# SUBJECT TEACHING GUIDE

## G1679 - Geographical Information Systems II (Vector-Based)

## Degree in Geography and Land Planning

### Academic year 2023-2024

## 1. IDENTIFYING DATA

| Degree | Degree in Geography and Land Planning | | Type and Year | Compulsory. Year 3 |
|---|---|---|---|---|
| Faculty | Faculty of Humanities | | | |
| Discipline | Technical Fundamentals in Geography and Land Use Planning<br>Technical Subjects in Geography | | | |
| Course unit title and code | G1679 - Geographical Information Systems II (Vector-Based) | | | |
| Number of ECTS credits allocated | 6 | Term | Semester based (2) | |
| Web | | | | |
| Language of instruction | Spanish | English Friendly | No | Mode of delivery | Face-to-face |

| Department | DPTO. GEOGRAFIA, URBANISMO Y ORDENACION DEL TERRITORIO |
|---|---|
| Name of lecturer | PABLO FERNANDEZ DE ARROYABE HERNAEZ |
| E-mail | pablo.fdezarroyabe@unican.es |
| Office | E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 2. DESPACHO (2046) |
| Other lecturers | FRANCISCO CONDE ORIA |

## 3.1 LEARNING OUTCOMES

- Students will be able to transform a geographic problem into a logic model in the computer.
- They will acquire the ability to edit the spatial and non-spatial components of a thematic map.
- Students will understand and be able to distinguish the CAD edition from GIS edition modes.
- Students will have the ability to understand topological rules in vectorial formats
- Student will know how to edit and organise graphic and thematic information in a GIS
- Students will have the capacity to create SQL expressions and apply selection functions in a complex GIS environment.
- They will know how to use spatial analysis tools in order to solve different geographical problems .
- Students must know how to elaborate final layouts based on projects related to the use of GIS

**4. OBJECTIVES**

The main aim is to facilitate students the acquisition of theoretical knowledge and technical abilities that allow them to design and develop and GIS project according to a correct methodology.

**6. COURSE ORGANIZATION**

| CONTENTS | |
|---|---|
| 1 | MODULE 1. THE SCIENCE OF GEOGRAPHIC DATA<br>1.1 Digital revolution and geographic information<br>1.2 Geographic data adquisition and management<br>1.3 Vectorial data structures |
| 2 | MODULE 2. ARCGIS PLATFORM<br>2.1 ArcGIS Desktop, ArcGIS Pro, ArcGIS Online<br>2.2 Spatial reference systems in ArcGis<br>2.3 Georeferencing functions<br>2.5 The edition of vectorial maps |
| 3 | MODULE 3. GEOPROCESSING TOOLS AND DATA ANALYTICS IN ARCGIS<br>3.1 Basic queries and selection functions<br>3.2 Spatial selections and unions<br>3.3 Advance geoprocessing tools<br>3.4 Exploring the third dimension (3D)<br>3.5 The geostatistical methods in ArcGis |
| 4 | MODULE 4. PLANNING YOUR GIS PROJECT<br>4.1 GIS Project: defining aims<br>4.2 Theoretical design of a spatial database<br>4.3 Technical implementation of the theoretical design<br>4.4 Presenting and displaying results |
| 5 | MODULE 5. BIG DATA AND GEOGRAPHIC INFORMATION<br>5.1 The added value of Spatial Big Data<br>5.2 ETL-OLAP tools<br>5.3 GIS and Cloud Computing<br>5.4 Artificial Intelligence in GIS |

## 7. ASSESSMENT METHODS AND CRITERIA

| Description | Type | Final Eval. | Reassessn | % |
|---|---|---|---|---|
| Practical exam in the computer about the practical work developed during the semester in class | Laboratory evaluation | Yes | Yes | 40,00 |
| Test based on a multiple choice questionaire. Wrong answers will give negative points. | Written exam | Yes | Yes | 20,00 |
| In the event that the health situation obliges to modify the face-to-face conditions towards a scenario 2 (mixed teaching) or a scenario 3 (virtual teaching), the continuous assessment activities will be delivered and corrected preferably through the tool | Activity evaluation with Virtual Media | No | Yes | 40,00 |
| TOTAL | | | | 100,00 |

| Observations |
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| Plagiarisms or fraudulent realization of evaluation activities will not be accepted at any point and be marked with 0 points in this course.<br>If a student does not obtain the minimum grade required to pass an evaluation test, the overall grade for the subject will be the lowest value between 4.9 and the weighted average of all the evaluation test.<br>Theoretical exam will be a multiple choice questionnaire and wrong answers will count negatively. Exams could be substituted by virtual exams or virtual tasks assessments if the public health circumstances would requiere it.<br>In the event that the health situation forces to modify the face-to-face conditions towards a scenario 2 (mixed teaching) or a scenario 3 (virtual teaching), the assistance will be verified by means of the tools available on the UC institutional platforms (connection time , student responses in MOODLE chats and forums, video calls etc ...) |

| Observations for part-time students |
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| Part-time students, or those who justifiably cannot follow the continuous assessment, may be evaluated through the delivery of a work that will be agreed with the professor responsible for the subject. Attendance is mandatory in the case of field activities. |

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

| BASIC |
|---|
| BOSQUE SENDRA, J. (1992)<br>Sistemas de Información Geográfica. Ed. Rialp, S.A. Madrid |
| COMAS, D. RUIZ, E. (1993)<br>Fundamentos de los Sistemas de Información Geográfica. Ed. Ariel, S.A. Barcelona. |
| LONGLEY, P. A.; GOODCHILD, M.F.; MAGUIRRE, D.J.; RHIND, D.W. (2011)<br>Geographic Information Systems & Science. Ed. WILEY. |
| FERNANDEZ DE ARROYABE HERNAEZ, P. (2018)<br>Del "geographical feature" al "dataset" en ArcGis: modelización y análisis geográfico. TGD, Santander (con CD de ejercicios). |
| FERNANDEZ DE ARROYABE HERNAEZ, P. (2003)<br>Sistemas de Información Geográfica Vectoriales: ejercicios prácticos bajo una estructura de datos Arco-Nodo. Santander, TGD, SL. Pag.150 |