COURSE DATA

Data Subject	
Code	33102
Name	Geographical information systems
Cycle	Grade
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1104 - Degree in Environmental Sciences	Faculty of Biological Sciences	2	Second term

Subject-matter

Degree	Subject-matter	Character
1104 - Degree in Environmental Sciences	164 - Geographic information systems	Obligatory

Coordination

Name	Department
CARMONA GONZALEZ, MARIA PILAR ASCENS	195 - Geography

SUMMARY

Geographic Information Systems is one of the two subjects of the module "instrumental subjects' degree of Environmental Sciences. It is a 6-credit trunk course that is designed to be imparted in second year. Scholars and environmental professionals manage geographic information, which is complex and diverse, from different sources, highlighting its thematic components, and space. The geographical information is expressed by maps or digital-analog-which are, in turn, sources of information, tools for analysis and synthetic medium of expression results. At present, the Geographic Information Systems (GIS) are key tools for storing, integrating and managing all types of geographic information systems (traditional maps, aerial photographs, satellite images, statistics, data from field works, etc) allowing conduct complex spatial analysis and cartographic representation.

This subject, based on the description of basic concepts of mapping and information sources (aerial photography and satellite images), introduces students to the creation and management of geographic information systems (components and functions), an instrument essential for the treatment of information relating to the territory.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

1104 - Degree in Environmental Sciences

- Capacidad para analizar la información geográfica con sus componentes temática, espacial y temporal.
- Capacidad para representar la información geográfica mediante mapas, eligiendo el tipo de mapa adecuado al tipo de información.
- Lectura e interpretación de documentos cartográficos (mapas topográficos y mapas temáticos diversos).
- Capacidad para manejar fuentes analógicas y digitales diversas de información geográfica.
- Manejo de tecnologías de información geográfica y programas informáticos con aplicación medioambiental.

The aim of the course is introduce students to Geographic Information Systems at a basic level, as a tool for the development of cartographic and spatial analysis in the field of Earth Sciences. To achieve this, we propose several specific objectives:
a) Knowledge of cartographic sources (analog and digital) systems and their availability on the Internet.
b) Understanding of the problems of mapping the passage of the curved surface of the Earth to the plane by projection systems, the concept of scale, coordinate systems, the language mapping and map types.
c) Obtain the necessary practice in reading, analysis and interpretation of the topographic map and other thematic maps. Learn to identify, recognize and classify physical and human elements represented on the map. To interpret the topography and measurements on the map.
d) Know the sources and resources that feed the GIS mapping. Introduce students to the principles of air and space remote sensing, and methods of analysis (photo interpretation and digital image processing).

e) Understand the organization of geographic information in the GIS using the various data structures (vector and raster)
f) Know the main functions of GIS for data entry, processing, analysis and mapping, by application examples.

DESCRIPTION OF CONTENTS

1. From paper maps to GIS. Cartographic sources on the Internet

Definition of GIS as a set of programs and applications that allow the management of spatially georeferenced data that can be displayed on maps.
Professional fields that have developed GIS.
Series of basic and environmental mapping. Designation of sheets. Scales. Cartographic sources on the internet. Formats.

2. The representation of the Earth: Scale, shape and dimensions of the earth. systems proyection and coordinate systems. The UTM projection

The shape of the earth. Ellipsoid, geoid and topographic surface.
Ellipsoid and Datum (the ED 50-ETRS89 to WGS84).
The geodetic network.
Georeferencing. Geographical, meridians and parallel coordinates. Length of meridian and parallel arcs.
Direction and guidance. Types north. Azimut.
Projection types. The Universal Transverse Mercator projection. UTM coordinates. Distribution of zones and their correlation with geographic coordinates.

3. The mapping language and the construction of a map. Types of maps (topographic and thematic).

Types of maps, topographic map, the representation language and the main map series. Scale, north and legend. Generalization.

4. Aerial and satellite remote sensing

Definition of aerial and satellite remote sensing
Data and resolution
Electromagnetic spectrum and spectral signature
Aerial photo. Photointerpretation. Orthophoto concept. The 1957 aerial photo. Remote Sensing and GIS

5. GIS components and data structure. Vector and raster structures. Commercial and free software

Elements of a GIS. Functions of a GIS. Models of raster and vector data. Advantages and disadvantages. Examples. Types of GIS software. Raster and vector files on the network.

6. GIS functions: data entry and storage, processing, analysis, representation

Entrada de datos CAD. Tabla atributos. Concepto de campo. Funciones de análisis SIG: Área de influencia (buffer). Recortar (clip). Dissolve (agrupar por adyacencia y criterios alfanuméricos). Juntar (merge). Intersección. Unión. Enlace espacial (Spatial Join). Convex Hull (minimo poligono convexo). Diferencia. Traslación 2D. Reproyección

7. Digital Elevation Models and derived products

TIN or GRID models. Characteristics of raster cells. Rasterization and vectorization. Algebra maps. Neighbourhood. Slopes, orientation, hydrological applications, shading, visibility.

8. Applications of Geographic Information Systems

Applications of GIS to environmental studies

9. Practices

Georeferencing GIS: geographic positioning curves and UTM coordinates. Angle and distance. From paper maps to digital map: scale and resolution. Path field (GPS, profile, horizontal and vertical scales). Measurements: slopes, orientations, distances, areas, triangulation. (6 hours)

Visit web mapping Institutes in Spain and other countries. Downloading files and Web services. Download CNIG mapping (National Center for Geographic Information). The mapping green (environmental) in TERRASIT. (3 hours).

Introduction to Software GVSIG: raster and vector files. Basic functions of the program. Formation of a view (files. Gvp). Add and remove layers, change the symbology, attribute tables, legends configuration according fields. (3 hours)

10. Informatica practices

Input vector data GVSIG: making new files, .shp views with linear, areal and point elements. Attribute table. Create fields.Change fields. Tables. Dbf.
Creating new views with analysis functions. Functions dissolve and cut layers. Attribute tables of new layers.
Georeferencing functions.
Digital Elevation Models. Slope map, directions, shading, visibility analysis. Applications in Hydrology. Generating Profiles with MDT.
Graphical output: composition of a map from a view. Insert view, insert images, insert legend, scale and north. Export to image.(15 hours)

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Computer classroom practice	15,00	100
Laboratory practices	12,00	100
Tutorials	3,00	100
Study and independent work	20,00	0
Readings supplementary material	20,00	0
Preparation of evaluation activities	30,00	0
Resolution of case studies	20,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Master class in the presentation of the theoretical foundations of the subject. Problems (scales. georeferencing, profiles, tracks, measurements) in laboratory practice. Practical computer (lab groups and computer groups) with GVSIG GIS sofware.

EVALUATION

The final grade for the course is obtained from a theoretical and practical final exam with the assistance and delivery of the exercises of practical classes (mandatory). Regular attendance at classes, participation, care, effort and interest shown by the student will be evaluated by the teacher.
The final grade is derived with a score of 3.5 points and practical qualification examination (theoretical and practical) of 6.5. To pass the course and make theory and practice is necessary to achieve a minimum of 2.6 points (equivalent to 4 out of 10) in the theoretical and practical examination.

To request an advance convocation of examination in this discipline, the student must have completed mandatory activities listed in the teaching guide. Specifically, made and approved practices of computer and laboratory detailes in this teaching guide.

REFERENCES

Basic

- BIELZA DE ORY, V , Ed. (1993). Geografia general, Tomo I, capítulo II: "Información geográfica y representación cartográfica", Ed. Taurus, Madrid.
- BOSQUE SENDRA, J. (1997): Sistemas de información geográfica, Madrid, Rialp, 2ª edición corregida, 451 p.
- CHUVIECO, E. (1990), Fundamentos de teledetección espacial, Madrid, Ediciones Rialp, S.A. 453pp.
ESTÉBANEZ ALVAREZ, J. , PUYOL, R. (1976), Análisis e interpretación del mapa topográfico, Ed.

Tebar Flores, Madrid.
- GUTIERREZ PUEBLA, J. Y GOULD, M. (1994) SIG: Sistemas de Información Geográfica, Ed. Síntesis, Madrid, 251 p.

Additional

- - STRAHLER, A.N. (1977) Geografía Física, Barcelona, Omega
- VÁZQUEZ MAURE, F. (1986) Lectura de mapas, Inst. Geográfico Nacional, 382 pp

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

Como norma general, la modalidad de docencia se adaptaría a la situación sanitaria del momento y a lo que las autoridades sanitarias y académicas acuerden en este sentido.

1. Contenidos

Se mantienen los contenidos inicialmente recogidos en la guía docente

2. Volumen de trabajo y planificación temporal de la docencia

Mantenimiento del peso de las distintas actividades que suman las horas de dedicación en créditos ECTS marcadas en la guía docente original

Sesiones programadas en las mismas fechas y horas con la misma duración.

3. Metodología docente

La modalidad de la docencia se adaptaría a la situación sanitaria del momento.

Subida de materiales al Aula virtual

Propuesta de actividades por aula virtual

Videoconferencia síncrona BBC

Tutorías mediante videoconferencia

4. Evaluación

1. Adición de actividades de evaluación contínua

2. Pruebas de evaluación mediante trabajos académicos.

3. Exámenes orales por videoconferencia

4. Alternativamente a los exámenes orales, se contempla la posibilidad de examen tipo test por aula virtual de algunos contenidos.

5 Exámenes presenciales con el aforo en aula recomendado por la Universitat de València (si la situación lo permite).

5. Bibliografía

La bibliografía recomendada se mantiene pues es accesible