GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2024-2025

Ship Resistance and Propulsion (E055080)

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 2024-2025

A (semester 2)	English	Gent	lecture	0.0h
			seminar	0.0h
			excursion	0.0h
B (semester 2)	Dutch	Gent		

Lecturers in academic year 2024-2025

Delefortrie, Guillaume	TW15	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Bridging Programme Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	B
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	A
International Master of Science in Advanced Design of Sustainable Ships and Offshore Structures	6	A

Teaching languages

English, Dutch

Keywords

Hydrodynamics, Ship resistance, Ship engines, Ship propulsion, Vibrations, Under water radiated noise, Sustainability

Position of the course

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. Attention is given to alternative and sustainable means of propulsion.

Contents

- Description of fluid dynamics
- Ship resistance:
  - Principles
  - Resistance components
  - Experimental and numerical methods
  - Influence of ship geometry
- Ship engines: principles, power and efficiency
- Ship propulsion:
  - Propeller geometry
  - Propeller theory,
  - Propeller-hull interaction
  - Propeller design (propeller series)
- Adverse effects:
  - Cavitation
  - Vibrations excited by propeller, propeller shaft, engines, sea state

- Under water radiated noise
- Alternative means of propulsion and energy saving

Initial competences

This course builds on some learning outcomes of Marine Hydrostatics and Stability and of Transport phenomena

Final competences

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

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, Independent work

Study material

Type: Syllabus

Name: Ship Resistance and Propulsion: lecture notes
Indicative price: € 25
Optional: no
Language : English
Number of Pages : 550
Oldest Usable Edition : 2025
Available on Ufora : No
Online Available : No
Available in the Library : No
Available through Student Association : Yes

Type: Slides

Name: Ship Resistance and Propulsion: slides
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

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.