UCLouvain

lmapr2001

2026

Project "chemical & materials engineering for a sustainable future"

8.00 credits	35.0 h + 50.0 h	Q2

Teacher(s)	De Wilde Juray ;Jacques Pascal ;Jonas Alain ;Luis Alconero Patricia ;Poncé Samuel ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	Chemistry and materials science and engineering, sustainable development, life cycle assessment, processing, recycling, social life cycle assessment of products, innovation
Learning outcomes	**At the end of this learning unit, the student is able to :** Given the AA repository of the program of "Master ingénieur civil en chimie et science des matériaux", this course contributes to the development, acquisition and evaluation of the following learning outcomes: **a. Disciplinary Learning Outcomes** · 1.1, 1.2, 1.3 · 2.1, 2.2, 2.3, 2.5 · 3.1, 3.2, 3.3 · 4.1, 4.2, 4.3, 4.4, · 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 · 6.1, 6.2, 6.3, 6.4, 6.5 *At the end of this course, students will be able to:* · analyze, understand and summarize the technological and scientific issues related to the proposed case studies in the field of chemistry and material science; · conduct a social life cycle assessment of the considered case studies and to summarize the points of improvements with respect to imposed standards, criticality of raw materials, recycling issues, … · propose alternative and innovative solutions that could meet the revealed weak points of the case studied or that could improve the global efficiency also in relationship with the economical dimension; · summarize the conducted analysis in a technical report and in a presentation adapted to different audiences (experts, general public …). **b. Transversal Learning Outcomes** *At the end of this course, students will be able to:* · develop a pro-active methodology for finding the adequate pieces of information needed in an engineering approach of technological and scientific problems; · write down a clear and concise summary of seminars, conducted work, meeting, … · conduct a project in a group, requiring: · to translate some objectives; · to effectively distribute the tasks; · to evaluate the required resources, and organize the methodology; · to insure adequate communication within the group; · to develop the adequate procedure for decision-making; · to manage interpersonal relationships within and outside the group. · perform adequate presentations adapted to the considered audience.
Evaluation methods	The students are evaluated by group and individually, both evaluations being continuously led. Group evaluation will involve grading at different times the deliverables produced by the group, including a final deliverable at the end of the project; the individual one will consist of a few short tests aiming to evaluate the acquisition of key concepts by each student; these tests may be written or oral. The final grade will be a combination of all grades acquired along the semester - there will be no final exam. In case the project is failed, individual tests can be passed again, and group deliverables can be improved if needed. The use of generative artificial intelligence for the production of (parts of) deliverables is allowed, provided this use be indicated to the teachers, done in a critical way, compared to other sources, and respects the general principles defined by EPL. If, for one part of the continous evaluation process, a student does not abide to the methodological instructions defined on Moodle by the teachers, including the use of online resources and student collaborations, all the continuous evaluation will obtain a grade of 0.

Teaching methods	The project is led in small groups of students. It may involve a variety of activities, including reading review articles and book chapters, seeking the input of external experts, simulating processing paths and/or of materials/devices properties, innovatively designing alternative solutions or creative new uses, managing societal and life cycle assessments, evaluating economic impacts, and communicating by modern communication tools such as, e.g., web sites, promotional videos, etc. This course addresses issues related to sustainable development and transition through the following activities: · One seminair dedicated to Sustainable Development, to understand the concepts and introduce the Sustainable Development Goals · A life cycle assessment will be performed by the students during the course. This analysis will allow the students to identify the 'hot spots' of the overall life of the product, leading to critical discussion and a deeper reflection by the students considering the Belgian, European and global context.
Content	The project focuses on the study of a (class of) material and/or of a (class of) production process and/or of a (class of) device, the proposition of an improvement to - or innovative use of - this specific material, process or device, the evaluation of its potential ecological, economical and societal impacts, including a complete lifecycle analysis, and the use of communication/reporting tools. It aims to provide an integrated view of the development of a product or device, from cradle to end-of-life and recycling, and/or of a process, including its environmental and societal aspects. The topic of the project is modified yearly. In relation to content on sustainable development, the course includes: · quantifying the direct environmental impacts of a typical technological product or service (via a life cycle analysis) · identifying hotspots in terms of the environmental impacts of a technological product or service, · qualitatively analyzing indirect environmental impacts resulting from the introduction of a technology into society, · having a historical perspective of the development of a technology and the socio-ecological impacts that resulted from it.
Inline resources	All needed resources will be made available *via* the Moodle website of the project.
Other infos	The project requires the continuous involvement of the students all along the semester.
Faculty or entity in charge	EPL

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Chemical and Materials Engineering	KIMA2M	8		
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	8		
Master [120] in Chemistry and Bioindustries	BIRC2M	8		