

## SYLLABUS

### 1. Course description

<b>Degree:</b>	<b>Biotechnology</b>
<b>Course:</b>	<b>Separation Operations</b>
<b>Module:</b>	<b>Bioengineering and Biotechnological Processes. Biotechnological Processes</b>
<b>Department:</b>	<b>Molecular Biology and Biochemical Engineering</b>
<b>Academic Year:</b>	<b>2017-18</b>
<b>Term:</b>	<b>First</b>
<b>ECTS credits:</b>	<b>4,5</b>
<b>Year:</b>	<b>3<sup>rd</sup> year</b>
<b>Type:</b>	<b>Compulsory</b>
<b>Language:</b>	<b>Spanish</b>

<b>Course Model:</b>	<b>B1</b>	
<b>a. Basic learning (EB):</b>		<b>60 %</b>
<b>b. Practical learning (EPD):</b>		<b>40 %</b>

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### 2. Lecturers

#### 2.1. Coordinator: Gassan Hodaifa Meri

2.2. Lecturers	
<b>Name:</b>	Gassan Hodaifa Meri
<b>School:</b>	School of Experimental Sciences
<b>Department:</b>	Molecular Biology and Biochemical Engineering
<b>Area:</b>	Chemical Engineering
<b>Office Hours:</b>	Mondays and Tuesdays: 12.00-15.00 (with previous arrangement)
<b>Office:</b>	22.2.19
<b>E-mail:</b>	mmunrui@upo.es
<b>Phone:</b>	954349387

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### 3. Topics

#### **Topic I: Fundamentals of transfer operations**

Unit 1. Transport phenomena in Biotechnology. Aspects for design and equipment operation. Separation operations.

Note: The content of this topic is not taught in class and it is available at the virtual classroom, so the students can read it.

#### **Topic II: Mass transfer and separation operations**

Unit 2. Distillation of binary mixtures: Liquid-vapor equilibrium, differential distillation and continuous or equilibrium distillation.

Unit 3. Rectification of binary mixtures: McCabe-Thiele Method and Lewis-Sorel Method.

Unit 4. Liquid-liquid extraction.

#### **Topic III: Separation operations by momentum transfer**

Unit 5. Centrifugation equipment and its application in biotechnology.

Unit 6. Filtration: Types of filtration, filtration media, equipment and application in biotechnology, separation by membranes.

Unit 7. Sedimentation: Sedimentation and clarification, sedimentation rate, kinetics of sedimentation, effectiveness of sedimentation.