



**Code:           ING-IND/25**

**Credits: 9**

**Matter: SAFETY AND ECOLOGY OF PRODUCTION SYSTEMS**

**Main language of instruction: Italian**

**Other language of instruction: English**

## **Teaching Staff**

### **Head instructor**

**Prof. Marianna GALLO- marianna.gallo@unicusano.it**

### **Introduction**

#### *1. Objective of the course:*

The course of SAFETY AND ECOLOGY OF PRODUCTION SYSTEMS aims to provide the general criteria for the choice and sizing of the most common plants widespread in production systems, from a technical-managerial point of view, through the indication of the rules and regulations in force.

Provide the basic notions of safety, general criteria and quantitative methods for the design and management for the safety of the industrial system.

Provide procedures for linking environmental aspects with economic and social aspects.

The Ectivity associated with the course develop the skills necessary to formulate industrial safety problems through the use of computing systems.

### **Objectives**

#### *2. Course Structure:*

The SAFETY AND ECOLOGY OF PRODUCTION SYSTEMS course has the following educational objectives:

- Acquire the main knowledge relating to the technical design and management of the most widespread production systems.
- Acquire the main knowledge related to safety management within manufacturing or process.
- Know the basic standards and regulations in force in the field of industrial plant safety.
- Provide the tools for an environmental policy aimed at sustainable development; the goal is to achieve a better understanding of how to integrate environmental needs with economic activities.



## **Competencies:**

### **A. Knowledge and understanding**

At the end of the course, the student will have demonstrated knowledge of the technical and managerial design topics of the most used industrial plants.

The student will acquire the basic knowledge of industrial safety and the rules and regulations in force in the field of industrial plant safety and sustainable development.

Furthermore, through the Etivity, students will acquire the ability to apply theoretical concepts in practice with particular reference to plant design, quality management and safety of industrial plants.

### **B. Applying knowledge and understanding**

The student will be able to use the knowledge of the fundamental principles of technical design, quality management and safety within industrial realities.

The Etivity provide for the application of theoretical knowledge to practical problems to be solved.

### **C. Making judgements**

The student will be able to identify the most appropriate models to describe the unit operations of an industrial process, to interpret the plant specifications, and to manage the quality control, certification of the same, management of safety at work and of effect on the environment in relation to the application context.

The student must be able to use the acquired knowledge to analyze and process numerical data.

### **D. Communication skills**

The student will be able to describe and hold conversations on typical problems of industrial safety and ecology, correctly identifying the relevant physical quantities, and using adequate terminology.

### **E. Learning skills**

At the end of the course, the student will have knowledge of the fundamental notions necessary for the analysis of safety problems and industrial ecology. All this will allow him to continue his engineering studies with greater maturity and will provide him with the basis for quality management, maintenance and safety, through the autonomous consultation of specialized texts, scientific or popular magazines, even outside the topics strictly covered during the course.



## Syllabus

### 3. Programme of the course:

#### **Subject 1. PRINCIPLES OF TECHNICAL AND MANAGEMENT DESIGN**

- Introduction to the most used systems in the industrial sector
- The Exchangers
- The Concentrators
- Fluid mixers
- Extraction

#### **Subject 2. SAFETY IN PRODUCTION SYSTEMS**

- Introduction: Importance of Safety in Production Systems.
- Theoretical Foundations of the Safety of Industrial Plants
- Protection of Health and Safety of Industrial Plants
- The Regulation of Prevention in Italy: Law no.81/2008 and subsequent additions (Legislative Decree no.106 of 3/8/2009).

#### **Subject 3. SYSTEM SAFETY REGULATIONS**

- Industrial Activities Subject to Major Accident Risks (Legislative Decree 334/99 - "Seveso bis").
- International Standards for Safety and the Environment (ISO 14001, EMAS Regulation, BS 8800, OHSAS 18001, OHSAS 18002).
- Risk factors in Production Activities.

#### **Subject 4. ECOLOGY OF INDUSTRIAL PLANTS**

- The problems of Environmental Protection in the Logic of Sustainable Development
- Production Systems, Industrial Ecology and Circular Economy
- Life Cycle Analysis (LCA) of Products, Processes and Services
- Environmental and Sustainability Indicators
- Environmental Management Systems (EMAS, ISO14001)
- Environmental Protection and Innovation of Product and Process
- Product Policies (environmental labels, IPP, DfE, the fate of the products at the end of their "useful life")

### Evaluation system and criteria

The examination consists of a written test. This includes:

- 2 open-ended questions (10 marks each for a total of 20 out of 30 marks).
- 1 exercise question (1 marks each for a total of 10 out of 30 marks).

In addition, an e-tivity, consisting of discussion of process problems, are compulsory. These need to be sent to the instructor in advance of the examination. The e-tivity counts 3 marks.

## **Bibliography and resources**

### *4. Materials to consult:*

Notes written by the instructor are available in English. The notes cover the course contents and examination programme.

### *5. Recommended bibliography:*

Suggested readings are:

Roberto Rizzo, "La sicurezza degli Impianti industriali", Edizioni scientifiche italiane 1998

Manzini Riccardo Regattieri Alberto, "Manutenzione dei sistemi di produzione" Esculapio editore, 2007

D.T. Allen and D.R. Shonnard. Green Engineering. 2002, Prentice Hall: Upper Saddle River.

E.S. Rubin. Introduction to engineering & the environment. 2001, McGraw-Hill: New York.