

CIRCULAR ECONOMY IN AGRICULTURE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
ACADEMIC UNIT	CROP SCIENCE		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	CRS_903	SEMESTER OF STUDIES	9 th
COURSE TITLE	Circular Economy in Agriculture		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
	Lectures	3	
	Tutorials	1	
	Total	4	5
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Specialized general knowledge		
PREREQUISITE COURSES:	Typically, there are no prerequisite courses		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
COURSE WEBPAGE (URL)			

2. LEARNING OUTCOMES

<p>Learning outcomes</p> <ul style="list-style-type: none"> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes
<p>Circular economy is a model of production and consumption, which aims to increase productivity of existing materials as long as possible, minimizing simultaneously use of natural resources. That is in full contrast with the linear economic model due to the fact that the chain "production, consumption-disposal" does not include re-use stage. Against common belief, circular economy does not consist a new way of waste recycling. It is a totally different approach, a radical change of thought and behavior. Transition towards circular economy is a systemic change. Circular economy fulfils the need for corrective adjustments on principles of sustainable growth as they stand until now days, where focus is given to ecological performance, minimization of environmental damage and set of a robust framework for long term sustainable goals is currently avoided. Circular economy provides solutions in non-sustainable processes offering zero negative impact and/or environmental damage.</p> <p>By the end of this course the student will have developed the following skills:</p> <ul style="list-style-type: none"> • Full understanding of circular economy principles and implementation strategies. • Be able to apply solutions on technical problems having in mind that the environment is not limitless in resources and pollution waste recipient.

- Be able to provide solutions preventing waste production, and offer novel reusing material processes.
- Be capable to exploit eco-innovated technical solutions to convert wastes into secondary resources
- Be able to evaluate and balance the efficiency and reliability of social, economic and environmental aims in a short- middle- and long- time planning for societal good and wellbeing.
- Be informed for legal and institutional framework related to circular economy policies in Greece and European Union. Attention is provided for comparative differences in circular economy policies among front line industrial countries (US, China) and European Union.

General Competences	
<i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i>	
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>
<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>
<i>Decision-making</i>	<i>Respect for the natural environment</i>
<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Team work</i>	<i>Criticism and self-criticism</i>
<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment</i>	<i>.....</i>
<i>Production of new research ideas</i>	<i>Others...</i>
	<i>.....</i>

- Simulative adaptations
- Training on interdisciplinary projects
- New ideas promotion.
- Respect in cultural differences and multiculturality
- Respect in natural environment
- Self and interpersonal criticism
- Promotion of free, creative and inductive thinking

3. SYLLABUS

1. Introduction - Definitions.
2. Origin of circular economy.
3. Principles and applications of circular economy at the global context.
4. Circular economy: A new model for entrepreneurial growth
5. Sustainability in linear and circular economy.
6. Transition towards circular economy.
7. Circular economy at small scale
8. Circular economy and consumption. Consumer's liability and Green Public Procurement.
9. Circular economy and waste management. Resource recovery and minimization of negative environmental impact.
10. Middle scale circular economy.
11. Large scale circular economy.
12. Collaborative consumption models.
13. Disconnection of economic growth from environmental impact.

4. TEACHING AND LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Lectures, and tutorials, face to face.
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<p>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	<p>Use of Information and Communication Technologies (ICTs) in teaching. Scenarios <i>in silico</i> and evaluation of circular economic in agriculture data will be integrated in the course. Exemplary solutions will be provided.</p>													
<p>TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of nondirected study according to the principles of the ECTS</i></p>	<table border="1"> <thead> <tr> <th>Activity</th> <th>Semester workload</th> </tr> </thead> <tbody> <tr> <td>Lectures (3 conduct hours per week x 13 weeks)</td> <td>39</td> </tr> <tr> <td>Tutorials (1 conduct hour per week x 13 weeks)</td> <td>13</td> </tr> <tr> <td>Individual and group reports</td> <td>10</td> </tr> <tr> <td>Hours for private study of the student, preparation and attendance mid-term or/and final examinations.</td> <td>63</td> </tr> <tr> <td>Total number of hours for the Course (25 hours of work-load per ECTS credit)</td> <td>125 hours (total student work-load)</td> </tr> </tbody> </table>	Activity	Semester workload	Lectures (3 conduct hours per week x 13 weeks)	39	Tutorials (1 conduct hour per week x 13 weeks)	13	Individual and group reports	10	Hours for private study of the student, preparation and attendance mid-term or/and final examinations.	63	Total number of hours for the Course (25 hours of work-load per ECTS credit)	125 hours (total student work-load)	
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<p>STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Strong participation in the course is required.</p> <p>Projects need deep learning approach and student's critical thought (30% of the final mark).</p> <p>Final written examination is mandatory. Examination will be based on full length questions and / or multiple-choice questions (70% of the final mark).</p> <p>Minimum pass mark: 5 (full scale: 0-10)</p> <p>The above-mentioned process will be taking place in Greek and for foreign students (eg ERASMUS students) in English.</p>													

5. ATTACHED BIBLIOGRAPHY

<p><i>Proposed literature (indicative and not restrictive):</i></p> <ol style="list-style-type: none"> <li>1. Ευρωπαϊκή Επιτροπή, Γενική Διεύθυνση Περιβάλλοντος, 2016. "Πράσινη ανάπτυξη" – Υιοθετώντας τις αρχές της κυκλικής οικονομίας. Εκδόσεις Ευρωπαϊκής Ένωσης. <li>2. Το κλείσιμο του κύκλου – Ένα σχέδιο δράσης της ΕΕ για την κυκλική οικονομία. Βρυξέλλες, 2.12.2015 COM(2015) 614 final. <li>3. Το κλείσιμο του κύκλου – Ένα σχέδιο δράσης της ΕΕ για την κυκλική οικονομία. Βρυξέλλες, 2.12.2015 COM(2015) 614 final, ANNEX 1. <li>4. Δέσμη μέτρων για την κυκλική οικονομία. Βρυξέλλες, 17.3.2016, COM(2016) 157 final, 2016/0084 (COD).

5. Επόμενα βήματα για ένα βιώσιμο ευρωπαϊκό μέλλον Ευρωπαϊκή δράση για την αειφορία, Στρασβούργο, 22.11.2016, COM(2016) 739 final.
6. ACHIEVING 'GROWTH WITHIN', Ellen MacArthur Foundation.
7. Kirchherr J, Reike D, Hekkert M. 2017a. Conceptualizing the circular economy: an analysis of 114 definitions. *Resour Conserv Recycl.* 127:221–232.
8. Lieder M, Rashid A. 2016. Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *J Cleaner Prod.* 115:36–51