Course Specifications
From the academic year 2016-2017 up to and including the academic year 2018-2019

Manoeuvring and Seakeeping Behaviour of Maritime Constructions (E055290)

Course offerings and teaching methods in academic year 2018-2019

A (semester 1) English lecture 30.0 h
practicum 30.0 h

Lecturers in academic year 2018-2019
Delefortrie, Guillaume TW15 lecturer-in-charge
Vantorre, Marc TW15 co-lecturer

Offered in the following programmes in 2018-2019
Bridging Programme Master of Science in Electromechanical Engineering (main subject Maritime Engineering) 6 crdts A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering) 6 crdts A

Teaching languages
English

Keywords
Response of floating constructions in irregular waves, manoeuvring

Position of the course
Theoretical background and practical approach of the behaviour of floating and sailing constructions as a result of (regular and irregular) waves and internally or externally induced horizontal forces.

Contents
• Gravity waves: Irrotational wave motion: linear theory, Irregular waves, energy spectrum
• Response of floating constructions in regular waves: Introduction to radiation and diffraction problem for floating, stationary objects, Pitch, heave and roll motions of ships
• Response of floating constructions in irregular waves: Response spectrum, Statistical considerations, Applications
• Behaviour of ships in the horizontal plane: Directional stability and manoeuvrability, Forces acting on a manoeuvring ship hull, Control devices, External forces, Automatic course control

Initial competences
Elements of the course 'Introduction to maritime technology'

Final competences
1 Be capable of explaining the physical phenomena on which the motion response of a ship or another floating structure due to regular waves is based. Be capable of composing the mathematical representation of the heave, pitch and roll response of a ship to regular waves by means of linear wave theory and strip theory.
2 Describe and apply the characteristics and properties of an irregular seaway by means of (directional) wave spectra.
3 Derive, interpret and apply the mathematical formulation of the response spectrum of a ship or floating structure on an irregular sea. Calculate exceedance probabilities for undesired effects (slamming, shipping of water, ...).
4 Acquire insight into the non-linear aspects of the roll motion of ships. Explain the
Access to this course unit via a credit contract is determined after successful competences assessment.

This course unit cannot be taken via an exam contract.

1. Be able to apply seakeeping software for determining the response characteristics of ships or other floating structures to regular waves and for calculating exceedance probabilities for undesired effects in irregular seas.

2. Gain insight into the manoeuvring and steering behaviour of ships by means of linear theory. Explain and analyse the effect of the principal parameters determining the manoeuvring and steering behaviour of ships.

3. Explain and interpret the execution and results of standard manoeuvres.

4. Be able to explain the physical background and derive the mathematical formulation of the main hydrodynamic coefficients of the linear equations of motion for sway and yaw.

5. Be able to explain the physical background and the mathematical formulation of the hydrodynamic forces acting on a rudder. Distinguish the main types and realisations of rudders and other steering equipment for ships and their application ranges.

6. Be able to derive and interpret the mathematical background of autopilots for ships.

7. Gain insight into the mathematical modelling of a ship's manoeuvring behaviour for simulation purposes.

8. Determine the main rudder characteristics in a concept design phase.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment.

Conditions for exam contract

This course unit cannot be taken via an exam contract.

Teaching methods

Lecture, practicum

Learning materials and price

Syllabus in English

References

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Open book examination, oral examination

Examination methods in case of periodic evaluation during the second examination period

Open book examination, oral examination

Examination methods in case of permanent evaluation

Report

Possibilities of retake in case of permanent evaluation

Examination during the second examination period is possible in modified form

Extra information on the examination methods


Calculation of the examination mark

Oral closed-book exam during examination period: 50%
Written open-book exam during examination period: 25%
Project reports during semester: 25%
A student can only pass if he/she has participated to the three parts.

(Approved)