

Hydrostatics and Propulsion of Maritime Constructions (E055270)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2023-2024

Offering	Language	Location	Teaching Methods	Duration
A (semester 2)	Dutch	Gent	excursion	5.0h
B (semester 2)	English	Gent	excursion	
			seminar lecture	

Lecturers in academic year 2023-2024

Delefortrie, Guillaume TW15 lecturer-in-charge

Offered in the following programmes in 2023-2024

Programme	crdts	offering
Bridging Programme Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	B
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	B

Teaching languages

English, Dutch

Keywords

Advanced hydrostatics of floating objects, Ship resistance, Ship engines, Ship propulsion, Vibrations, Under water radiated noise

Position of the course

Theoretical background, practical applications and calculation methods concerning hydrostatics of floating structures: damage calculations, ship in contact with a bottom. Theoretical background and practical approach to the hydrodynamic aspects of resistance and propulsion of ships (with emphasis on screw propellers), and adverse effects due to propeller action.

Contents

- Hydrostatics of floating structures: damage calculations for ships.
- Hydrostatics of floating structures: contact with bottom.
- Ship resistance: Principles, Resistance components, Extrapolation methods, Selection of standard series and statistical methods, Influence of ship geometry
- Ship engines: principles, power and efficiency
- Ship propulsion: Propeller geometry, Propeller theory, Similarity laws, Propeller-hull interaction, Propeller design (propeller series), Special propulsion devices
- Adverse effects: Cavitation, Vibrations excited by propeller, propeller shaft, engines, sea state, under water radiated noise

Initial competences

This course builds on some learning outcomes of Introduction to maritime technology and of Transport phenomena

Final competences

- 1 Understand and analyse the physical background of the consequences of damage to a ship on hydrostatics and stability. Distinguish the regulatory principles on which the criteria for damaged ships are based.
- 2 Be capable to solve realistic problems concerning damage calculations of ships in a simplified way. Be capable of executing damage calculations by means of

- specialised software.
- 3 Be capable to solve realistic problems concerning floating structures supported by the bottom in a simplified way.
 - 4 Distinguish and explain the different physical causes of ship resistance.
 - 5 Derive how ship resistance can be determined by means of experimental techniques.
 - 6 Apply empirical methods to approximate ship resistance.
 - 7 Derive the power flow in the conversion from mechanical power to resistance power and define the efficiencies involved.
 - 8 Be capable to identify the geometric characteristics of a screw propeller. Describe special propeller types and make distinction between their specific application range.
 - 9 Explain the action of a screw propeller for ship propulsion by means of momentum theory, blade element theory and vortex theory.
 - 10 Understand the characteristic behaviour of a propeller in open water and behind a ship, including terms as wake fraction and thrust deduction fraction.
 - 11 Explain the propeller cavitation phenomenon and apply practical cavitation criteria.
 - 12 Execute the concept design of a propeller by means of systematic propeller series.
 - 13 Identify the hydrodynamic aspects of ship vibrations and underwater radiated noise.

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

Seminar, Excursion, Lecture

Learning materials and price

Course notes in English, estimated cost 30 EUR, to be acquired at VTK

References

Course content-related study coaching

Lecturer and assistant are available before and after the lectures. Additional contacts are possible after appointment or by e-mail

Assessment moments

end-of-term and continuous assessment

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

Oral assessment, Written assessment open-book

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

Oral assessment, Written assessment open-book

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

During examination period:

- oral closed-book theory exam, written preparation;
- written open-book exercises exam.

During semester: graded project reports. No assistance is provided during the second examination period.

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%

The student can only pass for the entire course if:

- for each of the above mentioned items a mark of at least 5 on 20 is obtained
- for two of the above mentioned items a mark of at least 10 on 20 is obtained

If the above conditions are not met the final mark is the minimum of 9/20 and the above mentioned weighted result.