

69751 - Material cycles

Syllabus Information

Academic year: 2023/24

Subject: 69751 - Material cycles

Faculty / School: 100 - Facultad de Ciencias

Degree: 627 - Master's Degree in Circular Economy

ECTS: 6.0

Year: 01

Semester: First semester

Subject type: Compulsory

Module:

1. General information

The *Materials Cycles* subject is designed to learn the main characteristics of the natural and technical cycles of the elements and water. The subject is taught at the University of Zaragoza. Regular use of the teaching platform and daily study of the concepts presented is recommended, with special emphasis on the solving of practical activities. It is also quite important to make use of personalized tutoring.

It is aligned with Sustainable Development Goal (SDG) No. 12 (Responsible Production and Consumption) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of its learning results provides training and competence to contribute to some extent to the achievement of the Goal.

2. Learning results

- To know the main characteristics of the natural and technical cycles of the elements and water.

3. Syllabus

Topic 1. Biogeochemical (natural) and anthropogenic (technical) cycles.

Topic 2. Atmosphere.

Topic 3. Water cycle.

Topic 4. Cycle of the elements.

Topic 5. Persistent Organic Pollutants (POPs): destruction, remediation

Topic 6. Biophysical limits of the planet: geographical distribution, resource availability and evolution.

Topic 7. Analysis of *stocks* and flows of raw materials in the technosphere.

Topic 8. Hubbert's Peak.

Topic 9. Criticality of raw materials.

Topic 10. Metal recycling: secondary raw materials, quality standards, *downcycling*, *upcycling*.

4. Academic activities

4. Academic Activities

Master classes: 16hours

Sessions of 50 minutes each for the entire group. Teachers explain the theoretical contents and solve representative applied problems. The teaching materials are available on the Moodle teaching platform. Regular attendance is recommended.

Problem solving and case studies: 44 hours of student work, including 8 face-to-face hours.

Students must prepare two reports.

Study: 84 hours

Students must study theory, read supplementary readings and prepare for the final test.

Assessment tests: 6 hours.

Students take a final short answer, long answer and/or open-ended questions test

5. Assessment system

The subject is assessed using two evaluation methods: continuous and global. For this purpose, the grades obtained in the following tests will be used:

- Two reports (rated I1 and I2). Each report consists of a report on a topic related to the subject or the critical analysis of a research or popularisation article. The reports are sent to the teacher electronically.
- Final short answer, long answer and/or open-ended question test (graded F). The test is held simultaneously in each university under conditions that guarantee the proper identification of students and the impossibility of fraud.

The grades obtained by each student in the above assessment activities are weighted according to the following formulas:

Formula 1:

Final grade of the subject: $0.15 \times I1 + 0.15 \times I2 + 0.7 \times F$

Formula 2:

Final grade for the course: F

For the application of formula 1 it is necessary to obtain at least a 4 in the assessment test. The final grade is calculated as the best grade obtained between those obtained with formulas 1 and 2.