COURSE GUIDE: 2017-18

COURSE DETAILS

Name:	Treatment of Toxics and Persistent Pollutants		
Code:	70982215	Plan:	Master in Industrial and Agrifood Biotechnology
Academic year:	2016-2017	Level:	Official University Master
Course:	1	Type:	Optional
Semester:	Second semester		

TIME DISTRIBUTION IN ACCORDANCE WITH REGULATION

ECTS:	3	In-class hours:	22,5
		Not in-class hours:	52,5
		Total time (in hours):	75
USE OF VIRTUAL PLATFORM:		Teaching support	

LECTURER DETAILS

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ACTIVITIES ORGANIZATION		
Planned activities for learning and workload distribution per activity (in hours)		
I. STUDENT'S ACTIVITIES (In-class / Online)	• Seminars [Example]	0,0
	• Teaching group [Example]	11,5
	• Work group / small group [Example]	11,0
	Total In-class/Online time:	22,5
II. STUDENT'S AUTONOMOUS ACTIVITIES (not in-class)	•	52,5
	Total not in-class time:	52,5
TOTAL WORKING HOURS		75

ELEMENTS OF INTEREST FOR COURSE LEARNING
Justification of contents
The water-energy-food triangle involves the three fundamentals elements on which the existence of our lives and civilizations depend. There is currently a clear consensus about the impact that overexploitation of natural resources is having on the planet's fragile ecosystem and we are rapidly approaching breaking point for its sustainability. As part of this, renewable energies and biotechnology in general, can and must play a relevant role in helping achieve sustainable development. This subject attempt to provide a general idea about these problems and subsequent solutions for the environmental difficulties related to the water.
Other courses related
Design and implementation of bioprocesses
Minimum knowledge required to deal with the Course
General knowledge of chemistry and biology

COMPETENCIES
General competencies
General objectives of the University of Almería • Ability to solve problems • Oral and written communication in their own language
Other general objectives • Understand and have knowledge • Specific skills developed

Specific competencies developed
CT2. Understanding the value and limits of the scientific method in R&D. CT4. Ability to work in multidisciplinary teams. CE 4 Modelling and simulate bioprocesses or part of them. CE 6 Analyze real bioprocesses (or portion thereof) and solve problems related to practical situations and bottlenecks in the process. CE 10 Mastering basic research methodologies in the context of the topic of the Master. CE 27 Planning research applied to solve specific problems, including the development of prototypes.
LEARNING OJECTIVES/OUTCOMES
Aware of the need for treatment of toxic substances and protection of natural resources. Know how to design processes for the treatment of effluents contaminated with persistent toxic. a) Get to know and use the basic concepts of persistent toxic treatment, with special emphasis on water pollution. b) Get to know and use design methods of Advanced Oxidation Processes (PPOA) and its application to the treatment of non-biodegradable industrial wastewater. c) Get to know and use design methods of biological treatment of water contaminated with persistent toxic. d) Get to know how develop integrated treatment processes (chemical and biological) of effluents contaminated with non-biodegradable, toxic and persistent compounds.

CONTENTS			
Module	Biological treatments		
Content	Biological treatments of toxic and persistent compounds.		
Learning system and methodology			
System	*Learning procedures and activities*	*Observations*	*Hours In-class/ Online*
Teaching group	Lecture, debate		4,0
Teaching group	Working groups exposure		1,0
Work group	Problem-based learning		2,0
Work group	Information search		2,0
Work group	Results evaluation		1,0
Work group	Making reports		2,0
Description of autonomous workload			
Search information, organize and present. Identify strengths and weaknesses of the studied technologies.			

Module	Photocatalytics treatments
Content	Photocatalytics treatments of toxic and persistent compounds

Learning system and methodology

System	*Learning procedures and activities*	*Observations*	*Hours In-class/ Online*
Teaching group	Lecture, debate		4,0
Teaching group	Working groups exposure		1,0
Teaching group	Evaluation session		1,5
Work group	Problem-based learning		2,0
Work group	Information search		2,0

Description of autonomous workload

Organizing the information obtained and to establish criteria for decision making

EVALUATION SYSTEM

Assessment criteria

To write reports and to show calculations in a clear, accurate and specific fashion. To write answer to the questions of the written exams and their calculations in a clear, accurate and specific fashion. To accurately identify the fundamentals and superfluous elements of either their own written report / oral presentation, or that of another. To do the assigned tasks in an appropriate and timely manner. To apply the theoretical knowledge of the subject in order to find a solution to the task at hand. To find the correct solution to the task at hand in a timely manner. Get to know and apply the treatment operations design methods. Get to know and apply the operational design methods based on Advanced Oxidation Processes (AOPs). Get to know and apply the operational design methods based on biological treatment.
Skills assessment:

- Presentation of work and activities (70%) Skills evaluated CT2, CT4, CE6 and CE27.
- Written tests (30%) Skills evaluated CE4, CE6, CE10 and CE27.

Marking system

	Activity	*(Number of hours)*	*Percentage*
I. STUDENT 'S ACTIVITIES (In-class/Online)	• Teaching group	11,5	15,3%
	• Work group/ small group	11	14,7%
II. STUDENT'S AUTONOMOUS ACTIVITIES (Autonomous work)	• Individual work [example]	52,5	70%

Assessment instruments
• Tests, exercises, problems. • Final assessment reports, papers, projects, etc.
Monitoring mechanisms
• Seminar attendance and participation • Sign up and access virtual classroom • Submit class tasks

BIBLIOGRAPHY
Recommended bibliography
• Depuración de aguas contaminadas con tóxicos persistentes mediante combinación de fotocatálisis solar y oxidación biológica *(Isabel Oller Alberola, José Antonio Sánchez Pérez, Sixto Malato Rodríguez)* • Eliminación de plaguicidas no biodegradables en aguas mediante acoplamiento de fotocatálisis solar y oxidación biológica *(María de la Menta Ballesteros Martín, José Antonio Sánchez Pérez, Sixto Malato Rodríguez)* • Combination of Advanced Oxidation Processes and biological treatments for wastewater decontamination-A review (Oller, I., Malato, S., Sánchez-Pérez, J.A.)
Bibliography existing in the library of the University of Almeria
http://almirez.ual.es/search/e?SEARCH=TRATAMIENTO DE CONTAMINANTES TOXICOS Y RECALCITRANTES

WEB ADRESSES
http://www.ciesol.es/