



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			
Ecology		3447			
3. Academic Unit					
FORESTRY SCIENCES FACULTY					
4. Academic programme			5. Level		
Environmental Management Engineering			Bachelor's degree		
6. Training Area					
Discipline					
7. Academy					
Basic and Methodological Sciences					
8. Modality					
Mandatory	X	Course		Attendance	X
Elective		Course-workshop	X	Non-attendance	
		Workshop		Mixed	
		Seminar			
		Laboratory, field practice, etc.			
		Professional Practice			
		Academic Stay			
9. Pre-requirements					
Have completed the Computer Learning Unit					
Have completed the Creative and Critical Thinking Skills learning unit					

Have completed the Reading and Writing learning unit				
10. Theory hours	Practice hours	Independent study hours	Total hours	Credits
4	0	0	4	4
11. Names of the teachers who participated in the development and/or modification of the programme				
Dra. Laura Isabel Rentería Arrieta				
12. Date of development	Date of modification		Date of approval	
05/11/2014	06/10/2017		12/10/2017	

II. LEARNING UNIT SPECIFIC DATA	
13. Presentation	
<p>Under the new educational model of the curriculum of the UJED, the Ecology learning unit seeks that the student of the Environmental Management Engineering acquires the integral professional competences that allow him to apply the basic knowledge of the structure, the operation and the dynamics of the ecosystems, and to base the current problems in the care of the environment and health; as well as acquiring the necessary skills to gather information and analyse it, and have the capability to make rational decisions in favour of a sustainable use that allows adapting the use of natural resources in a way that avoids its degradation, and is possible its restoration, and / or ensure its equilibrium within the framework of an exploitation compatible with the integral development of the current man and future generations. In addition, the student will acquire an attitude of responsibility and respect for the use and management of natural resources and the environment, and learn to collaborate with other people and perform team work.</p>	
14. Integral professional competences to develop in the student	
Generic competences	<p>1) Instrumentals Capability for analysis and synthesis Oral and written communication skills Ability to manage information Problem resolution Decision making</p> <p>2) Personal Teamwork Ethical and quality commitment</p> <p>3) Systemic Motivation for quality Ability to apply theoretical knowledge in practice</p>

	Ability to communicate with non-experts in the field			
Professional competences	1) Consultancy and evaluation of environmental impact: The graduate provides consulting services and strategic evaluation to companies and institutions regarding environmental impact based on ethical and sustainability criteria.			
General purpose of the course	That the student acquires the necessary tools for an adequate knowledge and understanding of the integral functioning of an ecosystem that leads to a better use, management and conservation of natural resources.			
15. Joint of axes				
This learning unit articulates the transversal axis of Ethics and Values to encourage reflection on the performance that graduates must present in the exercise of the profession, in addition to strengthening the ability to participate freely and responsibly in social coexistence activities; Likewise, it articulates the transversal axis of environmental, since during the entire training process, students must appropriate and develop an environmental awareness that allows them to live and coexist in harmony with their environment. In addition, this learning unit is the base of the curricular line of Natural Resources Management.				
16. development of the course				
Module 1	HISTORY AND FOUNDATIONS			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials

Synthesize the history of the emergence of the importance of Ecology, and name the different divisions of it, and the branches into which it is divided.	<ul style="list-style-type: none"> - Background - Definition of concepts - Importance of Ecology - Generalities of the Ecosystem 	<ul style="list-style-type: none"> - Summary by team - Written presentation of a conceptual map. - Written and electronic presentation of a synthesis. - Written presentation of the questionnaire answered. 	<ul style="list-style-type: none"> - Prepare a summary based on a video presented in class - Make related readings: History and Evolution of Ecology (pdf document provided in class). They answer a questionnaire. - They investigate in specialized electronic sources (it is suggested www.posgrado.unam.mx) Information related to the historical development of Ecology and its importance. 	Computer equipment, Video projector, Material of the proposed complementary, Bibliography, Internet and Videos.
Module 2	ORGANISMS AND ENVIRONMENT			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials

Recognize the resources that have the means to sustain life, and point out the adaptation that organisms have had to the environment in which they develop, as well as their evolution.	<ul style="list-style-type: none"> - Environmental conditions that sustain life - Adaptation of organisms to the environment - Environmental principles - Limiting factors in the distribution of organisms - Habitat and ecological niche 	<ul style="list-style-type: none"> - Electronic presentation of the morphological adaptations found in each Physiographic Region of the State of Durango, represented in the botanical garden of the Institute of Forestry and Wood Industry ISIMA-UJED. - Electronic presentation of topics of scientific journals on environmental principles (Law of minimum and tolerance). - Electronic presentation of six examples (three of flora and three of fauna) of similar niches with ecological equivalents, of fundamental and realized niche. 	<ul style="list-style-type: none"> - They make a guided visit to the botanical garden facilities of the Institute of Forestry and Wood Industry ISIMA-UJED and review in living material the main adaptations of the plants of the four Physiographic Regions of the State of Durango. - They investigate specialized electronic sources (we suggest www.uaeh.edu.mx; www.veterinaria.org; www.chapingo.mx; www.cienciorama.unam.mx) information related to each of the learning contents. 	Computer, internet, paintbrush, paintbrush down, projector, videos, field practice manual and scientific journals.
Module 3	INTERACTIONS BETWEEN ORGANISMS AND POPULATIONS			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials

Identify the relationships that exist between organisms; also, distinguish those that are given from the organisms with the environment; and to indicate the demographic dynamics of the populations.	<ul style="list-style-type: none"> - Limitation by resources - Types of interactions - Attributes of the population - Temporal evolution of the populations - Modalities of growth - Fluctuations 	<ul style="list-style-type: none"> -Electronic presentation of the Biotic Interactions. -Electronic presentation of Population Dynamics. -Electronic presentation of the topics Life cycles, Demography, Life tables and Survival curves. -Written and electronic presentation of a synthesis. 	<ul style="list-style-type: none"> - They perform related readings: Biotic Interactions (pdf document provided in class); Population dynamics (pdf document provided in class); Landscape Ecology (pdf document provided in class). - They investigate specialized electronic sources (we suggest www.uv.mx - theme Population Dynamics) 	Computer, internet, paintbrush, paintbrush down, projector, videos and scientific journals.
Modulo 4	STRUCTURE AND DEVELOPMENT OF THE COMMUNITIES			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Distinguish the dynamics of the communities; in the same way, determine the diversity of ecosystems; and describe the disturbances that may occur in them.	<ul style="list-style-type: none"> - Communities - Spatial distribution of communities - Composition of the community - Characters of plant communities - Diversity indexes - Temporal dynamics of the communities - Disturbances 	<ul style="list-style-type: none"> - Electronic presentation of the Dynamics of Communities and Landscape Ecology. - Electronic presentation of scientific articles related to the topics. - Report on field practice. - Written and electronic presentation of the results obtained with the data taken in the field. 	<ul style="list-style-type: none"> - They perform related readings: Dynamics of Communities (pdf document provided in class); Landscape Ecology (pdf document provided in class). - They make readings of scientific articles related to the distribution and composition of the communities. - Carry out a field practice to determine the spatial distribution and composition of a 	Computer, internet, paintbrush, paintbrush down, projector, videos, field practice manual and scientific journals.

			community; as well as diversity indexes.	
Modulo 5	OPERATION AND CLASSIFICATION OF THE ECOSYSTEM			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Determine the structure; and distinguish the dynamics that take place in ecosystems; as well as recognize the different types of biomes and regionalization of the planet.	<ul style="list-style-type: none"> - Nets and trophic chains - Productivity - Energy transfer - Nutrient cycles - Ecological pyramids - Ecosystem and biomes - Ecological regionalization of the planet 	<ul style="list-style-type: none"> - Electronic presentation of the nutrient cycles and ecological regionalization of the planet. - Electronic and written presentation of the flow of energy in ecosystems. 	<ul style="list-style-type: none"> - They perform related readings: Ecosystem Services (pdf document provided in class). - Investigate specialized electronic sources (we suggest www.agro.uba.ar, www.cec.org, www.cienciorama.unam.mx) information related to the functioning and classification of the ecosystem. 	Computer, internet, paintbrush, paintbrush down, projector, videos, field practice manual and scientific journals.
Modulo 6	APPLIED ECOLOGY: CARING FOR THE ENVIRONMENT AND HEALTH			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Recognize the fields of application of knowledge	<ul style="list-style-type: none"> - Sustainable development, pollution and conservation - Management and exploitation of natural resources - Control and 	<ul style="list-style-type: none"> - Written and electronic presentation of a case study in relation to pest control and management. - Written and electronic presentation of a case study in relation to bioaccumulation and biomagnification. - Report of the field practice. - Report of the laboratory practice. 	<ul style="list-style-type: none"> - They perform related readings. - They carry out a field practice on the river "El Tunal". - They carry out a practice with water samples in the Environmental Management 	Computer, internet, paintbrush, paintbrush down, projector, videos, manual field and laboratory practices, scientific journals, material and chemical reagents.

	management of pests and weeds - Level of economic damage and threshold of actions - Main types of pollutants in the environment - Bioconcentration and biomagnification - Pollution assessment and diagnosis - Bioindicators - Response of biota to environmental stress - Ecological indices to quantify environmental deterioration - Pollution in Terrestrial and Aquatic Ecosystems	- Written and electronic presentation of the results obtained with the data taken in the field and with laboratory work.	Engineering laboratory. - They investigate specialized electronic sources (it is suggested www.fusda.org , www.unicauca.edu.co , www.datateca.unad.edu.co , www.orton.catie.ac.cr , www.repositoriodigital.ipn.mx www.cienciorama.unam.mx) information related to learning content	
Modulo 7	ECOLOGY AND CONSERVATION			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Identify the bases of conservation, as well as the inherent stability of	- The ecological bases of conservation	- Electronic and written presentation of each of the learning contents.	- They perform related readings. - They investigate	Computer, internet, paintbrush, paintbrush down, projector, videos

ecosystems, and analyse the conservationist problem of species and their possible solutions.	<ul style="list-style-type: none"> - Conservation biology - Intrinsic and utilitarian value of biodiversity - Biodiversity and stability of ecosystems - Historical and recent extinction rates - Conservation of organisms and ecosystems 		specialized electronic sources (www.biodiversidad.gob.mx ; www.conanp.gob.mx ; www.conabio.gob.mx) Information related to the conservation of organisms and ecosystems.	and scientific journals.
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17. Performance assessment:

Performance evidence(s)	Performance criteria	Application scopes	Percentage
Learning products	Characteristics that the learning product must have: Relevance (delivery in time and form) Quality Content sufficiency Existence Congruence Coherence	Normative sector Social sector Productive sector	Formative evaluation (10%) Summative evaluation (70%) Self-evaluation (5%) Coevaluation (5%) Heteroevaluation (10%)

18. Evaluation criteria:

Criterion	Value
Formative Evaluation	The values of the student (truthfulness, tolerance, respect, honesty, commitment, punctuality, etc.) 10%
Summative evaluation	Quality and form of its products (content, spelling, writing, organization, delivery on specified date, etc.) 70%

Selfevaluation	The student becomes aware of his learning process and takes responsibility for it. 5%
Coevaluation	It is a joint assessment of the performance of the team, based on evaluation criteria or indicators established by consensus. 5%
Hetereoevaluation	It is an assessment that a person makes to another about what they have done; it can be from the teacher to the student or vice versa. 10%
Criteria summation	100%
19. accreditation	
<p>The student accredits if he takes a 6.0 grade.</p> <p>The student will exempt the ordinary exam if he obtains a semiannual average of 8.5.</p> <p>It is necessary that the student attends at least 80% of the theoretical classes.</p> <p>Attendance at practices is mandatory.</p>	
20. Information sources	
Basic	<p>Equihua, M. and G. Benítez. 1991. Dynamics of Ecological Communities. Ed. Trillas. 2a. ed. 120 P.</p> <p>Grime, J. 1982. Adaptation Strategies of Plants and Processes that Control Vegetation. Ed. Limusa. 1st ed. 291 P.</p> <p>Granados, D. and R. Tapia. 1990. Vegetable Communities. University Notebooks Collection. Agronomy Series No.19. Univ. Autonomous Chapingo. Ed. College of Postgraduates. 1st ed. 235 P.</p> <p>Krebs, Ch. 1985. Ecology: Study of Distribution and Abundance. Ed. Harla. 2a. ed. 753 P.</p> <p>Nebel, B. and R. Wright. 1999. Environmental Sciences: Ecology and Sustainable Development. Ed. Pearson. 6th. ed. 698 P.</p> <p>Odum, E. 1995. Ecology. Ed. McGraw-Hill. 3rd ed. 639 P.</p> <p>Ondarza, R. 1997. Ecology. The man and his environment. Ed. Trillas. 1st ed. 248 P.</p> <p>Primack, R. and R. Rozzi; P. Feinsinger; R. Dirzo; F. Massardo. 2001. Fundamentals of Biological Conservation: Latin American Perspectives. Fondo de Cultura Económica, Mexico. 797 P.</p> <p>Ricklefs, R. 1990. Ecology. Ed. Freeman and Company. 3rd ed. 895 P.</p> <p>Van Dobben, W. and R. Lowe-McConnel. 1980. Unifying Concepts in Ecology. Ed. Blume. 1st ed. 397 P.</p>
Complementary	<p>Broker, J. y J. Zar, C. Von Ende. 1990. Field and Laboratory Methods for General Ecology. Ed. Brown Publishers. 3era. ed. 237 P.</p> <p>Emmel, T. 1975. Ecología y Biología de las Poblaciones. Ed. Interamericana. 1era. ed. 182 P.</p> <p>Franco, J. 1989. Manual de Ecología. Ed. Trillas. 2a. ed. 265 P.</p> <p>Gilbert; Gutiérrez; Frazer y Jones. Relaciones Ecológicas. Colec. Blume Ecología. 1era. ed. 152 P.</p>

Harald, S. Ecología y Protección de la Naturaleza. Conclusiones Internacionales. Colec. Blume Ecología. 1era. ed. 480 P.
Sutton, B. y P. Harmon. 1989. Fundamentos de Ecología. Ed. Limusa. 10ª. ed. 293 P.

Main international journals that can be consulted for ecological issues:

American Naturalist
Biodiversity and Conservation
Biological Conservation
Biotropica
Bird Conservation International
Canadian Journal of Zoology
Conservation Biology
Conservation Biology in Practice
Conservation Ecology
Ecography
Ecology
Ecological Applications
Ecological Research
Environmental Conservation
Evolution
Functional Ecology
Journal of Animal Ecology
Journal of Applied Ecology
Journal of Biogeography
Journal of Wildlife Management
Nature
Oecologia
Oikos
Science
Trends in Ecology and Evolution

	<p>Links in the net that can be consulted for ecological terms: CONSERVATION BIOLOGY NETWORK. It includes the links to virtual libraries of biodiversity and ecology, resources for students of biology, conservation, educational projects and environmental programmes directory, etc.</p> <p>List of electronic sites of interest for the ecologists: ESRI CONSERVATION PROGRAM NATIONAL GAP ANALYSIS PROGRAM GENETIC RESOURCES CONSERVATION PROGRAM Biodiversity Information Network - BIN21 EcoNet Home Page EnviroLink</p>
21. Profile for the teacher who imparts this learning unit	
<p>Doctorate with specialization in Natural Resources Management. University professional experience as a professor in the area. Field experience Ability to work in a team. Ability to work under pressure.</p>	

