

UNIVERSITY COLLEGE STORD / HAUGESUND

AND

UNIVERSITY OF APPLIED SCIENCES HOCHSCHULE EMDEN-LEER

# Appendix 2

## Program description

---

Master in International Ship Technology,  
Maritime Operations and Management

|   |    |
|---|----|
| Study Program.....  | 1  |
| Brief facts: .....  | 1  |
| About the program (contents):.....                              | 1  |
| Target group:.....  | 2  |
| Profile: .....  | 2  |
| Learning outcomes:.....   | 3  |
| Forms of assessment (types of examination):.....                | 4  |
| Internationalization: .....                                     | 5  |
| Practical information about the program:.....                   | 5  |
| Application:.....   | 6  |
| Program / Course plan.....                                      | 7  |
| Philosophy of Science, Research Design and Methods .....        | 9  |
| Maritime HTO (Human-Technology- Organization) .....             | 14 |
| Advanced Ship Stability.....                                    | 18 |
| Business Administration and Management .....                    | 21 |
| Quality and Risk Management .....                               | 26 |
| Scientific Approach of Complex Problems .....                   | 30 |
| Ship Technology.....  | 33 |
| Tools of Operational Research and Simulation .....              | 36 |
| Subsea Technology and Operations, incl. Hydraulic Systems ..... | 39 |
| Ship Operation- and Maintenance System.....                     | 42 |
| Marine operations in the Ocean Space .....                      | 45 |
| Maritime Project .....  | 48 |
| Technical Aspects of Safe and Environmental Shipping .....      | 51 |
| Operational Aspects of Safe and Environmental Shipping .....    | 57 |
| Managerial Aspects of Safe and Environmental Shipping.....      | 62 |
| Master's thesis .....   | 66 |

## **Study Program**

### **Brief facts:**

|                    |   |
|--------------------|---|
| Type of study:     | Full time   |
| Department:        | HS Emden / Leer Faculty of Maritime Studies & Stord /<br>Haugesund University College, Department of Maritime Studies |
| Number of Credits: | 120   |
| Degree:            | Master of science, M.Sc   |
| Duration:          | 4 semester  |
| Campus:            | Haugesund / Leer  |

### **About the program (contents):**

The maritime sector and associated branches of industry especially within the European Economic Area (EEA) have an increased need for post-graduate qualified employees with international orientation at the interface ship engineering/management and operations. Qualified candidates, combining technical, operational and managerial knowledge and who are exposed to an international environment are crucial. A joint master degree Program with an international partner university offers a particularly suitable approach to fulfil these requirements. The newly accredited PhD-Program in nautical operations will also recruit suitable candidates from the joint master in International Ship Technology, Maritime Operations and Management. The degree Program is developed and operated as a joint master Program between Stord / Haugesund University College and University of Applied Sciences Emden / Leer.

Central themes in the master Program are related to ship technology, maritime operations and maritime management, which provide the students with a solid foundation for both working in the maritime industry and further studies on a PhD level.

Within the first semester the priorities are scientific work as well as a deeper introduction into international maritime processes. Cultural aspects, communication, safety and organizational learning are reviewed in detail. The access into maritime technology is achieved by a deeper understanding of the stability of floating devices. This is the key for safe technological maritime operation.

In the second semester the ability to analyse will be promoted by examples of complex projects. By the help of analysis models, a variety of simulations are constructed. These are evaluated commercially, logistically and from the perspective of technology, quality and risk. Moreover, optimizing methods are presented and

applied to simulation models. Here management aspects are always a further dimension of consideration, which is imparted in a project oriented way.

In the third semester the student can expand the knowledge, skills and competencies gained so far while assisting in ongoing research projects. In this context the Faculty of Maritime Studies in Leer offers the profile „Sustainable Maritime Operations“. The University College Stord / Haugesund has specialized in „Offshore Operations“. In this semester students can apply for student exchange.

The graduates will be placed in a position to independently and responsibly solve technical, operational and managerial problems related to the maritime field using various methods and instruments conveyed during the course of the program. A student graduated from the Master of International Ship Technology, Maritime Operations and Management has a broad competence related to technical, operational and managerial aspects of the maritime industry.

Besides specialized expertise within ship technology and maritime operations, the takeover of management duties often also requires leadership skills and management techniques as well as mental maturity, self-confidence, independence, decision-making abilities and the sense of responsibility. According to this the International Master in Ship Technology, Maritime Operations and Management” also focuses on the acquisition of methodological and social competence as well as personal development. Intercultural competence of the graduates is promoted during some of the courses, but also during the at least one semester abroad within the joint Program.

### **Target group:**

The target group for the participation in the International Ship Technology, Maritime Operations and Management Master’s Program are highly qualified and motivated students interested in the issue of technology, maritime operations and management and especially the international dimension of such. Moreover, they should be willing and able to analyze as well as assess complex processes from an interdisciplinary perspective.

Admission to this master’s program is normally only granted to persons who have completed an academic degree of at least 180 ECTS (bachelor’s degree or equivalent program of at least 180 ECTS) within relevant fields.

Graduates from different forms and fields of studies can be admitted if the completed program is judged to be equivalent in the regular admission procedure of the university for which the student applies.

### **Profile:**

Haugesund: “Offshore Operations”

Leer: “Sustainable Maritime Operations”

## Learning outcomes:

Knowledge – the candidate:

1. has advanced knowledge in the academic field of a variety of maritime disciplines, giving an interdisciplinary overview of the maritime environment
2. has specialized insight in offshore technology and its processes
3. can apply knowledge to new areas in the framework of design topics within the areas of maritime engineering and operations
4. has thorough knowledge of theories and methods in the field of maritime operations and technology e. g. the operation of vessels and maritime constructions as well as their safety- and risk assessment based on international research findings
5. can analyse academic problems related to the maritime field on the basis of history, tradition, distinctive characters and the place in society of the maritime industry
6. has thorough knowledge of the scholarly theories about environmental friendly systems and can discuss these in an operational, technical and management view
7. can apply his/her knowledge about the clues of safe and environmental maritime operations to the academic field of maritime technology, operation and management

Skills – the candidate:

1. can analyse existing theories, methods and interpretations e. g. system analysis, cost benefit analysis, optimisation and risk assessment, in the field of the maritime industry
2. can deal critically with various sources of information both in the maritime and related fields and use them to structure and formulate scholarly arguments relevant for the maritime industry
3. can use relevant methods for research and scholarly development to point out the sustainability of technological developments as well as analyse and develop environmentally friendly and resource efficient solutions in technological systems, products and processes
4. can carry out an independent, limited research or development project under supervision and in accordance with applicable norms for research ethics
5. can analyze existing theories, methods and interpretations in the maritime field and work independently on practical and theoretical problems relevant for the field.

General competence – the candidate:

1. can apply his/her knowledge and skills in new areas in order to carry out advanced assignments and projects
2. can communicate extensive independent work and masters language and terminology of the maritime sector, incl. rules, legislation and classification as well as knowledge of maritime technology and innovation
3. can contribute to new thinking and innovation processes within the maritime field and independently initiate and implement academic and interdisciplinary collaboration
4. can analyze relevant academic, professional and research ethical problems related to the maritime field
5. can assume responsibility for own academic development and specialization that can finalize in a doctor course
6. can communicate about academic issues, analyses and conclusions related to the maritime field with both specialists or the general public

### **Forms of assessment (types of examination):**

The forms of assessments are chosen according to the learning outcomes of the different courses and the total learning outcomes of the Program, and include assessment forms such as portfolio, written exams, oral exam, project thesis and master thesis.

We strive to have different assessments within the Program so that the students can be tested on several aspects such as theory, ability to reflect, to work in groups, academic skills and so on.

More information regarding the forms of assessment can be found in the module descriptions.

The forms of assessment have two goals:

1. To give the students feedback to which level they are at, and thereby facilitate improvement.
2. To say something about the students' learning outcomes.

The grade scales consists of the grades A-F and passed/not passed. The grades A-E indicates that the student has passed the exam. The grade F indicates that the student has failed the exam. The grade C reflects a good and solid academic performance.

### **Teaching methods:**

The teaching and learning methods are varied and aim to make the students actively participate and build up independent thinking. The teaching methods vary, with lectures, solving exercises in groups, and problem-based learning being the most common. In addition to individual work, group work is encouraged throughout the

Program. It is expected that the students show up for class well prepared, as the lecturers place a significant amount of time and effort in preparing the lectures. Information and communication technology are integrated in the teaching, with Moodle/Fronter and computer based support systems as important tools in the scientific and educational work.

**Practical training:**

N/A.

**R&D base:**

A research-based and analytical approach to the topics is a key feature of the study. This means that teaching reflects a methodological approach to problems and the use of academic themes. Most lecturers conduct research and they convey their knowledge to students by combining theoretical and applied insights as well as exposing students to research issues and results from the industry at an early stage. In addition, the students learn about Philosophy of science, research design and methods in the first semester. This course is tightly connected to several other courses within the Program, such as e. g. the Maritime HTO-course and the master thesis.

The lecturers will guide students working with their master's thesis. The students will learn to apply relevant research literature and use research-based knowledge in their academic work.

**Internationalization:**

In this study program the first and second semesters are compulsory. During the first semester the students are in Haugesund, Norway, and in Leer, Germany, during the second semester. In the third semester the students can select a profile, which will decide the place of study (Norway or Germany). The students' choice of topic for their master thesis affects the location for their last semester.

**Practical information about the program:**

This program is a joint master study program between Stord / Haugesund University College and the University of Applied Sciences Emden / Leer. The program takes 4 semesters. The first semester is compulsory in Haugesund (Norway) and the second semester compulsory in Leer (Germany). The lectures are all given in English. The two partner institutions provide each one profile that can be elected in the third semester. This determines the location of study. The master thesis in the fourth semester should be within the frame of the profile. Overall 120 ECTS are reached when completed the study Program.

The study Program is managed by a common steering committee consisting of members from both partners. Two students of the study Program are part of this steering committee.

The students can apply for this study Program at both universities. A common selection committee will select the students from all the applicants. The students are enrolled at both universities. For the examinations the local examination rules are applied. A good level of understanding and speaking of English is recommended. At least a B2 level according the Common European Framework of References for Language is required.

The teaching methods vary, with lectures, exercises in groups, and problem-based learning. The workload in a course is measured in credits. One year full-time is 60 credits. Most courses are 10 or 6 credits. The courses run over one semester. In a full-time study, a minimum of 40 hours of productive work each week during the study is required. Some students will need to use more time.

An English online application is provided for all applicants.

### **Application:**

- Deadlines  
NON-EU applicants: October 15th – December 01<sup>st</sup>  
EU, EEC and Nordic applicants: March 01<sup>st</sup> – April 15th.
- The Program is scheduled to start September 1st.
- The second semester is starting 1<sup>st</sup> of March in Leer.

### **Application and admission requirements:**

A student who applies to the “International Ship Technology, Maritime Operations and Management” Masters Program needs to upload the following documents within the deadlines:

- Certificates and Diplomas from previous studies at a recognized higher education institution, or provide documentation indicating that the student will earn his / her first degree from such an institution by the time of enrolling in the program – not less than 3 years of full time studies.
- Transcript of completed courses and grades for each semester including course-list
- Proof of English language skills – B2 CEF or equivalent
- Statement of Purpose / motivation letter
- Curriculum Vitae
- Copy of the passport ID page
- Additional information related to the field

All documents, except for copies of the passport ID page and diploma / degree certificate must be submitted in English. All copies should be certified by the respective institutions, i. e. lawyers, Ministries, etc.

The Selection Committee will select the students on the basis of their relevant academic background – bachelor or equivalent.



If two or more candidates are of similar ranking, then the statement of Purpose / Motivation Letter will be taken into consideration upon selecting the candidates.

### **Program / Course plan**

Study model, overview over the subjects in the program, both institutions retain the right to make changes due to unforeseen events.

| Course name  | ECTS | C / E* | Semester | Organization                           |
|--|------|--------|----------|--|
| Philosophy of Science, Research Design and Methods                       | 10   | C      | 1        | Session-based teaching<br>Haugesund    |
| Maritime HTO (Human-Technology- Organization) and Cultural Understanding | 10   | C      | 1        | Session-based teaching<br>Haugesund    |
| Advanced Ship Stability  | 10   | C      | 1        | Session-based teaching<br>Haugesund    |
| Scientific Approach of Complex Problems                                  | 6    | C      | 2        | Session-based teaching<br>Emden / Leer |
| Business Administration and Management                                   | 6    | C      | 2        | Session-based teaching<br>Emden / Leer |
| Ship Technology  | 6    | C      | 2        | Session-based teaching<br>Emden / Leer |
| Quality and Risk Management  | 6    | C      | 2        | Session-based teaching<br>Emden / Leer |
| Tools of Operational Research and Simulation                             | 6    | C      | 2        | Session-based teaching<br>Emden / Leer |

| <b>Alternative 1: Profile: Sustainable Maritime Operations (30 ECTS)</b> |      |        |          |  |
|--|------|--------|----------|--|
| Course name  | ECTS | C / E* | Semester | Organization                                       |
| Technical Aspects of Safe and Environmental Shipping                     | 6    | E      | 3        | Session-based teaching<br>Emden / Leer             |
| Operational Aspects of Safe and Environmental Shipping                   | 6    | E      | 3        | Session-based teaching<br>Emden / Leer             |
| Managerial Aspects of Safe and Environmental Shipping                    | 6    | E      | 3        | Session-based teaching<br>Emden / Leer             |
| Maritime Project   | 12   | E      | 3        | Session-based teaching<br>Emden / Leer             |
| <b>Alternative 2: Profile: Offshore and Subsea Operations (30 ECTS)</b>  |      |        |          |  |
| Course name  | ECTS | C / E* | Semester | Organization                                       |
| Subsea Technology and Operations, incl. Hydraulic Systems                | 10   | E      | 3        | Session-based teaching<br>Haugesund                |
| Marine Operations in the Ocean Space                                     | 10   | E      | 3        | Session-based teaching<br>Haugesund                |
| Ship Operation- and Maintenance Systems                                  | 10   | E      | 3        | Session-based teaching<br>Haugesund                |
| <b>Alternative 3: Student Exchange (30 ECTS)</b>                         |      |        |          |  |
| <b>Master thesis</b>   |      |        |          |  |
| Master thesis  | 30   | C      | 4        | Session-based teaching<br>Haugesund/<br>Emden-Leer |

\*C=Compulsory courses, E=Elective courses

## Philosophy of Science, Research Design and Methods

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | Faculty of Technology, Business and Maritime Education                      |
| Campus:                  | Haugesund   |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 10 ECTS   |
| Language of instruction: | English   |
| Taught during:           | 1 <sup>st</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | Fall  |
| Program Sequence:        | 1 <sup>st</sup> semester  |
| Taught Initially:        | Fall 2017   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

General presentation of:

- Common concepts, problems and theories of philosophy of science, particularly related to epistemology and ontology.
- A variety of theoretical positions within philosophy of science, i. e. different solutions to the most common problems of epistemology and ontology, and a discussion of the pros and cons of these solutions.
- How different solutions to epistemological and ontological problems provide different resources for building different kinds of scientific disciplines - within both natural and social sciences.

In depth presentation of:

- Knowledge about the relationship between philosophy of science and research design, i. e. how epistemological and ontological assumptions provide possibilities and restrictions for how specific research ought to be designed.
- Methodological challenges that arise when designing research projects based on different epistemological and ontological assumptions.



## Learning Outcome:

Knowledge – the student has advanced knowledge of:

- What the concepts ontology and epistemology refer to, and the relationships between them.
- The more important problems with different epistemological and ontological theories, particularly the distinction between objectivist and relativist theories.
- The most common advantages and disadvantages of the different common solutions to epistemological and ontological problems, e. g. the distinction between explain and understand.
- The fundamental epistemological and ontological differences between natural and social sciences.
- The common ontological and epistemological theories employed within different types of sciences.
- How specific epistemological and ontological assumptions allow for some types of research designs and not other, i. e. allow for certain kinds of research questions and therefore necessitate certain kinds of methods.
- The difference between qualitative and quantitative methods and the different problems of validity associated with both types of methods
- Kuhn's theory about how sciences develop
- Popper's rule about falsification as a defining trait of any science.

Skills – the student:

- Is able to analyse research based knowledge claims and evaluate their philosophical strengths and weaknesses, including methodological validity.
- Is able to independently use relevant research methods.
- Is able to design a coherent research project where epistemology, ontology, subject matter theories and methods are consistent and appropriate for answering the research question.

General Qualifications – the student is able to:

- Analyse all kinds of knowledge claims with regards to their philosophical status.
- Critically assess the types of knowledge produced by different kinds of research.
- Critically assess the validity of knowledge claims presented in scientific literature
- Employ insights from philosophy of science to identify and appreciate (evaluate on all possible parameters) the weaknesses and strengths of knowledge claims.



**Teaching Methods:**

Lectures / seminars, group work, presentations in class.

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

None

**Compulsory work:**

A draft design of a research project is handed in approximately half way through the course.

**Grading Scale:**

A-F:   X                        Passed/Not passed:       

**Examination:**

| Comp. | Component Name | Duration | Weight  | Supporting Materials |
|-------|----------------|----------|---------|----------------------|
| 1     | Portfolio      |          | 100/100 | Any                  |

The portfolio consists of 3 portfolio assignments:

Part 1: An analysis of a research article to identify the epistemological and ontological assumptions upon which it rests, as well as methodological strengths and weaknesses.

Part 2: A proposal for a research question for the master thesis together with identification of the epistemological and ontological assumptions upon which it rests and an assessment of the what methods that may be used to answer it.

Part 3: A draft design of a research project.

**Course Administrator / Lecturer:**

Ass. Prof. Bjarne Vandeskog

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 80, Self-Study Time: 187

## **Maritime HTO (Human-Technology- Organization)**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | Faculty of Technology, Business and Maritime Education                      |
| Campus:                  | Haugesund   |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 10 ECTS   |
| Language of instruction: | English   |
| Taught during:           | 1 <sup>st</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | Fall  |
| Program Sequence:        | 1 <sup>st</sup> semester  |
| Taught Initially:        | Fall 2016   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

The main focus of the course is on safety outcomes and organizational learning. A variety of theories and empirical knowledge will be presented in order to demonstrate how a variety of factors come together and create the complex system called *Maritime HTO*. The course therefore presents:

- In depth knowledge of human, technological and organizational factors, and the complex relationships between such factors, and how these interactions affect operative outcomes.
- Introduction to general theories about psychological, social and cultural dynamics of organizations, including intercultural communicative challenges and how organizations work and how they learn (or fail to learn).
- Introduction to theories about socio-technical systems, accident causation, safety and risk.



The course also presents knowledge about the key regulations and maritime stakeholders that constitute the contexts for maritime operations and that guide actions within the maritime industry.

- Insight into the national, European and international laws and regulations that govern nautical operations.
- Overview of the complex array of stakeholders, and their responsibilities and areas of activity, in the maritime industry, including commercial, government and international organizations.

### **Learning Outcome:**

Knowledge about various human-technological-organizational factors related to management of complex maritime operations that can help minimizing unwanted events, enhance operational safety, and improve organizational learning. After having taken this course the students are expected to have the following knowledge, skills and general competence:

Knowledge – the student has advanced knowledge of:

- Of the key regulatory institutions and documents that guide actions in the maritime industry.
- Of the key maritime stakeholders, and their interrelationships.
- Of what culture is and how cultural dynamics contribute to how individuals understand their environment, their understanding of themselves, how they interact and how organizations work.
- About how cultural differences introduce a particular challenge regarding the management of risk in maritime operations and organizational learning.
- About how the critical interface between human, organizational, and technological aspects in maritime operations, how humans create this interface and how they manage it.

Skills – the student is able to:

- Critically examine regulations, standards and the interrelationship between key stakeholders to identify the viability and limits on different development and operational management.
- Apply tools, methods, and techniques to improve safety and organizational learning in maritime operations
- Analyze the complexities of interaction between technology, humans and organizational processes
- Employ their knowledge of complex human and organizational aspects in the design and operation of maritime operations
- Use theories about culture to identify how culture contributes to how people create, manage and struggle to improve operational organizations that deal with technological challenges.

General Qualifications – the student:

- Knows how to critically assess the limitations and possibilities for maritime safety and organizational learning set by standards and regulations
- Knows how to manage the complex and dynamic nature of technology, humans and organizational processes in relation to risk and safety in maritime operations
- Knows how to critically examine causal arguments involving accident causation and prevention theories
- Is awareness of risk associated with the negligence of critical human-technology-organization interfaces
- Knows how to critically review maritime operations
- Able to understand all the different concepts of culture that permeate the organizational literature, the strengths and weaknesses of the various concepts, and how they can be used in different ways in order to analyze the organization, create strategies and plan operations.

**Teaching Methods:**

Lectures, Interactive discussions and Group work consisting of case studies and presentations.

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

None

**Compulsory work:**

Must be approved before receiving an assessment for the course.

**Grading Scale:**

A-F:   X        Passed/Not passed:

**Examination:**

| Comp. | Component Name | Duration | Weight  | Supporting Materials |
|-------|----------------|----------|---------|----------------------|
| 1     | Portfolio      |          | 100/100 |                      |

The portfolio consists of three parts:

Part 1: Literature review where the students choose literature relevant for their master's thesis

Part 2: Assessment of another student's literature review

Part 3: Analysis of a case – a description of an incident - in order to identify the more critical interrelationships between human (individual), technical and organizational factors contributing to the incident, and make suggestions for how the organization can learn from such incidents

**Course Administrator / Lecturer:**

Ass. Prof. Helle Oltedal and Ass. Prof. Bjarne Vandeskog

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 80, Self-Study Time: 187

## **Advanced Ship Stability**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | Faculty of Technology, Business and Maritime Education                      |
| Campus:                  | Haugesund   |
| Study Program:           | Master of International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 10 ECTS   |
| Language of instruction: | English   |
| Taught during:           | 1 <sup>st</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | Fall  |
| Program Sequence:        | 1 <sup>st</sup> semester  |
| Taught Initially:        | Fall 2017   |

### **Offered to Students in the Following Programs:**

Master of International Ship Technology, Maritime Operations and Management

### **Course Contents:**

- General notion of stability.
- Forces and moments.
- Centre of gravity and centre of pressure. Simpson's rules for calculating centre of pressure. Density and specific gravity.
- Laws of floatation.
- Euler's theorem.
- Transverse statical stability. Longitudinal stability.
- Dynamical stability and moment of statical stability.
- Stability and hydrostatic curves.
- Effect of free surface of liquids on stability. Calculating the effect of free surface of liquids.
- Icing allowances and effects on trim and stability.
- Drydocking and grounding.
- Computer-aided calculations. Application of specialized software, such as MATLAB or NAPA, for making stability calculations and for visualizations.
- Analyses of case studies involving loss of stability.

**Learning Outcome:**

Knowledge – the student has:

- Advanced knowledge related to different types of stability (static, dynamic, longitudinal and transverse).
- Thorough knowledge of basic theories and theorems related to ship stability.
- Sufficient knowledge to calculate hydrostatic information.
- Advanced knowledge of stability for operational considerations relating to the safety of ships.
- Thorough understanding of how winds, waves and other forces affect the ship's stability.
- Knowledge of how different types of cargo influence on ship stability.

Skills – the student:

- Can calculate transverse and longitudinal stability, statically stability and dynamical stability.
- Can analyze intact and dynamic stability.
- Can determine influence of reception of a cargo on ship stability.
- Can analyze stability during dry-docking and loading/unloading operations.
- Can analyze stability during accidents and grounding.
- Can use stability software programs.
- Is able to analyze regulatory documents related to stability.
- Is able to analyze stability in critical scenarios and accidents.

General Qualifications – the student:

- Is able to understand and discuss problems related to stability.
- Has the foundation to acquire new and more advanced knowledge related to stability
- Can analyze problems related to stability.
- Can communicate about stability related issues with both specialists and the general public.
- Can contribute to new thinking and development within the field of stability.

**Teaching Methods:**

The course contains lectures; tutorials; practical assignments related to calculations of stability, stress, bending moment, damage stability as well as advanced calculations of stability using stability software programs and simulator exercises/demonstrations.

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

NAB1021 Hydrostatics and stability, NAB2007 Ship construction, NAB2059 Loading Techniques 1 and NAB2060 Loading Techniques 2 or equivalent.

**Compulsory work:**

Mandatory assignments.

**Grading Scale:**

A-F:   X              Passed/Not passed:              

**Examination:**

| Comp. | Component Name | Duration | Weight  | Supporting Materials                   |
|-------|----------------|----------|---------|--|
| 1     | Written exam   | 5 hrs    | 100/100 | School's calculator and formulae book. |

**Course Administrator / Lecturer:**

Dr. Prof. Marina Solesvik

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 80, Self-Study Time: 187

## **Business Administration and Management**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 6   |
| Language of instruction: | English   |
| Taught during:           | 2 <sup>nd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 2 <sup>nd</sup> semester  |
| Program Sequence:        | 1 <sup>st</sup> year of study   |
| Taught Initially:        | Spring 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

The course covers the most important aspects of Business Administration and Management for technical oriented participants in the maritime industry. The course provides an introduction to the foundations of investments and finance, several aspects of management accounting & control as well as the practical application of the acquired theoretical knowledge through participating in a computer based management simulation.

The Course is divided into 3 main modules:

1. Part 1 focusses on the prerequisites and foundations for investments and finance including the following areas (but not restricted to): calculating cash flows relevant for decision making, interest calculations and financial mathematics, net present value calculations, investment analysis and methods & sources of financing.
2. Part 2 covers the area of management accounting especially introducing key ideas, concepts, and tools of strategic management accounting and control. Including the following content (but not restricted to): Income and cost control, models for internal accounts including the use of normal and standard costing, cost distribution, decision-relevant costs and income, budgeting, performance measurement, and balanced scorecard.

3. Part 3 is integrating the theoretical knowledge of the above modules through a practical application. For a better understanding of the complex interactions within a maritime company the students participate in a computer based management simulation. They take the role of the board of executives of a maritime company and experience typical conflicts in corporate governance. The Participants learn to apply business economic methods and information resources as well as how to deal with the uncertainty of decision-making usually in a team, often under time pressure.

### **Learning Outcome:**

The student has broad knowledge in various aspects of business administration and management. After having taken this course the students are expected to have the following knowledge, skills and general competence:

Knowledge – the student:

- Can explain various principles for cost estimation, cost distribution, and product calculations.
- Is familiar with budgeting as a management tool, and can explain how budgeting processes are organized and carried out.
- Can explain how enterprises are financed, new investments are considered, and how annual accounts are prepared and analyzed.
- Can explain the basis for the time value of money and the relationship between the use of net current value as a decision making criterion for investments.
- Can account for the relationship between net current value and the internal rate of return.
- Knows the purpose of a financial statement.
- Knows the concepts of expenses, costs, expenditures, revenues and payments and has acquired a good understanding of the cost concept and cost variation.
- Knows about various principles for cost distribution, and product calculation.
- Is familiar with budget as a management tool, and can account for how budget processes are organized and carried out.

Skills – the student:

- Can budget cash flows that are relevant for decision-making concerning investment and financial decisions.
- Can carry out profitability analyses based on net current value.
- Can calculate an internal rate of return.
- Is able to carry out cost, profit and volume analyzes.
- Can apply the most common instruments of strategic management accounting to evaluate an organization's performance and to support strategic decision-making.



- Can calculate financial performance measures.
- Is able to develop pre and post calculations using the self-cost and contribution principles for firms in various business sectors.
- Can perform traditional calculations based on the normal and standard costing methods.
- Can design and use a balanced scorecard for evaluating performance.
- Can set up budgets (result, liquidity, and balance budgets) based on the company's plans and activities for a given period, and see the connection between the company's various subordinate budgets.
- Can apply knowledge from the various academic fields to practical problems in the workplace, and can collect and analyze relevant information in order to solve a wide specter of problems within business administration and management.
- Is able to update his / her own knowledge throughout his / her working life.

General Qualifications – the student:

- Has basic academic insight, analytical training, and an understanding of problems within the general fields of business administration and management.
- Can plan and carry out his/her own analyses of practical problems and make decisions based on these analyses.
- Can convey academic material both orally and in writing, and can exchange views and experience, thereby contributing towards the development of good work experiences.
- Can ask critical questions about and reflect upon central prerequisites and assumptions within this academic field.

**Teaching Methods:**

Lectures, exercises, interactive discussions and Group work consisting of case studies, computer based management simulation and student presentations.

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

None

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

1-5: X

Passed/Not passed: \_\_\_\_\_

**Examination:**

| <b>Comp.</b> | <b>Component Name</b>  | <b>Duration</b> | <b>Weight</b> | <b>Supporting Materials</b>                      |
|--------------|--|-----------------|---------------|--|
| 1            | Written exam at school   | 3 hours         | 75/100        | Formula book; non programmable pocket calculator |
| 2            | Student presentation (of the results of the management simulation) | 0,5 hours       | 25/100        |  |

**Course Administrator / Lecturer:**

Prof. Dr. Klaus Heilmann

**Required Reading (Syllabus):**

- Please consult the syllabus pages in the library section.
- Burns, J., Quinn, M., Warren, L., & Oliveira, J. (2013). Management accounting. New York: McGraw-Hill.
- Participants' Manual of the computer based Management Simulation

**Workload (hours):**

Contact time: 48, Self-Study Time: 112

## Quality and Risk Management

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 6   |
| Language of instruction: | English   |
| Taught during:           | 2 <sup>nd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 2 <sup>nd</sup> semester  |
| Program Sequence:        | 1 <sup>st</sup> year of study   |
| Taught Initially:        | Spring 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

Shipping is a process that is linked to operational (e. g. navigational risks), safety (e. g. fire, abandoning ship risks) and environmental (e. g. handling of cargos and bunkers) risks and is taking place in a global competition. Similar problems can be found in varying degrees in all industries (e. g. offshore, aviation, automotive).

The student should be able to understand and apply the generic philosophy of the risk based approach and quality management. He is a specialist in maritime processes regarding the operation of a ship, as well as for offshore structures. He can analyse the potential risks to human safety and to the environment and is familiar with the process of safety management and environmental protection.

- The term "quality" in the maritime environment
- Fundamentals of quality management systems (QMS)
- Quality Management Standards (e. g. ISO 9000, ISO 14000, ISO 18000, ISO 50000)
- Introduction into "Quality Management Systems" in the maritime environment (ISM, TMSA, OVMSA)
- Analysis of the cost / benefit of a QMS
- Prerequisites for a successful use of QMS in companies

- Strategies for creating, implementing, auditing, improvements (e. g. quality indicators, handling of deviations, Plan-Do-Check-Act cycle) of QMS
- Methods to conduct incident/accident investigations (e. g. Bow Tie, STEP, MSACT)
- Introduction into the risk management process (Identification, Assessment, Evaluation and control of risks) in the maritime environment
- Fundamental aspects of accident prevention and safe working procedures on ships and offshore installations
- Management of change

### **Learning Outcome:**

This module aims to introduce students to use quantitative methods and techniques for effective decisions-making; model formulation and applications that are used in solving business decision problems in regard to QMS.

Knowledge – through the successful completion of this module, students can:

- specify the risk based approach
- specify the principles of risk management (e. g. HAZID, HAZOP, ALARP)
- analyse and differentiate the existing quality management systems (QMS)
- can specify QMS used in the maritime environment (e. g. ISM, TMSA, OVMSA)
- identify / evaluate the "value" (cost / benefit) of a management system for a company
- express the need for the investigation of marine incidents/accidents
- plan how to identify, evaluate and assess the causes of incidents/accidents with different tools
- specify the need for change management

Skills – the students:

- can plan the risk management processes of a company in regard to technical safety and safe working operations
- can integrate QMS into existing management structures of a company
- can manage quality management systems purpose-oriented in the maritime environment
- can analyze quality management systems, formulate corrective actions and support the implementation
- can implement an effective change management
- can derive appropriate measures to improve the safety of ship operations
- can conduct incident/accident investigations

General Qualifications – the students:

- can analyze and structure a problem to extract the main parameters of a problem and describe the objects for optimization
- can plan, conduct and evaluate a problem in an interdisciplinary framework

**Teaching Methods:**

The course contains lectures, supervision, net discussions, net based resources and work with portfolio elements.

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

Basic knowledge about quality management and risk management in the maritime sector

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

1-5:   X              Passed/Not passed:       

**Examination:**

| Comp. | Component Name  | Duration                 | Weight                           | Supporting Materials             |
|-------|---|--------------------------|----------------------------------|----------------------------------|
| 1     | Portfolio(thesis paper, exercises, short written test | 2 <sup>nd</sup> semester |                                  |                                  |
|       | Thesis paper  |                          | 40%                              | All supporting materials allowed |
|       | Exercises   | 20%                      | All supporting materials allowed |                                  |
|       | Short written text                                    | 120 min                  | 40%                              | Nothing allowed                  |

**Course Administrator / Lecturer:**

Prof. Capt. Rudolf Kreuzer

**Required Reading (Syllabus):**

- Please consult the syllabus pages in the library section.
- M. Chauvel: "Managing safety and quality in shipping : the key to success. A guide to ISM, ISO 9002, TQM", Nautical Institute, 1997

- Svein Kristiansen: "Maritime Transportation: Safety Management and Risk Analysis", Elsevier Butterworth-Heinemann, 2005

**Workload (hours):**

Contact time: 48, Self-Study Time: 112

## Scientific Approach of Complex Problems

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 6   |
| Language of instruction: | English   |
| Taught during:           | 2 <sup>nd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 2 <sup>nd</sup> semester  |
| Program Sequence:        | 1 <sup>st</sup> year of study   |
| Taught Initially:        | Spring 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

The students attending successful the course acquire an advanced understanding of the conceptual design of models in the field of maritime sciences. The way is shown to a suitable modeling strategy of a complex system. Special emphasis will be placed on a broad introduction of the scientific term “modeling”. The most relevant scientific modeling concepts will be introduced, both from engineering and an economic point of view.

### **Learning Outcome:**

Knowledge – the student has:

- knowledge on the need and availability of appropriate measurement techniques for the understanding of involved processes and the steering, calibration and verification of models
- knowledge about collecting data via market-/opinion research, measurements in the laboratory and measurements in nature
- knowledge on special engineering applications such as the theory of similarity
- knowledge on the intended application of a broad range of different types of mathematical models in the maritime sciences



- knowledge on limitations of mathematical models, risk of empirical approaches included in mathematical models
- limits of accuracy of different modeling concepts

Skills – the student:

- can indicate the truly relevant processes of a complex system
- can create measurement campaigns for understanding the identified processes in a targeted manner
- can design a modeling concept for understanding a complex system including empirical and mathematical models

General Qualifications – the student:

- can plan, conduct and evaluate smaller investigations of complex problems on the basis of models
- can supervise the quality of ordered investigations on the basis of models

### **Teaching Methods:**

The course contains lectures, project-oriented conceptual exercises in the lecture room and comprehensive computational and experimental lab exercises. Lecturers and students will collaborate and communicate in the special labs for project-oriented learning in the Center for Modeling and Simulation at the campus Leer of the University of Applied Science Emden / Leer.

### **Practical Information about the Course:**

None

### **Prerequisites:**

None

### **Recommended Previous Knowledge:**

None

### **Compulsory work:**

Yes, will be specified in the course plan by semester start.

### **Grading Scale:**

1-5:   X              Passed/Not passed:

**Examination:**

| Comp. | Component Name      | Duration                 | Weight | Supporting Materials             |
|-------|---------------------|--------------------------|--------|----------------------------------|
| 1     | Written examination | 120 min.                 | 50%    | Nothing                          |
| 2     | Project Thesis      | 2 <sup>nd</sup> semester | 50%    | All supporting materials allowed |

**Course Administrator / Lecturer:**

Prof. Dr.-Ing. Jann Strybny

**Required Reading (Syllabus):**

-----

**Workload (hours):**

Contact time: 48, Self-Study Time: 112

## **Ship Technology**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 6   |
| Language of instruction: | English   |
| Taught during:           | 2 <sup>nd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 2 <sup>nd</sup> semester  |
| Program Sequence:        | 1 <sup>st</sup> year of study   |
| Taught Initially:        | Spring 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

- Introduction to ship propulsion systems as Layout, Engines, Gears, Bearings, Seals, Shafts, Propeller, Diesel-Electric systems, ...
- Introduction to ship operating systems as Layout, pipework, devices, fittings, ...
- Introduction to ship engines – 2 stroke engines, 4 stroke engines, gas turbines.
- Introduction to ship fuels – today's fuels and future fuels.
- Different fuel systems according to the fuel – tanks, handling, safety.
- Thermodynamics of combustion engines – today's and future fuels.
- Combustion – today's and future fuels.
- Propulsion system dynamics, safety and availability, installation complexity of the different propulsion systems / propulsion engines.
- Environmental aspects / efficiency, exhaust gas composition.
- Calculation and measurement methods for engine power output, fuel consumption, heat exchange, temperatures, pressures, flows, speed, exhaust gas composition, ...
- Furthermore, fatigue strength of the steel structure is addressed as well as the exciter.
- Relevant concepts of classification societies to evaluate fatigue

**Learning Outcome:**

The course aims at providing students a foundation.

Theoretic and practical knowledge in ship technology. The content of the course will be closely related to the student's own research work.

Knowledge – the student has:

- knowledge about ship propulsion systems, fuel consumption, environmental aspects and ship handling
- knowledge about ship system layout and basic international rules for system layout
- knowledge about major research methodologies for applied research according propulsions and ship operation systems
- knowledge about the general stress cycles a ship has to survive
- understand the most fatigue critical stress parts in the ships steel structure

Skills/General Qualifications – the student is:

- Able to analysis ship propulsion systems on different types of ships
- Able to layout the different systems on board
- Able to discuss/ work with the different partners in the ship building/ maritime industry
- Can use classification rules to layout steel structure of a ship respecting fatigue
- Able to work in groups, manage report writing, presentation, function in a multi-disciplinary and intercultural team

**Teaching Methods:**

The course contains lectures, work in groups (layout work, experiments/ measurements in the ship propulsion and operation labor

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

Basic knowledge about ship types, ship technology and ship building technology, working in research projects.

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

1-5:   X                        Passed/Not passed:       

**Examination:**

| Comp. | Component Name           | Duration   | Weight     | Supporting Materials                           |
|-------|--------------------------|------------|------------|--|
| 1     | Written exam             | 4 hours    | 80/100     | Formula book                                   |
| 2     | Portfolio (Reports etc.) | 1 semester | 20/100     | All helping aids and printed documents allowed |
|       | exercises                |            | 50% of 20% | nothing  |
|       | Thesis Paper             |            | 50% of 20% | All supporting materials allowed               |

**Course Administrator / Lecturer:**

Prof. Dipl.-Ing. Freerk Meyer, Prof. Dr. Marcus Bentin

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 48, Self-Study Time: 112

## Tools of Operational Research and Simulation

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 6   |
| Language of instruction: | English   |
| Taught during:           | 2 <sup>nd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 2 <sup>nd</sup> semester  |
| Program Sequence:        | 1 <sup>st</sup> year of study   |
| Taught Initially:        | yes   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

Operations research helps in solving problems in different environments that needs decisions. The module covers tradition topics of Operational research (OR) that include: linear programming, Transportation, Assignment. But this is not only limited to business problems, also technical problems have to optimized, for example weight and strength of a construction, resistance of a vessel by varying the ship hull. In these cases, heuristic optimization approach know as artificial intelligence are used. At least but not at last many processes are probilistic hence the optimum has to be found for unsure situation. For all of this a kind of simulation model is needed. These can be analytic ones but often they are a kind of discrete / numerical simulation model.

Analytic techniques and computer packages will be used to solve problems facing business managers in decision environments.

- Introduction to Operations Research (OR)
- Introduction to Foundation mathematics and statistics
- Linear Programming (LP), LP and allocation of resources, LP definition, Linearity requirement
- Maximization Then Minimization problems

- Graphical LP Minimization solution, Introduction, Simplex method definition, formulating the Simplex model
- Linear Programming – Simplex Method for Maximizing
- Simplex maximizing example for similar limitations, Mixed limitations
- Example containing mixed constraints, Minimization example for similar limitations
- Introduction to Genetic Algorithms and Neural Networks
- Introduction to simulated annealing and branch and bound methods
- Using an optimization algorithm on a maritime challenge – logistic, resistance, strength, ...
- Probability concepts and simulation, Monte Carlo Methods

### **Learning Outcome:**

This module aims to introduce students to use quantitative methods and techniques for effective decisions-making, model formulation and applications that are used in solving business decision problems.

Knowledge – the student:

- has knowledge about OR science and its models and methods
- has knowledge about the fundamentals of artificial intelligence its background and application possibilities
- has an understanding of the limits of the different optimization methods.
- has knowledge about probability concept, understand the theory of statistics and can use it on practical problems
- has knowledge how to interpret optimisation results

Skills – the students:

- can solve analytic optimization problems using popular tools
- can program the basics of a numerical optimization method
- can use software for optimizing a real world maritime problem

General Qualifications – the students:

- can analyze and structure a problem to extract the main parameters of a problem and describe the objects for optimization
- can plan, conduct and evaluate a problem in an interdisciplinary framework

### **Teaching Methods:**

The course contains lectures, supervision, net discussions, net based resources and work with portfolio elements. Lecturers and students will collaborate and communicate through our internet-based system for teaching and learning, Moodle.

### **Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

None

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**1-5:   X                        Passed/Not passed:       **Examination:**

| Comp. | Component Name  | Duration                 | Weight | Supporting Materials             |
|-------|---|--------------------------|--------|----------------------------------|
| 1     | Portfolio (thesis paper, exercises, short written test) | 2 <sup>nd</sup> semester |        |                                  |
|       | thesis paper  |                          | 40%    | All supporting materials allowed |
|       | exercises   |                          | 30%    | All supporting materials allowed |
|       | short written test                                      | 60 min                   | 30%    | nothing                          |
| 2     |   |                          |        |                                  |

**Course Administrator/ Lecturer:**

Prof. Dr. Marcus Bentin

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 48, Self-Study Time: 112



## **Subsea Technology and Operations, incl. Hydraulic Systems**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | Faculty of Technology, Business and Maritime Education                      |
| Campus:                  | Haugesund   |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 10  |
| Language of instruction: | English   |
| Taught during:           | 3 <sup>rd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 3 <sup>rd</sup> semester  |
| Program Sequence:        | 2 <sup>nd</sup> year of study   |
| Taught Initially:        | Fall 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

The influence of the subsea environment on technical systems and operations, Subsea production systems, Remotely Operated Vehicles (ROV's) and related operations, Diving technology and operations, Surface support vessels and related operations, Hydrodynamic calculations, Analysis of safety and reliability in relation to subsea operations and equipment, Practical simulator demonstration, Student excursion to the PRS subsea base at Killingøy.

Hydraulic systems and circuits, Hydraulic fluids, Oil quality and analysis, Fluid mechanics, Pumps and motors, Control valves, Tanks, filters, coolers, Couplings and pipes.

### **Learning Outcome:**

Knowledge – the student:

- can explain the challenges and constraints the subsea environment represents for subsea equipment and operations
- have basic knowledge of typical field developments where subsea production systems are extensively used

- have knowledge of subsea production systems, including drilling and completion of wells, equipment, and maintenance-/intervention methods
- can explain methods for subsea operations, including the use of Remotely Operated Vehicles (ROV's), diving and relevant surface vessels
- have knowledge of reliability- and risk analysis methods and can apply them on equipment and operations
- have basic knowledge of components and control equipment used in hydraulic systems and know how to integrate them in functional systems
- can explain the sources and consequences of contaminants in the oil, and how this can be prevented
- have knowledge of regulation of pump capacity in hydraulic systems

Skills – the students are able to:

- prepare specifications for equipment to be used subsea
- perform hydrodynamic calculations for subsea lifting- and ROV-operations
- prepare operation procedures related to subsea installation and maintenance / intervention
- design basic hydraulic systems based on standard components

General Qualifications – the students:

- are able to keep themselves updated in a subject of rapid development
- can apply standards and guidelines related to general engineering work
- can work in teams together with other persons to prepare and perform project work

### **Teaching Methods:**

Lectures, mandatory laboratory exercises, calculation training, simulator training and industry excursion. Develop a project report.

### **Practical Information about the Course:**

Simulator training at a simulator centre in Haugesund (one day), Excursion to a subsea base in Haugesund (one day).

### **Prerequisites:**

None

### **Recommended Previous Knowledge:**

Physics, Thermodynamics and Fluid mechanics.

### **Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

A-F:   X        Passed/Not passed:       

**Examination:**

| <b>Comp.</b> | <b>Component Name</b>           | <b>Duration</b> | <b>Weight</b> | <b>Supporting Materials</b>                    |
|--------------|---------------------------------|-----------------|---------------|--|
| 1            | Written exam                    | 5 hours         | 80/100        | Formula book                                   |
| 2            | Portfolio (Project report etc.) | 1 semester      | 20/100        | All helping aids and printed documents allowed |

**Course Administrator / Lecturer:**

Jens Christian Lindaas

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 80, Self-Study Time: 187

## Ship Operation- and Maintenance System

### **Brief facts:**

|                          |  |
|--------------------------|--|
| Department:              | Faculty of Technology, Business and Maritime Education       |
| Campus:                  | Haugesund  |
| Study Program:           | International Master Ship Technology and Maritime Management |
| Number of credits:       | 10   |
| Language of instruction: | English  |
| Taught during:           | 3 <sup>rd</sup> semester                                     |
| Number of semesters:     | 1  |
| Semester of Assessment:  | 3 <sup>rd</sup> semester                                     |
| Program Sequence:        | 2 <sup>nd</sup> year of study                                |
| Taught Initially:        | Fall 2018  |

### **Offered to Students in the Following Programs:**

International Master Ship Technology and Maritime Operations and Management

### **Course Contents:**

General ship operation and maintenance with a focus on offshore technology/vessels, Strategies and methods for maintenance, Reliability and availability of equipment and systems, Condition monitoring, Instrumentation for detection and measuring of parameters as pressure, temperature, flow, vibration and more, Signal conversion, Signal transmission, Automation systems, Control engineering, Analysis methods to establish maintenance programs i. e. "Reliability Centred Maintenance" (RCM), Computer based systems for maintenance management and spare part control.

### **Learning Outcome:**

Knowledge – the student:

- is able to describe different strategies and methods for maintenance of technical systems and equipment
- is familiar with definitions related to reliability and availability of technical systems
- is able to prescribe condition monitoring systems for various types of equipment
- has basic knowledge of central topics in electrical engineering, including measuring principles related to condition monitoring
- is able to explain basic topics in control engineering and automation

- is able to explain computer aided maintenance systems

Skills – the student is able to

- establish strategies and methods for maintenance including inspection, preventive maintenance, corrective maintenance and condition monitoring
- calculate the reliability and availability of technical systems and equipment
- describe various principles of measuring physical quantities
- calculate measurement system properties
- carry out analyses to establish and optimize maintenance systems
- specify computer aided maintenance- and spare part systems

General Qualifications – the student:

- is able to explain the importance of maintenance with respect to safety, environment, availability and total economy
- has sufficient knowledge of instrumentation and signal transmission to cooperate with the instrumentation engineers on the ship and offshore installations
- can work in teams together with other persons to prepare and perform project work

**Teaching Methods:**

Lectures, calculation exercises, laboratory exercises, project work and guest lecture. Develop a portfolio for the subject.

**Practical Information about the Course:**

Possible visiting a typical offshore vessel

**Prerequisites:**

None

**Recommended Previous Knowledge:**

Physics, Mathematics

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

A-F:   X              Passed/Not passed:

**Examination:**

| <b>Comp.</b> | <b>Component Name</b>    | <b>Duration</b> | <b>Weight</b> | <b>Supporting Materials</b>                    |
|--------------|--------------------------|-----------------|---------------|--|
| 1            | Written exam             | 4 hours         | 80/100        | Formula book                                   |
| 2            | Portfolio (Reports etc.) | 1 semester      | 20/100        | All helping aids and printed documents allowed |

**Course Administrator / Lecturer:**

Jens Christian Lindaas

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 80, Self-Study Time: 187

## **Marine operations in the Ocean Space**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | Faculty of Technology, Business and Maritime education                      |
| Campus:                  | Haugesund   |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 10 ECTS   |
| Language of instruction: | English   |
| Taught during:           | 3 <sup>rd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | Fall  |
| Program Sequence:        | 3 <sup>rd</sup> semester  |
| Taught Initially:        | Fall 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

Introduction

- The ocean environment
- Operational challenges in the ocean space and surface border
- Engineering tools with emphasis on Orcaflex

Advanced marine hydrodynamics

- Kinematics and dynamics of ocean waves
- Natural frequencies, frequency encounter, resonance
- Wave-induced loads and motions
- Strip theory
- Green's theorems
- Haskind relation of existing forces
- Response Amplitude Operators (RAOs)
- Minimization of vessel motions

## Environmental criteria

- Weather window
- Uncertainties in weather forecasting
- Weather-routing systems

## Station-keeping

- Principle of Dynamic Positioning
- Catenary and mooring analysis

## Modelling and simulation of case studies

- Marine seismic operations
- Cable operations
- Anchor handling
- Bow loading
- ROV/UAV operations

## **Learning Outcome:**

### Knowledge – the student:

- Knows the basic principles of marine operations in the oceans space with emphasis on how the environment affects the operations.
- Has thorough understanding of the key environmental factors affecting the performance of marine operations in the ocean space.
- Knows the fundamental hydrodynamics as a theoretical basis for operations in the surface zone.
- Knows the basic principles in determining the operational window based on weather conditions.
- Knows the principles in weather-routing systems and its applications, possibilities and limitations.
- Has an overview of the principles and operational challenges of station-keeping.
- Knows well how marine operations can be modelled and simulated.

### Skills – the student:

- Is able to use appropriate SW tools to perform static and dynamic analysis of marine operations.
- Is able to understand limitations in modelling and simulation of marine operations.
- Is able to propose and evaluate solutions for planning of effective operations.



General Qualifications – the student:

- Is able to work in project teams of marine operations, including international and interdisciplinary project teams.
- Has the foundation to acquire new and more advanced knowledge related to work tasks and operations within the maritime field.
- Is able to contribute in discussions regarding relevant marine operations.

**Teaching Methods:**

Lectures, group-work, self-studies

**Practical Information about the Course:**

None

**Prerequisites:**

Advanced Ship Stability

**Recommended Previous Knowledge:**

NAB3035 Marine operations in the ocean space

**Compulsory work:**

A number of compulsory written assignments must be approved.

**Grading Scale:**

A-F:   X              Passed/Not passed:              

**Examination:**

| Comp. | Component Name | Duration | Weight | Supporting Materials            |
|-------|----------------|----------|--------|---------------------------------|
| 1     | Oral Exam      | 1 hr     | 100%   | No supporting materials allowed |

**Course Administrator / Lecturer:**

Prof. Egil Pedersen

**Required Reading (Syllabus):**

- Please consult the [syllabus](#) pages in the library section.
- O. Faltinsen (1993) Sea Loads on Ships and Offshore Structures, ISBN; 9780521458702

**Workload (hours):**

Contact time: 80, Self-Study Time: 187

## **Maritime Project**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 12  |
| Language of instruction: | English   |
| Taught during:           | 3 <sup>rd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 3 <sup>rd</sup> semester  |
| Program Sequence:        | 2 <sup>nd</sup> year of study   |
| Taught Initially:        | Fall 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

A term paper is the self-written processing of a subject-specific or interdisciplinary task. The student shall work independently on the basis of scientific methods to solve the tasks of a maritime problem. These projects are often integrated in ongoing research projects. The necessary deepened theory for the project is prepared by several lectures and modules which are provided in the third semester. The offered lectures are clustered in three master modules:

- Technical Aspects of Safe and Environmental Shipping
- Operational Aspects of Safe and Environmental Shipping
- Managerial Aspects of Safe and Environmental Shipping

Together with the project mentoring professor the student selects the lectures that fit best to his / her project. Following scopes, covered by research projects, for the projects can be offered:

- Wind propulsion systems (MariGreen & GreenSailer)
- Low and environmental emission propulsion systems (MariGreen & GreenSailer)
- Vessel monitoring and optimization (MariGreen)
- Environmental Monitoring/ Research Shipping (GreenSailer)
- Green Harbour (MariGreen)

**Learning Outcome:**

Knowledge – the student:

- Has practical and theoretical knowledge of the topic he / she deepened in the project using scientific approaches.

Skills – the students:

- Can apply scientific methods on a specific task to solve a problem.
- Can critical evaluate the process of investigation under scientific aspects, correctly interpret the found results and their own contribution to the solution.

General Qualifications – the students:

- Enlarge their skills concerning self and time management when processing complex problems.
- Identify and communicate the essential points of its scientific work.

**Teaching Methods:**

The course contains supervision. Students will collaborate and communicate through our Internet-based system for teaching and learning; Moodle.

**Practical Information about the Course:**

None

**Prerequisites:**

The student should have completed his second semester.

**Recommended Previous Knowledge:**

None

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

1-5:  X  Passed/Not passed:      

**Examination:**

| Comp. | Component Name | Duration                 | Weight | Supporting Materials             |
|-------|----------------|--------------------------|--------|----------------------------------|
| 1     | Term Paper     | 3 <sup>rd</sup> semester | 100%   | All supporting materials allowed |

**Course Administrator / Lecturer:**

Prof. Meyer, Prof. Dr. Bentin, Prof. Dr. Göken, Prof. Dr. Strybny, Prof. Vahs,  
Prof. Kreuzer, Prof. Dr. Heilmann, Prof. Dr. Münchau, Prof. Dr. Klußmann

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 96 Self-Study Time: 224

## Technical Aspects of Safe and Environmental Shipping

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 6   |
| Language of instruction: | English   |
| Taught during:           | 3 <sup>rd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 3 <sup>rd</sup> semester  |
| Program Sequence:        | 2 <sup>st</sup> year of study   |
| Taught Initially:        | Fall 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

This module prepares the student for the technical view on maritime project she/he has to prepare in the third semester. The lecture will be fit to the student needs and depends on the projects decided for the third semester. In the following the learning outcome is described as a sum of all possible lectures that can be given.

To understand the potential of sustainable operations the forces acting on a vessel have to be understood. There are on the one hand forces due to load and bouncy a ship has to be designed for. On the other hand, there are also forces due to wind and waves that influences the steel structure for safe shipping. The vessel is moving true the water therefore it needs power to overcome the resistance. At last but not at least it needs power for maneuvering to overcome the hydrodynamic forces in that case. All these forces have to be understood and calculated. For some forces formulas in rules from classification societies can be found or some thump rules for estimation exists. But all these forces can also be calculated by numerical methods. Some can be verified by measuring at models to get force coefficients that can be used for the real case. The module will discuss the following forces:

- Bending moments and shear forces due to load
- Forces due to wind and waves, seakeeping of vessel
- Dynamic loads and frequencies

- Maneuvering forces
- Resistance
- Understanding of advanced fluid dynamics including three-dimensional, transient and compressible processes
- Identifying the significant physical processes, defining the dimensionality and relevant scales in time and space
- Theory of similarity, range of dimensionless numbers

#### Potential Theory

- Numerical Algorithms and possibilities of independent coding of simplest mathematical models
- Limitations of numerical models, risk of empirical approaches included in numerical models
- Introduction of a complete chain of Open-Source-CFD-Tools, considering preprocessing, processing and post processing tools
- Need and availability of appropriate measurement techniques for the steering, calibration and verification of models
- Use of contactless high-resolving measuring techniques in the fluid dynamics
- Limits of accuracy of different modelling and simulation concepts

To design a sailing system, the overall concept has to be considered. Hence the sailing capacities of the ship hull in respect of stability and maneuverability is important. The maneuverability is influenced by the sails as well as from the ship hull and rudder. On the other side stress calculations for the rig and its foundations are necessary. In order to calculate the stress, the forces have to be known. But these depend also on the ship hull and the requirements given from the planned ship operations and scenarios. The required ship speed influences directly the size of the sailing systems and therefore the forces.

- Calculating stress using classical and Finite Element methods
- layout of sailing system and choosing the material
- estimating the maneuverability and sailing ability of ship hull
- calculating ship stability under sailing condition

#### Layout of Low Emission Ship Propulsion Systems

- Basic Understanding of the different Ship Propulsion Systems as Combustion Engines, Gas Turbines, Electric Systems – e. g. Fuel Cells –, Sailing Systems e. g. Flettner Rotors, Modern Sailing Arrangements, ...
- Basic Understanding: Power Supply and Need of different ship types & ship size

- Combustion Engines
  - Different Ship Fuels – comparison: “classic” and “new” fuels according: tanks, handling, efficiency, safety, ....
  - New fuels: Environmental aspects, efficiency, availability, costs, exhaust gas composition, ....
  - New technologies to reduce environmental impact of ship propulsion systems – e. g. exhaust gas cleaning systems, systems to increase the propulsion efficiency, ...
- Sailing Systems
  - Modern Technologies to use Wind and Sun for Ship Propulsion

#### Design of environmental safe Ship Operation Systems

- Basic Understanding of the different Ship Operation Systems: Cooling Systems, Ballast, Water Systems, Drinking Water Systems, Waste Water Systems, Bilge Systems, ...
- New Technologies to reduce environmental Impact of Ship Operation Systems: energy consumption, chemical waste water, ...

The fundamentals for understanding of light metals will be placed. Knowledge of metal physics and material science of this group of materials is necessary to carry out a targeted material substitution. The skills acquired can be exploited for various areas of transport in which among other things it comes to energy savings.

Material damping is the ability of a material to absorb vibrational energy. On the one hand material damping has a high importance in industrial applications, on the other hand its value act as an analytical tool in modern science because it is used to study diffusion, solubility, plastic deformation, alloy segregation, and a number of other physical and mechanical phenomena associated with material behavior. The fundamentals for understanding the microstructural mechanisms for the material damping are taught.

#### **Learning Outcome:**

Knowledge – the student:

- knows and understands the forces acting on a ship
- knows new materials and their properties
- understands how the properties are affected and determined
- understands a design brief
- has knowledge about the different forces acting on a vessel
- knows the main parameters of the forces in ship operating which influence the sustainability most
- knows the effect of the forces on the ship design
- understands methods of potential flow

- has advanced understanding of the conceptual design of models in the field of engineering sciences. Special emphasis is on identifying the significant physical processes and the choice of the most efficient modelling type
- has knowledge about the basic understanding of the relationships between microstructure and mechanical behavior of light metals, as well as its damping behavior
- has knowledge about the methods for influencing and determining material properties
- has an insight into the methodology of selection of materials
- has knowledge about the methods for influencing and determining material damping
- has an insight into the performance of damping measurements
- has knowledge about ship propulsion systems, fuel consumption, environmental aspects and ship handling
- has knowledge about modern ship system layout and basic international rules for system layout
- has knowledge about major research methodologies for applied research according propulsions and ship operation systems

Skills – the student:

- Can work with engineering methods.
- Understands design parts of a vessel respecting the environment.
- Can analyze and structure maritime problems.
- Understands measuring and analyzing of maritime problems.
- Can calculate forces according thump rules and classification society.
- Can use different programs to calculate resistance and maneuvering forces.
- Can discuss the interaction of numerical simulations with field measurements and laboratory measurements including the theory of similarity.
- Understands modelling and simulation of fluid dynamics in small scales and close to structures.
- Can calculate the stress in the rig and foundation.
- Can design the sails for the required ship speed.
- Can estimate the maneuverability and design a rudder good for sailing operation.
- Can work on materials science problem areas.
- Can show the advantages and disadvantages of light metals compared to other common metals.
- Can understand and discuss material models.
- Can work in the area of vibration problems.
- Can distinguish between high and low damping materials.
- Can understand and discuss models of material damping.
- Is able to analyze ship propulsion systems on different types of ships.



- Is able to layout the different systems on board – according today's and future rules for environmental safe ship design.
- Is able to work in groups, manage report writing, presentation, function in a multi-disciplinary and intercultural team.

General Qualifications – the student:

- enlarge their skills in interdisciplinary works
- identify and communicate the essential points of its scientific work
- enlarge their skills concerning self and time management when processing complex problems
- can evaluate the quality of existing research literature
- can plan, conduct and evaluate a limited research project

**Teaching Methods:**

The course contains lectures, supervision, and work in groups (layout work, experiments / measurements in the ship propulsion and operation labor), net discussions, net based resources and work with portfolio elements.

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

The student should have completed his second semester.

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

1-5:   X              Passed/Not passed:

**Examination:**

| Comp. | Component Name  | Duration                 | Weight | Supporting Materials             |
|-------|---|--------------------------|--------|----------------------------------|
| 1     | Portfolio (thesis paper, exercises, short written test) | 3 <sup>rd</sup> semester | 100%   |                                  |
|       | thesis paper  |                          | 50%    | All supporting materials allowed |
|       | exercises   |                          | 20%    | All supporting materials allowed |
|       | short written test                                      |                          | 30%    | nothing                          |

**Course Administrator / Lecturer:**

Prof. Meyer, Prof. Dr. Bentin, Prof. Dr. Göken, Prof. Dr. Strybny

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 48, Self-Study Time: 112

## Operational Aspects of Safe and Environmental Shipping

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 6   |
| Language of instruction: | English   |
| Taught during:           | 3 <sup>rd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 3 <sup>rd</sup> semester  |
| Program Sequence:        | 2 <sup>st</sup> year of study   |
| Taught Initially:        | Fall 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

This module prepares the student for the operational view on maritime project she/he has to prepare in the third semester. The lecture will be fit to the student needs and depends on the projects decided for the third semester. In the following the learning outcome is described as a sum of all possible lectures that can be given.

The operational aspect can be trained, understand and analyzed by different simulation systems. Therefore, this module gives a complete introduction into the chain of computational maritime modeling and simulation techniques in the course of lab exercises:

- Computer Aided Geometric Modeling
- Computational Fluid Dynamics (CFD)
- Ship Handling Simulation, Offshore- and DP-Simulation
- Engine Room Simulation, Liquid Cargo Handling Simulation
- Modeling and Simulation of the sustainable operation of vessels
- Interaction of vessels with other vessels, waterways, harbours, various coastal and offshore structures
- Modeling navigational aspects on the engineering of waterways and port structures
- Investigation of maritime activities influencing the marine environment

- Visualization
- Scientific reporting

The efficiency and sustainability of ships have to be enlarged steadily. Therefore, the condition of a vessel has to be determined to know the potential of improvement or to ensure that a safe and environmental operation is obtained. This is a large field of data collection using sensors or manual stored data from all relevant systems of the vessel including the ship hull. All these data have to be interpreted to draw the right conclusion. There are questions like:

- optimal trim
- optimal speed
- optimal maintenance concept for each system
- managing the fleet and its sustainability

Preparation and conduct of expedition cruises:

- Research expedition cruises (e. g. 1 week)
- Operation of sailing research vessels to achieve nearly undisturbed areas of investigation
- Conception of measurement campaigns on research vessels
- Field exercises regarding the measuring of a broad range of ocean parameters:
  - marine weather observation
  - usage of water sampling technology, CTD, Secchi disk, bottom samplers, plankton and micro plastic nets

Operation of sonar imaging systems and underwater camera systems, influencing the results by means of navigational aspects

- Laboratory exercises regarding the interaction between shipping and aquatic ecosystems e. g.:
  - control of the operational reliability of ballast water treatment technologies with systems proofed by IMO, US-Coastguard
  - effectiveness of environmental friendly anti fouling systems
- Analysis, scientific reporting

Operation of wind powered ships: different technologies, on-board implementation, operation, potentials and limitations:

- Technologies: soft sails, rigid wing sails, Flettner rotors, kites, others
- Implementation: system instability, impact on ship design, new-build and retrofit
- System operation: handling, efficiency, stability, maneuvering characteristics, other safety aspects, hybrid mode
- Economic considerations: analysis of cost structure, savings
- Case studies from current research projects

## Learning Outcome:

Knowledge – the student:

- Knowing the parameters in operation that influence the sustainability
- Knowledge about environmental legislation
- Has knowledge of the different simulation technics needed to understand, analyze and train maritime operations. As well as the relations and dependencies between each simulation system.
- Knows the main parameters in the operations that influence the sustainability most.
- Has deep knowledge about nautical operations.
- Has knowledge about different maintenance concept
- Knows the parameter to optimize the fleet
- Knows several sensors and methods to retrieve data
- Knows concept that describe the ship performance like EEDI and EEOI
- Knows concept to manage sustainability like SEEMP
- has practical and theoretical knowledge about the tools used to measure a broad range of Ocean parameters, e. g. water sampling technology, CTD, Secchi disk, bottom samplers, plankton and micro plastic nets
- has practical and theoretical knowledge about sonar systems and underwater camera systems.
- has practical and theoretical knowledge about the interaction between shipping and aquatic ecosystems
- has knowledge about the navigational aspects such measurement campaigns
- Has knowledge about the different wind propulsion systems. Their efficiency, pro and cons
- Knows the main parameters in operating the different propulsion systems to maximize their efficiency on sustainability and economic.
- Has deep knowledge about the necessary nautical operations for these systems.

Skills – the Student:

- Can work with scientific methods.
- Can analyze the problem building models.
- Can use tools for monitoring and measuring.
- Can evaluate the results of the simulation model against reality at least roughly.
- Are able to use at least one of the simulation tools to model a part of the simulation chain.
- Can document an “How to” of his simulation model and describe its results.
- Can analyze statistical data and draw the right conclusion.
- Can use optimization techniques to give advices for the most important parameters for sustainability.
- Can work out a scientific measurement campaign.

- Can critical evaluate and analyze the measured parameters according international and national standards.
- Can operate the different tools e. g. sonar system, underwater camera, water sampling technology, CTD, Secchi disk, bottom samplers, plankton and micro plastic nets.
- Can evaluate the efficiency of the different propulsion systems in the frame of service / ship route.
- Estimate their influence on the safety of the ship.
- Can formulate a project structure to realize renewables for ship propulsion.

General Qualifications – the students:

- Enlarge their skills in interdisciplinary works.
- Identify and communicate the essential points of its scientific work.
- Enlarge their skills concerning self and time management when processing complex problems.

**Teaching Methods:**

The course contains lectures, supervision, net discussions, net based resources and work with portfolio elements.

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

The student should have completed his second semester.

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

1-5:   X              Passed/Not passed:

**Examination:**

| Comp. | Component Name  | Duration                 | Weight | Supporting Materials             |
|-------|---|--------------------------|--------|----------------------------------|
| 1     | Portfolio (thesis paper, exercises, short written test) | 3 <sup>rd</sup> semester | 100%   |                                  |
|       | thesis paper  |                          | 50%    | All supporting materials allowed |
|       | exercises   |                          | 20%    | All supporting materials allowed |
|       | short written test                                      |                          | 30%    | nothing                          |

**Course Administrator / Lecturer:**

Prof. Vahs, Prof. Kreutzer, Prof. Dr. Strybny

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 48, Self-Study Time: 112

## **Managerial Aspects of Safe and Environmental Shipping**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | University of Applied Sciences Emden / Leer                                 |
| Campus:                  | Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 6   |
| Language of instruction: | English   |
| Taught during:           | 3 <sup>rd</sup> semester  |
| Number of semesters:     | 1   |
| Semester of Assessment:  | 3 <sup>rd</sup> semester  |
| Program Sequence:        | 2 <sup>st</sup> year of study   |
| Taught Initially:        | Fall 2018   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Contents:**

This module prepares the student for the managerial view on maritime project she/he has to prepare in the third semester. The lecture will be fit to the student needs and depends on the projects decided for the third semester. In the following the learning outcome is described as a sum of all possible lectures that can be given.

The course covers central themes concerning the organization and leadership of projects, as well as methods and techniques for analysis and management. The academic knowledge is founded on a basic understanding of what is involved in the management, organization, and leadership of projects. The course provides a uniform introduction to the ABCs of project work. First it focuses on terminology, initialization and management, and the organization and leadership of projects. The module provides the student with a general understanding of what project work is, in order to be able to manage and participate in projects in a rational manner and use project software. Then it covers the early evaluation of the project phases and systematically goes through the steps, from the idea phase through the concept definition/concept development, to the final project design.



Legal aspects of shipbuilding projects:

- Legal framework: standard contracts, applicable law, technical regulations
- Main elements and key issues of a shipbuilding contract
- Contract and claim management
- Liability, insurance and dispute settlement
- Ship repair and conversion contracts; ship sale and purchase contracts

Economic and financial aspects of shipbuilding projects:

- Financing of shipbuilding projects
- Refund and payment guarantees
- Shipyard management
- Controlling of shipbuilding projects
- Shipbuilding markets, business strategies and marketing

As a result of strong competition between the ports and terminals it is essential to use high sophisticated simulation systems. With the aid of simulation technology, it is possible to analyze an existing or planned terminal as a virtual system in detail

### **Learning Outcome:**

Knowledge – the student:

- deepens the knowledge of management and decision methods
- shows the managerial view on a maritime problem
- highlights the relation between environmental and business aspects
- understands project terminology
- can describe the process of project work from the beginning to finished results
- understands methods for creating goals, planning, execution, and control
- has practical and theoretical knowledge of the various stages about modelling and simulation of different port terminals
- has knowledge about major research methodologies for visualization of new terminals
- has knowledge for integration of ecological aspects in models
- understands the structure and mechanisms of shipbuilding and ship purchase contracts
- assess the legal implications with regard to drafting and negotiating of shipbuilding contracts
- explains the financing instruments in the framework of shipbuilding and ship purchase projects
- contrasts various forms of financing in the general context of shipping economics

Skills – the students:

- learn to use management tools
- analyze and structure maritime problems
- contribute towards developing project ideas
- specify project goals
- plan projects
- follow-up project work
- organize and lead a project team
- use project software
- achieve skills in port logistics

General Qualifications – the students:

- can analyze and structure a problem to extract the main parameters of a problem and describe the objects for optimization
- can plan, conduct and evaluate a problem in an interdisciplinary framework
- are prepared for project work in the professional world
- understand the discipline's terminology and complexity, and has a critical insight into its methodology
- can apply knowledge and skills from the discipline in an independent manner in the various phases of a project by demonstrating cooperation, responsibility, and introspection

**Teaching Methods:**

The course contains different lectures, group work, supervision, net discussions, net based resources and work with portfolio elements, as well as with project software, simulation systems combined with virtual reality.

**Practical Information about the Course:**

None

**Prerequisites:**

None

**Recommended Previous Knowledge:**

The student should have completed his second semester.

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

1-5:   X              Passed/Not passed:

**Examination:**

| <b>Comp.</b> | <b>Component Name</b>                                   | <b>Duration</b>          | <b>Weight</b> | <b>Supporting Materials</b>      |
|--------------|---|--------------------------|---------------|----------------------------------|
| 1            | Portfolio (thesis paper, exercises, short written test) | 3 <sup>rd</sup> semester |               |                                  |
|              | thesis paper  |                          | 50%           | All supporting materials allowed |
|              | exercises   |                          | 20%           | All supporting materials allowed |
|              | short written test                                      |                          | 30%           | nothing                          |

**Course Administrator / Lecturer:**

Prof. Dr. Heilmann, Prof. Dr. Klußmann, Prof. Dr. Münchau

**Required Reading (Syllabus):**

Will be specified in the course plan by semester start.

**Workload (hours):**

Contact time: 48, Self-Study Time: 112

## **Master's thesis**

### **Brief facts:**

|                          |   |
|--------------------------|---|
| Department:              | Faculty of Technology, Business and Maritime Education                      |
| Campus:                  | Haugesund / Leer  |
| Study Program:           | Master in International Ship Technology, Maritime Operations and Management |
| Number of credits:       | 30  |
| Language of instruction: | English   |
| Taught during:           | 4 <sup>th</sup> semester  |
| Number of semesters:     | 1(2)  |
| Semester of Assessment:  | 4 <sup>th</sup> semester  |
| Program Sequence:        | 2 <sup>nd</sup> year of study   |
| Taught Initially:        | 2018 / 2019   |

### **Offered to Students in the Following Programs:**

Master in International Ship Technology, Maritime Operations and Management

### **Course Content:**

The master's thesis is an independent, empirical and scientific work in which the student documents insight into research and development work, relevant theory and methods relevant for the problem examined in the thesis. Based on the student's profile choice the subject will provide the student with the ability to deepen their knowledge about a specific topic within the maritime field.

Through the independent work the students shall develop their analytical abilities and achieve a deeper understanding of theoretical and/or empirical possibilities and challenges within the chosen field of study.

The work on the master's thesis is to be carried out in accordance with ethical guidelines for research and rules and regulations at the partner institutions. In total, the master's thesis will document understanding, reflection and maturity.

The master's thesis will include:

- academic and scientific theory positioning of the problem area and issue
- justification of the theory and method selection
- implementation of a research project in the chosen practice field
- presentation, analysis and discussion of results

## **Learning Outcome:**

Knowledge – the candidate:

- Has knowledge of key directions within scientific theory
- Has knowledge of key research methods within maritime research
- Has insight into what scientific knowledge is and how this is developed
- Has practical and theoretical knowledge of the phases of a research project
- Has knowledge of applicable norms for research ethics

Skills – the candidate:

- Is able to develop a research design and do theoretical and/or empirical analyses on own or existing material
- Can analyze and critically assess different sources of information
- Can reflect on research ethics and related issues
- Can formulate research questions and relate these to different methods
- Is able to use software for analysis of qualitative and quantitative data
- Can carry out an independent, limited research project under supervision and in accordance with applicable norms for research ethics

General competence – the candidate:

- Can reflect on and critically assess own and other people's work.
- Can communicate extensive independent work and master's language and terminology of both the academic and maritime field.
- Can analyze problems related to the profession, academia and research ethics.
- Can discuss own and other's work with both specialists and the general public.
- Is able to evaluate the quality of existing research literature.
- Can use the knowledge and skills achieved through the work on the master's thesis on future research projects.

## **Work forms:**

The master's thesis is an independent subject closely connected to the previous subject in the course of study and will be carried out with supervision. An individual supervision agreement will be signed by the student, supervisor(s) and study manager when the theme of the master's thesis has been determined. The student is responsible for seeking supervision in accordance with the agreed plan. It may be relevant for students to associate the work on the master's thesis with ongoing R&D work at the institution or problems from the maritime industry.

**Practical Information:**

The master's thesis is research based and is completed with supervision

**Prerequisites:**

The students must have completed the Philosophy of Science, Research Design and Methods course (or equivalent), and completed a minim of 45 ECTS Credits within the study Program.

**Recommended Previous Knowledge:**

Builds on previous courses within the study Program.

**Compulsory work:**

Yes, will be specified in the course plan by semester start.

**Grading Scale:**

A-F/1-5: \_\_X\_\_

Passed / Not passed: \_\_\_\_\_

**Course Examination Description:**

Master's thesis

| Comp. | Component Name  | Duration | Weight | Supporting Materials             |
|-------|-----------------|----------|--------|----------------------------------|
| 1     | Master's thesis |          | 70/100 | All Supporting Materials Allowed |
| 2     | Presentation    |          | 30/100 |                                  |

**Workload (hours):**

Contact time: 10, Self-Study Time: 790