

## Powertrains for Sustainable Transportation (E032650)

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

**Credits 3.0**

**Study time 90 h**

**Course offerings in academic year 2026-2027**

A (semester 1)

English

Gent

**Lecturers in academic year 2026-2027**

Verhelst, Sebastian

TW08

lecturer-in-charge

**Offered in the following programmes in 2026-2027**

[Master of Science in Electromechanical Engineering\(main subject Maritime Engineering\)](#)

**crdts**

3

**offering**

A

[Master of Science in Electromechanical Engineering](#)

3

A

[Master of Science in Engineering: Ships and Marine Technology](#)

3

A

[Master of Science in Mechanical and Electrical Systems Engineering](#)

3

A

### Teaching languages

English

### Keywords

engines, fuel cells, renewable fuels, critical thinking

### Position of the course

This is an advanced academic elective course in the learning line thermo-fluids.

### Contents

- Course positioning: transportation modes, their energy use, load profiles and impact, options for making them sustainable, important criteria depending on the application
- Hydrogen: origin, energy density, properties, application
- Renewable fuels for combustion engines: origin, production efficiency, fuel properties, application (storage, energy and power density, emissions, efficiency), life cycle impact analysis
- New combustion concepts
- Fuel cells, battery-electric drives and hybrid powertrains: basics

### Initial competences

- Transport Phenomena
- Technical Thermodynamics
- Heat and Flow Engineering
- Thermal Machines

### Final competences

- 1 Synthesize, present and explain scientific literature on powertrains for sustainable transportation
- 2 Explain trends in powertrain technologies and fuels
- 3 Be able to choose an energy carrier and powertrain technology for a specific application, depending on its features, and present the pros and cons of your choice

### 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, Lecture

**Extra information on the teaching methods**

Theory lectures, presentations in small groups of scientific paper

**Study material**

None

**References****Course content-related study coaching**

- Interactive support through the electronic learning platform (forums, e-mail), in person: after agreement on date, fixed contact hour: immediately before and after lectures.

**Assessment moments**

end-of-term and continuous assessment

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

Oral assessment, Presentation

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

Oral assessment, Written assessment

**Examination methods in case of permanent assessment****Possibilities of retake in case of permanent assessment**

not applicable

**Extra information on the examination methods**

- oral examination (open book)

**Calculation of the examination mark**

The end score (S) is determined as:  $S = 0.5 \cdot T + 0.5 \cdot A$ , with T the score for the theory exam and A the score for the assignment.