Course guide
320080 - DELC - Design Of Woven Laminar Structures

Last modified: 02/04/2024

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 TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Mónica Ardanuy

Others: Cano Casas, Francesc

PRIOR SKILLS

Previously studying the subject Materials for Textile Product Design is highly desirable.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE24-GETDT. Knowledge and application of woven laminate structures. (Specific Technology Module: Textile)

TEACHING METHODOLOGY

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

LEARNING OBJECTIVES OF THE SUBJECT

GLO1.To know the weaving technologies and processes.
GLO. To know all representation and structuring processes for woven fabrics and the effects of their combinations on fabric appearance.
GLO3. To be able to select the most appropriate process in terms of the fabric to be produced and its purpose, as well as the technical and economic requirements involved.
GLO4. To be able to design, manufacture and purchase any type of fabric.

STUDY LOAD

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

Total learning time: 150 h

CONTENTS

Topic 1: CHARACTERIZATION OF FABRICS

Description:
1.1. Structural parameters of fabrics.
1.2. Fabric representation. Names and symbols.
1.3. Major classifications of fabrics according to use.
1.4. Technical vocabulary.

Specific objectives:
OE1. To know how to make a basic characterization of a woven fabric
OE2. To know the basic vocabulary related with the design of woven fabrics

Full-or-part-time: 20h
Theory classes: 4h
Laboratory classes: 4h
Self study : 12h

Topic 2: DESIGN OF BASIC STRUCTURES

Description:
1.5. Study of basic structures and their derivatives.
1.6. Requirements of their production processes.
1.7. Analysis of basic weaves.

Specific objectives:
SO3. To become acquainted with the simple weaves used in fabric design, as well as with the technical and production requirements involved.

Full-or-part-time: 25h
Theory classes: 5h
Laboratory classes: 5h
Self study : 15h

Topic 3: COMPLEX STRUCTURES

Description:
1.8. Two-sided and multiple fabrics.
1.9. Long yarn float in fabrics.
1.10. Double-layers and multiple layers fabrics.
1.11. Leno weave.
1.12. Narrow fabrics.
1.13. Terry fabrics.
1.14. Double shed fabrics.
1.15. Circular weaves.
1.16. 2D and 3D fabrics.

Specific objectives:
SO4. To become acquainted with the complex weaves used in fabric design, as well as with the technical and production requirements involved.
SO5. To know how to choose the machinery to produce woven structures in function of the product to produce

Full-or-part-time: 40h
Theory classes: 8h
Laboratory classes: 8h
Self study : 24h

Topic 4: DESCRIPTION OF PREPARATION SYSTEMS

Description:
1.17. Manufacturing calculations. Economic study.
1.18. Production and quality management.
1.19. Technical sheets for outsourced production.

Specific objectives:
OE6. To know how to choose the preparation system in function of the fabric to produce

Full-or-part-time: 20h
Theory classes: 4h
Laboratory classes: 4h
Self study : 12h

Topic 5: ANALYSIS OF THE WEAVING MACHINE PERFORMANCE IN TERMS OF THE DESIGN TO BE PRODUCED

Description:
1.20. Specificities of machines as a function of the target article.
1.21. Fabric design and the reed of the weaving machine. Faults.
1.22. Importance of drawing-in-draft.
1.23. Density regulators.
1.24. Warp stress control.
1.25. Double beams.
1.26. Yarn feeders, warp stop motion and weft stop motion.
1.27. Weaving triangle and evolution of looms.

Specific objectives:
OE7. To know the operation of weaving machines to prevent and correct complications during the design process.

Full-or-part-time: 30h
Theory classes: 6h
Laboratory classes: 6h
Self study : 18h

Topic 6: SELECTION CRITERIA FOR WEAVING SYSTEMS

Description:
1.28. Approaching the target product as a function of the particular machine.
1.29. Trends in weaving machinery.
1.30. Factors influencing the choice of a weaving system.

Specific objectives:
OE8. To know how to choose the best system to weave in function of the design

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

GRADING SYSTEM

Exams: 60% (30% 1st, 30% 2nd)
Laboratory: 15%
Other deliverables: 25%
Recovery mechanism: The unsatisfactory results of the first partial exam can be redirected by means of a written test to be carried out on the day set for the final exam. The score will be between 0 and 5. The mark obtained by the application of the conversion will replace the initial qualification as long as it is higher.

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:
- Lundell, L.; Windesjö, E. The big book of weaving: hand-weaving in the Swedish tradition: techniques, patterns, designs and materials. London: Collins & Brown, 2008. ISBN 9781843404569.
- Adanur, Sabit. Sulzer handbook of weaving. Boca Raton: CRC Press, 2001. ISBN 1587160137.
- 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.
- Miravete, Antonio. 3-D textile reinforcements in composite materials. Boca Raton: CRC Press, 1999. ISBN 0849317959.

Complementary:
- Roca, Isidro. Tecnología del diseño en el tejido de calada, vol. 1, Ligamentos. Terrassa: Universitat Politècnica de Catalunya, 1998. ISBN 8460578275.
- Victori, Joan. Tissatge: aspectes descriptius i d'anàlisi en el procés de teixir. Barcelona: Universitat Politècnica de Catalunya, 1990. ISBN 8476530749.
- Scanzio, Fernando. Intrecci e strutture dei tessuti. Torino: Paravia, 1988. ISBN 8839518088.