

Module: Residue management and valorisation						
Course: Logistics, sorting & recycling systems						
Educational profile: general						
ECTS points 2						
Education level: 5 EQF						
Prerequisites	Secondary education Knowledge of the basics of natural sciences					
Target group	A course dedicated to people who want to gain and deepen their knowledge of the residue management of polymer packaging in the context of the development of the circular economy					
CLASS LANGUAGE	ENGLISH					
LECTURER						
Number of hours of classes within individual forms of classes	Lectures	Classes	Workshops	Seminar	Project	Laboratories
	10	5	5			
COURSE OBJECTIVES	<p>C1. Acquiring knowledge in the residue management of polymer packaging in the context of a circular economy.</p> <p>C2. Acquiring knowledge in the logistic of plastic packing waste.</p> <p>C3. Acquiring an understanding of the activities in a sorting plant.</p> <p>C4. Acquiring knowledge about methods to improve sorting and recycling systems</p>					
Reference to learning outcomes	Description of learning outcomes				Verification of learning outcomes	
Knowledge						
C1	Theoretical basis of knowledge about residue management of polymer packaging.				Media follow-up	



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C2	Route optimisation for residue logistics	Media follow-up
C3	Activities in a sorting plant	Media follow-up
C4	Methods to improve sorting and recycling systems	Media follow-up
C1, C4	Current industry position on plastic production and recycling	Media follow-up
Skills		
C2	The student can prepare transportation routes	Role play
C2	The student can establish waste collection routes	Role play
C2	The student will be able of following recycling collection schedules	Role play
C3, C4	The student will acquire the operation knowing of a sorting plant, sort waste, and manage a waste treatment facility.	Role play
Responsibility and autonomy		
C1, C2, C3, C4	Networking and collaboration with different participants in the value chain.	Individual portfolio
C1, C2, C3, C4	Responsibility for the training in waste management of other members of the supply chain.	Individual portfolio
C1, C2, C3, C4	Responsibility on team working to redesign processes.	Individual portfolio
C1, C2, C3, C4	Responsibility on data collection and data analysis for decision making in collaboration with different departments	Individual portfolio
Students' own workload (in didactic hours 1h did.=45 minutes)**		
Participation in lectures	10	
Participation in classes	10	
Participation in workshops	5	
Preparation to classes	5	
Preparation to lectures	5	



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Preparation to an examination	5	
Project tasks	5	
Credit/examination	5	
others (indicate which)		
TOTAL:	50	
ECTS points:	2	
PREREQUISITES	Lectures	Seminars
COURSE CONTENT	<p>1- Introduction to polymer materials and polymer processing.</p> <ul style="list-style-type: none"> - Polymeric materials - Processing of plastics - Effects of processing on thermoplastics - Need of sorting plastics - Reprocessing of thermoplastic recyclates <p>2- Residue management.</p> <ul style="list-style-type: none"> - Municipal solid waste. Data analysis, prediction and optimization. - Plastics value and lifetime 	<p>1- Current industry position on plastic production and recycling</p> <p>2- Management methods for municipal solid waste</p>
LITERATURE (compulsory reading)	<p>Introduction to Plastics Recycling. Vanessa Goodship. Smithers Rapra Technology Limited. 2007</p> <p>Understanding Plastics Recycling. Natalie Rudolph, Raphael Kiesel, Chuanchom Aumnate. Hanser Publications.</p> <p>Polymers : The Environment and Sustainable Development. Adisa Azapagic. Wiley.</p>	
OPTIONAL LITERATURE (including at least two items)		

in English, either books or articles)	
SCHOLARLY PUBLICATIONS BY PERSONS WHO CONDUCT CLASSES, WHICH ARE RELATED TO THE MODULE SUBJECT	<p><u>Campus Iberus</u></p> <p>Cristina Nerín is Full Professor of Analytical Chemistry at the University of Zaragoza (Spain). Member of WG Recycling in EFSA from 2010 to 2018 and Director of Master in Environmental Engineering at the University of Zaragoza from 1990 to 2012. Research topics: Food contact materials, virgin and recycled, migration, NIAS and development of new materials.</p> <p>Robert Soliva-Fortuny is full professor in the area of Food Technology at University of Lleida. His research is driven by the development of high-quality, safe and healthy products by combining novel and conventional processing and packaging techniques. He has been working on edible and biodegradable films and their application to MAP systems.</p> <p>Alberto Navajas is Assistant Professor at the Public University of Navarre (Spain) and member of the research unit Chemical Reactors and Processes for the Valorization of Renewable Resources. Research topics: Photocatalyst, and Ecodesign by life cycle assessment. Teaching experience: Chemistry, Polymeric Materials, and Ecodesign.</p> <p>Elena Canellas is Senior Doctor at the University of Zaragoza, Spain. Degree in Biochemistry, Master in Environmental Engineering and PhD- Doctor in Analytical Chemistry at the University of Zaragoza. She obtained an Inncorpora-Torres Quevedo official grant for doing the postdoc in the company Samtack SL (Barcelona). Research topics: migration study of toxic or carcinogenic non intentionally added substances (NIAS) from food packaging to food focusing on all types of packaging including bioplastics and recyclable plastics, development of active packaging to prevent food spoilage.</p> <p><u>Ecoembes</u></p>



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	<p>Daniel Menchaca is Telecom Engineer (Universidad de Zaragoza) with a master degree in Project Management with more than 19 years of experience leading with digital, smart cities and sustainability projects. Now, working in the field of smart waste management with a strong committed to the environment and the Circular Economy as part of Ecoembes' The Circular Lab.</p> <p>David Cenicerros is a BA graduate, master on Teaching in Economics. Specialized on Circular Economy and Design Methodologies for innovation, currently embarked on an entrepreneurial project called Sustained focused on developing open innovation strategies with companies for boosting their transition to a circular model.</p>
TEACHING METHODS	<p>Lecture Team work Practical tasks Case study Working with text Error identification Peer Review</p>
TEACHING AIDS	<p>Presentations Role play script Media Contents</p>
FORM AND CONDITIONS OF ASSESSMENT	<p>No exam, media follow up assessed by teacher, peer and teacher evaluation of participation role play, portfolio assessed by teacher, self-assessment as a part of portfolio All these have to be completed to pass the course.</p>