Course guide
320194 - TDP - Textiles for Product Design

Last modified: 11/04/2025

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

Degree: BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Ventura Casellas, Heura

Others: Ventura Casellas, Heura

PRIOR SKILLS

Not having completed a Bachelor's Degree in Textile Design and Technology

TEACHING METHODOLOGY

Sessions of theory
Sessions of practical work at laboratory

LEARNING OBJECTIVES OF THE SUBJECT

OE1: To have a general view of the possibilities that the textile materials and technologies for product design
OE2: To be capable to solve design problems with textile materials

STUDY LOAD

Type	Hours	Percentage
Hours small group	30,0	20.00
Self study	90,0	60.00
Hours large group	30,0	20.00

Total learning time: 150 h

CONTENTS

Topic 1. Introduction to the textile and clothing industry

Description:
1.1. Textile value chain
1.2. Socioeconomic importance
1.3. Textile products and their uses

Specific objectives:
Know and understand the structure of the textile cycle, its socioeconomic importance, the nomenclature and the main applications of the products obtained by this industry, as well as the concept of textile design

Full-or-part-time: 4h
Theory classes: 2h
Self study : 2h

Topic 2. Textile fibres and their possibilities in product design

Description:
2.1. Classification of textile fibres
2.1.1. Natural fibres of plant, animal and minerals
2.1.2. Man-made fibres from natural polymers
2.1.3. Man-made synthetic fibres
2.2. Main properties and their influence in design

Specific objectives:
Learn to classify textile fibres according to their nature. Know the main properties of textile fibres from the perspective of engineering design.

Related activities:
P1. Identification microscopy and organoleptic textile fibres
P2. Mechanical characterisation of textile fibres

Full-or-part-time: 24h
Theory classes: 4h
Laboratory classes: 4h
Self study : 16h

Topic 3. Spinning from the perspective of design

Description:
3.1. Fundamentals of spinning processes
3.2. Yarn properties
3.3. Influence of yarn construction on the textiles products

Specific objectives:
Know and understand, from the perspective of product design, the basic operations of spinning processes, the main properties of yarns, and their influence on the textile products.

Full-or-part-time: 10h
Theory classes: 2h
Laboratory classes: 2h
Self study : 6h

Topic 4. Weaving and knitting from the perspective of design

Description:
4.1. Fundamentals of woven fabrics
4.1.1. Weaves
4.1.2. Looms
4.2. Fundamentals of knitted fabrics
4.2.1. Weft-knitted fabrics
4.2.2. Warp-knitted fabrics
4.3. Influence of fabric properties in product design

Specific objectives:
Learn the basics of woven fabrics and their weaves, and understand their production process. Learn the basics of knitted fabrics. Learn in practice the main tests used to characterise fabrics from the perspective of product design.

Related activities:
P3. Mechanical characterisation of fabrics

Full-or-part-time: 22h
Theory classes: 4h
Laboratory classes: 6h
Self study : 12h

Topic 5. Nonwoven fabrics

Description:
5.1. Fundamentals of nonwoven fabrics
5.2. Production systems
5.3. Properties and applications of nonwoven fabrics

Specific objectives:
Learn the fundamentals of the production technologies for nonwoven fabrics, their properties and their main applications.

Full-or-part-time: 14h
Theory classes: 4h
Laboratory classes: 2h
Self study : 8h

Topic 6. Finishing from the perspective of design

Description:
6.1. Pre-treatment processes for fabrics and their relevance
6.2. Colouring processes
6.3. Main finishing processes

Specific objectives:
Learn the basics of the main finishing processes and its possibilities from the perspective of product design.

Full-or-part-time: 12h
Theory classes: 2h
Laboratory classes: 2h
Self study : 8h

Topic 7. Industrial clothing process

Description:
7.1. Industrial clothing process
7.2. Pattern making: from 2D to 3D
7.3. Joining fabrics
7.4. Tech-pack

Specific objectives:
Learn the principles of pattern making and fabric joining for the production of textile products.

Related activities:
P4. Pattern making for production of 3D volumes.

Full-or-part-time: 14h
Theory classes: 2h
Laboratory classes: 4h
Self study : 8h

Topic 8. Composite materials reinforced with textile structures

Description:
8.1. Fundamentals of composite materials
8.2. Main reinforcement fibres and textile structures
8.3. Composite production technologies
8.4. Properties estimation: rule of mixtures

Specific objectives:
Learn the basics of composite materials, the production technologies, and the main fibres and textile structures used as reinforcement. Know the rule of mixtures for the estimation of the properties of a composite.

Related activities:
P5. Production and analysis of a composite

Full-or-part-time: 21h
Theory classes: 5h
Laboratory classes: 6h
Self study : 10h

Topic 9. Technical textiles

Description:
9.1. Textiles for medicine
9.2. Textiles for sport
9.3. Textiles for the automotive sector
9.4. Smart textiles
9.5. Other technical textiles

Specific objectives:
Know the main applications of textiles for technical use.

Related activities:
Course project

Full-or-part-time: 29h
Theory classes: 5h
Laboratory classes: 4h
Self study : 20h

GRADING SYSTEM

First partial exam: 20%
Second partial exam: 20%
Deliverables (exercises, questionnaires, practicum reports): 30%
Course project: 30%

BIBLIOGRAPHY

Basic:
- El Mogahzy, Y.E. Engineering textiles: integrating the design and manufacture of textile products. Cambridge; Boca Raton: Woodhead Publishing: CRC Press, 2009. ISBN 9781845690489.
- Wilson, Jacques. Handbook of textile design: principles, processes and practice [on line]. Boca Raton: Cambridge, UK: CRC Press; Woodhead, 2001 [Consultation: 19/09/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=1640149. ISBN 9781855735736.
- Carrera, Enric. Caracterización de tejidos: principales ensayos físicos para evaluar la calidad de los tejidos textiles [on line]. Terrassa: UPC. Departament d'Enginyeria Tèxtil i Paperera, 2015 [Consultation: 12/04/2022]. Available on: http://hdl.handle.net/2117/76654.
- Scott, Richard A. Textiles for protection. Cambridge: Woodhead Publishing, 2005. ISBN 1855739216.
- Shishoo, R. Textile advances in the automotive industry. Cambridge: Woodhead Publishing, 2008. ISBN 9781845693312.
- Shishoo, R. Textiles in sport. Boca Raton: Woodhead/CRC, 2005. ISBN 9781855739222.
- Li, Y.; Dai, X.-Q. Biomechanical engineering of textiles and clothing. Cambridge: Woodhead Publishing, 2006. ISBN 9781845690526.

Complementary:
- Bartels, V.T. Handbook of medical textiles. Cambridge: Woodhead Publishing, 2011. ISBN 9781845696917.
- Briggs-Goode, A.; Townsend, K. Textile design: principles, advances and applications. Cambridge: Woodhead Publishing, 2011. ISBN 9781845696467.
- Gacén, Joaquín. Fibras textiles: propiedades y descripción: curso básico. Terrassa: UPC. ETSEIT. Càtedra de Polímers Tèxtils i Fibres Químiques, 1991. ISBN 8476530994.
- Hu, Jinlian. Structure and mechanics of woven fabrics. Cambridge: Woodhead Publishing, 2004. ISBN 9780849328268.