

## 205068 - Smart Textiles

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
 Teaching unit: 702 - CMEM - Department of Materials Science and Metallurgy  
 Academic year: 2019  
 Degree: MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Teaching unit Optional)  
 MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Teaching unit Optional)  
 MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)  
 ECTS credits: 3 Teaching languages: English

### Teaching staff

Coordinator: Mònica Ardanuy Raso  
 Others: Gil Gali, Ignacio  
 Fernandez Garcia, Raul

### Teaching methodology

Sessions of theory  
 Sessions of practical work at class  
 Sessions of practical work at laboratory

### Learning objectives of the subject

OE1. To know the main characteristics and properties smart and multifuncional textiles  
 OE2. To be able to develop new smart textiles for specific applications

### Study load

Total learning time: 75h	Hours large group:	27h	36.00%
	Hours medium group:	0h	0.00%
	Hours small group:	0h	0.00%
	Guided activities:	0h	0.00%
	Self study:	48h	64.00%

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### Content

<p>LESSON 1. BASIC CONCEPTS</p>	<p>Learning time: 15h Practical classes: 3h Laboratory classes: 3h Self study : 9h</p>
<p>Description:</p> <ul style="list-style-type: none"> <li>1.1. Definitions</li> <li>1.2. Basic principles: <ul style="list-style-type: none"> <li>1.2.1. Shape memory</li> <li>1.2.2. PCMs (phase -change materials)</li> <li>1.2.3. Piezoelectricity, piezoresistivity, flexoelectricity, thermoelectricity</li> <li>1.2.4. Optic fibres</li> <li>1.2.5. Thermochromism</li> <li>1.2.6. Photovoltaic systems</li> <li>1.2.7. Functional nanotechnology</li> <li>1.2.8. Others</li> </ul> </li> </ul> <p>Specific objectives: OE1, OE2</p>	
<p>LESSON 2. SUBSTRATES FOR SMART TEXTILES</p>	<p>Learning time: 10h Laboratory classes: 4h Self study : 6h</p>
<p>Description:</p> <ul style="list-style-type: none"> <li>2.1. Textile materials <ul style="list-style-type: none"> <li>2.1.1. Woven fabrics</li> <li>2.1.2. Knitted fabrics</li> <li>2.1.3. Nonwoven fabrics</li> <li>2.1.4. Other textile structures</li> </ul> </li> <li>2.2. Non-textile flexible substrates <ul style="list-style-type: none"> <li>2.2.1. Elastomeric</li> <li>2.2.2. Plastic films</li> <li>2.2.3. Others</li> </ul> </li> </ul>	

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<p>LESSON 3. COMPONENTS AND ACTUATORS FOR SMART TEXTILES</p>	<p>Learning time: 15h Laboratory classes: 6h Self study : 9h</p>
<p>Description: content english</p> <p>Related activities: 3.1. Conductive yarns 3.2. Finishes 3.2.1. Inks 3.2.2. Coatings 3.3. Other components</p>	
<p>LESSON 4. PROCESSES FOR THE DEVELOPMENT OF SMART TEXTILES</p>	<p>Learning time: 15h Laboratory classes: 6h Self study : 9h</p>
<p>Description: 4.1. Weaving and knitting 4.2. Coating, active finishing, printing 4.3. Embroidery 4.4. Joining technologies 4.5. Other production techniques for smart textiles</p>	
<p>LESSON 5. CASE STUDIES</p>	<p>Learning time: 20h Laboratory classes: 7h Self study : 13h</p>
<p>Description: Analysis of case studies (projects and/or existing products) according to several points of view such as functionality, application and design.</p>	

### Qualification system

Exam 1: 20%  
Exam 2: 20%  
Exercises and practical cases: 30%  
Course project: 30%.

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### Bibliography

#### Basic:

Koncar, Vladan (ed.). Smart textiles and their applications [on line]. Duxford: Woodhead Publishing, 2016 [Consultation: 24/07/2017]. Available on: <<http://www.sciencedirect.com/science/book/9780081005743>>. ISBN 9780081005835.

Tao, Xiaoming. Handbook of smart textiles. Singapore: Springer, 2015. ISBN 9789814451444.