

# Course Specifications

Valid in the academic year 2023-2024

# Hydrostatics and Propulsion of Maritime Constructions (E055270)

| Course size             | (nominal values; actual values may depend on programme) |                |           |      |  |
|-------------------------|---|----------------|-----------|------|--|
| Credits 6.0             | Study time 1  | 80 h           |           |      |  |
| Course offerings and te | eaching methods in academic                             | year 2023-2024 |           |      |  |
| A (semester 2)          | Dutch   | Gent           | excursion | 5.0h |  |
| B (semester 2)          | English   | Gent           | excursion |      |  |
|                         |   |                | seminar   |      |  |
|                         |   |                | lecture   |      |  |
| Lecturers in academic y | year 2023-2024  |                |           |      |  |

| Delefortrie, Guillaume TW15   |                | lecturer-in-charge |          |
|---|----------------|--------------------|----------|
| Offered in the following programmes in 2023-2024  |                | crdts              | offering |
| Bridging Programme Master of Science in Electromechanical Engineering(<br>Maritime Engineering) | main subject   | 6                  | В        |
| Master of Science in Electromechanical Engineering(main subject Maritim                         | e Engineering) | 6                  | Α        |
| Master of Science in Electromechanical Engineering(main subject Maritim                         | e Engineering) | 6                  | В        |

## 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 flaoting 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, Propellerhull 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.