

820085 - ARS - Surface Finishing and Coatings

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 702 - CMEM - Department of Materials Science and Metallurgy
Academic year: 2016
Degree: BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
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ECTS credits: 6 Teaching languages: Catalan

Teaching staff

Coordinator: GEMMA FARGAS RIBAS
Others: JOSE ANTONIO BENITO PARAMO - JOSÉ MARÍA CLAVERO GÁMEZ - GEMMA FARGAS RIBAS -
JORDI JORBA PEIRÓ - JORDI LLUMA FUENTES - DANIEL RODRÍGUEZ RIUS

Opening hours

Timetable: FIND INFORMATION IN ATENEA

Prior skills

UNDERSTAND THE FUNDAMENTALS OF MATERIALS SCIENCE AND CHEMISTRY.

Requirements

THE STUDENTS MUST HAVE COMPLETED COURSES OF MATERIALS SCIENCE AND TECHNOLOGY AND BASIC CHEMISTRY

Degree competences to which the subject contributes

Transversal:

1. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

Teaching methodology

FACE-TO-FACE EXPOSITORY CLASSES (THEORY)
FACE-TO-FACER DIRECTED CLASSES (PROBLEM SOLVING)
COOPERATIVE LEARNING

Learning objectives of the subject

DESCRIBE THE MAIN GOALS, TECHNOLOGICAL PROCESSES AND APPLICATIONS OF COATINGS AND SURFACE FINISHING IN ORDER TO ACHIEVE A PRACTICAL AND FUNDAMENTAL UNDERSTANDING OF SURFACE ENGINEERING.



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Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours small group:	15h	10.00%
	Self study:	90h	60.00%

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Content

<p>1. INTRODUCTION TO SURFACE ENGINEERING</p>	<p>Learning time: 6h Theory classes: 3h Laboratory classes: 0h Self study (distance learning): 0h Self study : 3h</p>
<p>Description: PURPOSE OF SURFACE FINISHING AND COATING APPEARANCE CORROSION CONTROL, WEAR AND FATIGUE</p>	
<p>2. SURFACE CHARACTERIZATION</p>	<p>Learning time: 14h Theory classes: 5h Laboratory classes: 2h Self study (distance learning): 0h Self study : 7h</p>
<p>Description: MORPHOLOGY, MECHANICAL AND TRIBOLOGICAL PROPERTIES MICROSCOPY AND SPECTROSCOPY TECHNIQUES</p>	
<p>3. SURFACE CLEANING</p>	<p>Learning time: 19h Theory classes: 5h Laboratory classes: 2h Self study (distance learning): 5h Self study : 7h</p>
<p>Description: SOLVENTS. DETERGENTS. ACID AND ALKALINE PRODUCTS ULTRASOUNDS SANDBLASTING. PICKLED PRODUCTS</p>	

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<p>4. SURFACE MODIFICATION. CONVENTIONAL TREATMENTS</p>	<p>Learning time: 26h Theory classes: 8h Laboratory classes: 3h Self study (distance learning): 5h Self study : 10h</p>
<p>Description: THERMAL (QUENCHING) MECHANICAL (SHOT PEENING) BY DIFUSION (CARBURIZING, NITRIDING)</p>	
<p>5. SURFACE MODIFICATION. ADVANCED TREATMENTS</p>	<p>Learning time: 18h Theory classes: 5h Laboratory classes: 2h Self study (distance learning): 5h Self study : 6h</p>
<p>Description: THERMAL (INDUCTION HARDENING, LASER HARDENING) BY DIFUSION (ION NITRIDING) BY SPUTTERING (ION IMPLANTATION)</p>	
<p>6. COATINGS. CONVENTIONAL TECHNIQUES</p>	<p>Learning time: 33h Theory classes: 10h Laboratory classes: 3h Self study (distance learning): 5h Self study : 15h</p>
<p>Description: ELECTROPLATING (ZINC, CHROMIUM, ANODIZING) ELECTROLESS PLATING (NICKEL) BY IMMERSION (GALVANIZED)</p>	

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<p>7. COATINGS. ADVANCED TECHNIQUES</p>	<p>Learning time: 19h Theory classes: 5h Laboratory classes: 2h Self study (distance learning): 5h Self study : 7h</p>
<p>Description: THERMAL SPRAYING PVD CVD</p>	
<p>8. ORGANIC COATINGS</p>	<p>Learning time: 15h Theory classes: 4h Laboratory classes: 1h Self study (distance learning): 5h Self study : 5h</p>
<p>Description: PAINTINGS ENAMELS</p>	

Qualification system

FIRST PARTIAL EXAM: 10%
SECOND PARTIAL EXAM: 20%
THIRD PARTIAL EXAM: 40%
SELF-DIRECTED LEARNIG (GENERIC SKILL): 20%
LABORATORY: 10%

Bibliography

Basic:

- Davis, J. R. (ed.). Surface engineering : for corrosion and wear resistance. Materials Park: ASM International, cop. 2001. ISBN 9780871707000.
- Puértolas Ráfales, J. A. [et al.] (eds.). Tecnología de superficies en materiales. Madrid: Síntesis, 2010. ISBN 978-84-975668-0-3.
- Vázquez Vaamonde, A. J.; Damborenea González, J. J. (eds.). Ciencia e ingeniería de la superficie de los materiales metálicos. Madrid: Consejo Superior de Investigaciones Científicas, 2000. ISBN 84-00-07920-5.
- ASM handbook, vol. 5, Surface engineering. Materials Park, Ohio: ASM International, 1994. ISBN 087170384X.