# COURSE OUTLINE

## (1) GENERAL

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|---|---|---|---|
| **SCHOOL** | SCHOOL OF SCIENCES | | |
| **DEPARTMENT** | DEPARTMENT OF CHEMISTRY | | |
| **LEVEL OF STUDIES** | ISCED level 6 – Bachelor's or equivalent level | | |
| **COURSE CODE** | EN22 | **SEMESTER** | 8th Semester |
| **COURSE TITLE** | Circular Economy | | |

| **TEACHING ACTIVITIES** *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.* | **TEACHING HOURS PER WEEK** | **ECTS CREDITS** |
|---|---|---|
| | 3 | 3 |
| | | |
| | | |
| *Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.* | | |

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|---|---|
| **COURSE TYPE** *Background, General Knowledge, Scientific Area, Skill Development* | Background |
| **PREREQUISITES:** | NO |
| **TEACHING & EXAMINATION LANGUAGE:** | Greek |
| **COURSE OFFERED TO ERASMUS STUDENTS:** | NO |
| **COURSE URL:** | https://eclass2.emt.duth.gr/courses/CHEM-N1102/ |

## (2) LEARNING OUTCOMES

**Learning Outcomes**
*Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.*

Upon completion of the Circular Economy course, students will have acquired the following knowledge and skills:
• understand the principles of the circular economy
• recognize the differences between a linear and a circular economic system as well as the dimensions of the bioeconomy
• recognize the basic dimensions of a system and map the flows of materials and energy
• apply the Life Cycle Analysis methodology
• draw basic conclusions and evaluate the application of circular economy practices in businesses and processes

**General Skills**
*Name the desirable general skills upon successful completion of the module*

*Search, analysis and synthesis of data and information,*
*ICT Use*
*Adaptation to new situations*
*Decision making*
*Autonomous work*
*Teamwork*
*Working in an international environment*
*Working in an interdisciplinary environment*
*Production of new research ideas*
*Project design and management*
*Equity and Inclusion*
*Respect for the natural environment*
*Sustainability*
*Demonstration of social, professional and moral responsibility and sensitivity to gender issues*
*Critical thinking*
*Promoting free, creative and inductive reasoning*

• Searching, analyzing, and presenting data and information
• Decision making

- Adapting to new situations
- Project planning and management
- Working independently
- Teamwork
- Respect for the natural environment

## (3) COURSE CONTENT

1. Introduction to the circular economy
• Circular economy, bioeconomy.
• The European strategy for the circular economy and the Green Deal
• Reference to SDGs and their relationship to the circular economy
2. From the linear model to the circular economy
3. Material Flow Analysis
• Understanding the flow of materials and energy within the economy.
• Methodology & examples
4. Systemic approach
• Biomass production - Agriculture, forests, and food
• Plastics
• Energy
5. Life Cycle Assessment
• Methodology & examples
6. Organization & Circular Economy Systems.
• Sustainable circular economy: education, innovation, entrepreneurship.
• Contribution of Bioeconomy Sectors to the Greek Economy and Employment.
7. Systems for the treatment and utilization of liquid agro-industrial waste Management and utilization of plastic waste: The case of the coastline.
8. Conventional vehicles as an example of the circular economy in practice.
9. Cities, Citizens, Policy for the Circular Economy. Challenges of the transition to circularity. Circular economy & local government. "Circular economy in smart cities."
10. European good practices
• Good practices - Bulgaria – Italy – Denmark – Finland - Wales - London “London’s Circular Economy Route Map” .
• Comparative analysis of European municipal initiatives
11. Circular economy monitoring framework
• Indicators for measuring the implementation of the circular economy.
• The circular economy in the EU and Greece.
• The implementation of the circular economy in Greece as an opportunity
• for sustainable development.
• Examples of Greek cities turning to the circular economy
• Network of Cities for Sustainable Development and the Circular Economy.

## (4) LEARNING & TEACHING METHODS - EVALUATION

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|---|---|
| **TEACHING METHOD**<br>*Face to face, Distance learning, etc.* | Face to face |
| **USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)**<br>*Use of ICT in Teaching, in Laboratory Education, in Communication with students* | Use of ICT in Teaching<br>Use of ICT in Communication with students |

**TEACHING ORGANIZATION**

*The ways and methods of teaching are described in detail.*
*Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.*

*The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*

| Activity | Workload/semester |
|---|---|
| Lectures | 35 |
| Bibliographic research & analysis | 20 |
| Project | 45 |
| Total | 100 |

**STUDENT EVALUATION**

*Description of the evaluation process*

*Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others*

*Please indicate all relevant information about the course assessment and how students are informed*

Description of the assessment process

Final exam during the exam periods.

Assessment methods:
- Written exam with short-answer questions (formative, summative),
- Written exam with extended response questions (formative, summative),
- Written assignment (formative, summative),
- Public presentation (formative, summative)

## (5) SUGGESTED BIBLIOGRAPHY

1. Πράσινη ανάπτυξη, Υιοθετώντας τις αρχές της κυκλικής οικονομίας, ISBN 978-92-79-59258-4 Εκδόσεις Ευρωπαϊκής Ένωσης, 2016.
2. Βιομηχανική Οικολογία, T.E. Graedel, B.R. Allenby, ISBN : 978-960-461-202-4, Εκδόσεις Κλειδάριθμος, 2009