

Course guide

240EM143 - 240EM143 - Materials with Transport Applications

Last modified: 26/06/2025

Unit in charge: Barcelona East School of Engineering

Teaching unit: 702 - CEM - Department of Materials Science and Engineering.

Degree: ERASMUS MUNDUS MASTER'S DEGREE IN ADVANCED MATERIALS SCIENCE AND ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2025

ECTS Credits: 4.5

Languages: English

LECTURER

Coordinating lecturer: ANTONIO MANUEL MATEO GARCIA

Others: Segon quadrimestre:
JUAN DAVID GUTIÉRREZ CASTILLO - T10
ANTONIO MANUEL MATEO GARCIA - T10

PRIOR SKILLS

The student should have previous knowledge on mechanical properties, corrosion and degradation of materials, as well as on the classification and main properties of metallic alloys, polymers and composites.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEMCEM-04. (ENG) Realitzar estudis de caracterització, avaluació i certificació de materials segons les seves aplicacions

CEMCEM-12. (ENG) Adaptar-se als canvis estructurals de la societat motivats per factors o fenòmens de índole econòmic, energètic o natural, per resoldre els problemes derivats i aportar solucions tecnològiques amb un alt compromís de sostenibilitat

Transversal:

03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

TEACHING METHODOLOGY

This course will have a part of theory lectures given by the professors, as well as problems and presentations by the students.

LEARNING OBJECTIVES OF THE SUBJECT

Transportation is an engineering field where the correct selection of materials is vital for the performance of vehicles. The students should understand the specific requirements of critical components in vehicles, translate them into materials' properties and select among the existing materials the ones able to fulfil the specifications.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	27,0	24.00
Self study	72,0	64.00
Hours small group	13,5	12.00



Total learning time: 112.5 h

CONTENTS

1. Materials for automobile applications

Description:

The main materials used for the Body-in-White, as well as for engine parts will be presented.

Specific objectives:

The main requirements for the Body-in-White, which is the structure of vehicles for road transportation, as well as for engine parts will be explained and the materials providing an optimal behaviour according to the requirements will be presented.

Related activities:

In addition to the lectures, the students will work on activities related to the subject, mainly preparing presentations and analysing articles related to the subject.

Full-or-part-time: 45h

Theory classes: 12h

Guided activities: 6h

Self study : 27h

2. Materials for aeronautic applications

Description:

The main materials used for the fuselage, as well as for turbines will be presented.

Specific objectives:

The main requirements for the fuselage, which is the structure of aeroplanes, as well as for turbine parts will be explained and the materials providing an optimal behaviour according to the requirements will be presented.

Related activities:

In addition to the lectures, the students will work on activities related to the subject, mainly preparing presentations and analysing articles related to the subject.

Full-or-part-time: 45h

Theory classes: 12h

Guided activities: 6h

Self study : 27h

3. Materials for railway transportation applications

Description:

The main materials used in trains and railways will be described.

Specific objectives:

The main requirements for trains and related structures, such as railways, will be explained and the materials providing an optimal behaviour according to the requirements will be presented.

Related activities:

In addition to the lectures, the students will work on activities related to the subject, mainly preparing presentations and analysing articles related to the subject.

Full-or-part-time: 11h

Theory classes: 4h 30m

Self study : 6h 30m

4. Materials for boats

Description:

The main materials used in boats of different kinds will be described.

Specific objectives:

The main requirements for boats will be explained and the materials providing an optimal behaviour according to the requirements will be presented.

Related activities:

In addition to the lectures, the students will work on activities related to the subject, mainly preparing presentations and analysing articles related to the subject.

Full-or-part-time: 11h 30m

Theory classes: 4h 30m

Self study : 7h

GRADING SYSTEM

35% midterm exam 1 + 35% midterm exam 2 + 15 % monographic work and presentation + 15% Activities proposed by the professors

To apply this formula both midterm exams need to be passed (a mark of 5 or plus), otherwise, the student will have to do a final exam which will have a value of 70%.

EXAMINATION RULES.

There will be two midterm exams. The activities proposed by the professor will be problems or activities oriented to work a specific subject. These activities will have to be done at home or during the lecturing time in the class. There will be between 3 and 5 activities during the whole semestre, including a monographic work.

BIBLIOGRAPHY

Basic:

- Davies, Geoff. Materials for automobile bodies [on line]. Amsterdam [etc.]: Elsevier, Butterworth Heinemann, cop. 2003 [Consultation: 21/05/2020]. Available on: <https://www.sciencedirect.com/science/book/9780750656924>. ISBN 9780750656924.
- Benini, Ernesto. Advances in gas turbine technology. Rijeka: Intech, 2014. ISBN 9789533076119.
- Warren, Nigel. Metal corrosion in boats : the prevention of metal corrosion in hulls, engines, rigging and fittings. 3th ed. Nova York: Adlard Coles Nautical, 2006. ISBN 9781574092370.