



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			
Solid Waste Management		8500			
3. Academic Unit					
FORESTRY SCIENCES FACULTY					
4. Academic programme			5. Level		
Environmental Management Engineering			Higher Bachelor's degree		
6. Training Area					
Discipline					
7. Academy					
Environmental management					
8. Modality					
Mandatory	X	Course	X	Attendance	X
Elective		Course-workshop		Non-attendance	
		Workshop		Mixed	
		Seminar			
		Laboratory, field practice, etc.			
		Professional Practice			
		Academic Stay			
9. Pre-requirements					

1.Be registered.

2.Having studied the Learning Units: Ecology, Health and Environment and Environmental Legislation.

10. Theory hours	Practice hours	Independent study hours	Total hours	Credits
3	3	0	5	5
11. Names of the teachers who participated in the development and/or modification of the programme				
Juan Carlos Herrera Cárdenas				
12. Date of development		Date of modification	Date of approval	
10/07/2015		08/02/2017	0/03/2017	

II. LEARNING UNIT SPECIFIC DATA

13. Presentation

Characterization of the Learning Unit

Nowadays, the amount of solid waste worldwide grows rapidly due, in the

First place, to the increase in population and, secondly, to technological advances aimed at satisfying new consumption habits, often unnecessary. This reality obliges us to Elaborate standards and to develop practices based on sustainable criteria that contemplate the economic, social And environmental aspects, in order to carry

Out an Integral Management of Wastes in which it is highlighted , the sweep, collection, use and final disposition of them. This learning unit brings to the profile of the Engineering Environmental Management an overview of environmental pollution by waste and the role of Engineering in prevention and control. It provides you with the tools to design and implement integral waste management plans applying current legislation.

Didactic intention.

The learning unit is organized in four modules, grouping the conceptual contents in each of them.

The first module allows the student to know the environmental problem due to residues at a local, regional and global level, as well as an overview of the consumption and generation of waste, calculating their ecological footprint by consumption.

The second module provides the necessary tools to propose solutions for the management and final disposal of solid urban waste and special management.

The third module refers to the recovery and characterization of waste, includes the concept of recycling and its environmental, economic and social implications, considering the technologies applied to the recycling of different types of waste, aerobic and anaerobic treatments of

organic matter.

The fourth module provides the student with an overview of the Environmental Legislation on Solid Waste and its Official Standards. The Solid Waste Management Learning Unit, under the competency approach, suggests various learning strategies that promote the development of skills or experimentation, such as: researching the literature, making diagnoses, performing calculations, solving exercises and problems, and developing designs for sanitary landfills. The learning strategies necessary to make learning more meaningful and effective, some of the suggested activities can be done as an independent study activity to later carry out the discussion in class. In the course of the programmed activities of this learning unit, it is necessary to emphasize the importance of the students' assessment of the activities, that they understand that they are building their future work and consequently act in a professional manner; with responsibility and ethics.

14. Integral professional competences to develop in the student

Generic competences	Instrumental 1 Analysis and synthesis capability 2 Capability for oral and written communication 4 Information management capability 5 Troubleshooting 6 Decision making Personal 7 Team work 8 Ethical and quality commitment Systemic 9.- Motivation for quality 10.- Ability to apply theoretical knowledge in practice.
Professional competences	Management and management of soil quality and treatment.- The graduate designs and manages soil bioremediation programs. Disciplinary (know) • Basic general knowledge of environmental engineering. • Ability to approach environmental problems in a multidisciplinary way • Qualitative data interpretation. • Capability Environmental management. • Quality Management Systems

	Professionals (know how) Design and application of sustainability indicators Planning and management of waste disposal and control Treatment of contaminated soil			
General purpose of the course	General: Identify the different aspects of the environmental problem by waste, classifying the sources contaminants, know the methodology to carry out an Integral Management of Solid Waste contemplating the current regulations. Specific: Applies the basic concepts to identify, and characterize the residues, know the operating principles of the different treatments applied for supervising and control, and propose the appropriate methods for the handling, treatment and final disposal of the same. - Distinguish the most relevant aspects of the environmental problem due to waste, both locally, regionally and globally. - Applies the different methodologies for the development of basic diagnoses of urban solid waste and special handling. - Plans Comprehensive Urban Solid Waste Management Systems, their valuation from the economic, social and environmental point of view - Design regularization plans and final disposal sites for solid waste.			
15. Joint of axes				
The learning unit articulates social responsibility and commitment to the preservation of the environment; with the environmental quality management systems and audits, as well as with the consultancy and evaluation of the environmental impact. In order to grant the student the competences for the analysis and evaluation of the compliance levels of the Environmental Legislation.				
16. development of the course				
Module 1	The problem of waste			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials

Distinguishes the most relevant aspects of the environmental problem by waste, both locally, regionally and globally	- Problems and Waste Situation at international and national level - Ecological footprint	- Development of a Summary of the projected videos of National Geographic (The Human Foot Print) emphasizing the waste generated by the human - Calculation of the Ecological Footprint Calculate your ecological footprint on the www page. Footprint calculator	Discussion Forum 1. The problem of solid waste? Discussion Forum 2 What is the ecological footprint'. Collaborative learning and case study.	Anthology - Class presentations - Video projection - Articles - Website www.footprintcalculator.org
Module 2	Waste Management Urban Solids and Special Management			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Applies the different methodologies for the development of basic diagnoses of urban solid waste and special handling	Overview of solid urban waste and special handling. - Characterization and Classification of Solid Residues - Generation of RSU and special handling - Storage. - Swept - Collection of	Diagnosis of the characterization and generation of the waste generated in the institution. Group presentation on the characterization of solid waste.	Discussion Forum 3. What is waste? Discussion Forum 4 What are the special handling waste? Case Study and Collaborative Learning	Anthology - Class presentations - Video projection - Articles

	MSW and Special Management • Transfer stations. • Final disposition. • Minimization of Urban Solid Waste and Special Management			
Module 3	Valorisation of Solid Waste.			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Plans Comprehensive Urban Solid Waste Management Systems, their valuation from the economic, social and environmental point of view	Separation and recycling concept and its environmental, economic and social implications. • Physical treatments of urban solid waste. • Technologies applied to the recycling of: glass,	3R Project. It consists of carrying out a project that, based on a solid waste, prepare a reuse proposal	Discussion Forum 5. How can we take advantage of waste? Discussion Forum 6 What are the 3R? Project Based Learning (PBL)	• Anthology • Class presentations • Video projection • Articles

	paper and cardboard, aluminium, plastic, tetra pack and ferrous metals. Aerobic and anaerobic treatment of organic matter. •Fundamentals of composting and worm composting. •Fundamentals of the processes of anaerobic digestion and incineration of MSW. •Industrial, commercial and social aspects of generation of RSU. •Legal aspects of co-responsibility. • Replacement of common			
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	probiodegradable materials			
Modulo 4	Legal Aspects of the Integral Management of Solid Residues			
Intended learning	Learning contents	Learning product(s)	Strategies	Teaching resources and materials
Design regularization plans and final disposal sites for solid waste.	• General Law for the Prevention and Integral Management of Waste. • Official NOM'S	• Project of a Final Disposal Site for Waste.	Discussion Forum 7. What is the Integral Waste Management? Discussion Forum 8, What is an NOM? Project Based Learning (PBL)	• Anthology • Class presentations • Video projection • Articles
17. Performance assessment:				
Performance evidence(s)	Performance criteria		Application scopes	percentage
• Learning activities • Presentations	Contain the requested according to the instructions • Congruence of the preliminary project		Institutional • Local	25% 25%

• Diagnosis • Draft	• Quality in the Presentation • Relevance	• Regional • National	25%
18. Evaluation criteria:			
Criterion	Value		
Formative Evaluation	20% Responsibility, commitment, tolerance, ethics, values, participation		
Summative evaluation	50% The development and presentation of the products		
Self evaluation	10% The student values their performance, compares it with the established and determines what objectives met successfully.		
Co evaluation	10% Students value their peers and apply the values of respect, tolerance and honesty		
Heteroevaluation	10% Students value the work of the teacher and the teacher values the students		
Criteria summation	100%		
19. accreditation			
The Learning Unit is accredited, if the student presents the evidences of performance with sufficiency. The minimum qualification to be accredited is a 6.0 includes the attendance (minimum 80%), the qualification of the preliminary project and its participation in group work and independent study.			
20. Information sources			
Basic	OFFICIAL GAZETTE OF THE FEDERATION .Oct of 2015. General Law for the Prevention and Integral Management of Waste. Esquinca Cano Froilán, Escobar Villagrán José Luis, Hernández López Agustín, Villalobos Maldonado Juan José Characterization and Generation of Solids Residues of Tuxtla Gutierrez, Chiapas. OFFICIAL JOURNAL OF THE FEDERATION (1985). Mexican Standard NMX-AA-15-1985, Protection to the Environment-Soil Pollution-Municipal Solid Waste- Quartering Method. OFFICIAL JOURNAL OF THE FEDERATION (1985). Mexican Standard NMX-AA-19-1985, Protection to the		

	Environment-Soil Pollution-Municipal Solid Waste-Volume Volume "In Situ". OFFICIAL JOURNAL OF THE FEDERATION (1985). Mexican Standard NMX-AA-22-1985, Protection to the Environment-Soil Pollution-Municipal Solid Waste- Selection and Quantification of Byproducts OFFICIAL JOURNAL OF THE FEDERATION (1985). Mexican Standard NMX-AA-52-1985, Protection to the Environment-Soil Pollution-Municipal Solid Waste- Sample Preparation in the Laboratory for its Analysis. OFFICIAL JOURNAL OF THE FEDERATION (2015). General Law for the Prevention and Integral Management of Waste. OFFICIAL JOURNAL OF THE FEDERATION (1985). Mexican Standard NMX-AA-16-1985, Protection to the Environment-Soil Pollution-Municipal Solid Waste-Moisture Determination. OFFICIAL JOURNAL OF THE FEDERATION (1985). Mexican Standard NMX-AA-18-1985, Protection to the Environment-Soil Pollution-Municipal Solid Waste-Ash Determination. OFFICIAL JOURNAL OF THE FEDERATION (1985). Mexican Standard NMX-AA-25-1985, Protection to the Environment-Soil Pollution-Municipal Solid Waste- Determination of PH-Method Potentiometric Jiménez Martínez N. M. (2014) .- The integral management of urban solid waste in Mexico: between the intention and the reality. College of Mexico. HONDUPALMA (2011) .- Solid waste management A guide for HONDUPALMA partners and staff, Design: Comunica Chávez Vasavilbaso A. Solid Waste Management in Mexico.
Complementary	Semarnat.gob.mx
21. Profile for the teacher who imparts this learning unit	
• Have a Bachelor's degree, preferably a Master's or Doctorate • Basic knowledge about the discipline: Forest Science Engineering, Agronomist Specialist in Forestry, Environmental Engineer. • Professional university experience as a teacher in front of a group • Ability to work in team. • Knowledge about the Educational Program of Engineer in Environmental Management with focus on Competencies.	

- Knowledge of the Educational Model of the UJED.
- Have completed the Diploma in Competences for the New Educational Model of the UED.
- Have completed the Diploma in Tutorials.
- Develop the ability to coordinate and work as a team; guide the work of the student and empower him autonomy, cooperative work and decision making.
- Show flexibility in the follow-up of the training process and encourage interaction among students. Take into account the knowledge of students as a starting point and as an obstacle to the construction of new knowledge.
- Develop learning activities that promote the application of the concepts, models and methodologies that are being learned in the development of the Learning Unit
- Promote metacognition activities. Before the execution of an activity, indicate or identify the type of intellectual process that was performed: an identification of patterns, an analysis, a synthesis, the creation of a heuristic, etc.
- Propose problems that allow the student to integrate the contents of the subject and between different subjects, for their analysis and solution
- Promote activities of search, selection and analysis of information in different sources
- Relate the contents of this learning unit with the rest of the Educational Program to develop an interdisciplinary vision in the student.
- Encourage the development of intellectual abilities related to reading, writing and oral expression.