



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		
Biochemistry			2751		
3. Academic Unit					
FORESTRY SCIENCES FACULTY					
4. Academic programme			5. Level		
Environmental Management Engineering			Higher		
6. Training Area					
Basic					
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					
Have passed: Chemistry, Biology and Mathematics.					

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. María Angélica Martell Nevárez				
12. Date of development	Date of modification		Date of approval	
04/10/2013	06/10/2017 Dra. María Angélica Martell Nevárez		28/09/2015 12/10/2017	

II. LEARNING UNIT SPECIFIC DATA	
13. Presentation	
<p>This learning unit is located in the second cycle of the Environmental Management Engineering Educative Program and comprises a total of 5 credits. In this learning unit it is intended that the student deepens in that knowledge of Biochemistry, analyses and understands the structures and characteristics that allow to distinguish biomolecules, relating them to the chemical reactions involved in the main metabolic processes in which they participate, acquiring, skills and abilities that allow their later application in Engineering for the resolution of environmental problems with a sense of social responsibility within a framework of sustainable development. The subject has a mixed theoretical-experimental character, since it allows to know the basic structures and the function of the biomolecules involved in the processes of every living being and this knowledge is reaffirmed in the practical part, in what refers both to the resolution of problems that involve these concepts through the development of exercises, laboratory practices and projects. In the Educational Plan of Environmental Management Engineering, Biochemistry serves as the basis for the subjects of Physic-chemistry, Microbiology, Biotechnology, Environmental Toxicology Environmental, Health and Environment, Air Pollution, Soil Pollution, Water Pollution, Instrumental Analysis, Pollutants Management, Solid waste management, Hazardous waste management, Water quality and treatment and Soil bioremediation. In addition to being related to specific areas such as: Physics, Mathematics, Thermodynamics.</p>	
14. Integral professional competences to develop in the student	
Generic competences	<p>Instrumental</p> <ul style="list-style-type: none"> - Analysis and synthesis - Oral and written communication skills - Knowledge of a foreign language <p>Personal</p> <ul style="list-style-type: none"> - Capability of teamwork <p>Systemic</p>

	<ul style="list-style-type: none">- Motivation for quality- Ability to apply theoretical knowledge in practice			
Professional competences	Disciplines <ul style="list-style-type: none">- Basic general knowledge of environmental engineering- Ability to approach environmental problems in a multidisciplinary way			
General purpose of the course	The student is able to understand, handle and correctly apply the fundamental concepts of Biochemistry, which allow him to understand in a reasonable, analytical, systematic and integral way the organic compounds and their reaction mechanisms to know the environmental impacts that they generate as well as to identify possible alternatives to solve problems in relation to them.			
15. Joint of axes				
Research, Ethics, Values, Environmental education, Languages and disciplinary fields of environmental sciences				
16. development of the course				
Module 1	Fundamentals of biochemistry			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Understanding the main concepts of biochemistry and identifies how different sciences have participated in the development of this science	Basic concepts and biomolecules	Glossary of basic concepts in the area of biochemistry	Research in at least 3 bibliographical sources of concepts related to the area of biochemistry	Computer, internet, marker for white-board, projector, multimedia presentations, referred bibliography.
	Fundamentals of biochemistry: chemical, physical, biological, genetic and evolutionary	Mental map of the different foundations	Reading and analysis of The chapter on the fundamentals of biochemistry in Lehninger's book	

Module 2	Water the middle of life			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Analyse and Recognize the importance of water in different biochemical processes	Importance of water in biological processes The biological solvent water Chemical and physical properties of water Ionization and pH Buffer solutions	Summary of the main aspects of water. Problem solving and laboratory practice for pH measurement. Problem solving and laboratory practice for preparing buffer solutions	Reading, analysis and synthesis of the water theme Presentation of the teacher on the subject	Computer, internet, White-board, marker for white-board, projector, multimedia presentations, referred bibliography.
Module 3	Carbohydrates			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Identify and classify carbohydrates and relate them to different living beings	General, Classification characteristics and properties of carbohydrates	Presentation pptx Conceptual map	Reading, analysis and transfer of information	Computer, internet, white-board, marker for white-board, projector, multimedia presentations, referred bibliography.
	Chemical reactions of carbohydrates	Laboratory practice on identification of carbohydrates	Presentation of the teacher on the subject	
	Carbohydrate metabolism	Presentation pptx Conceptual map	Presentation of students on the main metabolic pathways	

Module 4	Lipids			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Analyses the impact of lipids on the environment and classifies them according to their chemical structure	Generalities, Classification and characteristics of lipids	Presentation pptx Conceptual map	Reading, analysis and transfer of information.	Computer, internet, White-board, marker for white-board, projector, multimedia presentations, referred bibliography.
	Chemical reactions of lipids	Laboratory practice on lipid extraction	Presentation of the teacher on the subject	
	Lipid metabolism	Presentation pptx Conceptual map	Presentation of students on the main metabolic pathways	
	Lipids and environment	Presentation pptx on an article that shows the relationship of lipids with the environment	Search, analysis and interpretation of information on the relationship of lipids and the environment	
Module 5	Amino Acids, Peptides and Proteins			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Identify and classify different types of proteins according to their structure	Concepts, structure and classification	Presentation pptx Conceptual map Laboratory practice Design of a protein (mock-up)	Reading, analysis and transfer of information.	Computer, internet, white-board, marker for white-board, projector, multimedia presentations, referred bibliography.
	Characteristics and properties			
Module 6	Enzymes			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials

Knows basic concepts of enzymes and understands the use of these as an alternative in the solution of environmental problems	Concept, structure and classification	Presentation pptx Enzyme Summary	Reading, analysis and transfer of information.	Computer, internet, white-board, marker for white-board, projector, multimedia presentations, referred bibliography.
	Components of the enzymatic system			
	Regulation of enzymatic reactions			
	Factors that affect enzymatic activity			
	Importance of enzymes in the environment			
	Importance of enzymes in the environment		Discussion forum: The enzymatic application as an alternative in the solution of environmental problems	
Module 7	Nucleic acids			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Know, understand and represent the nucleic acids and the processes in which they are involved	Basic concepts, Classification and structure Biological functions replication, transcription and translation	Presentation pptx DNA model	Reading, analysis and transfer of information. Article by Watson and Crick	Computer, internet, white-board, marker for white board, projector, multimedia presentations, referred bibliography.
17. Performance assessment:				
Performance evidence(s)	Performance criteria		Application scopes	percentage

<ul style="list-style-type: none"> - Glossary of concepts - Mental maps - Summary - Presentation pptx 	<ul style="list-style-type: none"> - Punctuality - Quality (Presentation): Cover, objective of the work, numbering of the page, individual conclusion, bibliography. - Congruence (content sequence) - Relevance (information regarding the requested topics). - Spelling. 	Social, business, governmental sector: local, regional, national and international	<ul style="list-style-type: none"> - Formative evaluation 60% - Summative evaluation 20% - Self-evaluation 5% - Co-evaluation 10% - Heteroevaluation 5%
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18. Evaluation criteria:

Criterion	Value
Formative Evaluation	60% Exercises, presentations, internship reports are considered.
Summative evaluation	20% The exam grade is considered.
Criteria summation	80%

19. accreditation

The accreditation of the learning unit is aligned with the provisions of the regulations of the Forestry Sciences Faculty. It is necessary to approve with a minimum of 6.0. The student who has obtained a minimum final average of 8.5 (eight point five) and 80% attendance, will be exempt from presenting ordinary exam.

20. Information sources

Basic	<ul style="list-style-type: none"> - Elson, D.L. y Cox, M.M. (2013). Lehninger Principles of Biochemistry. 6ª edición. Ed. Omega - Champe Pamela C. (2008). Biochemistry.Ed. Lippincott. 4ª Ed. - Hicks Gómez J.J. (2007). Biochemistry.Editorial McGraw Hill. 2ª Ed.
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	<ul style="list-style-type: none"> - Mathews, C.K., Van Holde, K.E. y Ahern, K.G. (2002). Biochemistry. 3ª edición. Ed. Addison Wesley/Pearson Education. Madrid. - McKee, T. y McKee J. R. (2003). Biochemistry. The molecular basis of life. 3ª edición. Ed. McGraw-Hill - Koolman, J. y Rohm, K.H. (2004). Biochemistry. Text and atlas. 3ª ed. Ed. Médica Panamericana - Trudy, McKee. (2003). Biochemistry: The molecular basis of life. Editorial Mc Graw Hill. - Voet, E. (1992). Biochemistry Editorial Omega.
Complementary	<ul style="list-style-type: none"> - Smith, C., Marks, A.D., Lieberman, M. (2005). Basic biochemistry. Marks. A clinical approach. 2ª edición. Ed. McGraw-Hill. - Devlin, T. M. (2004). Biochemistry. A text with clinical applications 4ª ed. Ed. Reverte
21. Profile for the teacher who imparts this learning unit	
<ul style="list-style-type: none"> - University Degree with Master's or Doctorate in Chemistry, Biochemistry, Molecular Biology or related area. - Professional university experience as a professor in the area. - Teaching experience with the management of large groups. - Laboratory experience - Good interpersonal and communication relationships. - Ability to work in a team. - Ability to work under pressure. 	