Universidad Zaragoza

Academic Year/course: 2021/22

60647 - Renewable Raw Materials

Syllabus Information

Academic Year: 2021/22
Subject: 60647 - Renewable Raw Materials
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

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It favors the knowledge of the main renewable raw materials sources and their transformation in higher added value products. A wide range of teaching and learning tasks are implemented, such as lectures and seminars.

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

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.

4.2. Learning tasks

The course includes 3 ECTS organized according to:

- Lectures (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.

The learning and evaluation activities will be carried out in person unless, due to the sanitary situation, the provisions issued by the competent authorities and by the University of Zaragoza require them to be carried out electronically or semi-electronically with rotating reduced capacity.

4.3. 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.

4.4. 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

4.5. 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 ?
- **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