# Course guide
# 320078 - MCPA - Colouring Agents and Auxiliary Materials

**Last modified:** 19/04/2023

**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:** 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

## LECTURER

**Coordinating lecturer:** DIANA CAYUELA MARIN

**Others:** Primer quadrimestre:
VALENTINA BUSCIO OLIVERA - Grup: 11
DIANA CAYUELA MARIN - Grup: 11

## PRIOR SKILLS

A previous knowledge of Organic Chemistry is highly desirable.

## DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

**Specific:**
CE25-GETDT. Applied knowledge of chemistry for the textile industry. (Specific Technology Module: Textile)

**Transversal:**
CT06 N3. Self-directed learning - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

## TEACHING METHODOLOGY

The teaching methodology is divided into three parts:
- Face-to-face exposure sessions - content participation and exercises.
- Laboratory sessions where the students will put into practice the contents of the exhibition sessions. We work in groups of 2 students.
- Autonomous work of study and performance of exercises and activities.
In the exposition sessions - participation of the contents, the teacher will introduce the theoretical bases of the subject, concepts, methods and results illustrating them with suitable examples and applicant, if appropriate, the exercises to facilitate their understanding.
The student, autonomously, has to work the material provided by the faculty and the result of the work-problems sessions to assimilate and fix the concepts.
Teachers will provide a study plan and activity monitoring (ATENEA).

## LEARNING OBJECTIVES OF THE SUBJECT

GLO1. Capability to the student for the characterization of dyes, pigments and auxiliary textile products preparations, in views to his optimum application in the processes of the textile production chain that will be later used in the textile technology studies
GLO2. To acquire knowledge about of the chemical features of dyes and the physic-chemical phenomena involved in their action with a view to their rational use towards ensuring the required quality in the end product
GLO3. Knowledge of environmental parameters of the products used to guarantee his good behavior of as regards the environmental view

## STUDY LOAD

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

**Total learning time:** 150 h

## CONTENTS

### Topic 1. Textile dyes and auxiliary products: Types and properties

**Description:**
1.1. Nature and classification of auxiliary products according to use and the fundamental properties of the surfactants.
1.2. Wetting agents: effects, classification and assessment.
1.3. Foaming and anti-foaming agents: effects and assessment.
1.4. Levelling: effects and assessment.
1.5. Emulsifiers and dispersants: effects and assessment.
1.6 Auxiliary products for preparation and bleaching textile materials: classification.
1.7. Auxiliary products for dyeing and finishing textile materials: classification.

**Specific objectives:**
SO6. To acquire a knowledge of the action mechanisms of
surfactants with a view to their rational use..
SO7. To become acquainted with the variety of auxiliary products available and their desirable properties in views for the efficient use.
SO8. Necessary specific effects required for the optimization of the processes by saving energy and time with the use of auxiliary products.
SO9. To acquire a knowledge of the technical properties of auxiliary products and their assessment.
SO10. To develop a conscientious behaviour based on the use of environmentally friendly products and without toxicity

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

## Topic 2. Textile detergency

**Description:**
2.1 Nature of impurities in the textile materials.
2.2 Steps of the detergency process: assessment.
2.3 Types of additives in detergent formulations for textile materials and the basic mechanisms of action with the ecological needs for their use.

**Specific objectives:**
SO11. Knowledge and differentiation of the different stain types with a view to their removal and/or washing.
SO12. To develop a basic knowledge of detergency mechanisms with a view to their optimization.
SO13. To acquire a knowledge and the use of additives in detergent formulations in terms of detergent requirements.
SO14. Ecological and respectful with the environment and non toxic additives will be used.

**Full-or-part-time:** 27h
Theory classes: 4h
Laboratory classes: 4h
Self study : 19h

## Topic 3. Supply water and waste water

**Description:**
3.1 Supply water and waste water.
3.2 Types of supply water and their impurities.
3.3 Minimum water quality required for different textile processes.
3.4 Types of wastewater produced by the textiles industry.
3.5 Influence of the chemical nature of pollutants on their removal.
3.6 Management of dyeing and finishing effluents.

**Specific objectives:**
SO15. To develop a knowledge of the different types of water resources and their properties with a view to their appropriate management and to ensuring sustainability in the textile sector.

**Full-or-part-time:** 22h
Theory classes: 4h
Laboratory classes: 4h
Self study : 14h

**TOPIC 4. Dyes and pigments: types and properties**

**Description:**
4.1. Natural dyes.
4.2. Synthetic dyes.
4.3. Classification and properties according to the chemical structure.
4.4. Classification and properties according to application.
4.5. Color Index.

**Specific objectives:**
SO1. To acquire knowledge of the evolution of colouring materials, pigments and intermediates products.
SO2. Knowledge of the families of dyes, pigments and their specific peculiarities in view to is appropriate application.
SO3. Knowledge of the characteristics and attributes of commercial dyes.
SO4. To determine dyes in solution and on fabric. Technical properties of application of dyes for the dyeing processes.
SO5. To acquire a basic knowledge of ecological parameters of dyes and pigments according to European regulations on dye and pigment production.

**Related activities:**
AV0, AV1, AV2, AV3, AV4, AV5

**Full-or-part-time:** 61h
Theory classes: 14h
Laboratory classes: 14h
Self study : 33h

## GRADING SYSTEM

- First evaluation: 35%
- Second evaluation: 35%
- Lab and problems: 30%
- The unsatisfactory results of the partial exams can be redirected by means of a written test for each of them to be carried out on the day fixed by the final examination. This test can be accessed by all students enrolled. The grade of the test will be valued between 0 and 8. The grade obtained by the application of the renewal will replace the initial grade 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:**
- Shore, John. Colorants and auxiliaries : organic chemistry and application properties. 2nd ed. Bradford: Society of Dyers and Colourists, 2002. ISBN 0901956775.
- Smulders, Eduard. Laundry detergents. Weinheim: Wiley-VCH, 2002. ISBN 9783527305209.
- Rosen, Milton J.; Dahanayake, M. Industrial utilization of surfactants: principles and practice. Champaign: AOCS Press, 2000. ISBN 1893997111.
- Jakobi, G.; Löhr, A. Detergents and textile washing: principles and practice. Weinheim: VCH, 1987. ISBN 3527268103.
- Peters, R. H. Textile chemistry, vol.1-vol.2. Amsterdam: Elsevier, 1963-1975. ISBN 0444411208.
- Perkins, Warren S. Textile coloration and finishing. Durham: Academic Press, 1996. ISBN 0890898855.
- APHA, American Water Works Association. Standard methods for the examination of water and wastewater. 22nd ed. Washington: American Public Health Association, 2012. ISBN 9780875530130.
- Metcalf & Eddy. Wastewater engineering: treatment and reuse. 4th ed. Boston: McGraw-Hill, 2003. ISBN 0070418780.
- Cabeza i Díaz, R. L'aigua, un recurs universal i escàs: iniciació al tractament i utilització racional de l'aigua. Barcelona: Beta, 1997. ISBN 8470913638.

**Complementary:**

- Christie, Robert M. Colour chemistry [on line]. Cambridge: Royal Society of Chemistry, 2001 [Consultation: 14/06/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=1185381. ISBN 0854045732.
- Vigo, Tyrone L. Textile processing and properties : preparation, dyeing, finishing, and performance [on line]. Amsterdam: Elsevier, 1994 [Consultation: 07/10/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=1819892. ISBN 0444882243.
- Trotman, E. R. Dyeing and chemical technology of textile fibres. London: Charles Griffin, 1975. ISBN 085264227X.

## RESOURCES

**Audiovisual material:**

- Cayuela Marín, Diana. Apunts de classe (Atenea). Notes of the topic (Atenea)