



SUBJECT OUTLINE

1. Information on the programme

1.1. Higher education institution	University of Agricultural Sciences and Veterinary Medicine of Cluj-Nap
1.2. Faculty	Agriculture
1.3. Department	Environmental and plant protection
1.4. The field of studies	Environmental Engineering
1.5 Cycle of studies ¹⁾	License
1.6. Specialization / Study program	Environmental Engineering
1.7. Form of education	IF

2. Information on the discipline

2.1. Name of the discipline	ENVIRONMENTAL CHEMISTRY							
2.2. Holder of course activities	Associate Professor PhD. Antonia ODAGIU							
2.3. Holder of seminar / laboratory / project activities	PhD. Ing. Claudia BALINT							
2.4. Year of study	II	2.5. Semester	II	2.6. Type of evaluation	Summative	2.7. The discipline regime	Content ²	DD
							Obligatory ³	DI

3. Estimated total time (hours per semester of teaching activities)

3.1. Number of hours per week - frequency form	4	of which: 3.2. course	2	3.3. seminar / laboratory / project	2
3.4. Total hours of the educational plan	56	of which: 3.5. course	28	3.6. seminar / laboratory	28
Distribution of the time fund					ore
3.4.1. Study after manual, course support, bibliography and notes					22
3.4.2. Additional documentation in the library, on specialized electronic platforms and in the field					10
3.4.3. Preparation of seminars / laboratories / projects, topics, reports, portfolios and essays					8
3.4.4. Tutorials					4
3.4.5. Examinations					4
3.4.6. Other activities					
3.7. Total hours of individual study	48				
3.8. Total hours per semester	104				
3.9. Number of credits ⁴	4				

4. Preconditions (where applicable)

4.1. of curriculum	It's not necessary
4.2. of skills	It's not necessary

5. Conditions (where applicable)

5.1. development of the course	The course is interactive, students can ask questions about the content of the exhibition. The university discipline requires the observance of the start and end time of the course. No other activities are tolerated during the lecture.
5.2. for conducting the seminar / laboratory / project	In practical works it is compulsory to consult the practical guide, to respect the rules of labor protection regarding chemicals. Students will carry out their practical laboratory activity in groups of two. Academic discipline is required throughout the duration of the work.

some pollutants in order to establish the optimal methods and techniques of analysis. Use theoretical and practical knowledge for interpretation of experimental results and establishing conclusions regarding the evolution and behavior of a pollutant in the environment.

8. Contents

8.1.Course Number of hours – 28	Teaching methods	Remarks
The chemistry of the environment. Getting started. Pollutants: chemical nature, effects, sources;	Lecture, Conversation The description	2 hours
Chapter 1. Air chemistry. 1.1.Atmosfera. The structure of the atmosphere. The chemical composition of the atmosphere. The physico-chemical characteristics of the air.	Lecture, Conversation, Guided Learning, Video	2 hours
1.2 The main components of the air. Properties of the main natural components of the air	Lecture, Conversation, Guided Learning, Video	2 hours
1.3 Air pollution. Main air pollutants. Sources of pollution. Classification. Chemical processes in the atmosphere	Lecture, Conversation, Guided Learning, Video	2 hours
1.4 Mechanisms for the formation, transport and transfer of pollutants into the air. The effects of air pollution.	Lecture, Conversation, Guided Learning, Video	2 hours
Chapter 2. Water chemistry. 2.1. Hydrosphere. Structure of the hydrosphere. Chemical composition of water. Physico-chemical characteristics of water	Lecture, Conversation, Guided Learning, Video	2 hours
2.2. Physico-chemical properties of water	Lecture, Conversation, Guided Learning, Video	2 hours
2.3. Water pollution. Main water pollutants. Sources of pollution. Classification. Chemical processes in the hydrosphere	Lecture, Conversation, Guided Learning, Video	2 hours
2.4. Mechanisms for formation, transport and transfer of pollutants into water. Effects of water pollution.	Lecture, Conversation, Guided Learning, Video	2 hours
Chapter 3. Soil chemistry. 3.1.Litosfera. Structure of the lithosphere. The ground. Physico-chemical and biological characteristics of the soil.	Lecture, Conversation, Guided Learning, Video	2 hours
3.2 Physico-chemical and biochemical processes in soil.	Lecture, Conversation, Guided Learning, Video	2 hours
3.3. Soil pollution. Main soil pollutants. Classification	Lecture, Conversation, Guided Learning, Video	2 hours
3.4.Sources of soil pollution. Classification. Mechanisms of soil pollution	Lecture, Conversation, Guided Learning, Video	2 hours
Chapter 4. Indoor pollution. Characterization. Indoor pollutants. Mechanisms of indoor pollution	Lecture, Conversation, Guided Learning, Video	2 hours

8.2. PRACTICAL WORK Number of hours – 28		
Labor protection rules. Presentation of the practical works and of the vessels specific to the chemistry laboratory.	Explication; conversation	2 hours
Air quality Analytical techniques for the identification and physico-chemical characterization of air. Equipment used in air quality control. Air quality indicators. Determination of PM, O ₃ , SO ₂ , VOC, NO _x in air. Problems. Project	Experiment; Explication; Exercise; Problematization, Video materials	8 hours
Water quality Analytical techniques for the identification and physico-chemical characterization of air. Equipment used in water quality control. Water quality indicators. Determination of the physico-chemical indicators of the water (pH, turbidity, oxygen content, conductivity). Problems. Project	Experiment; Explication; Exercise; Problematization, Video materials	8 hours
Soil quality Analytical techniques for soil physical and chemical identification and characterization. Equipment used in soil quality control. Soil quality indicators. Determination of soil physico-chemical indicators (pH, humus). Problems. Project	Experiment; Explication; Exercise; Problematization, Video materials	6 hours
Analytical techniques for identifying indoor pollution. Problems. Project	Experiment; Explication; Exercise; Problematization, Video materials	2 hours
Assessment of knowledge. Project	Experiment; Explication; Exercise; Problematic	2 hours
Bibliography Required:		
<ol style="list-style-type: none"> 1. Odagiu Antonia, Chimia mediului, Note de curs, 2018 2. F.V. Dulf: Chimia Mediului, Ed. Academic Pres, 2013 3. Garry W. Van Loon and Stephen J. Duffy: Environmental Chemistry. A Global Perspective., Oxford University Press Inc., New York, 2000. 4. L. Kadar: Chimie analitica. Ed. Academic Pres, 2003 5. Gh. Radulescu, I. M. Moise. I. Cetean: Chimie analitica calitativa. Ed. Did. si Ped., Bucuresti, 1997. 		
Optional bibliography:		
<ol style="list-style-type: none"> 1. I Cetean, I Marginean, M. I. Moise: Chimie analitica calitativa, Ed. ALC Media Group, Cluj-Napoca, 2001. 2. C. Luca: pH-ul si aplicatiile lui, Ed. Tehnica, Bucuresti, 1964. 3. L. Kekedy: Analiza fizico-chimica, Ed. Did. si Ped., Bucuresti, 1969. 		

9. Corroborating the contents of the discipline with the expectations of the representatives of the epistemic communities, professional associations and representative employers in the field related to the program

After completing and promoting the discipline, the student will have the theoretical knowledge and practical skills to perform a series of qualitative and quantitative chemical analyzes of pollutants from different compartments of the environment (water, air, soil) in any laboratory specialized in environmental chemical analysis.

10. Evaluation

Activity type	10.1. Evaluation criterias	10.2. Methods of evaluation	10.3. Weight in the final grade

	correct understanding and application of the issues dealt with in the course. Correct solution of exercises and problems.	E (SUMMATIVE)	75%
10.5. Seminar / Laboratory	The correctness of the answers - the proper understanding and understanding of the problems treated in the laboratory. Correctly solving the themes during the semester. Meeting the practical objectives.	Colloquy	25%
10.6. Minimum standard of performance			
Establishing the evolution of some pollutants (studied) by applying appropriate models and theories The correct use of methods and techniques, materials, substances and equipment in compliance with the safety and health standards at work when conducting a chemical experiment. Carrying out a project on a subject studied in the laboratory and arguing it based on the data obtained.			

- ¹ The cycle of studies - one of the variants is chosen - Bachelor / Master / Doctorate
- ² Discipline regime (content) - for the license level one of the variants is chosen - DF (fundamental discipline), DD (discipline in the field), DS (specialty discipline), DC (complementary discipline).
- ³ The regime of the discipline (compulsory) - one of the variants is chosen - DI (compulsory discipline) DO (optional discipline) DFac (optional discipline).
- ⁴ A credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Date completed
04.09.2019

Date of approval in the department
05.09.2019

Course holder
PhD Associate Professor. Antonia
ODAGIU



Holder of laboratory works / seminars
PhD. Ing. Claudia BALINT



Department Director
Professor PhD Juan Oroian

