Course guide
295767 - 295EM131 - Materials with Transport and Energy Applications

Last modified: 04/06/2026

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).
MASTER'S DEGREE IN MATERIALS SCIENCE AND ADVANCED MATERIALS ENGINEERING (Syllabus 2019). (Optional subject).
ERASMUS MUNDUS MASTER'S DEGREE IN ADVANCED MATERIALS SCIENCE AND ENGINEERING (Syllabus 2021). (Optional subject).

Academic year: 2026 **ECTS Credits:** 6.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: JESICA CALVO MUÑOZ - ANTONIO MANUEL MATEO GARCIA

Others: Segon quadrimestre:
JESICA CALVO MUÑOZ - Grup: T1
ANTONIO MANUEL MATEO GARCIA - Grup: T1
MIGUEL MORALES COMAS - Grup: T1

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEMCEAM-02. (ENG) Aplicar métodos innovadores para el diseño, simulación, optimización y control de procesos de producción y transformación de materiales

TEACHING METHODOLOGY

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.

Concerning Energy, the three main topics are:
Materials for energy conversion
Materials for energy storage
Materials for fuel production

STUDY LOAD

Type	Hours	Percentage
Hours large group	28,0	18.67
Self study	108,0	72.00
Hours small group	14,0	9.33

Total learning time: 150 h

CONTENTS

Automotive materials

Description:
Els materials amb aplicacions automobilístiques es divideixen en dos grans blocs:
Materials per la carroceria o BIW (Body in white), principalment acers d'alta resistència i aluminis
Materials pel motor: cada part, tant interna com externa del motor té uns requeriments en servei que porten a la selecció d'un determinat material i procés de fabricació. Es detallaran per Bloc motor, Pistons i anelles de retenció, Vàlvules, Cigonyal i arbre de lleves.

Full-or-part-time: 33h
Theory classes: 10h
Laboratory classes: 1h 30m
Guided activities: 1h 30m
Self study : 20h

Aerospace Materials

Description:
content english

Full-or-part-time: 33h
Theory classes: 10h
Laboratory classes: 1h 30m
Guided activities: 1h 30m
Self study : 20h

Train materials

Description:
content english

Full-or-part-time: 16h 30m
Theory classes: 4h 30m
Practical classes: 2h
Self study : 10h

Sea transport materials

Description:
content english

Full-or-part-time: 16h 30m
Theory classes: 4h 30m
Guided activities: 2h
Self study : 10h

title english

Description:
Materials for energy conversion
Materials for energy storage
Materials for fuel production

Full-or-part-time: 49h 30m
Theory classes: 15h
Laboratory classes: 1h 30m
Guided activities: 3h
Self study : 30h

GRADING SYSTEM

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

BIBLIOGRAPHY

Basic:
- Davies, Geoffrey. Materials for automobile bodies [on line]. Amsterdam [etc.]: Elsevier, Butterworth Heinemann, cop. 2003 [Consultation: 06/10/2020]. 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.
- Yamagata. Nou llibre.