



Nr. _____ from _____

Form USAMV 0107040106

DISCIPLINE FILE

1. Program data

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. 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. Data Discipline

2.1. Name of the discipline	SOURCES OF RADIATIONS AND PROTECTION TECHNIQUES							
2.2. Holder of course activities	PhD Associate Professor. Antonia ODAGIU							
2.3. Holder of seminar / laboratory / project activities	PhD. Ing. Claudia BALINT							
2.4. Year of study	IV	2.5. Semester	1	2.6. Type of evaluation	Continue	2.7. The discipline regime	Continut ²⁾	DD
							Obligativitate 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 / laborator / proiect	2
3.4. Total hours of the educational plan	56	of which: 3.5. course	28	3.6. seminar / laborator	28
Distribution of the time fund					ore
3.4.1. Study after manual, course support, bibliography and notes					16
3.4.2. Additional documentation in the library, on specialized electronic platforms and in the field					12
3.4.3. Preparation of seminars / laboratories / projects, topics, reports, portfolios and essays					12
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 credit ⁴⁾	4				

4. Preconditions (where applicable)

4.1. of curriculum	General Chemistry, Physics
4.2. of skills	Team communication skills, organization, use of the internet as a resource.

5. Condiții (acolo unde este cazul)

5.1. development of the course	Room with video projector. 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.
5.2. for conducting the seminar / laboratory / project	Room with video projector, blackboard. Academic discipline is imposed throughout the duration of the work.

6. Specific skills acquired

Professional skills	<p>1. Knowledge, understanding, explanation and interpretation</p> <ul style="list-style-type: none"> - knowledge of radiation sources and types of radiation - knowledge of the biological effects of radiation - knowledge of protection methods - understanding of the methods of designing the protective screens <p>2. Instrumental Applications</p> <ul style="list-style-type: none"> - use of dosimetry techniques - calculating the efficiency of the protection methods - knowledge of the legislation in the field <p>3. Attitude</p> <ul style="list-style-type: none"> - manifestation of positive and responsible attitudes towards the scientific ruler, based on the knowledge of phenomena and practical connections - cultivation of a scientific environment centered on democratic values and relationships - the optimal and creative valuation of its own potential in scientific activities - engaging in the partnership relationship with other people: colleagues, teachers, people from the economic sector, etc. - participation in their own scientific development
Transversal competences	<p>Understand the connections between the factors impacting radiation sources and the protection techniques against them</p> <p>To develop the skills to work effectively with people with different personalities and backgrounds.</p> <p>To have competences to analyze the usefulness of different types of radiation protection solutions in different contexts.</p>

7. The objectives of the discipline (based on the grid of specific skills acquired)

7.1. The general objective of the discipline	Presentation of the essential concepts, principles and notions specific to the different sources of radiation and the protection against them
7.2. Specific objectives	<p>Understanding and understanding the different basic concepts, the radiation sources and the protection against them and the characteristics of each problem</p> <p>Correlation by the students of the necessity of analyzing the radiation sources with the means of protection against them</p> <p>To develop essential skills in developing solutions for radiation protection</p> <p>To develop the capacity for analysis and synthesis using terms specific to the debated problem.</p>

8. Conținuturi

8.1.COURSE	Teaching methods	Remarks
Number of hours – 28		
1. Notions of atomic nucleus physics	Lecture	2 hours
2. Radioactivitatea	Lecture	2 hours
3. The main types of radiation sources (natural and artificial)	Lecture	2 hours
4. The interaction between ionizing radiation and matter	Lecture	2 hours
5. Measurement of ionizing radiation	Lecture	2 hours
6. Cosmic radiation	Lecture	2 hours
7. Neutron radiation	Lecture	2 hours
8. Protection against radiation pollution	Lecture	2 hours
9. Radiation shielding	Lecture	2 hours
10. Dosimetric sizes	Lecture	2 hours
11. Professional irradiation	Lecture	2 hours
12. Irradiation in case of nuclear explosions	Lecture	2 hours
13. Nuclear accident	Lecture	2 hours
14. Pollution with high frequency electromagnetic radiation	Lecture	2 hours
8.2. PRACTICAL WORK		
Number of hours – 28		
1. Work instructions and norms of labor safety technique	Presentation	2 hours

<p>in profile laboratories. Work organization, norm of prevention and extinguishing of fires and first aid measures in case of accidents.</p> <p>2. Units of measurement and dosimetry.</p> <p>3. Measuring equipment.</p> <p>4. Radiation protection standards.</p> <p>5. Radiation intensity measurement techniques.</p> <p>6. Visit to the radioactivity laboratory of APM Cluj.</p> <p>8. Verification of knowledge</p>	<p>Exercise method. Analyze</p> <p>Presentation</p> <p>Exercises</p> <p>Presentation and exercise</p> <p>Visit</p> <p>Testing</p>	<p>6 hours</p> <p>6 hours</p> <p>6 hours</p> <p>4 hours</p> <p>2 hours</p> <p>2 hours</p>
<p>Required bibliography:</p> <p>1. Petrescu-Mag Valentin, 2014. <i>Note de curs</i>.</p> <p>2. Cartas V.- <i>Fizica nucleara</i>, Ed metalurgica Bucuresti,2004</p> <p>3. Cartas V.- <i>Interactiile nucleu-nucleu</i> Ed metalurgica Bucuresti,2004</p> <p>4. Popescu T.- <i>Protectia la radiatii</i>, Ed Stiintifica,Bucuresti,1997</p>		
<p>Optional bibliography:</p> <p>1. D.D. Sandu, „Microunde”, Ed. Victor, Bucuresti, 2005</p> <p>2. H. Moseley, „Non-ionising radiation”, Medical Physics Handbook 18,1988</p> <p>3. G. Rulea, „Bazele teoretice și experimentale ale tehnicii microundelor”, Ed. Șt. și Encicl., 1989</p> <p>4. D. D. Sandu, „Dispozitive electronice pentru microunde”, Ed. Șt. și Encicl., 1982</p> <p>5. D. D. Sandu, „Electronică fizică și aplicată”, Edit. Universității “Al.I.Cuza” Iași, 1994</p> <p>6. Ch. Polk, E. Postow, „Handbook of Biological Effects of Electromagnetic Fields, CRC Press, New York, 1996</p> <p>7. A. Ishimaru, “Electromagnetic wave propagation, radiation and scattering”, Prentice Hall Intern. Editions, 1986 http://home.uaic.ro/~gasner/</p> <p>8.V.Levin - <i>Nuclear Physics and Nuclear Reactors</i>, Ed.MIR,1993</p>		

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

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 in order to understand the topics addressed in the higher years of study.

10. Evaluation

Activity type	10.1. Evaluation criterias	10.2. Methods of evaluation	10.3. Weight in the final grade
10.4. Course	Correct answer, with specialized language to the exam subjects	Written exam - grid test	70%
10.5. Laboratory	Ability to apply knowledge, ability to analyze and interpret results	Verification	30%
10.6. Minimum standard of performance			
Course: for grade 5 the student will respond to the examination topic in his own words (without specialized language) and to prove at least 60% of the information included in the course support.			
Laboratory: 60% knowledge of the information obtained from the laboratory hours.			

- 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

Course holder
Associate Professor PhD. Antonia
ODAGIU

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

Date of approval
in the department
05.09.2019

Department Director
Professor Ioan ORGIAN, PhD