UNIVERSIDAD PONTIFICIA ICAI ICADE COMILLAS MADRID

COURSE GUIDE 2026-27

COURSE GUIDE

Course data	
Name	Circular economy and eco-industry
Code	DOI-OPT-439
Degree	Grado en Ingeniería en Tecnologías Industriales (GITI), Grado en Ingeniería en Tecnologías de Telecomunicación (GITT)
Year	4
Semester	2º
ECTS Credits	3 ECTS
Type	Free choice
Department	Organización Industrial / Industrial Organization
Area	Economics and Business Administration
Coordinator	José Carlos Romero

Teachers' information	
Professor	
Name	Katia Hueso Kortekaas
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Tutoring hours	By appointment (e-mail)

SPECIFIC INFORMATION OF THE COURSE

Course context

Contribution to the professional profile of the degree

This course introduces the student to the basic concepts of the circular economy, and provides an opportunity for hands-on learning on these topics.

Classes will combine theoretical content and hands-on team work on a project. The team project will indeed be the cornerstone of the course: students will work on innovative solutions for the circular economy taking into account technical consideration and business model design.

During the course students will learn how to apply the principles of the circular economy to real cases and develop skills such as creativity, systems thinking and teamwork.

Pre-requirements

There are no particular prerequisites to take this course

CONTENTS

Topics

1. The case for the circular economy: exploring global socio-environmental pressures & their connection to the linearity of our production-consumption system
2. The origins and fundamentals of the circular economy
3. A framework to understand the circular economy
4. Circular strategies, and business models with real examples
5. Life cycles regulatory trends and material /energy cycles in the biosphere
6. Biomimicry -nature as an inspiration for solutions
7. Circular life cycle assessment
8. Eco-design
9. A critical view on circular economy

Project work

The contents of the course will be explored at a practical level in class, working progressively in teams to develop a business model that can contribute to the circular economy. Hands-on learning, and learning from project-related discussions and interactions, thus becomes an essential part of the course. The project also gives the students the opportunity to engage with methodologies such as design thinking and develop soft skills related to problem solving, creativity, system thinking and team work.

Competences – Learning results

Competences

Basic competences

CG3.	Knowledge of basic and technological subjects, which enables students to learn new methods and theories, and gives them versatility to adapt to new environments.
CG4.	Ability to solve problems with initiative, decision, creativity, and critical reasoning; and to communicate and transfer knowledge, abilities and skills, understanding the ethical and professional responsibility.
CG7.	Ability to analyze and assess the social and environmental impact of technical solutions.
CG9.	Management and planning ability in business environments, or in other institutions or organizations.
CG10.	Ability to work in a multilingual, multidisciplinary environment.
CFB6.	Appropriate knowledge of the concept of the firm, its institutional and legal setting. Business management.

Specific competences	
CRI9.	Basic knowledge on production and manufacturing systems
CRI10.	Basic knowledge and application of environmental and sustainability technologies
CRI11.	Business management applied knowledge

Learning results

At the end of the course the student must have achieved the following outcomes:

RA1. Understand the context, the challenges and the opportunities of the circular economy

RA2. Get insights and inspiration from real examples of the circular economy

RA3. Propose a business model for the circular economy considering technical, economic, social and environmental aspects

RA4. Apply tools for business model design

RA5. Engage in collaborative dynamics for team work

TEACHING METHODOLOGY

In class activities

1. **Theoretical content**: the instructor will introduce some background and relevant frameworks to understand key contents.
2. **Real cases**: key concepts will be illustrated using real-life examples and case studies, which can will also become a source of inspiration for students' projects.
3. **Tools & techniques**: the instructor will introduce some key tools and techniques from design thinking and entrepreneurship that can be useful for developing the projects: brainstorming, idea selection, business model design, etc.
4. **Hands-on learning**: we will have some guided dynamics in class to encourage students' participation and engagement, and time for team work on the projects applying the tools and techniques explained in class.

Activities beyond the classroom

5. **Individual research**: students will be encouraged to do research on their own, both to deepen the understanding of the concepts and methods discussed in class and to discover new resources, related concepts and inspiration for their projects.
6. **Team project**: students will have to work on their projects out of classroom. Team project is the cornerstone of this course: it is here where students should demonstrate their understanding of concepts and their ability to propose innovative solutions, in a process of co-creation and co-learning. The instructor will guide this process and be available for addressing the questions of students.

ACTIVITIES AND ASSESSMENT CRITERIA

Assessment activities	Assessment criteria	WEIGHT
Active participation in class	- Questions and comments in class, and active engagement in the proposed activities - Activities' outcomes	10%
Assignments	- Meeting the assignment - Original and critical analysis - Evolution of ideas	15%
Final project	- Degree to which students apply what they have learned to the analysis of a real situation - Degree of innovation of the proposed solution - Ability to present and communicate the solution	35%
Final test	- Understanding of the key concepts explained in class	40%

Assessment criteria
Grading will be based on: • [10%] Active participation in class • [15%] Assignments • [35%] Final Project • [40%] Final test The following conditions apply to pass the course: A minimum overall grade of at least 5 over 10 (being 0 lowest and 10 highest) **Extraordinary session:** • [50%] Retake exam • [50%] Revised versión of the Project The use of Artificial Intelligence is permitted exclusively for the completion of the PROJECT. Therefore, Level 2 of the Evaluation Scale by Perkins et al. (2024) establishes: 'AI may be used for pre-task activities such as brainstorming, outlining, and initial research. This level focuses on using AI for planning, synthesis, and idea generation, but assessments should emphasise the ability to develop and refine these ideas independently.' That is, the student

may use AI for planning, developing ideas, and conducting research, but both the Report and the Final Presentation must demonstrate how these ideas have been developed and refined.

WORK PLAN AND SCHEDULE

SUMMARY OF THE STUDENT'S EXPECTED WORK HOURS			
IN CLASS HOURS			
Lectures	**Practical work**		
10	20		
NON-CLASSROOM HOURS			
Individual research / work	**Team work / project**		
20	40		
		ECTS CREDITS:	**3 (90 hours)**

BIBLIOGRAPHY AND RESOURCES

Basic references

Books, articles and videos

Braungart, M. & McDonough, W. (2010). *Cradle to cradle: Remaking the way we make things*. Vintage Books, London.

Benyus, J. M. (1997). *Biomimicry: Innovation inspired by nature*. Harper Collins, New York

Ellen MacArthur Foundation (2013).*Towards The Circular Economy Vol. 1: An Economic And Business Rationale For An Accelerated Transition*.
[Available from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf]

Hawken, P. (1993). The ecology of commerce: a declaration of sustainability

Hawken, P., Lovins, A. B., & Lovins, L. H. (2013). Natural capitalism: The next industrial revolution. Routledge.

Koppius, O., Ö.r Özdemir-Akyildirim, and E. van der Laan (2014), *Business Value from Closed-Loop Supply Chains*. Int. J Sup. Chain. Mgt, vol. 3, nr. 4, p 107-120.
[Available from http://ojs.excelingtech.co.uk/index.php/IJSCM/article/view/1006]

Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular economy: the concept and its limitations. *Ecological economics*, 143, 37-46. [Available from: https://www.researchgate.net/profile/Jouni_Korhonen2/publication/318385030_Circular_Economy_The_Concept_and_its_Limitations/links/5a53e343a6fdccf3e2e28b99/Circular-Economy-The-Concept-and-its-Limitations.pdf]

Stahel, W. R. (2016). *The circular economy*. Nature, vol. 531, nr. 7595, comment.
[Available from http://www.nature.com/news/the-circular-economy-1.19594]

Stahel, W. R. (2019). *The circular economy. A user's guide*. Routledge, New York

Morlet, A., Opsomer, R., Herrmann, S., Balmond, L., Gillet, C., & Fuchs, L. (2017). A new

textiles economy: redesigning fashion's future. *Ellen MacArthur Foundation*.

SwitchMed (2014) *Create your Green Business! The Handbook for Green Entrepreneurs in the Mediterranean*
[Available from https://www.switchmed.eu/en/corners/start-up/training-materials]

Additional references

Online resources

Ellen MacArthur Foundation: https://www.ellenmacarthurfoundation.org/

Circular Design Guide: https://www.circulardesignguide.com/

Ask Nature: https://asknature.org/

Documentaries:

- Closing the loop: http://www.closingtheloopfilm.com/
- The Lightbulb Conspiracy - Planned Obsolescence: https://www.youtube.com/watch?v=zdh7_PA8GZU
- System reset: https://www.ellenmacarthurfoundation.org/news/system-reset-video