Course title: Bioenergy and Biorefinery Technologies – selectable / ~~regular course~~

Number of contact hours: 60 hours (22h lectures/8 Lab/ 20 CompLab/ 10 Project)

ETCS credits: 6

Course description: The aims of the module are:

1. to give the students the ability for the identification and characterization of different types of renewable biomass resources and to enable them to apply this knowledge for the production of bioenergy and chemicals.

2. to develop the student's knowledge and understanding of the main technologies available to convert biomass into bioenergy and chemicals.

3. to introduce the students to the concept of biorefinery, showing the trends and future research and development strategies to produce biofuels, materials and chemicals from biomass under a bio-based integrated approach.

4. to familiarize the students with the application of simulation software to simulate, analyse and optimize processes involving biomass conversion into bioenergy and chemicals.

Education effects: At the end of the module, the learner is expected to be able to:

1. identify and characterize renewable biomass resources involved in the production of bioenergy and chemicals.
2. list and explain the main technologies available to convert biomass into bioenergy and chemicals.
3. recognize the importance of the concept of biorefinery, the trends and future research and development strategies to produce biofuels, materials and chemicals from biomass under a bio-based integrated approach.
4. apply simulation software to simulate, analyse and optimize processes involving biomass conversion into bioenergy and chemicals.

Literature:

Donald Klass, Biomass for Renewable Energy, Fuels and Chemicals, Academic Press, 1998. Chapters 2-5, pages 1-158.
Donald Klass, Biomass for Renewable Energy, Fuels and Chemicals, Academic Press, 1998. Chapters 6-9, pages 159-331.
Caye Drapcho, John Nghiem, Terry Walker, Biofuels Engineering Process Technology, McGraw-Hill, 2007. Chapters 5-6, pages 105-268.
Jhuma Sadhukhan, Kok Siew Ng, Elias Martinez Hernandez, Biorefineries and Chemical Processes: Design, Integration and Sustainability Analysis, Wiley, 2014.
Mohd Kamaruddin Abd Hamid, HYSYS: An Introduction to Chemical Engineering Simulation, Universiti Teknologi Malaysia, 2007. Chapters 1-12, pages 1-142

Assessment method:

LOs	Assessment methods	Weight
1	Project assignment and written exam.	20%
2	Laboratory work and written exam.	35%
3	Project assignment and written exam.	20%
4	Computer laboratory work.	25%

Prerequisites: Before the course unit the learner is expected to be able to:

1. demonstrate strong knowledge on the fundamentals of basic sciences.

2. demonstrate knowledge on the formulation of mass and energy balances.

3. demonstrate knowledge on the use of informatic tools in the resolution of engineering problems.

Primary target group:

Lecturer: Helder Teixeira Gomes - Polytechnic Institute of Bragança