



Packaging, recycling and environmental protection, university graduate study

-learning outcomes-

Reproduction Processes in the Packaging Industry

1. Compare printing techniques with the production of specific packaging
2. Recommend printing techniques for the production of required/defined packaging
3. Select the optimal machine for the production of defined packaging
4. Solve simple problems independently
5. Argue an opinion about the advantages of one reproduction technique over another
6. Choose multiple reproduction techniques with the aim of obtaining a conceptual graphic solution
7. Present and defend a position from a seminar paper for the course

Analyzing the Mechanical Properties of Packaging

1. Review and conduct mechanical tests on various types of packaging materials
2. Identify acquired skills for working in a packaging testing laboratory/industry
3. Compare types of packaging materials
4. Compare mechanical properties of packaging materials
5. Review decisions related to the procurement and application of packaging materials

Methodology of the Scientific Research Work

1. Evaluate, analyze and compare various data and information related to the field of study of packaging, recycling and environmental protection and evaluate them
2. Valorize the types and methods of scientific research work, basic methodological concepts and research paradigms and apply them during research activities and writing their papers in other courses of the ARZO study
3. Predict a research design, select research methods, conduct research, apply research methods and write a seminar paper using all of the above
4. Valorize professional papers and use the content and knowledge from them when designing and conducting their own research activities
5. Valorize the acquired competencies when writing seminar papers in other courses of the study of Packaging, Recycling and Environmental Protection and independently design and conduct simpler scientific research

Environmental Chemistry

1. Examine the interaction of environmental components and the cycle of processes in the biosphere
2. Compare organic and inorganic pollutants of water, air and soil
3. Compare and explain the decomposition of organic and inorganic compounds in the biosphere by chemical and photochemical reactions and biodegradation
4. Compare the interaction of packaging materials with natural components of the environment
5. Evaluate the approach to chemical analysis of environmental samples (water, soil, air) and choose an appropriate method of analysis (classical or instrumental)
6. Evaluate and analyze data related to the project task in a team, present them in written and oral form in front of an audience and discuss



Microbiological Control of Packaging

1. To establish basic knowledge of microbiology and the role of microorganisms in human life and nature
2. To establish the role of microbes in packaging damage
3. To evaluate the causes of microbial contamination of packaging materials
4. To review methods for microbiological control of packaging
5. To evaluate the results of microbiological analyses
6. To present and defend a position paper in the field of microbiology of packaging materials

Environmental Protection

1. Evaluate what ecology is and what environmental protection is.
2. Evaluate environmental components (soil, water, air...) and recognize their protection measures
3. Evaluate methods of water and air purification
4. Self-assess when and why the environmental and/or nature impact assessment procedure and environmental permit are carried out
5. Evaluate types of landfills and describe types of waste and methods of waste management
6. Compare the basics of climate protection and the ozone layer

Ecotoxicology

1. Valorize acquired knowledge in the field of ecotoxicology for the development of new packaging materials
2. Compare the basics of indirect and direct effects of harmful substances on the ecosystem, and their interrelationships (acute, chronic effects, toxicity tests)
3. Self-assess changes caused by environmental pollution. Apply appropriate methods in the field and in the laboratory.
4. Valorize the basic types and specificity of requirements of biological indicators of pollution, and knowledge of the concept and basic types of programs for monitoring the biological state of the environment (biomonitoring).
5. Present and argue the acquired competencies in writing seminar papers, in communicating with professionals and in designing new scientific research
6. Self-assess the competencies for conducting studies and assessing the impact of harmful substances on the ecosystem

Development of Complex System Models in Environmental Protection

1. Identify concepts from systems theory
2. Evaluate the basics of complex systems in environmental protection
3. Compare the basic types of conceptual models and their development
4. Predict the parameterization of the use of statistical data processing and methods of data collection
5. Recommend a model of a complex system
6. Evaluate an experimental model

Packaging Marketing

1. Recommend, analyze and compare various data and information related to the field of study of packaging marketing and evaluate them
2. Evaluate basic marketing concepts and paradigms of packaging marketing management,
3. Evaluate basic methodological concepts and research paradigms and apply them when conducting marketing research activities and writing marketing plans and projects
4. Evaluate marketing research drafts, select research methods, conduct desk and field research, apply research methods and write a seminar paper using all of the above
5. Evaluate professional papers and use the content and knowledge from them when designing and conducting their own research activities



6. Self-assess acquired competencies when writing seminar papers in other courses of study of Packaging, Recycling and Environmental Protection

Environmental and Packaging Engineering

1. Compare the principles of conservation of mass and energy in physical, chemical and biochemical processes
2. Determine the process space, system boundaries and input and output quantities of the process
3. Evaluate waste streams from the packaging production, disposal and recovery process
4. Evaluate packaging waste according to different criteria
5. Recommend appropriate unit operations for the purpose of processing different waste streams
6. Recommend available packaging waste recycling technologies