820528 - OBA2 - Unit Operations II

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering
Academic year: 2017
Degree: BACHELOR’S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan

Teaching staff
Coordinator: Gibert Agullo, Oriol
Others: Gibert Agulló, Oriol
Estrany Coda, Francesc
Valderrama Ángel, César Alberto

Prior skills
Find relevant information in the field of chemical engineering and correct oral and written expression, interpret graphs and diagrams, knowledge of transmission of heat and physicochemical

Requirements
Fluid mechanics
Chemical Engineering
Thermodynamics and heat transfer
Physical chemistry

Degree competences to which the subject contributes

Specific:
1. Understand mass and energy balances, biotechnology, mass transfer, separation operations, chemical reaction engineering, the design of reactors, and the recovery and processing of raw materials and energy resources.

Transversal:
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.

Learning objectives of the subject
To Acquire the necessary theoretical knowledge for the calculation and design industrial plants both mass transfer and simultaneous transfer of heat and matter, such as distillation, rectification continuous and discontinuous, solids drying, gas absorption, liquid-liquid extraction, etc..

To acquire analytical skills and ability to use information sources to solve exercises and problems of all these processes
and facilities

<table>
<thead>
<tr>
<th>Study load</th>
<th>Total learning time: 150h</th>
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<tbody>
<tr>
<td>Hours large group:</td>
<td>60h</td>
</tr>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
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<tr>
<td>Hours small group:</td>
<td>0h</td>
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<tr>
<td>Guided activities:</td>
<td>0h</td>
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<tr>
<td>Self study:</td>
<td>90h</td>
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</tbody>
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### Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Learning time</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>1. Introduction to the operations with mass transfer</strong></td>
<td><strong>2h</strong></td>
<td><strong>Description:</strong> Introduction to the operations with mass transfer. Diffusion. Film and double-film theories. Mass transfer coefficient.</td>
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<tr>
<td><strong>3. Air-water interaction</strong></td>
<td><strong>4h</strong></td>
<td><strong>Description:</strong> Humidity, dew point, humid temperature and adiabatic saturation temperature, enthalpy of air-water systems. Psychrometric diagram. Humidification, cooling, etc.</td>
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<tr>
<td><strong>4. Cooling towers</strong></td>
<td><strong>4h</strong></td>
<td><strong>Description:</strong> Industrial cooling circuits: open, closed and half open. Differential characteristics between them. Cooling towers: problematic and their specific characteristics.</td>
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<tr>
<td><strong>5. Solids drying</strong></td>
<td><strong>6h</strong></td>
<td><strong>Description:</strong> Drying kinetics: critical humidity, precritical and postcritical periods. Drying rate. Humidity removal mechanisms in both mentioned periods. Drying time in each period and total duration of drying.</td>
</tr>
</tbody>
</table>
| 6. Absorption | Learning time: 8h  
Theory classes: 8h |
| Description:  

| 7. Liquid-liquid extraction | Learning time: 8h  
Theory classes: 8h |
| Description:  
Liquid-liquid extraction of binary mixtures in one stage of equilibrium and in various stages of equilibrium. Specific diagrams. Mass balance and design equations. |

| 8. Solid-liquid extraction | Learning time: 6h  
Theory classes: 6h |
| Description:  

| 9. Adsorption | Learning time: 8h  
Theory classes: 8h |
| Description:  
### Bibliography

#### Basic:


#### Complementary:


#### Others resources: