60647 - Renewable Raw Materials

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	540 - Master's in Industrial Chemistry
ECTS	3.0
Year	1
Semester	Second semester
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It favors the understanding of the different chemical processes that occur in the environment. A wide range of teaching and learning tasks are implemented, such as theory sessions, seminars, and tutorials.

Students are expected to participate actively in the class throughout the semester.

60647 - Renewable Raw Materials

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

5.2.Learning tasks

The course includes 3 ECTS organized according to:

- Theory sessions (2.5 ECTS): 25 hours. Lecture presentations will be available for the students previous to the classes
- Seminars (0.5 ECTS): 5 hours. They will be offered by external experts on subjects related to biorefinery and green chemistry .
- Assignments: 42 hours.
- Evaluation activities: 3 hours.

5.3.Syllabus

The course will address the following topics:

Topic 1. Basic concepts of biorefinery.

Topic 2. Study of different raw materials: features and availability.

Topic 3. Pretreatment and treatment of the different renewable raw materials.

Topic 4. Interesting Products from renewable raw materials:

- Biofuels (biogas, bioethanol, biodiesel, biooil).
- Terpenes.
- Proteins and other non-carbohydrated biopolymers.
- Lipids and oils: fatty acids and glycerol.
- Carbohydrates.
- Lignins.

5.4.Course planning and calendar

Further information concerning the timetable, classroom, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the "Facultad de Ciencias" website
http://ciencias.unizar.es/web/horarios.do

5.5.Bibliography and recommended resources

- Ulber, R. **Renewable Raw Materials**. Wiley-Blackwell. 2010
- **Biorefineries-industrial processes and products: status quo and future directions**. Birgit Kamm, Patrick R. Gruber, and Michael Kamm Weinheim, Eds. Wiley-VCH, 2006.
- **Feedstocks for the future: renewables for the production of chemicals and materials.** Joseph J. Bozell, editor, Martin K. Patel, editors ; sponsored by the ACS Division, Cellulose and Renewable Materials. Washington, DC : American Chemical Society , cop. 2006
- **Introduction to chemicals from biomass** / editors, James H. Clark with Fabien E. I. Deswarte Chichester : Wiley, cop. 2008

60647 - Renewable Raw Materials

- **Renewable bioresources : scope and modification for non- food applications** / editors, Christian V. Stevens with Roland Verhé Chichester: John Wiley & Sons, 2004 cop. 2004
- **Catalysis for renewables: from feedstock to energy production** / edited by Gabriele Centi and Rutger A. van Santen . - 1st ed., 1st rep. Weinheim : Wiley-VCH, 2008
- **Polymers from agricultural coproducts** / Marshall L. Fishman, Robert B. Friedman, Samuel J. Huang, [editors] Washington, DC : American Chemical Society, 1994
- Goettemoeller, Jeffrey. **Sustainable ethanol: biofuels, biorefineries, cellulosic biomass, flex-fuel vehicles, and sustainable farming for energy independence** / Jeffrey Goettemoeller and Adrian Goettemoeller Maryville, Missouri : Prairie Oak, cop. 2007
- **Thermoplastic starch : A green material for various industries** / edited by Leon P.B.M. Janssen and Leszek Moscicki Weinheim : Wiley-VCH, cop. 2009
- **Biopolymers from renewable resources** / D. L. Kaplan (ed.) Berlin [etc.] : Springer, cop. 1998
- **Surfactants from renewable resources** / edited by Mikael Kjellin, Ingegärd Johansson Chichester : Wiley, 2010
- Pagliaro, Mario. **The future of glycerol : new usages for a versatil raw material** / Mario Pagliaro, Michele Rossi Cambridge : RSC Publishing, cop. 2008
- Pahl, Greg. **Biodiesel : growing a new energy economy** / Greg Pahl ; foreword by Bill McKibben . - 2nd ed. White River Junction, Vermont : Chelsea Green, cop. 200
- **Handbook of plant-based biofuels** / edited by Ashok Pandey Boca Raton : CRC Press, cop. 2008
- Lin, C.A.. **Renewable Resources for Biorefineries.** Royal Society of Chemistry. 2014
- Wertz, J.L.. **Lignocellulosic Biorefineries**. PU POLYTECHNIQU. 2013