Course guide
220291 - 220291 - Advances in Textile Fibers

Last modified: 11/04/2025

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 714 - ETP - Department of Textile and Paper Engineering.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).

Academic year: 2025 **ECTS Credits:** 5.0 **Languages:** Catalan, English

LECTURER

Coordinating lecturer: MONICA ARDANUY RASO

Others: LAURA GONZALEZ LOPEZ

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Ability to apply multivariate analysis techniques in market knowledge about materials and textiles in order to implement a flow production system.
2. Ability to develop new fibers or yarns and woven and non-woven structures according to specifications and latest technologies for specific technical applications.
3. Ability to manage and optimize production processes of technical textiles.

TEACHING METHODOLOGY

Theoretical classes
Analysis of Case Studies
Laboratory classes

LEARNING OBJECTIVES OF THE SUBJECT

OE1. To know the main characteristics and properties of the textile fibres used for technical applications
OE2. To be able to develop new fibres for specific applications

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	24.00
Hours small group	15,0	12.00
Self study	80,0	64.00

Total learning time: 125 h

CONTENTS

TOPIC 1. Introduction to the innovations in textile fibres

Description:
1.1. Innovations in the field of high performance fibres, high functionality fibres, nanofibres, biofibres, etc.

Specific objectives:
OE1

Related activities:
X

Full-or-part-time: 2h
Theory classes: 1h
Self study : 1h

TOPIC 2. High performance fibres

Description:
2.1. High mechanical performance fibres: Polyethylene HP, Polyamide HP, Polyester HP, Alcohol de Polyvinyl HP, Acrylic HP, etc.
2.2. High thermally resistant fibres: polybenzoazole (PBO, PBI, PBIOH), polysulphurs of phenilene (PPS), fluorcarbonfibres, fibres from thermoset polymers, Polyetherketones (PEEK), Aromatic polyamides, carbon fibres, glass fibres, ceramic fibres, etc.

Specific objectives:
OE1, OE2

Related activities:
Sessions of theory
Sessions of practical work at class
Sessions of practical work at laboratory

Full-or-part-time: 52h
Theory classes: 12h
Laboratory classes: 6h
Self study : 34h

TOPIC 3. High functionality fibres

Description:
3.1. High comfort fibres
3.2. conductive/antistatic fibres
3.3. Superabsorbent fibres
3.4. Antibacterial and antifungal fibres
3.5. Thermocromic fibres
3.6. Another high functionality fibres

Specific objectives:
OE1, OE2.

Related activities:
Sessions of theory
Sessions of practical work at class
Sessions of practical work at laboratory

Full-or-part-time: 18h
Theory classes: 5h
Laboratory classes: 1h
Self study : 12h

TOPIC 4. Fibres from biopolymers

Description:
4.1. Introduction to biopolymers
4.2. Fibres based on natural polymers
4.3. Fibres obtained from biomass
4.4. Fibres synthesised from microorganisms
4.5. Fibres synthesised from monomers obtained from biomass
4.6. Bast fibres

Specific objectives:
OE1, OE2

Related activities:
Sessions of theory
Sessions of practical work at class
Sessions of practical work at laboratory

Full-or-part-time: 30h
Theory classes: 8h
Laboratory classes: 3h
Self study : 19h

TOPIC 5. Microfibres and nanofibres

Description:
5.1. Introduction
5.2. Microfibres
5.3. Nanofibres: electrospinning, nanoweb structure, characterization and applications

Specific objectives:
OE1, OE2

Related activities:
Sessions of theory
Sessions of practical work at class
Sessions of practical work at laboratory

Full-or-part-time: 23h
Theory classes: 4h
Laboratory classes: 5h
Self study : 14h

GRADING SYSTEM

Exam 1: 20%
Exam 2: 20%
Exercises and practical cases: 30%
Course project: 30%.
For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

BIBLIOGRAPHY

Basic:
- Hearle, J.W.S. (ed.). High-performance fibres. Cambridge: Boca Raton: Woodhead; CRC, cop. 2001. ISBN 1855735393.
- Horrocks, A.R.; Anand, S. Handbook of technical textiles [on line]. 2nd ed. Cambridge UK: Woodhead Publishing; Textile Institute, 2016 [Consultation: 04/11/2022]. Available on: https://www-sciencedirect-com.recursos.biblioteca.upc.edu/book/9781782424581/handbook-of-technical-textiles.
- Bunsell, A.R. (ed.). Handbook of tensile properties of textile and technical fibres. Cambridge: Boca Raton: Woodhead; CRC, 2009. ISBN 9781845693879.
- Brown, P.J.; Stevens, K. (eds.). Nanofibers and nanotechnology in textiles. Boca Raton [etc.]: Cambridge: CRC; Woodhead, 2007. ISBN 9781845691059.
- Hongu, T.; Phillips, G.O.; Takigami, M. New millennium fibers. Boca Raton [etc.]: Woodhead/CRC, cop. 2005. ISBN 1855736012.
- Blackburn, R.S. (ed.). Biodegradable and sustainable fibres. Boca Raton [etc.]: CRC: Woodhead publishing limited, cop. 2005. ISBN 185573916X.