UCLouvain

lbirc2201

2024

Industrial project in chemical and biochemical engineering

5.00 credits	52.5 h	Q1

Teacher(s)	Gerin Patrick (coordinator) ;Stenuit Benoît ;
Language :	French > English-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Knowledge and skills acquired throughout the whole science, engineering and economy courses of the BIRC programme.
Main themes	A. Industrial partners submit to the students a problem of chemical or biotechnological engineering. The industrial partners belong to various technology areas: chemistry, biotechnology , biomedicine, environment. The problems are submitted with all the reality of their complexity, as experienced by the company. Different types of projects can be proposed : 1. design of a facility or part of a industrial facility with a few (2 or 3) unit operations (eg, filtration, sedimentation , distillation, drying, grinding ...). ; 2. "exploratory " study to identify and assess the feasibility of various possible solutions to the industrial problems ; 3 . technical (possibly technical and economic) comparison of two or more industrial processes with a single purpose . B. Each student team takes in charge the resolution of one problem, with interactions with the industrial partner and with mentoring by the teacher. C. Each student team synthesize the problem, the solving approach and the solutions in a written report and an oral presentation , in a way that is understandable and usable by an engineer with no particular specialization.
Learning outcomes	**At the end of this learning unit, the student is able to :** a. Contribution de l'activité au référentiel AA (AA du programme) 1.4, 1.5 2.1, 2.2, 2.3, 2.4 3.6, 3.7, 3.8 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 5.5 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8 b. Formulation spécifique pour cette activité des AA du programme (maximum 10) At the end of this activity, the student is able to take in charge and solve a complex problem in industrial chemistry or biotechnology, i.e. : - Analyze and understand the problem, identify its ins and outs in the context of the company, and distinguish the key elements, by mobilizing all its knowledge of chemical bioengineer ; 1 - Clarify and if necessary redefine the problem and the objectives of the resolution; - Identify, acquire and integrate the new knowledge needed to carry out the resolution of the problem ; - Investigate, identify, design and document potential solutions to the problem ; - Pre- select the technological solutions that seem most appropriate, on the basis of all his knowledge of biochemical engineer, as well as the new knowledge acquired for the purpose of solving the problem ; - Develop the pre-selected solutions, in their technological and their design details, taking into account the constraints of practical implementation in the company; - Check the suitability of proposed solutions to the problem posed, by assessing and comparing their performance and impacts; - Formulate the recommended solution and argue that it indeed solves the problem ; - Communicate the problem analysis , solution proposals and resolution process in a structured , rigorous and synthetic way, orally and in writing ; - Orally defend his claims.

Evaluation methods	Oral presentation and defence (answer to questions and justifications) of the solutions to the problem. Final written report of each student team, that has to define the initial problem in its context, and build and argue the solution(s). Criteria: - Relevance and extent of information search - Relevance and rigour in the solutions and calculations developed - Critical analysis of scientific and technological aspects of the solution - Relevance and rigour in the presentation and structuring of the subject - Clarity and completeness of the communication, quality of writing - Synthetic communication of the subject - Respect of the bibliographic citation rules - Personal contribution to the success of the team's mission **Continuous formative assessment** Tutoring and feedback from supervisors and industrial partners on regular communications and preliminary and interim reports. Peer assessment via the Moodle/Dynamo tool. **Certification assessment** Oral presentation and defense of the work (20%); final report provided to the industrial partner and supervisors (80%). Individual adjustment of teamwork grade by the relative engagement rate determined by peer assessment via Moodle/Dynamo tool
Teaching methods	Personal and team work, self-learning, guidance by teachers and industry partners. Writing preliminary and full report, oral presentation and defence.
Content	Real problems of industrial chemistry or biotechnology relevance are submitted by companies, which also provide the useful data they have. Given the context of transition in the face of the energy and environmental challenges, the projects submitted by the industrial partners often aim at improving the efficiency of their processes, to reduce the consumption of resources and the environmental impacts of their activities. The students organize themselves as a team of 4-6 students to solve one problem. The project involves individual work (information search , acquisition of theoretical background , calculations, etc.), team work, and weekly meetings with at least one of the supervisors. At the 7th week, an interim report has to be submitted to the industrial partner to present the problem, the potential solutions envisaged and to justify the selection of solutions that will be developed in more detail. The whole project solution is presented and defended orally in the 13th or 14th week in front of the the industrial partner and in the presence of all students. The written report is completed by early January. The oral and the written report must be formulated to be understandable by bioengineers. The Project in Industrial Chemistry requires the students to use in a integrated way the knowledge and skills they have acquired through all the courses of their bio-engineer education, 1) to understand and analyse an engineering problem in industrial chemistry or biotechnology, 2) to identify and document the possible ways to solve it, 3) to select the most promising solutions, 4) to develop the latter, ideally up to the dimensioning of the unit operations, 5) and finally to critically review the retained solutions. The project requires the students to present, justify and defend their intellectual approach and their solutions, with the rigour, accuracy and technological sense necessary for bioengineers. The project also requires students to mobilize their skills in teamwork, initiatives and work organization to carry out their project.
Inline resources	Moodle Autre: bibliographic databases accessible via the UCL libraries, technical and commercial documentation available online
Bibliography	Recherche bibliographique et technique guidée par les enseignants en fonction du problème posé. Recommandations sur l'organisation du travail d'équipe et sur la rédaction de rapports scientifiques et techniques mises à disposition sur icampus

Other infos	1. Given the implications for interactions with industrial partners and with other students, to participate in this course, students must have been previously credited for at least 45 credits of the M1 program, and specifically for the courses: LBIRC2109 Process engineering : unit operations LBIRC2108 Biochemical and Microbial Engineering LBIRC2107 Bibliographical team project: chemistry and bio-industries The students who would not meet these requirements may be excluded from the projects proposed by the industrial partners and limited to a purely academic project. Similarly, students who are not present or represented during the first session (practical organization of the course, defining teams, assigning projects) or during the first meeting with the industrial partner will be limited to a purely academic project. 2. For students who are not enrolled in the BIRC2M master, participation is subjected to the following conditions: 1. contact the coordinator of the course, no later than August 20, to allow him to organize the various projects; 2. participate in (and be present) to completion in January. 3. Wherever possible, the project is supervised by a team of teacher competent in process engineering for the various specializations of students, including if possible a teacher in chemical engineering. 4. The activity involves travel and visit of the industrial partners plants. This course can be organized in English.
Faculty or entity in charge	AGRO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Chemistry and Bioindustries	BIRC2M	5		