

Course guide

205123 - 205123 - Polymers from Renewable Resources for Industrial Applications

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: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).

Academic year: 2024 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Fakhoui, Farayde Matta
Others: Velasco Perero, Jose Ignacio
Zoppe, Justin Orazio

PRIOR SKILLS

none

TEACHING METHODOLOGY

Expository and participatory classes
Work of analysis of practical cases and recent scientific publications including oral presentation.

LEARNING OBJECTIVES OF THE SUBJECT

Know the possible renewable sources from raw materials capable of substituting polymers from non-renewable sources for industrial applications. Know the processing techniques and characterization of these materials, thus contributing to greater sustainability and circular economy.

STUDY LOAD

Type	Hours	Percentage
Self study	48,0	64.00
Hours large group	16,5	22.00
Hours small group	10,5	14.00

Total learning time: 75 h

CONTENTS

Introduction to polymers from renewable sources

Description:

Definition and classification of basic concepts such as: bioplastics, biopolymers, biodegradability, compostable, sustainable. Polymers from renewable sources. Sources, chemical structure, properties, modifications.

Full-or-part-time: 15h

Theory classes: 3h 18m

Laboratory classes: 2h 06m

Self study : 9h 36m

Processing and characterization

Description:

Processing techniques and characterization of polymers from renewable sources.

Full-or-part-time: 15h

Theory classes: 3h 18m

Laboratory classes: 2h 06m

Self study : 9h 36m

Compounding

Description:

Incorporation of additives, plasticizers, bioactive compounds, cellulose nanocrystals, natural fibers. Techniques for obtaining and incorporating bioactive compounds into materials.

Full-or-part-time: 15h

Theory classes: 3h 18m

Laboratory classes: 2h 06m

Self study : 9h 36m

Biodegradability and tests

Description:

Biodegradability of polymers. Biodegradability evaluation tests. Gas and water vapor permeation.

Full-or-part-time: 15h

Theory classes: 3h 18m

Laboratory classes: 2h 06m

Self study : 9h 36m

Aplicacions i innovacions

Description:

Industrial applications, case studies. Smart materials.

Full-or-part-time: 15h

Theory classes: 3h 18m

Laboratory classes: 2h 06m

Self study : 9h 36m

GRADING SYSTEM

The final grade for the course will depend on the following evaluation activities:

- 1) Four sets of case studies: 40%
- 2) A written report/oral presentation in groups of a minimum of 2 students and a maximum of 4 students: 35%
- 3) A final exam: 25%

BIBLIOGRAPHY

Basic:

- International Symposium on Polymeric Renewable Resource Materials 1985 : Miami Beach, Estats Units d'Amèrica). Renewable-resource materials: new polymer sources. New York: Springer, 2013. ISBN 9781461292951.
- Hashmi, Saleem; Choudhury I. Ahmed. Encyclopedia of renewable and sustainable materials. Elsevier, 2020. ISBN 9780128131961.