


5.00 credits

30.0 h + 22.5 h

Q2

Teacher(s)	Luis Alconero Patricia ;Mignon Denis ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	Unit operations for fluid-fluid separation (distillation, absorption/stripping, liquid-liquid and solid-liquid extraction). Operating principles and methods for the selection, sizing and choice of equipment applicable to these unit operations.
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p><b>Contribution of the activity to the AA referential :</b></p> <ul style="list-style-type: none"> <li>• AA 2.1 and 2.2</li> <li>• AA 3.1</li> <li>• AA 5.3, 5.4, 5.6</li> </ul> <p>1</p> <p><b>At the end of this course, the student will be able to :</b></p> <ul style="list-style-type: none"> <li>• understand the theoretical bases and practically apply the operating principles, as well as the selection, sizing and equipment choice methods applicable to unit operations for fluid-fluid separation.</li> <li>• use the ASPEN + process simulator for each of the studied techniques.</li> </ul>
Evaluation methods	<p>Individually during an examination composed of one written part (problems resolution and/or restitution of theoretical developments presented during the course) and one oral part (short questions/answers on other parts of the course material, without preparation).</p> <p>Exercises on Aspen+ done during the course and the laboratory session will be also part of the final evaluation.</p> <p>Unless specified otherwise during the course, the assignment(s) count for 20% of the final mark, the oral part of the examination for 40% and the written part of the examination for 40%.</p> <p>The part taught by each teacher normally counts for a half of the total mark, unless specified otherwise during the course. However, if a deep deficiency (<math>\leq 8/20</math>) is found for one part of the course, the total mark will represent a failure at the examination and be reduced to 8/20 as a maximum.</p>
Teaching methods	<p>The method of the course consists of 14 lectures by the course teachers, completed by 10 workouts sessions supervised by assistants. Some of the latter are based on paper-pencil computations, the others are based on the use of the ASPEN+ process simulation software.</p> <p>Two laboratory sessions are also planned (absorption and liquid-liquid extraction).</p>
Content	<p>The course covers successively the following topics:</p> <ul style="list-style-type: none"> <li>• Diffusion theory. Fick's law. Convective and molecular transfer coefficients. Analogy between heat and mass transfer.</li> <li>• Continuous and batch distillation of binary and multi-component mixtures. Graphical (McCabe and Thiele) and numerical sizing methods. Simplified ("shortcut") and rigorous methods. Trayed column design (equipment, efficiency and capacity).</li> <li>• Absorption of one or more components into a liquid, with or without a chemical reaction. Stripping. Packed column hydrodynamics. Different types of packing and absorbers.</li> <li>• Liquid-liquid extraction. Single stage and multiple stages, with or without reflux. Extractor types and selection criteria. Supercritical extraction.</li> </ul>
Inline resources	<a href="https://moodleucl.uclouvain.be/course/view.php?id=5563">https://moodleucl.uclouvain.be/course/view.php?id=5563</a>
Bibliography	<ul style="list-style-type: none"> <li>• Copie des supports de présentation. Ces documents sont disponibles sur Moodle.</li> <li>• Livre de référence : Separation Process Principles, Third Edition, Henley, Seader and Roper, Editeur John Wiley &amp; Sons, 2011, ISBN-13: 978-0470646113.</li> </ul>
Other infos	It is highly recommended to have attended a Thermodynamics - Phase equilibria course LMAPR1310 or similar.
Faculty or entity in charge	FYKI

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Chemical and Materials Engineering	KIMA2M	5		
Master [120] in Biomedical Engineering	GBIO2M	5		