

Course guide

295582 - 295PB012 - Experimentation and Instrumentation

Last modified: 09/08/2024

Unit in charge: Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: MASTER'S DEGREE IN POLYMERS AND BIOPLASTICS (Syllabus 2024). (Compulsory subject).

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

LECTURER

Coordinating lecturer: LUIS JAVIER DEL VALLE MENDOZA

Others: Primer quadrimestre:
LUIS JAVIER DEL VALLE MENDOZA - Grup: T11, Grup: T12, Grup: T13
NURIA SAPERAS PLANA - Grup: T11, Grup: T12, Grup: T13

PRIOR SKILLS

This is a practical course; therefore, laboratory experience would be desirable.
It is also advisable to be acquainted with the use of Excel and basic statistical analysis.

TEACHING METHODOLOGY

Laboratory sessions performed in small groups.

LEARNING OBJECTIVES OF THE SUBJECT

To provide the students with the knowledge and skills required to perform the synthesis and characterization of several types of polymers and composites and their characterization through different techniques.

STUDY LOAD

Type	Hours	Percentage
Self study	51,0	68.00
Hours small group	24,0	32.00

Total learning time: 75 h



CONTENTS

Polymerization processes

Description:

This block includes a short introductory theory session and the following laboratory sessions:

P1 - Bulk polymerization: Poly(methyl methacrylate) (PMMA)

P2 - Interfacial polymerization: Nylon-6,10 (polyamide)

P3 - Solution polymerization: linear and cross-linked Polyacrylamide (PAM)

Electrophoretic analysis of natural polyamides (proteins) using cross-linked PAM.

P4 - Composites: preparation of a laminate of glass fiber reinforced polyester resin

Bioplastics from starch

Specific objectives:

To become acquainted with the use of some of the main polymerization techniques.

Full-or-part-time: 37h 30m

Theory classes: 1h 15m

Laboratory classes: 10h

Self study : 26h 15m

Polymer characterization

Description:

This block includes a short introductory theory session and the following laboratory sessions:

C1 - Physical properties of a plastic material

C2 - Staining of a plastic material

C3 - Water absorption in hydrogels

Determination of the hydrophobicity/hydrophilicity of a polymeric material surface: Contact angle measurement

C4 - Analysis of plastic materials by infrared spectroscopy (FTIR)

Specific objectives:

To become acquainted with the use of some of the main polymer characterization techniques.

Full-or-part-time: 37h 30m

Theory classes: 1h 15m

Laboratory classes: 10h

Self study : 26h 15m

GRADING SYSTEM

8 lab reports (12.5 % each)

EXAMINATION RULES.

All laboratory practices are mandatory.

A report must be submitted for each of the laboratory sessions.

The final mark will correspond to the average of the mark of the 8 reports.



BIBLIOGRAPHY

Basic:

- Braun, Dietrich. Polymer synthesis : theory and practice : fundamentals, methods, experiments. 5th ed. Berlin [etc.]: Springer, cop. 2013. ISBN 9783642289798.
- Collins, Edward A.; Bares, Jan; Billmeyer, Fred W. Experiments in polymer science. New York: Wiley-Interscience, cop. 1973. ISBN 0471165840.
- Hundiwale, D. G. Experiments in polymer science. New Delhi: New Age International, cop. 2009. ISBN 9788122423884.
- Sandler, Stanley R. Polymer synthesis and characterization : a laboratory manual [on line]. San Diego: Academic Press, 1998 [Consultation: 13/09/2024]. Available on: https://discovery.upc.edu/permalink/34CSUC_UPC/rdgucl/alma991001891599706711. ISBN 9780126182408.

RESOURCES

Other resources:

Classroom material available at ATENEA