



No. _____ of _____

USAMV form 0107030108

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	Water and wastewater treatment							
2.2. Course coordinator	Associate Professor PhD Tania MIHĂIESCU							
2.3. Seminar/ laboratory/ project coordinator	Associate Professor PhD Tania MIHĂIESCU							
2.4. Year of study	III	2.5. Semester	II	2.6. Evaluation type	summative	2.7. Discipline status	Content ²	DS
							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					15
3.4.2. Additional documentation in the library, electronic platforms and field experiences					8
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					15
3.4.4. Tutorials					2
3.4.5. Examinations					4
3.4.6. Other activities					
3.7. Total hours of individual study	44				
3.8. Total hours per semester	100				
3.9. Number of credits ⁴	4				

4. Prerequisites (if applicable)

4.1. curriculum-related	Fluid mechanics, Environmental chemistry, Technologies for the acquisition and diagnosis of environmental quality, Analysis and synthesis of technological processes, Automation of technological processes
4.2. skills-related	Cognitive competences: possessing notions related to pollutants and their properties. Action skills: information and documentation, group activity, argumentation and use of computer technologies for acquisition + processing of analytical data; performing active and critical analyzes; operationalization and application of knowledge

5. Conditions (if applicable)

5.1. for the course	The course is interactive, students can ask questions about the content of the exhibition. Academic discipline is required for the entire duration of the lecture. No other activities are tolerated during the lecture, mobile phones must be switched off. Room equipped with computer, video projector, Internet access, blackboard.
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5.2. for the project	Room equipped with computer, video projector, blackboard, internet access Academic discipline is required for the entire duration of the work. The deadline for teaching and supporting the project is established by the holder in agreement with the students. The oral presentation of the projects is done by all the members of each team involved
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6. Cumulated specific competences

Professional competences	Explaining the mechanisms of processes and effects of anthropic or natural origin that determine and influence the pollution of the environment Managing and solving specific environmental problems for sustainable development Analysis of environmental protection measures and elaboration of technical solutions for the prevention, reduction and elimination of pollution phenomena and for the optimal use of natural resources Applying the legal norms and best available techniques (BAT) to prevent and reduce the impact of human activities on the environment Coordination of technological activities and processes based on the technical procedures in force
Transversal competences	Identifying and observing the rules of professional ethics and deontology, taking responsibility for the decisions taken and the risks involved; Defining and respecting the competences of the team, distributing responsibilities to the team members and solidarity in assuming responsibilities; Efficient use of information sources and resources for communication and assisted professional training (portals, Internet, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation.

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

7.1. General objective	Acquisition of theoretical and practical notions related to the main techniques and technologies of wastewater treatment and water treatment for drinking water
7.2. Specific objectives	Acquiring the basic principles of the main techniques and procedures for water treatment and purification. Description of industrial water and wastewater treatment plants Acquisition of design elements of water treatment and treatment schemes Elaboration of water and wastewater treatment schemes, based on the knowledge acquired

8. Content

8.1. COURSE Number of hours - 28	Teaching methods	Observation
1. Water quality. Qualitative conditions for different uses of water	oral lectures with interactive sections	2 hours
2. Sources of water pollution		2 hours
3. Selfpurification of water		2 hours
4. Physical processes for water and wastewater treatment		2 hours
5. Chemical processes for water and wastewater treatment		2 hours
6. Biological processes for water and wastewater treatment		4 hours
7. Advanced wastewater treatment technologies.		4 hours
8. Treatment of sludge		2 hours
9. Technological processes of wastewater treatment. Case studies		2 hours
10. Treatment processes for obtaining potable and industrial water.		2 hours
11. Water disinfection		2 hours
12. Technological processes of water treatment. Case studies		2 hours

8.2. PROJECT Number of hours - 28	Teaching methods	Observation
1. Presentation of the project themes. Establishing and choosing project themes.	Oral lecture	2 hours
2. European normative acts regarding the water regime and their transposition of the Romanian legislation. Terminology used in water treatment. Conditions for discharging wastewater into streams: quality categories and quality conditions.	Oral lecture with interactive sections	2 hours
3. Calculation of water requirement and requirement. Calculation summary. Applications.	Conversation, individual study	4 hours
4. Estimation of pollutant loads generated by household activities. Calculation summary. Applications.	Conversation, individual study	2 hours
5. Calculation of the degree of purification required		6 hours

6. Establishing the purification technology. Choosing the equipment needed for the proposed technology. Applications. 7. Visit to the Cluj treatment plant	Conversation, individual study	2 hours
	Conversation, individual study Presentation, argumentation, interactive sections	6 hours
8. Presentation of projects	Project presentation	4 hours
Compulsory bibliography:		
1. Mihăiescu Tanla, 2019, <i>Tratarea și epurarea apei</i> , Course notes		
Optional bibliography:		
1. Ianculescu O., Ionescu, Gh., Racovițeanu Raluca; 2001. <i>Epurarea apelor uzate</i> , Ed. Matrix Rom, București.		
2. Robescu, D., Szabolcs, L., Robescu, Diana, Verestoy, A., 2004. <i>Wastewater treatment technologies, installations and equipments</i> . Ed. Tehnică, București.		
3. Rojanschi V., Ogneanu T., 1989. <i>Cartea operatorului din stațiile de tratare și epurare a apelor</i> . Ed. Tehnică, București		
4. Stoianovici, S., Robescu, D., 1982. <i>Procedee și echipamente necesare pentru tratarea și epurarea apei</i> . Ed. Tehnica, București		
5. Teodosiu Carmen, 2001. <i>Tehnologia apei potabile și industriale</i> , Ed. Matrix Rom, București.		
6. Robescu, D., Robescu, Diana, Szabolcs, L., Constantinescu, I., 2000. <i>Tehnologii, instalații și echipamente pentru epurarea apelor</i> , Ed. Tehnică, București.		

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

- By acquiring the theoretical-methodological concepts and approaching the practical aspects included in the discipline Water treatment and purification students acquire a consistent knowledge bag, in accordance with the partial competences required for the possible occupations provided in Grid 1 - RNCIS.
- The activities carried out by the students will follow the development of the individual work capacities, of analysis and interpretation of the results, of the capacity to offer solutions to practical problems.
- The discipline responds concretely to the current requirements of development and evolution at national and international level of the higher education, as well as of the economic environment in the field of environmental engineering.
- The program of the discipline is related to similar study programs from universities in Romania and Europe that apply the Bologna system.
- In the current context of environmental engineering development, the fields of activity concerned are practically unlimited, the possible employers targeted being from both the educational environment, public institutions at central (profile ministries) and local (county and municipal councils), Environment Agencies, Administration Roman Waters, Environmental Guard, R&D environment, but also organizations / associations / companies certified for the elaboration of Impact Studies etc. or offering consulting in the field of engineering and environmental protection or national / international / multinational companies with activities in the field.
- The skills acquired will be needed for the employees who carry out their activity in the field of environmental engineering, in all the phases of design, execution, operation and monitoring of environmental factors. The implications of the topics addressed during the course relate to the profoundly engineering-applied side of the engineering profession.
- The students are provided with adequate competences with the needs of current qualifications, an adequate scientific and technical training, which will allow them to quickly enter the labor market after graduation, but also the possibility of continuing their studies through masters and doctoral programs.
- The study program is part of the policy and strategy of USAMV Cluj, both in terms of content and structure, as well as in terms of international aptitude and openness offered to students. The content of the discipline is in accordance with what is studied in other university centers in the country and abroad.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation type	10.3. Percentage of the final grade
10.4. Course	The correctness of the answers, the learning and understanding of the problems dealt with in the course.	summative(E) Written exam (multiple choice test)	60%
10.5. Project	Scientific content, Compliance with the content of the framework and the drafting criteria. Vocabulary and coherence in expression; framing the presentation in time; originality of the presentation mode	Project oral presentation	40%
10.6. Minimum performance standards			
Course: 50% knowledge of the information taught. - Definitions: Water pollution; Water purification; Used water; Mechanical purification; grills; site; Deznisipatoare; Grease separators; decanters; Chemical treatment; neutralization; Chemical precipitation; Coagulation-			

flocculation; Biological treatment; Aerobic biological treatment; Anaerobic biological treatment;
- Pollution types - classifications; Sources of pollution - enumeration and examples; Pollutants - enumeration and examples; Effects of pollutants - enumeration and examples.
- Constructions specific to mechanical purification - enumeration;
- Simplified schemes: mechanical (primary) treatment; horizontal clarifier; mechanical-chemical treatment; chemical precipitation; the conventional activated sludge process;
- The main agents used for: neutralizing acid / alkaline waters; chemical oxidation; chemical reduction; chemical precipitation
- Biological treatment in natural regime - variants - enumeration

Project:

Individual project supported and delivered on time according to the chosen theme.

Obtaining the mark of at least 5 in the project is a condition for entering the exam.

- 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
Associate Professor PhD Tania MIHĂIESCU

Laboratory work/seminar coordinator
Associate Professor PhD Tania
MIHĂIESCU

Approved by the
department on
05.09.2019

Head of the Department
Professor PhD Ioan ORQIAN