



No. \_\_\_\_\_ of \_\_\_\_\_

USAMV form 0107010103

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

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

**2. Information on the discipline**

<b>2.1. Discipline name</b>		<b>CHEMISTRY 1</b>						
<b>2.2. Course coordinator</b>				<b>Prof.PhD. Francisc V. DULF</b>				
<b>2.3. Seminar/ laboratory/ project coordinator</b>				<b>Prof.PhD. Francisc V. DULF</b>				
<b>2.4. Year of study</b>	<b>I</b>	<b>2.5. Semester</b>	<b>I</b>	<b>2.6. Evaluation type</b>	<b>Summative</b>	<b>2.7. Discipline status</b>	<b>Content<sup>2</sup></b>	<b>DF</b>
							<b>Compulsoriness<sup>3</sup></b>	<b>DI</b>

**3. Total estimated time (teaching hours per semester)**

<b>3.1. Hours per week - full time programme</b>	<b>4</b>	<b>out of which: 3.2. lecture</b>	<b>2</b>	<b>3.3. seminar/ laboratory/ project</b>	<b>2</b>
<b>3.4. Total number of hours in the curriculum</b>	<b>56</b>	<b>out of which: 3.5. lecture</b>	<b>28</b>	<b>3.6. seminar/laboratory</b>	<b>28</b>
<b>Distribution of the time allotted</b>					<b>hours</b>
<b>3.4.1. Study based on books, textbooks, bibliography and notes</b>					<b>22</b>
<b>3.4.2. Additional documentation in the library, electronic platforms and field experiences</b>					<b>8</b>
<b>3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays</b>					<b>10</b>
<b>3.4.4. Tutorials</b>					<b>4</b>
<b>3.4.5. Examinations</b>					<b>4</b>
<b>3.4.6. Other activities</b>					
<b>3.7. Total hours of individual study</b>	<b>48</b>				
<b>3.8. Total hours per semester</b>	<b>104</b>				
<b>3.9. Number of credits<sup>4</sup></b>	<b>4</b>				

**4. Prerequisites (if applicable)**

<b>4.1. curriculum-related</b>	<b>Inorganic chemistry; Organic chemistry</b>
<b>4.2. skills-related</b>	<b>The student must have knowledge regarding general chemistry and organic chemistry from high school</b>

**5. Conditions (if applicable)**

<b>5.1. for the course</b>	<b>The course is interactive, the students can address questions regarding the course content. Academic discipline enforce the compliance within the beginning and the end of the course. Any other activities are forbidden during course, the cell phones are strictly forbidden.</b>
<b>5.2. for the seminar/ laboratory/ project</b>	<b>In the laboratory students must consult the practical guide, every student will perform individual activity using the laboratory equipment which is described in the practical guide. During the practical activities the academic discipline must be maintained.</b>

**6. Cumulated specific competences**

Professional competences	<p>Knowledge of the main types of chemical bonds and interactions</p> <p>Understanding the role of water, acid-base equilibrium and functioning of buffer systems</p> <p>Knowledge of the composition and properties of inorganic substances/organic molecules: structure, nomenclature, isomerism, reactivity.</p> <p>Understanding the structural, physicochemical properties of inorganic substances/organic molecules, localization/role in the plants/environment. Role of biomolecules.</p>
Transversal competences	<p>- Applying strategies like perseverance, rigor, efficiency and responsibility in work, punctuality and personal assumption of responsibility for business results, creativity, common sense, analytical and critical thinking, problem solving and so on, based on principles, norms and code values applied for ethics in food.</p> <p>- Applying networking techniques within a team; amplification and shaping of empathic capacities of interpersonal communication and ownership of specific tasks in this activity group for treatment / conflict solving individual / group, and optimal management of time.</p>

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

7.1. General objective	Assimilation of fundamental concepts of inorganic and organic chemistry required for engineers in order to understand and learn other disciplines (biochemistry, nutrition, toxicology, food control, etc.); knowledge of organic compounds involved in the proper functioning of plant and animal organisms.
7.2. Specific objectives	The study of inorganic and organic chemistry is necessary for arming students with the knowledge and practical skills on the handling of laboratory tools, identification or determination of chemical compounds based on its content.

### 8. Content

8.1. COURSE Number of hours -28	Teaching methods	Observation
<p><b>Basic Concepts in Chemistry</b> Corpuscular structure of matter: Atoms, molecules. The models of atom structure. Chemical element, Isotope. Atomic mass, gram atom, molecular weight. Gram molecule.</p>	Lecture	3 lectures = 6 hours
<p><b>The main classes of inorganic compounds:</b> acids, bases, salts and oxides Periodical classification of elements. Periodicities. Physical-chemical properties of elements. General laws of chemistry. Chemical bonds: ionic bond, covalent, coordinative bond. Intermolecular bonds. Concentration of solutions. The ionic product of water. The pH of solution.</p>	Lecture	2 lectures = 4 hours
<p><b>Chemical reactions:</b> Basics of chemical reactions; Types of chemical reactions; Redox reactions. Reactions of organic molecules. Dissolution of ionic substances. Electrolyte dissociation.</p>	Lecture	1 lecture = 2 hours
<p><b>Elements of thermodynamics:</b> The reaction energy, enthalpy. Endothermic and exothermic reactions. Hess's law. Endothermic and exothermic reactions. Criteria for Spontaneous Processes.</p>	Lecture	2 lectures = 4 hours
<p><b>Elements of qualitative analytical chemistry</b> Cations. Classification, separation and identification</p>	Lecture	2 lectures = 4 hours
<p><b>Elements of qualitative analytical chemistry</b> Identification of anions</p>	Lecture	1 lecture = 2 hours
<p><b>Separation techniques: Chromatography:</b> Liquid and Gas chromatography: General principles</p>	Lecture	3 lectures = 6 hours

8.2. PRACTICAL WORKS Number of hours - 28	Teaching methods	Observation
Laboratory safety rules. Laboratory glassware and apparatus. Laboratory operation. Atom; Molecule; Electronic configurations.	Explication; Exercise; Modeling	1 lab work (2 hours/work)
Solutions. The concentrations of the solutions (Percent concentration,	Explication; Exercise; ;	2 lab works (2

molar and normal concentration). Exercises; preparation of solutions.	Preparation of solutions	hours/work)
Qualitative cation analysis. Qualitative analysis of group II and III of cations Qualitative analysis of group IV and V of cations	Experiment; Explication; Exercise;	3 lab works (2 hours/work)
Qualitative analysis of anions. Qualitative analysis of group I, II and III of anions.	Experiment; Explication; Exercise;	1 lab work (2 hours/work)
Identification of an anion and a cation in a salt solution.	Experiment; Explication; Exercise;	1 lab work (2 hours/work)
Introduction in volumetry : Application: titration strong acid-strong base.	Experiment; Explication; Exercise;	2 lab works (2 hours/work)
Instrumental analysis: UV-Vis spectroscopy: working principle; equipment; Thin layer chromatography (TLC) and high-performance (HPLC and GC) chromatographic techniques. Extraction and chromatographic (TLC) separation of lipids.	Explication; Exercise; Experiment;	3 lab works (2 hours/work)
Knowledge checks		2 hours

*Compulsory bibliography:*

1. C.D. Nenişescu, Chimie generală, Editura Didactică și Pedagogică, București, 1978.
2. F.V. Dulf: Chimia Mediului, Ed. Academic Pres, 2013
3. L. Kadar: Chimie analitica. Ed. Academic Pres, 2003
4. Gh. Radulescu, I. M. Moise. I. Cetean: Chimie analitica calitativa. Ed. Did. si Ped., Bucuresti, 1997.
5. D. J. Pietrzyk, C. W. Frank: Chimia analitica, Ed. Tehnica, Bucuresti, 1989.

C. Liteanu, E. Hopartean: Chimie analitica cantitativa. Ed. Did. si Ped., Bucuresti 1972.

*Optional bibliography:*

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.
- L. Kekedy: Analiza fizico-chimica, Ed. Did. si Ped., Bucuresti, 1969.

**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**

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**10. Evaluation**

Type of activity	10.1. Evaluation criteria	10.2. Evaluation type	10.3. Percentage of the final grade
<b>10.4. Course</b>	The results will be evaluated through a written examination containing question from all the chapters presented.	Summative(E)	75%
<b>10.5. Seminar/Laboratory</b>	The practical activity will be evaluated during and at the final of the semester. Practical tests and a report will be presented after all the practical session. Students must be able of using laboratory facilities, to perform an analisys following a described procedure and to analyse in a critical way the results obtained.	Written, oral and practical examination	25%

**10.6. Minimum performance standards**

Acquiring scientific information transmitted through lectures and practical work at an acceptable level. The students must have basic knowledge of the structure/properties and reactivity of inorganic/organic compounds. Getting the pass mark in continuous assessment is a graduation requirement.

<sup>1</sup> Cycle of studies - choose one of the three options: Bachelor/Master/Ph.D.

<sup>2</sup> according to the educational plan

<sup>3</sup> Discipline status (compulsoriness) - choose one of the options - **DI** (compulsory discipline) **DO** (optional discipline) **DFac** (facultative discipline).

<sup>4</sup> One credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Filled in on  
04.09.2019

Course coordinator  
Prof.PhD. Francisc V. DULF

Laboratory work/seminar coordinator  
Prof.PhD. Francisc V. DULF

Approved by the  
department on  
05.09.2019

Head of the Department  
Prof. Univ. Dr. Ing. IOAN OROIAN