SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeș-Bolyai University of Cluj-Napoca
1.2 Faculty	Environmental Science and Engineering
1.3 Department	Environmental Analysis and Assesment
1.4 Field of study	Environmental Engineering
1.5 Study cycle	Bachelor
1.6 Study program / Qualification	Environmental Engineer

2. Information regarding the discipline

2.1 Name of the discipline	Design and automation of technological installations						
2.2 Course coordinator			Assistant Prof., PhD Manciula Dorin				
2.3 Seminar coordinator			Assistant Prof., PhD Manciula Dorin				
2.4 Year of study	2	2.5 Semester	3	2.6. Type of assessment	E	2.7 Type of discipline	Compulsory

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 Seminar/laboratory Project	2
3.4 Total hours of the curriculum	56	Of which: 3.5 course	28	3.6 Seminar/Laboratory	28

Time allotment:	Hours
Learning using manual, course support, bibliography, course notes	20
Additional documentation (in libraries, on electronic platforms, field documentation)	20
Preparation for seminars/labs, homework, papers, portfolios and essays	20
Tutorship	6
Evaluations	2
Other activities: visits, workshops, and other academic activities	2

3.7 Total individual study hours	70
3.8 Total hours per semester	126
3.9 Number of credits	4

4. Prerequisites (if necessary)

4.1 Curriculum	• mathematics, unit operations, chemistry, risk assessment, computer-aided graphics.
4.2 Competencies	• basic notions of chemistry and engineering, information and documentation, teamwork, use of computer technologies for data acquisition and processing, computer-aided graphics.

5. Conditions (where applicable)

5.1 Course Conduct	• lecture room (50-60 seats), video projector and a computer / laptop.
5.2 For the seminar / lab activities	• lecture room (50-60 seats).

6. Specific competences accumulated

Professional competencies	• developing teamwork skills, relational thinking and finding concrete ways to approach and solve specific environmental problems at different levels of analysis (global, regional, local); • critical analysis, application of models, theories and the use of notions in the field of fundamental sciences and engineering to address the specific problems of environmental knowledge and protection; • explaining and interpreting properties, concepts, approaches, models and notions related to the fundamental and engineering sciences; • presentation of projects related to engineering fields; • recognition and description of elementary concepts, theories, methods and models relating to the basic sciences and engineering sciences.
Transversal competencies	• identifying and complying with the norms of ethics and professional deontology, assuming responsibilities for the decisions taken and the related risks; • identifying roles and responsibilities in a multidisciplinary team and applying techniques for relationships and effective work within the team; • efficient use of information sources and resources for communication and assisted professional training (Web portals, Internet, specialized software applications, databases, online courses, etc.) both in Romanian and in an international language; • description, analysis and use of concepts and theories in the fundamental scientific fields (mathematics, physics, chemistry) and in the field of engineering sciences; • description, analysis and use of concepts and theories in the economic-managerial field applied in the field of the environment.

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	• presentation and understanding of concepts related to machinery, processes and traditional industrial technologies, non-polluting technologies, technologies based on the use of primary energy, technological design, preparation of feasibility studies, environmental impact and effects and industrial automation; • the acquisition of the methods, techniques and procedures used in the technological and equipment design, the methodology of preparing the pre-feasibility and feasibility studies and the application of this knowledge in the design activity within the bachelor's thesis; • knowledge of the legislation and standards dedicated to the design procedure and the choice of materials for the construction of industrial appliances and machinery.
7.2 Specific objectives of the discipline	• familiarizing students with aspects regarding the development of technical skills in order to quantitatively assess environmental impacts;

	• development and implementation of concepts related to the design of industrial facilities.

8. Content

8.1 Course	Teaching methods	Observations
Course 1. Development of a technological process. Typical problems and situations encountered in the development of industrial processes.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 2. Organizational strategies for design activities. Types of licenses and know-how.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 3. Design studies. Methodologies and work tools used in the design activity. Marketing, pre-feasibility and feasibility studies.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 4. Technical project. Technological solution study, profile study and site study. Construction of the master plan.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 5. Technological design. Information analysis. Sources for providing design data. Operations diagram, technological diagram, process diagram and control diagram.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 6. CAD systems used in technology design.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 7. Equipment and machinery. Building materials. Material and energy balances.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 8. Pre-sizing. List of necessary equipment and machinery. Calculation algorithms for industrial plants and equipment.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 9. General notions about automated systems. Process control. Types of control. Security and technological risk.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 10. Installation design. Installation of machinery and pipes. Pipeline design systems.	Interactive lecture, problematization, learning	Attendance at the course is optional

	based on case studies and problems.	
Course 11. Assembly model. Elements of mechanical calculation.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 12. Construction of installations. Systems for securing connections and material flows. Construction of installations. Systems for securing connections and energy flows.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 13. Automation elements. Transducers, adapters, measuring devices, regulators, execution elements and process computers.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional
Course 14. Commissioning and operation of plants. Performance tests. Economic aspects.	Interactive lecture, problematization, learning based on case studies and problems.	Attendance at the course is optional

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- Marinoiu V. – Automatizarea proceselor petrochimice, Editura Didactică și Pedagogică, București 1979.

8.2 Seminar / laboratory	**Teaching methods**	**Observations**
P.1. Presentation of the subject of study, the design theme and the framework content of the project.	Interactive lecture, problematization, learning based on case studies	Attendance at activities is mandatory
P.2. Introduction to the topic. Defining and addressing the basic concepts related to traditional industrial processes, clean processes and technological design. Identification of sources of information and bibliography.		
P.3. Technological options. Classifications, advantages, disadvantages, ecological aspects. Detailed bibliographic study.	Interactive lecture, problematization, learning based on case studies	Attendance at activities is mandatory
P.4. Detailed description of the selected technological process. Choice of the technological variant and optimal working parameters. Operation scheme and installation scheme.		
P.5. Heat balance and material balance. Conservation relationships. Sankey diagram. Presentation and description of the technological scheme. Specific consumptions.	Interactive lecture, problematization, learning based on case studies	Attendance at activities is mandatory
P.6. Presentation of the principles of calculation and design. Choice of building materials. Standards.		
P.7. Identifying, choosing and pre-sizing the most important machines in the technological flow.		
P.8. Pre-feasibility study and feasibility study. The framework content of the feasibility study. General data, technical information, economic and financial information.	Interactive lecture, problematization, learning based on case studies	Attendance at activities is mandatory
P.9. Basic considerations regarding process optimization and automation.		

P.10. Identification of aspects related to risk analysis, catastrophes and hazards. Drawing up scenarios. The impact of technological processes on the environment.		
P.11. Technological dimensioning of the equipment. Obtaining the equilibrium curve and the operating line of the process. Actual material balance. Determination of the molar flow rates of the gas mixture and the liquid mixture. Total material balance.	Interactive lecture, problematization, learning based on case studies	Attendance at activities is mandatory
P.12. Technological dimensioning of the equipment. Hydrodynamic factors. Dimensioning of the key machinery in the technological process. The materials used for the filling. Calculation of the diameter of the key equipment.	Interactive lecture, problematization, learning based on case studies	Attendance at activities is mandatory
P.13. Technological dimensioning of the equipment. Dimensioning of the key machinery in the technological process. Calculation of the height of the filling material. Determination of potential difference. Calculation of the height of the key machinery. Execution of drawn parts. Annexes.	Interactive lecture, problematization, learning based on case studies	Attendance at activities is mandatory
P.14. Execution of drawn parts. Sketches and designs obtained through computer-aided graphics. Annexes.		

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9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The works carried out within the project include examples, studies and calculation exercises in order to familiarize students with the methodology of designing machinery in different industries, along with a series of qualitative and quantitative evaluations of various types of construction materials and substances, as well as the effects they can have on the environment.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Theoretical knowledge acquired	Oral exam	40 %
10.5 Seminar/lab activities	13 laboratory / project sessions for the study of the topic, calculation and design of the installation and the key equipment 1 seminar	Grading of each design step carried out individually	
	Presentation and support of the project	Presentation of the full material in its final form	60 %
10.6 Minimum performance standard			
• participation in at least 80 % of the practical work during the project (11 practical works out of 13) and presentation at the end of the results for each stage of work.			

Date	Signature of the course coordinator	Signature of the seminar coordinator
04.12.2024		

Date of approval	Signature of the head of department
.....	.....