UCL Université catholique de Louvain

# LMAPR2380

*2015-2016*

# Solid-fluid separation

| 5.0 credits | 30.0 h + 22.5 h | 1q |
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| Teacher(s) : | Adam Pierre ; Leyssens Tom ; |
| Language : | Anglais |
| Place of the course | Louvain-la-Neuve |
| Inline resources: | > http://icampus.uclouvain.be/claroline/course/index.php?cid=MAPR2380 |
| Main themes : | Crystallization/precipitation techniques<br>Other fluid-solid separation techniques (decantation, centrifugation, filtration including membrane filtration). ). Operating principles and methods for the selection, sizing and choice of equipment applicable to these unit operations. |
| Aims : | Contribution of the activity to the AA (Learning outcomes) referential:<br>--<br>LO 1 : 1.1<br>--<br>LO 2 : 2.1, 2.2, 2.3<br>--<br>LO 3 : 3.1<br>--<br>LO 4 : 4.1, 4.2<br>--<br>LO 5 : 5.1, 5.2, 5.3, 5.4, 5.6<br>At the end of this course, the student will be able to :<br>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.<br>*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 "Programmes/courses offering this Teaching Unit".* |
| Evaluation methods : | 1. Crystallization<br>Individually during an oral examination: short questions/answers on the course material, without preparation.<br>2. Other fluid-solid separation techniques :<br>--<br>Individually or in small group: results presentation, quality of the expression during the presentation of the design project for an industrial filtration unit and ability to answer the questions.<br>--<br>Individually during an oral examination on the course material, with written preparation. |
| Teaching methods : | 1. Crystallization :<br>In 3 lectures of 2 hours by the course teachers.<br>2. Other fluid-solid separation techniques :<br>--<br>In 11 lectures of 2 hours by the course teachers.<br>--<br>The addressed theoretical notions will be illustrated through case studies of different filters types. Those studies will include the characterization of the liquid to be filtered eventually lab trials and the sizing of the filter; Students are invited to present their results to the group. |
| Content : | 1. Crystallization<br>--<br>Study of the crystallization/precipitation techniques :<br>- Crystalline state, crystal lattice and polymorphism.<br>- Phase equilibrium.<br>- Crystallization kinetics (seed formation and crystal growth).<br>- Practice and instrumentation.<br>- Industrial applications.<br>2. Other fluid-solid separation techniques :<br>Theoretical fundamentals for the solid fluid separation techniques<br>- Physical properties of liquids and solids: porous media characterization (particles size, shape and distribution, porosity); introduction to surface tension<br>- Fluid flow through porous media<br>- Settling of particles thought fluids |

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| | Solid fluid separation techniques<br>- Sedimentation, centrifugation, cyclone, hydro cyclone<br>- Filtration : sieving, clarifying filtration, deep bed filtration, cake filtration<br>- Washing and deliquoring of cakes<br>- Membrane filtration: micro-, nano-, ultra-filtration, reverse osmosis, crossflow filtration, diafiltration |
| Bibliography : | 1. Copy of the presentation slides. These documents are available on iCampus (Site iCampus LMAPR2380).<br>2. Reference books:<br>Separation Process Principles, Third Edition, Henley, Seader and Roper, Editor John Wiley & mp; Sons, 2011, ISBN-13: 978-0470646113..<br>Solid-Liquid Filtration and Separation Technology, Second Edition, A. Rushton, A. Ward, R. Holdich, Editor Wiley VCH, 2000, ISBN-13 978-3527296040<br>Solid/ Liquid Separation: Principles of Industrial Filtration, 1st Edition, S. Tarleton, R. Wakeman, Editor Elsevier Science,2005 , ISBN-13 978-1856174190 |
| Other infos : | It is highly recommended to have attended Thermodynamics ' Phase equilibrium course [LMAPR 1310] or similar |
| Faculty or entity in charge: | FYKI |

## Programmes / formations proposant cette unité d'enseignement (UE)

| Intitulé du programme | Sigle | Credits | Prerequis | Acquis d'apprentissage |
|---|---|---|---|---|
| Master [120] in Chemical and Materials Engineering | KIMA2M | 5 | - | |
| Master [120] in Biomedical Engineering | GBIO2M | 5 | - | |