Universidad Juárez del Estado de Durango

Facultad de Ciencias Forestales

Learning Unit Programme

With an integral professional competences approach

I. LEARNING UNIT GENERAL DATA

1. Learning Unit Name					**2. Code**
Chemistry					**3656**
3. Academic Unit					
FORESTRY SCIENCES FACULTY					
4. Academic programme					**5. Level**
Environmental Management Engineering					**Higher**
6. Training Area					
Disciplinary					
7. Academy					
Academy of Basic and Methodological Sciences					
8. Modality					
Mandatory	**X**	**Course**	**X**	**Attendance**	**X**
Elective		**Course-workshop**		**Non-attendance**	
		Workshop		**Mixed**	
		Seminar			
		Laboratory, field practice, etc.	**X**		
		Professional Practice			
		Academic Stay			
9. Pre-requirements					
1. Have passed the Admission Exam, CENEVAL or taken and approved the Zero Semester Admission profile.					

2. Have completed a general baccalaureate or biological-chemical area
3. Interest in science and technology.
4. Interest in the interactions of the human being with his environment.
5. Critical ability and desire to participate actively in their learning process.
6. Ability to acquire new knowledge and skills to apply them to real-life situations related to environmental management.
7. Ease of adaptation and tolerance to different cultural and work environments.
8. Capability and tolerance for teamwork.

10. Theory hours	Practice hours	Independent study hours	Total hours	Credits
3	2	0	5	5

11. Names of the teachers who participated in the development and/or modification of the programme
Dra. Georgina Ixtaccihuatl Ojeda Mijares

12. Date of development	Date of modification	Date of approval
02/08/2016	06/10/2017	12/10/2017

II.LEARNING UNIT SPECIFIC DATA

13. Presentation

The learning unit consists in deepening that knowledge of Chemistry acquired in the high level, complementing them with new knowledge about the structure of the material and its transformation, especially in terms of the elements and pollutant compounds produced by the industry and the population in the region. Likewise, acquire skills and abilities that allow their later application in Engineering for the solution of environmental problems and others related to Chemistry. The Learning Unit includes an experimental part, so those of a practical nature are added to the theoretical components, as well as the resolution of cases, exercises and problems, and the performance of laboratory practices. Finally, this Learning Unit establishes fundamental concepts for subsequent Learning Units such as Biochemistry, Environmental Biology and Instrumental Analysis.

14. Integral professional competences to develop in the student

Generic competences	Instrumental competences • Capability for analysis and synthesis • Oral and written communication • Ability to manage information

	Personal competences **• Teamwork** **• Ethical and quality commitment** **Systemic competences** **• Motivation for quality** **• Ability to apply theoretical knowledge in practice**
Professional competences	**Disciplinary** **• Basic general knowledge of Environmental Engineering** **• Ability to integrate experimental evidences with theoretical knowledge.** **• Qualitative interpretation of data** **• Quantitative data interpretation capability** **Professionals** **• Planning and management of waste disposal and control**
General purpose of the course	**That the student is able to establish judgments about the role played by chemistry (the structure and nature of the material and the reactions in which it participates) in the current world, within the framework of management and environmental management**

15. Joint of axes

The learning unit articulates with the area of basic sciences: Biochemistry, Environmental Biology and Instrumental Analysis, and it deals with topics that are basic for the understanding and study of disciplinary subjects: Thermodynamics, Physic-chemistry, Environmental toxicology, Air pollution, Soil pollution, Water pollution, Pollution management, Solid waste management, Hazardous waste management, Quality and Water treatment and soil bioremediation.

16. Development of the course

Module 1	**Matter, atoms, molecules, chemical periodicity, chemical bond, compounds, chemical equations and solutions**			
Intended learning	**Learning contents**	**Learning product(s)**	**Strategies**	**Teaching resources and materials**

Recognize the properties of the material, its structure, organization, classification and the reactions that can be carried out between the different compounds.	**1.1 Matter** **1.1.1. Definition and properties** **1.1.2. Aggregation states** **1.1.3. Physical and chemical changes** **1.1.4. Element, compound, mixture and separation methods**	**Team presentation with power point**	**- Collaborative work and documentary research** **- Promote searching, selection and analysis of information in different sources activities**	**-common classroom materials** **- FSF library** **- Central University Library** **- e-literature** **- computer equipment** **- Internet** **- websites**
	1.2 Atoms and molecules **1.2.1 Definition, nomenclature** **1.2.2 Atomic weights, molecular weights** **1.2.3 Avogadro number**	**Team presentation with power point**		
	1.3 Chemical periodicity **1.3.1 structure of the atom** **1.3.2 fundamental particles** **1.3.3 atomic number** **1.3.4 periodic table** **1.3.5 electronegativity**	**Team presentation with power point**		
	1.4 Chemical link **1.4.1 definition** **1.4.2 ionic link** **1.4.3 ionic compounds** **1.4.4 covalent link** **1.4.5 coordinated covalent link**	**Team presentation with power point**		

	1.4.6 covalent compounds **1.4.7 metal link** **1.4.8 molecular interactions(dipole- dipole, London forces, hydrogen bridge)**			
	1.5 Chemical compounds **1.5.1 acids** **1.5.2 bases** **1.5.3 oxides** **1.5.4 solutions** **1.5.5 suspensions** **1.5.6 colloids**	**Team presentation with power point**		
	1.6 Chemical equations **1.6.1 synthesis** **1.6.2 simple substitution** **1.6.3 double substitution** **1.6.4 decomposition** **1.6.5 exothermic** **1.6.6 endothermic**	**exercises of chemical equations and balancing of each case**		
	1.7 Solutions **1.7.1 normal** **1.7.2 molars** **1.7.3 molales** **1.7.4 percent**	**Team presentation with power point, and solution concentration calculation exercises**		
Module 2	**Carbon chemistry, nomenclature, classification, main functional groups and importance in the natural environment**			

Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Recognize the importance of Carbon Chemistry, identify the different functional groups and properly use the rules of nomenclature	2.1 Introduction to Carbon Chemistry 2.2 Alkanes 2.2.1 definition 2.2.2 nomenclature 2.2.3 characteristics 2.2.4 reactions 2.3 Alkenes 2.3.1 definition 2.3.2 nomenclature 2.3.3 characteristics 2.3.4 reactions 2.4 Alkynes 2.4.1 definition 2.4.2 nomenclature 2.4.3 characteristics 2.4.4 reactions	Mental map with the definition, nomenclature, characteristics and examples of Alkanes, Alkenes and Alkynes.	-Collaborative work and documentary research - promote activities of search, selection and analysis of information in different sources	-common classroom materials - FSF library - Central University Library - e-literature - computer equipment - Internet - websites
	2.5 Functional groups 2.5.1 aldehydes 2.5.2 ketones 2.5.3 ac. carboxylic 2.5.4 alcohols 2.5.5 amines 2.5.6 amides 2.5.7 ethers 2.5.8 esters	Team presentation in power point of the functional groups Comparative table of the different functional groups		

Module 3	Elements and molecules of biological interest			
Intended learning	**Learning contents**	**Learning product(s)**	**Strategies**	**Teaching resources and materials**
	3.1 Intro		**Collaborative work and documentary research - promote activities of search, selection and analysis of information in different sources**	**- common classroom materials - FSF library - Central University Library - e-literature - computer equipment - Internet - websites**
	3.2 Chemical elements of biological importance			
	3.3 Inorganic molecules 3.3.1 minerals 3.3.2 gases 3.3.3 water 3.3.4 water ionization 3.3.5 pH scale	**Concept map of the different inorganic molecules of biological importance**		
	3.4 Carbohydrates 3.4.1 monosaccharides 3.4.2 disaccharides 3.4.3 polysaccharides	**Summary of Carbohydrates and their characteristics**		
	3.5 Lipids 3.5.1 fats and oils 3.5.2 phospholipids 3.5.3 waxes 3.5.4 steroids	**Mental map about Lipids and their characteristics**		

	3.6 Proteins **3.6.1 amino acids** **3.6.2 peptide bond** **3.6.3 peptides and polypeptides** **3.6.4 protein structure** **3.6.5 classification by its function**	**Proteins and its most important characteristics Synoptic table**		
	3.7 Nucleic acids **3.7.1 Pyramidic and pyramidic bases** **3.7.2 Nucleosides** **3.7.3 Nucleotides** **3.7.4 Ribonucleic acid** **3.7.5 Deoxyribonucleic acid**	**presentation in power point, about the nucleic acids from the chemical point of view**		

17. Performance assessment:

Performance evidence(s)	Performance criteria	Application scopes	percentage
-Team presentation with presentations in power point, of matter, atoms and molecules, chemical bond and compounds	**Rubric instrument determined for each product, with the indicators of:** **- quality** **- sufficiency** **- congruency** **- consistency**	**- local** **- regional** **- national** **- international**	**10%**
-Exercises of chemical equations and balancing of each case			**10%**
-Team presentation **- solution concentration calculation exercises**			**10%**

-mental map with the definition, nomenclature, characteristics and examples of Alkanes, Alkenes and Alkynes			10%
-Team presentation, in power point, of the functional groups -Comparative table of the different functional groups			20%
-Conceptual map of the different inorganic molecules of biological importance			6%
-Summary of Carbohydrates and its characteristics			6%
-Mental map about Lipids and their characteristics			6%
-Synoptic table of Proteins and its most important characteristics			6%
-Presentation in power point, of the nucleic acids from the chemical point of view			6%

18. Evaluation criteria:

Criterion	Value

Formative Evaluation	**10% values (respect, responsibility and honesty)** **10% attitudes (participation, organization, perseverance and personal presentation)** **5% skills (for listening, leadership, for written communication, to gather information)** **30% evidence of performance (indicated in point 17, of this Program, for each of the 3 Modules)**
Summative evaluation	**20% written exam**
Criteria summation	**100%**

19. Accreditation

The Learning Unit is accredited, if the student presents all the evidences of performance, if the attendance to the course is greater than 80%, and if the sum of evaluation criteria is 60 or greater

20. Information sources

Basic	1. Burns, R. A., Fundamentos de Química. Edit. Pearson. México 2003. 2. Chang, R., Química. Edit. Mc-Graw Hill. México, 2007. 3. JEAN B. UMLAND; JON M. BELLAMA Química General, International 4. Thomson Editores. Mexico, 2000.
Complementary	1. Juan Carlos de Kuyper. Química del medio ambiente. Edit. Alfaomega. 2ª Edición. 2. ColinBaird. Química ambiental. Edit. Reverté. España. 2001. 3. Hermenegildo García Gómez. Bases de la Química orgánica Industrial. Universidad politécnica de Valencia. 2005.

21. Profile for the teacher who imparts this learning unit

- **Have a bachelor's degree in Forest Science, Environmental Management, Ecology, Biology, or related area.**
- **Preferably with a Master's or Doctorate degree.**
- **Professional university experience as a teacher in front of a group.**
- **Availability to work as a team**
- **Availability to work in the competency-based model.**