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** | |
|---|---|---|---|---|---|
| Geographic Information Systems | | | | 4107 | |
| **3. Aademic Unit** | | | | | |
| Departament of Forest Science | | | | | |
| **4. Academic programme** | | | | **5. Level** | |
| Forest Science Engineering | | | | Bachelor | |
| **6. Training Area** | | | | | |
| Discipline | | | | | |
| **7. Academy** | | | | | |
| Environmental engineering. | | | | | |
| **8. Modality** | | | | | |
| **Mandatory** | **x** | **Curse** | | **Attendance** | **x** |
| **Elective** | | **Curse-workshop** | **x** | **Non-attendance** | |
| | | **Workshop** | | **Mixed** | |
| | | **Seminar** | | | |
| | | **Laboratory, Field practice** | **x** | | |
| | | **Internship** | | | |
| | | **Academic Stay** | | | |
| **9. Pre-requirements** | | | | | |

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| Have taken and passed<br>1. Computing (3853)<br>2. Statistical methods (2653)<br>3. Earth Science (8197) |

| 10. Theory hours | Practice hours | Independent study hours | Total hours | Credits |
|---|---|---|---|---|
| 2 | 2 | 1 | 5 | 5 |

| 11. Names of the teachers who participated in the development and/or modification of the programme |
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| Dr. Marín Pompa-García, Dr. Arnulfo Meléndez López. |

| 12. Date of establishment | Date of modification | Date of approval |
|---|---|---|
| 05/12/2014 | 03/10/2017 | 04/10/2017 |

## II. LEARNING UNIT SPECIFIC DATA

### 13. Presentation

The study plan of the Department of Forest Sciences at the UJED, includes the course called "Geographic Information Systems", so that the students obtain knowledge about these techniques and can use them to carry out forest resource inventories, determination of the current use and potential of the soil, in evaluations of environmental deterioration, among other applications. The structure of the course-workshop starts with the basic introductory concepts of geographic information systems, bases and finally their applications in the environmental and forestry field, which allows them to elaborate diagonals of the conditions that ecosystems keep in order to make decisions that impact its conservation, management and development.

### 14. Integral professional competences to develop in the student

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| **Generic competences** | **1) Comunication. (Level 2).**<br>2. Students communicate ideas, both written and oral, establishing relationships between what they read and what they understand<br>3. Students elaborate analytical files of specialized contents and make thematic presentations<br>**2) Critical thinking. (Level 2).**<br>1. Analyzes the parts, qualities, multiple relationships, properties and components of a problem.<br>2. Reflects the link and the multiple dependencies between the facts, processes and phenomena, as well as the contradictions that condition their development.<br>3. Allows the synthesis of many concepts and their parts. |

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| | **3) Use of technology. (Level) 2.**<br>1. Students develop specific applications as support tools in the learning process, in communication, the disciplinary area and research. |
| **Professional competences** | **1) Forest restoration** |
| **General purpose of the course** | The student uses the technology of geographic information systems, identifies the principles and models to design a geographic model for decision making. |

**15. Joint of axes**

The student will have the ability to solve real problems, strengthen their skills and have the attitude to enrich their knowledge. To this end, it will articulate ethics, scientific research and human development based on awareness and respect for human rights, with an environmentalist attitude, acquiring the English language and getting involved in the solution of social problems through an integrative and interdisciplinary approach.

**16. Development of the course**

| **Module 1** | ***BASIS ON GEOGRAPHICAL INFORMATION AND GIS.*** | | | |
|---|---|---|---|---|
| **Learning purpose** | **Learning contents** | **Learning product** | **Strategies** | **Teaching resource and materials** |
| The student recognizes and explains the basics of GIS | • Theoretical-conceptual framework of the SIG (Definitions, Components, Importance, History, Relationship with other disciplines).<br>• Composition and characterization of GIS data (Reference systems, cartographic projections, the raster model, vector data model). | Presentation on the components of a GIS, using TIC´s | Based on information contained in the textbook, students set up a presentation that, through collaborative work, expose per team (4 members) the components of a GIS to the group using the TIc's. | • Textbook “Apuntes de SIG”<br>• Projector<br>• Satellite images and vector information<br>• Field data bases, whiteboard, color pen<br>• Computer |

| **Módule 2** | ***INTEGRATION AND MODELING OF GEOGRAPHICAL INFORMATION.*** | | | |
|---|---|---|---|---|
| **Learning purpose** | **Learning contents** | **Learning product** | **Strategies** | **Teaching resource and materials** |
| The student generates geographic models to solve problems, able to answer questions such as: Where is it? How much is there? How is it? | Generation of geographic models (spatial data capture, spatial linkage with tabular data, manipulation operations and geometric and thematic data analysis, cartographic modeling) | Cartographic model on any natural or modified environment (terrestrial ecosystems, cities). | Through collaborative work, by a team of 4 members, they generate the geographic model using cartographic and technological inputs and expose it to the group as feedback. | • Textbook "Apuntes de SIG"<br>• GIS software<br>• Projector<br>• Computer<br>• Field data bases, internet, whiteboard, color pen |
| **Módulo 3** | ***PRODUCTOS PARA TOMA DE DECISIONES EN SIG.*** | | | |
| **Learning goals** | **Learning contents** | **Learning product** | **Strategies** | **Teaching resource and materials** |
| The student designs a geographic model to make decisions. | Results of the GIS as management tools (Tables and numerical reports, Graphics, Thematic maps, Legends, Texts and graphic symbols). | GIS in digital media for decision making | Using the information technologies, by a team of 4 members, they design and expose the GIS for decision making for evaluation and feedback. | • Textbook "Apuntes de SIG"<br>• GIS software<br>• Projector<br>• Computer<br>• Field data bases, internet, whiteboard, color pen |

| **17. Performance evaluation:** | | | |
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| **Evidence (s) of performance** | **Performance criteria** | **Application scope (s)** | **Porcentage** |
| Team presentation with multimedia presentations on the basis of GIS | Performance rubric, which includes indicators of quality, content, sufficiency, congruence and relevance | Productive, regulatory and academic sector of the forest sector (with local, regional and national coverage) | **30%** |
| Elaboration of a cartographic model on any natural or modified environment | Performance rubric, which includes indicators of quality, content, sufficiency, congruence and relevance | | **30%** |
| Creation of a GIS in digital media for decision making | Digital GIS and its report, which includes indicators of quality, content, sufficiency, congruence and relevance | | **30%** |

| **18. Evaluation criteria:** | |
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| **Criteria** | **Value** |
| **Formative assessment** | 10% values (respect, responsibility and honesty)<br>10% attitudes (participation, perseverance, personal image) |

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| | 30% evidence of performance (indicated in point 17) |
| **Summative assessment** | 35% delivery of the products in digital medium (presentations, report, GIS) |
| **Self-assessment** | 5% (each student has to write a document where they explain what they learned in the course). |
| **Co-assessment** | 5% (each student has to write a document to evaluate their classmates, indicating their strengths and areas of opportunity). |
| **Hetero-assessment** | 5% The teacher evaluates the work of the students. |
| **Total** | **100%** |
| **19. Acreditation** | |
| The learning unit will be accredited with 100 % performance given the practicality of the course and its competency-based design. This must be accredited through their performance evidences and their evaluation criteria satisfactorily fulfilled. | |
| **20. Information sources** | |
| **Basic** | **Pompa-García, M.** 2010.SIG note focused on ArcGis. Editorial UJED. 135 p. (ISBN: 978-607-0031-83-0). Used as textbook in SIG curses. |
| **Complementary** | https://drive.google.com/file/d/0BxdOKqm7raWHd0lYTEE0UFFZMDA/view |
| **21. Profile of the teacher offering this learning unit** | |
| University Degree with Doctorate in application of Geospatial technologies. Domain of software related to the geoinformatics area. Application of geographic information systems to the administration of natural resources. Knowledge of ecosystems through remote sensing and geographic information systems. Publications in these fields. | |