Course guide
205068 - 205068 - Smart Textiles

Unit in charge:	Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit:	702 - CEM - Department of Materials Science and Engineering.

Degree:	MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
	MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
	MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).

Academic year: 2023   **ECTS Credits:** 3.0   **Languages:** English

LECTURER

Coordinating lecturer:	Mònica Ardanuy Raso
Others:	Gil Gali, Ignacio
	Ilén, Elina Emilia

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 multifunciontal textiles
OE2. To be able to develop new smart textiles for specific applications

STUDY LOAD

Type	Hours	Percentage
Self study	48,0	64.00
Hours large group	27,0	36.00

Total learning time: 75 h

UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

CONTENTS

LESSON 1. BASIC CONCEPTS

Description:
1.1. Definitions
1.2. Basic principles:
1.2.1. Shape memory
1.2.2. PCMs (phase -change materials)
1.2.3. Piezoelectricity, piezoresistivity, flexoelectricity, thermoelectricity
1.2.4. Optic fibres
1.2.5. Thermochromism
1.2.6. Photovoltaic systems
1.2.7. Functional nanotechnology
1.2.8. Others

Specific objectives:
OE1, OE2

Full-or-part-time: 15h
Practical classes: 3h
Laboratory classes: 3h
Self study : 9h

LESSON 2. SUBSTRATES FOR SMART TEXTILES

Description:
2.1. Textile materials
2.1.1. Woven fabrics
2.1.2. Knitted fabrics
2.1.3. Nonwoven fabrics
2.1.4. Other textile structures
2.2. Non-textile flexible substrates
2.2.1. Elastomeric
2.2.2. Plastic films
2.2.3. Others

Full-or-part-time: 10h
Laboratory classes: 4h
Self study : 6h

LESSON 3. COMPONENTS AND ACTUATORS FOR SMART TEXTILES

Description:
content english

Related activities:
3.1. Conductive yarns
3.2. Finishes
3.2.1. Inks
3.2.2. Coatings
3.3. Other components

Full-or-part-time: 15h
Laboratory classes: 6h
Self study : 9h

LESSON 4. PROCESSES FOR THE DEVELOPMENT OF SMART TEXTILES

Description:
4.1. Weaving and kniting
4.2. Coating, active finishing, printing
4.3. Embroidery
4.4. Joining technologies
4.5. Other production techniques for smart textiles

Full-or-part-time: 15h
Laboratory classes: 6h
Self study : 9h

LESSON 5. CASE STUDIES

Description:
Analysis of case studies (projects and/or existing products) according to several points of view such as functionality, application and design.

Full-or-part-time: 20h
Laboratory classes: 7h
Self study : 13h

GRADING SYSTEM

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

BIBLIOGRAPHY

Basic:
- Koncar, Vladan. Smart textiles and their applications. Duxford: Woodhead Publishing, 2016. ISBN 9780081005835.
- Tao, Xiaoming. Handbook of smart textiles. Singapore: Springer, 2015. ISBN 9789814451444.