



3.00 credits

30.0 h

Q1

Teacher(s)	Cannella David ;Debecker Damien (coordinator) ;
Language :	English
Place of the course	Louvain-la-Neuve
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>a. Contribution de l'activité au référentiel AA LBIR1381 contributes to the learning outcomes B1.3, B1.6, B2.3, B4.2, B7.1, B7.3</p> <p>b. Formulation spécifique pour cette activité des AA du programme At the end of the activity, the student is able of:</p> <p>B1.3, connaitre comprendre socle bioing B1.6, mobiliser savoirs multiples, comprendre probl multidiscipl B4.2, identifier concepts clés pour résoudre problématique B7.1, indépendance et regard critique B7.3, comprendre enjeux DD</p> <p>1 - enumerating and defining the different types of biomass, and the different chemical fractions of biomass - understanding the working principles of biomass fractionation, transformation and upgrading, including the integrated concept of 'biorefinery' - stating and explaining the conceptual bases for the main purification techniques used in the context of biomass valorization - stating and explaining the conceptual bases for the main conversion processes used in the context of biomass valorization, including thermal, chemical, mechanical and catalytic transformation - discussing the complexity of the biorefinery concept and the interconnections between different streams - developing a critical thinking on the industrial, legal ethical and technological landscape of bio- vs. petro-sourced industries.</p> <p>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled '<a href="#">Programmes/courses offering this Teaching Unit</a>'.</p>
Evaluation methods	Written exam covering the learning outcomes as defined herein. (answers can be given in French)
Teaching methods	Ex cathedra course (30h), with power point slides used as a visual support (available beforehand via Moodle). References books and scientific articles are used as supports for the content. The course is taught in English. Owing the limited capacity of the classrooms due the the restrictions associated with the COVIC-19 crisis, some classes will be given remotely (Teams).
Content	<p>This teaching unit is a general introduction to the field of biomass valorisation, through the "biorefinery" concept. Due to the environmental concerns associated with the consumption of fossil resources, biomass appears as an attractive source for the production of fuels and chemicals. The course covers different aspects:</p> <ul style="list-style-type: none"> <li>• General introduction on the historical aspects around the "biorefinery" concept. Contextual analysis covering legal, ethical, economical aspects.</li> <li>• Definition of the different types and fractions of biomass; Discussion on storage, stability, and availability.</li> <li>• Technical bases for the transformation and conversion of biomass. Definition and description of the main concepts: reactors, catalysts, contact time, selectivity, yield, mass transfer, etc.</li> <li>• Description of the main biomass pre-treatments (mechanical, chemical, thermal).</li> <li>• Hydrolysis and fermentation: scientific basis and case studies.</li> <li>• Introduction to downstream processes for the separation and purification of the molecules of interest, and for their subsequent or combined valorization.</li> <li>• Upgrading (mainly catalytic upgrading) of bio-based platform chemicals for specific applications.</li> <li>• Examples of integrated biorefineries.</li> </ul>
Inline resources	Moodle: <a href="https://moodleucl.uclouvain.be/enrol/index.php?id=12174">https://moodleucl.uclouvain.be/enrol/index.php?id=12174</a>

Bibliography	<ul style="list-style-type: none"><li>• "Biomass Processing, Conversion and Biorefinery", (2013) B. Zhang &amp; Y. Wang, Nova Science Publishers, Inc., Ney York, pp 457</li><li>• "Biorefineries and Chemical Processes: Design, Integration and Sustainability Analysis", (2014) J. Sadhukhan, K.S. Ng, E. Martinez Hernandez, John Wiley &amp; Sons, Ltd, pp613</li></ul>
Other infos	This course is taught in English.
Faculty or entity in charge	AGRO

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Environmental Bioengineering	BIRE2M	3		
Master [120] in Chemistry and Bioindustries	BIRC2M	3		
Minor in Development and Environment	MINDENV	3		