demanded a combination of theoretical and analytical skills and practical knowledge of the Norwegian fisheries. The study gives a theoretically framework, and has complemented my former experience and more practical oriented education. The study touches many important topics, such as hydrodynamics, electronics, navigation systems and hydroacoustics. It has made it easier to see the interaction between subjects, and to seek more extensive knowledge when needed to solve actual problems".

MSc-programme in Marine Technology

Subjects in the programme in Nautical Science

Ex	Subject title	Note	Autumn F Ø S	Spring F Ø S	Cre- dits	Grade Exam
1h	TMA5100 Calculus 4		4 2 6		7.5	TE
1h	TMR4210 Marine Hydrodynamics, BC		4 6 2		7.5	TE
1h	TMR4215 Sea Loads		3 6 3		7.5	TE
1h	TTT4140 Fundamentals of Navigation		4 2 6		7.5	
Compulsary courses:						
1v	TMR4185 Marine dynamics			12	7.5	TE
1v	TMR5230 Nautical Science, BC			3 6 3	7.5	TE
1v	TTT4150 Navigation systems			4 2 6	7.5	TE
2h	TMR5240 Nautical science, Advanced course		3 6 3		7.5	TEØ
2h	TMR5250 Nautical Science, Project			12	7.5	TE
2h	TMR5260 Nautical Sc. Specialisation subject		4 4 4		7.5	TE
Optional courses:					75.0	
1v	TMR4130 Risk analysis safety	1		2 8 2	7.5	TØ
1v	TMR4220 Naval hydrodynamics	1		3 6 3	7.5	TE
1v	TMR4225 Marine operations	1		3 6 3	7.5	TE
1v	TMR4230 Oceanography	1		3 6 3	7.5	TE
1v	TMR4240 Marine Control systems	1		3 6 3	7.5	TEØ
1v	TTK4190 Guidance and control	1		2 8 2	7.5	TEØ
2h	TMR4235 Stochastic Theory of Sealoads	2	3 6 3		7.5	
2h	TMR5180 Control Engineering	2	3 6 3		7.5	
Master Thesis:						
2v	TMR4925 Nautical Science				30.0	TE

The MSC-PROGRAMME IN MARINE TECHNOLOGY— Nautical Science, is offered every year.

Preliminary application deadline 15. December the previous year (for scholarships and individual funding applicants). For further information see main programme information: www.marin.ntnu.no/msc

1h = 1st Semester, exams in autumn (December)

1v = 2nd Semester, exams in spring (June)

2h = 3rd Semester, exams in autumn

2v = 4th Semester, Master thesis

Weekly hours/recommended minimum work load:

Weekly hours in summer, autumn and spring semester:

divided into: **F**: Lectures, hours per week

Ø: Exercises, hours with instruction

S: Self study

Notes

1. Select one of the subjects

2. Select one of the subjects

Credits

Weighting of each subject in ECTS.

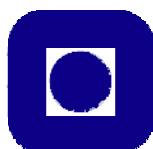
Grade (Basis for determining the grades):

TE - Grade/Exam (written)

TØ - Grade/Exercises, TEØ - Grade/Exam with exercises

BE—Passed—failed/Exam

BØ—Passed—failed/Exercises



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