



No. _____ of _____

USAMV form 0102010107

SUBJECT OUTLINE**1. Information on the programme**

1.1. Higher education institution	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca
1.2. Faculty	Agriculture
1.3. Department	Environmental and Plant protection
1.4. Field of study	Environmental Engineering
1.5. Cycle of study ¹	Bachelor
1.6. Specialization/ Study programme	Environmental Engineering
1.7. Form of education	Full time

2. Information on the discipline

2.1. Discipline name	TECHNOLOGIES FOR ENVIRONMENTAL PROTECTION							
2.2. Course coordinator	Prof. PhD. Ioan Oroian							
2.3. Seminar/ laboratory/ project coordinator	PhD Assist. Moldovan Bianca							
2.4. Year of study	IV	2.5. Semester	I	2.6. Evaluation type	Continuous	2.7. Discipline status	Content ²	DD
							Compulsoriness ³	DI

3. Total estimated time (teaching hours per semester)

3.1. Hours per week – full time programme	4	out of which: 3.2. lecture	2	3.3. seminar/ laboratory/ project	2
3.4. Total number of hours in the curriculum	56	out of which: 3.5. lecture	28	3.6. seminar/laboratory	28
Distribution of the time allotted					hours
3.4.1. Study based on books, textbooks, bibliography and notes					10
3.4.2. Additional documentation in the library, electronic platforms and field experiences					10
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					10
3.4.4. Tutorials					10
3.4.5. Examinations					4
3.4.6. Other activities					
3.7. Total hours of individual study	44				
3.8. Total hours per semester	90				
3.9. Number of credits ⁴	3				

4. Prerequisites (if applicable)

4.1. curriculum-related	Environmental Chemistry, Physics, Mechanical Engineering, Ecology
4.2. skills-related	Team communication skills, organization, use of the internet as a resource.

5. Conditions (if applicable)

5.1. for the course	The course is interactive, students can address questions regarding the exposed content. The university discipline impose respecting the beginning and finalizing hours of the course. Are not tolerated other activities during lecture, mobile phones are to be turned off.
5.2. for the seminar/ laboratory/ project	Room with video projector, blackboard. Academic discipline is imposed throughout the duration of the work. Laboratory room corresponding to the work carried out.

6. Cumulated specific competences

Professional competences	<p>The ability to apply the general knowledge acquired in previous years of study to develop solutions for optimal implementation of specific environmental technologies, mainly to ensure its quality, but also to remedy the shortcomings caused by pollution.</p> <p>Knowledge of the principles necessary to describe and understand some fundamental phenomena underlying the successful application in practice of technologies for environmental protection</p>
Transversal competences	<p>Identification of the objectives to be achieved, of the available resources, the stages of work within the implementation of specific technologies for environmental protection</p> <p>Identifying and assuming roles and responsibilities in a multidisciplinary team and applying effective networking and working techniques with team members</p> <p>Efficient use of information, communication and vocational training resources (Internet portals, specialized software applications, databases, online courses, etc.)</p>

7. Discipline objectives (based on the cumulated specific competences)

7.1. General objective	Presentation of the essential concepts, principles and notions specific to the technology for environmental protection
7.2. Specific objectives	<p>Knowledge and understanding of the different basic concepts, the components of the technologies for environmental protection and the specific characteristics for environmental factors (water, soil, air)</p> <p>To develop essential skills in the proper application of technologies for environmental protection</p> <p>To develop the capacity for analysis and synthesis using terms specific to the debated problem.</p> <p>To contribute to the objective assessment of conditions, needs and risks in order to put into practice the environmental technologies necessary to combat pollution damage.</p>

8. Content

8.1. COURSE Number of hours -28	Teaching methods	Observation
1.General considerations on the role of technologies in environmental protection (air, water, soil, green energy resources)	Lecture	2 hours
2. Community environmental legislation and the stage of its implementation in Romania	Lecture	2 hours
3. Theoretical basis for using the electrostatic field in environmental technologies	Lecture	4 hours
- The electric field and the electric field equations; - Load mechanisms of material particles and their electrical properties;		
4. Applications of electrostatics in environmental technologies	Lecture	4 hours
- Electric separators; - Electrofilters; - Ozonators; - Sprayers.		
5. Theoretical basis for using the electromagnetic field in environmental technologies	Lecture	2 hours
- Magnetic field and magnetic properties of bodies; - Magnetic separators.		
6. Air purifiers technologies	Lecture	4 hours
- Physical and chemical processes for purifying air and combustion gases; - Sewage machines.		
7. Water purification technologies	Lecture	4 hours
- Physical and chemical processes; - Machinery.		
8. Soil purification technologies	Lecture	4 hours
- Physical, electrochemical and chemical processes; - Soil decontamination.		
9. The role of green energy in environmental protection	Lecture	2 hours
- Solar energy		

8.2. PRACTICAL WORKS Number of hours - 28	Teaching methods	Observation
1.Work instructions and norms of labor safety technique in profile laboratories. Work organization, fire prevention and extinction rules and first aid measures in case of accidents.	Theoretical presentation of practical works	2 hours
2. Air and flue gas treatment plants. Carbon footprint calculation		6 hours

3. Water treatment plants. 4. Soil decontamination technologies 5. Harnessing green energy. Case studies. Ecological footprint calculation. 6. Verification of knowledge	6 hours 6 hours 6 hours 2 hours
<i>Compulsory bibliography: 1. Oroian I., 2014. Tehnologii pentru protecția mediului. Note de curs.</i> <i>2. Bratu A.E., 1984, Operații unitare în Ingineria chimică, vol. I-III, Editura Tehnică, București</i> <i>3. Morar R. (Coord.), Muntean I.O., Cugleşan N., Cugleşan I., Pocan I., 2012, Tehnologii pentru protecția mediului, legislație, teorie, aplicație, Editura Eco Transilvan, Cluj-Napoca</i> <i>4. Pavel S.Gh., V. Maier, M. Russu, 2001, Tehnologii electrice, UT Press, Cluj-Napoca</i>	
<i>Optional bibliography: 1. Bailey, I., 2003. New Environmental policy instruments in the European Union. Aldershot, Ashgate.</i> <i>2. Dulamiță N., Stanca M., 1999. Tehnologie chimică. Presa Universitară Clujeană, Cluj Napoca.</i> <i>3. Foster K.R., Repacholi M.H., 1999. Environmental impacts of electromagnetic fields from major electrical technologies. Paper at International Symposium, Germany, Ismaning.</i>	

9. Corroborating the discipline content with the expectations of the epistemic community representatives, of the professional associations and of the relevant employers in the corresponding field

The content of the discipline is in accordance with what is studied in other university centers in the country and abroad.

The content and structure of the course are aspects adapted to the needs of the students and the demands of the employers in the industrial fields, oriented towards the productive processes and the operations involved in the technologies of environmental protection.

The graduates of this course can use their knowledge gained in the job market offers, in institutions with a technological profile in general and in those with an environmental engineering profile in particular, including in companies and or non-governmental organizations that provide consultancy in the field.

At the same time, the specific knowledge of the course is a starting point towards the higher level of preparation, represented by the doctoral programs, in the field of environmental protection.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation type	10.3. Percentage of the final grade
10.4. Course	Correctness answers, the use of specialized language, learning and understanding the problem treated at the course.	Continuous(VP)	70%
10.5. Seminar/Laboratory	The way of public presentation of the project The correctness of the answers to the questions. Practical vision in solving a analytical problems	Continuous	30%
10.6. Minimum performance standards			
60% knowledge of the information taught at the course.			
60% knowledge of the information obtained from the laboratory hours.			

- 1 Cycle of studies - choose one of the three options: Bachelor/Master/Ph.D.
- 2 according to the educational plan
- 3 Discipline status (compulsoriness) - choose one of the options - DI (compulsory discipline) DO (optional discipline) DFac (facultative discipline).
- 4 One credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Filled in on
04.09.2019

Course coordinator
Prof. Oroian Ioan Ph.D.

Laboratory work/seminar coordinator
Asist. Bianca MOLDOVAN Ph.D.

Approved by the
department on
05.09.2019

Head of the Department
Prof. Oroian Ioan Ph.D.