# 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** |
|---|---|
| Digital Cartography | 6302 |
| **3. Academic Unit** | |
| ***FORESTRY SCIENCES FACULTY*** | |
| **4. Academic programme** | **5. Level** |
| Environmental Management Engineering | **Higher** Bachelor's degre |
| **6. Training Area** | |
| Disciplinary | |
| **7. Academy** | |
| 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 completed and passed: Mathematics, Physics, Computing, Statistical methods |

| 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 |
|---|
| Carlos Gandarilla Morales/Arnulfo Meléndez Soto/Jaime Briseño Reyes/modified by Carlos Gandarilla Morales |

| 12. Date of development | Date of modification | Date of approval |
|---|---|---|
| 05 / 12 / 2014 | 14 / 09 / 2015 14 /08/2107 by Carlos Gandarilla Morales | 04 /10/2017 |

| II. LEARNING UNIT SPECIFIC DATA | |
|---|---|
| **13. Presentation** | |
| The subject of Digital Cartography is structured to ensure that the student understands the basic concepts, general aspects, definitions and characteristics of the different topics and applies them involving cutting-edge cartographic technology in environmental management. | |
| **14. Integral professional competences to develop in the student** | |
| **Generic competences** | Instrumental<br>~ Ability to manage information<br>~ Troubleshooting<br>~ Decision making<br>Personal<br>~ Team work<br>~ Ethical and quality commitment<br>Systemic<br>~ Ability to apply theoretical knowledge in practice |
| **Professional competences** | Ability to integrate experimental evidences with theoretical knowledge. Capability for quantitative interpretation of data Management of Geographic Information Systems |
| **General purpose of the course** | That the student bases and applies the basic concepts of Cartography, perform vector extraction of geographic data, use geolocation technology using specialized software and equipment and generate digital cartography for Environmental Management. |

| **15. Joint of axes** | | | | |
|---|---|---|---|---|
| The learning unit articulates the research so that students develop projects with ethics and values. With respect to the beneficiaries of Environmental Management. Developing an environmental conscience that allows them to live and coexist in harmony with their environment. | | | | |
| **16. development of the course** | | | | |
| **Module 1** | Introduction to Cartography, Basic Concepts | | | |
| **Intended learning** | **Learning contents** | **Learning product(s)** | **Strategies** | **Teaching resources and materials** |
| Base and apply the basic concepts of Cartography and interpret any cartographic product | Fundamentals of cartography Geodetic reference frames: Datum Geoid and ellipsoid<br>Coordinate systems Cartographic projections Reading and<br>interpretation of the elements of a cartographic product (coordinates, symbology) | Essay of the subjects under a development rubric. Practice report of identification and interpretation of the elements of a cartographic product. | Documentary research and exhibition in teams of 2 to 4 members.<br><br>Practice of identification and interpretation of the elements of a cartographic product. | Computer equipment Video projector Basic and thematic cartography (Digital and analogue). Specialized software for digital mapping and manipulation |

| **Module 2** | Photointerpretation and vector extraction | | | |
|---|---|---|---|---|
| **Intended learning** | **Learning contents** | **Learning product(s)** | **Strategies** | **Teaching resources and materials** |
| It defines the basic concepts of remote perception, photointerpretation techniques and vector extraction of geographical features. | Aerial photography Satellite Digital image orthophoto extraction of geographical features (Points, lines and polygons)<br>Stereoscopic vision<br>Photo identification and roll-out Vector<br>Extraction of geographical features (Points, lines and polygons | Essay of the subjects under an development rubric. Photo-identification practice report. Digital file resulting from the vectorial extraction of geographical features. | Documentary research and exhibition in teams of 2 to 4 members. Photo Identification Practice Vector extraction practice of geographical feature | Computer equipment Video projector Digital orthophoto Specialized software for digital mapping and manipulation. |

| **Module 3** | Geo-basic processes with digital cartography | | | |
|---|---|---|---|---|
| **Intended learning** | **Learning contents** | **Learning product(s)** | **Strategies** | **Teaching resources and materials** |
| Download digital cartography of the main internet portals and make inquiries using specialized software. | Digital cartography storage formats<br>Download of digital cartography from Internet portals<br>Projection of digital cartography<br>Basic geo-processes: Buffer, Clip, Intersect, Union, Merge, Dissolve and calculation of áreas | Basic geo-processes: Buffer, Clip, Intersect, Union, Merge, Dissolve and calculation of areas | Practice on: identification of digital cartography formats, download of cartography, projection and basic geo-processes. | Video projector Internet Geoportals (Digital map of Mexico, CONABIO) Specialized software for digital mapping and Computer equipment manipulation. |

| **Module 4** | Cartographic methods for data acquisition and use of mobile devicesfor the generation of digital cartography | | | |
|---|---|---|---|---|
| **Learning purpose** | **Learning contents** | **Learning products** | **Strategies** | **Resources and teaching materials** |
| Knows the cartographic methods for data acquisition, operates geographic location devices and mobile devices that allow you to know your geographical location and generate digital cartography | GPS Total station<br><br>National Geodetic Network (Active and Passive)<br><br>Use of mobile devices for the generation of digital cartography. | Practice report on the use of GPS receiver equipment. Summary<br><br>Digital archive of the cartography generated with a mobile devic | Practice of using the GPS receiver equipment. Exhibition by the teacher.<br><br>Practice of using a mobile device to determine its location and generation of digital cartography. | GPS receiver equipment Computer equipment Video projector Internet Mobile devices(Telephones, tablets) |

| **17. Performance assessment:** | | | |
|---|---|---|---|
| **Performance evidence(s)** | **Performance criteria** | **Application scopes** | **percentage** |
| Module 1: - Essay on basic concepts of cartography Practice report of identification and interpretation of the elements of a cartographic product.<br><br>Module 2: - Remote sensing test - Photointerpretation practice report Digital archive resulting from the vectorial | - Delivered in time and form - Content and structure requested - Clarity in Conclusions - Delivered in time and form - Content and structure requested Clarity in Conclusions - Delivered in time and form Content and structure requested - Delivered in time and form - Content and structure requested | | 15% (Essay 10%, Report 5%)<br><br>15% (Essay 5%, Report 5%, digital archive 5%)<br><br>20% (Digital archive generated by MDM (20%)<br><br>20% (Report 5%, summary 5%, digital archive 10%) |

| | | | |
|---|---|---|---|
| extraction of geographic features Module<br><br>3: Digital files of thematic cartography generated from the information downloaded from the internet. Module<br><br>4: - Practice report on the use of GPS receiver equipment. - Summary of data | | | |

**18. Evaluation criteria:**

| Criterion | Value |
|---|---|
| **Formative Evaluation** | 10% Responsibility, commitment, tolerance, ethics, values. |
| **Summative evaluation** | 70% Development and presentation of products presented in each module. |
| **Criteria summation** | 5% The student will assess their performance, compare it with the established and determine which objectives met successfully. |
| **Co-evaluation** | 10% Students value their peers and apply the values of respect, tolerance and honesty. |
| **Heteroevaluation** | 5% Students value the work of the teacher and the teacher in turn values the students |
| **Criterion** | 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** | "GARMIN Garmin eTrex Legend Cx GPS<br>Manual del propietario" (Junio de 2006). "Manual de Conceptos Basicos", INEGI, 2002.<br>Manualde usuario de OruxMaps v.6.0.0, http://www.oruxmaps.com/oruxmapsmanual.pdf (2014)<br>http://www.inegi.org.mx/geo/contenidos/imgpercepcion/imgsatelite/elementos.aspx (14/sep/2015)<br>http://www.inegi.org.mx/geo/contenidos/topografia/carta1_20000.aspx (14/sep/2015).<br>Franco S., Valdez M. Principios Basicos de Cartografía y Cartografía Automatizada. Universidad Autónoma del Estado de México (2003) |
| **Complementary** | Apuntes y presentaciones proporcionadas en el curso.<br>Manual de Sistemas de Información Geográfica y Cartografía Digital: http://unstats.un.org/unsd/publication/SeriesF/SeriesF_79s.pdf Cartografía. Arte y ciencia de trazar mapas http://cartografia.supaw.com/observaciones.htm<br>GPS World Magazine www.gpsworld.com/resources/glossary.htm Canadá Centre for Remote Sensing www.ccrs.nrcan.gc.ca/ccrs/eduref/ref/glosndxe.html |

| **21. Profile for the teacher who imparts this learning unit** |
|---|
| • Experience in the use and management of cartography in physical and digital format, aerial photography and GPS.<br>• Have a bachelor's degree in Forest Science, Environmental Management, Agronomy, or related area.<br>• Preferably with university professional experience as a teacher in front of a group.<br>• Availability to work as a team • Availability to work in the competency-basedmodel |