Course guide
205510 - 205510 - Paper Conversion Technology

Last modified: 11/04/2025

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 717 - DEGD - Department of Engineering Graphics and Design.

Degree: MASTER'S DEGREE IN PAPER AND GRAPHICS TECHNOLOGY (Syllabus 2020). (Optional subject).

Academic year: 2025 **ECTS Credits:** 3.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Coordinador: Oriol Cusola

Others: Blanca Roncero

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Generical:
MUTPIG-CG1. Applying mathematical, analytical, scientific, instrumental and technological knowledge, related to the field of paper and graphic technologies.
MUTPIG-CG2. Projecting, calculating and designing products and processes, related to the field of paper and graphic technologies.
CG3. Lead, plan and supervise multidisciplinary teams.
MUTPIG-CG4. Carrying out research, development and innovation in the field of paper and graphic technologies.
MUTPIG-CG5. Technically and economically manage projects, companies and technology centers in the field of paper and graphic technologies.
MUTPIG-CG6. Applying the necessary legislation in the exercise of functions related to Paper Technology.

Basic:
CB06. Manage original concepts in research projects.
CB07. Student capacity to use their knowledge in new and multidisciplinary situations.
CB08. Generate decision from incomplete information assuming its social and ethical responsibilities.
CB09. Improve technical communication of results.
CB10. Improve self-learning capacity

TEACHING METHODOLOGY

The teaching methodology is divided in three parts:
â□□ Face-to-face sessions - content participation and exercises.
â□□ On-site laboratory work sessions.
â□□ Autonomous study (exercises and activities).
In the face-to-face sessions the teaching staff will introduce the theoretical concepts, methods and results, illustrated with suitable examples. Also, exercises to facilitate understanding will be introduced.
In the laboratory work sessions, the teacher will guide the student in the application of the theoretical concepts for the resolution of experimental set-ups.
The students have to work autonomously on the material provided by the teaching staff and on the results of the work-problem sessions to assimilate and fix the concepts. The teaching staff will provide a study plan and monitoring of activities (ATENEA).

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the subject the student must know the basics of the main operations of paper transformation, as well as the products obtained in the transformation. Special focus will be conducted on the study of operations in the binding of graphic products and corrugated cardboard. The student must be able to carry out an evaluation of the physical-mechanical properties of the conversion products. He must also be able to link these operations with the pre-printing process.

STUDY LOAD

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

Total learning time: 75 h

CONTENTS

Module 1: Introduction to Conversion

Description:
Statistical data on the situation of the paper and graphic arts sector. Paper types. Characteristics of the component materials . Binding types. Nomenclature used in the sector.

Related activities:
Theory sessions and final exam

Full-or-part-time: 3h
Laboratory classes: 1h
Self study : 2h

Module 2: Elementary Paper Transformation Operations

Description:
Study of the common transformation operations: Cutting, creasing, raising, milling, die-cutting, gluing, folding, lamination and sewing.

Related activities:
Theory sessions and final exam

Full-or-part-time: 3h
Laboratory classes: 1h
Self study : 2h

Module 3: Binding Processes

Description:
Principle of paperback binding. Paperback trains: collated, vibrated, milled, spine treatment, spine and side gluing, Principle of hardcover binding. Block preparation trains: raising, vibrating, sewing, placing guards, gluing the spine, reinforcing the spine, tight, cut Placement of covers: heating, rounding, removing the box, head, lateral gluing, block-cover union, pressing and tightening, dust jacket, stacking, other operations. Preparation of the cover, block-cover union, tightening, cutting and stacking.

Related activities:
Theory sessions and final exam

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

Module 4: Manufacture of corrugated cardboard

Description:
Types of Corrugated Cardboard (CC). Types of waves. Types of paper used in the manufacture of CC. General scheme of the process. Undulating group. Double face group. Drying ("hot tables"). Cut and crease. Adhesives. Obtaining the adhesives.

Related activities:
Theory sessions, laboratory work and final exam

Full-or-part-time: 12h
Laboratory classes: 4h
Self study : 8h

Module 5: Transformation of the corrugated cardboard sheet

Description:
Packaging design. Types of CC packaging. die cut Cleft. Drilling. Impression

Related activities:
Theory sessions, laboratory practices and final exam

Full-or-part-time: 11h
Laboratory classes: 4h
Self study : 7h

Module 6: Characterization of papers for the manufacture of corrugated cardboard

Description:
Types and characteristics of the papers used in the manufacture of CC. Paper tests for faces and corrugated: Determination of grammage and thickness. Edge compression (RCT, LCT, CCT and SCT); Rigidity (Taber, Concora); Traction; Pop; tear; Delamination (Scott Test); Fluid absorption (Cobb, Drop test); Concora Medium Test (CMT).

Related activities:
Theory sessions, laboratory practices and final exam

Full-or-part-time: 16h
Laboratory classes: 5h
Self study : 11h

Module 7: Characterization of corrugated cardboard

Description:
Determination of grammage and thickness: Burst; Rigidity; Flat Compression (FCT); Edge compression (ECT); Perforation (PET); Layer Adhesion (PAT). Box Compression (BCT).

Related activities:
Theory sessions, laboratory practices and final exam

Full-or-part-time: 20h
Laboratory classes: 8h
Self study : 12h

ACTIVITIES

Activity 1: Theory Sessions

Description:
Presentation of the contents of the subject following a participatory expository class model. The subject has been organized into 7 thematic areas that make up the 7 chapters presented in the contents of this guide. As part of the theory classes, exercises and problems related to the content are included. Some of the exercises will be proposed as deliverables and will be evaluated as individual student work. It will also be proposed to carry out online questionnaires related to the contents of the subject, which will also form part of the evaluation of the student's individual work.

Full-or-part-time: 24h
Self study: 16h
Laboratory classes: 8h

Activity 2: Laboratory work

Description:
8 laboratory practices related to the contents of the subject will be carried out:
- P1. Tests on component papers. Separation of the component papers (faces -liner- and corrugated). Grammage and thickness.
- P2. Tests on component papers. Resistance to delamination (Scott Test). Determination of static (Taber) and dynamic (Kodak) stiffness.
- P3. Tests on component papers. Corrugated compressive strength (CMT-Concora Medium Test-); CMT0, CMT60. Ring Crush Test (RCT).
- P4. Tests on corrugated cardboard. Grammage and thickness of corrugated cardboard. Flat compressive strength (FCT -Flat Crush Test-). Edge compression resistance (ECT -Edge Crush Test-).
- P5. Tests on corrugated cardboard. Layer adhesion (PAT -Pin Adhesion Test-). Water absorption (Cobb60).
- Q6. Tests on corrugated cardboard boxes. Box compression test (BCT - Box Compression Test).
- P7. barrier properties. water vapor permeability. capsule method.
- P8. Coefficient of friction. Static and Dynamic.
For each of the practices carried out, the student must submit an individual report of the practice according to the standardized model. Once corrected, the student can receive feedback from the teacher.

Full-or-part-time: 48h
Self study: 32h
Laboratory classes: 16h

Activity 3: Final exam

Description:
Development of the final exam of the subject.

Full-or-part-time: 3h
Laboratory classes: 3h

GRADING SYSTEM

The overall mark of the subject (NG) will be the result of the following calculation:
NG = 0.30 x EV1F (Final) + 0.50 x EV2 + 0.20 x EV3
Where:
â□□EV1. Note obtained in written or oral individual knowledge control tests. (Activity 3 of this guide).
â□□EV2. Mark obtained in the evaluation of practical work through deliverable reports. (Activity 2 of this guide).
â□□EV3. Mark obtained in the evaluation of the individual work. (Activity 1 of this guide).
The reports of the practical activities will be carried out individually. It is a necessary condition to pass the subject to carry out laboratory work and deliver the corresponding reports.
For those students who meet the requirements to take the reassessment exam, the reassessment exam grade will replace the grades of all the evaluation acts that are face-to-face written tests (EV1, midterms and final exams). The grades of the laboratoy work and other activities done through the course will be maintained. If the final mark obtained after the reassessment is greater than 5, the end mark of the subject will be approved with a grade of 5.0. The numerical grade after the reassessment will only replace the initial one if it is higher.

BIBLIOGRAPHY

Basic:
- Ek, Monica; Gellerstedt, Göran; Henriksson, Gunnar. Pulp and paper chemistry and technology. Berlin: De Gruyter, cop. 2009. ISBN 9783110213430.
- Martínez de Sousa, José. Manual de edición y autoedición. 2ª ed. Madrid: Pirámide, 2005. ISBN 9788436819311.

Complementary:
- Markström, Hakan. Testing methods and instruments for corrugated board. Stockholm: Lorentzen & Wettre, cop. 1988. ISBN 9179704549.
- Söderhelm, Liva; Levlin, Jan-Erik. Pulp and paper testing. Helsinki: Fapet Oy, 1999. ISBN 9525216179.

RESOURCES

Other resources:
Teacher's notes deposited in ATENEA.
AFCO. Corrugated cardboard. Commercial technical training manual. Madrid: AFCO 1999.