ARCGIS COURSE, APPLIED TO ENVIROMENTAL MANAGEMENT
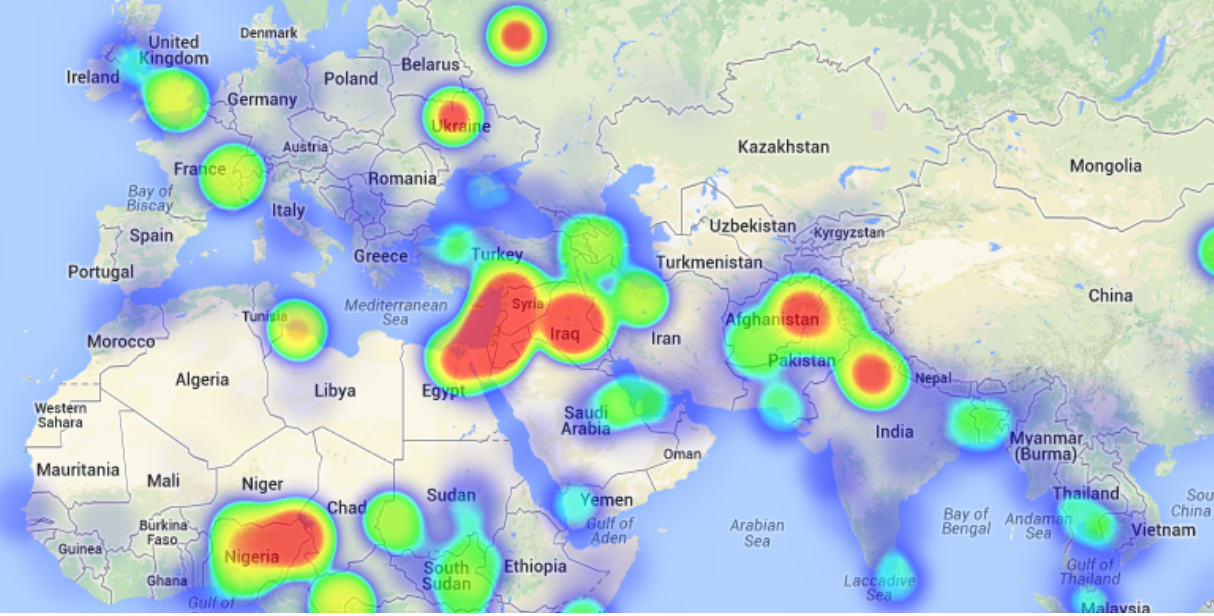
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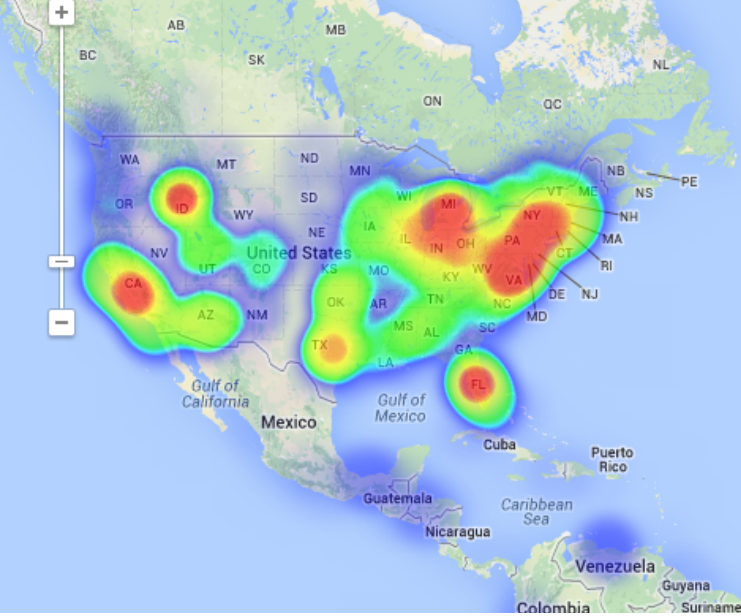
TRAINING OVERVIEW

This course will qualify students in the management of ArcGIS Desktop 10, and in particular of ArcMap, ArcCatalog and ArcTool Box, focusing on the elaboration of studies related to environ-mental management.

In few words, taking this course will transmit students an advanced knowledge for ARCGIS 10 tools useful for the crea-tion of environmental studies (Environmental Impact stud-ies, environmental documents, fauna studies, etc.). The stu-dent will be trained in the creation of high quality cartog-raphy, spatial multi-criteria analysis useful for environmental management and the study of project alternatives, and in the study of optimal and least cost routing.

STUDENT PROFILES

This course is aimed at students and professionals related to en-gi-neering, biology, geology and environmental sciences interested in the application of Geographic information Systems to its pro-fes-sional activities.

Important note: this course doesn't require previous ArcGIS Desk-top knowledge.

GOALS

· Inform students about the importance and uses of Geographic In-formation systems (GIS) for the study and management of variables applied to the engi-neering and environmental sectors.

· Provide the comprehension of the essential concepts for the ma-nagement of ArcGIS and geographic information systems (GIS) in general, for its applica-tion in environmental management.

· Learn about GIS key tools for the correct usage of vector and ras-ter data models, the creation of quality cartography and for the de-velopment of com-plex spatial analysis.

· Teach the existing difficulties in the execution of GIS environmen-tal studies, and their resolution, through practical cases .

· Train students in the preparation, layout and delivery of high-qua-lity cartog-raphy for environmental impact studies, etc.

Students will acquire skills like: creation of spatial data bases from field sampling, fauna density maps, erosion studies, hydrological studies, environmental sensitivity maps for the location of projects, obtaining lineal construction routes with least environmental im-pact, etc.

ONLINE FORMAT METHODOLOGY

The online format uses the online learning and technological platform Moodle, a telematics tool that works through the internet. It is a learning platform that provides students access to the training course content, fulfill the practical cases and consult the teaching staff, as well as availability to the resources and help at any moment.

The platform is available 24 hours a day, through which the student will be able to ask for help at any given moment. Instructors will reinforce the student´s autonomy during its training process, supporting and clarifying any possible doubts that may arise along the course.

Therefore, the course is carried out through different areas available on the online platform and where the student can search for training material, download information, complete the practical exercises and take assessments to verify the assimilated knowledge. The teachers will offer progressively the basic information needed to work towards the completion of a final practical case.

INSTRUCTOR

Santiago Pardini Herranz

With a Bachelor´s degree in Environmental Sciences and a Specialist certificate in Geographic Information Systems from the Universidad Politecnica de Madrid (Spain), Santiago has more than 5 years experience as a GIS Consultant / Technician.

He has experience in the development of GIS studies for diverse types of projects: hydraulic infrastructures, lineal structures, wind and photovoltaic installations, mining activities, land use zoning, fauna studies, etc.

TRAINING PROGRAM

1 - INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS

Introduction.

Definition and basic concepts.

Uses of Geographic Information Systems.

Geographic information: vector data models, raster data models and other data models (CAD, TIN, etc.). Main features of each data module, advantages and disadvantages.

Introduction to ArcGIS Desktop: ArcMap, ArCatalog, ArcToolbox, ArcScene and ArcGlobe.

Arcmap interface, extensions and tools.

2 - VECTOR DATA MODEL. INFORMATION DISPLAY

Information layers: how to add layers, features and attribute tables.

Data tools: search and queries.
Selection tools: selection per feature, selection by spatial location and information capture.

Layer symbology: simple symbology, by category, by quantity and through graphs.

Other display options: labelling and transparencies.

3 - COORDINATE SYSTEMS, PROJECTIONS AND GEOREFERENCING

Introduction to Coordinate systems and projections.

Defining Coordinate Systems.

Coordinate system transformation. Reprojection of ED50 or ETRS89 geographic databases.

Image, layer and CAD files georeferencing.

4 - VECTOR DATA MODEL. EDITING AND CREATING INFORMATION

Creation and editing of spatial data.

- Creating spatial data: Editing tools bar. Digitization techniques.

- Creating layers from CAD files.

- Modifying existing layers.

- Creating layers from coordinates and GPS data.

Creation and editing of data from the attribute table

- Structure of an Attribute Table.

- Types of data included in an Attribute Table.

- Modify information from an Attribute table.

- Calculate geometric information (surface, perimeter, length, etc.).

- Creation of statistics from an Attribute table.

- Export tables to Excel and other formats. Reports and graphs creation.

5 - DATABASE AND SPATIAL DATA BASE MANAGEMENT (GEODATABASE)

Designing databases.

Joining and relating databases.

Spatial joins. Obtain statistics from database information and spatial position of elements in a layer.

Geodatabase: Advantages. Properties.

Loading data to the geodatabase. Subtypes and domains.

Guided exercise 1 (data collection): Collecting field data with GPS or coordinates manual, its processing and creating digital cartography linked to information gathered in the field, as well as in the office.

6 - SPATIAL ANALYSIS USING VECTOR DATA

Extract (Clip, Split), overlay (intersect, union) and proximity toolsets (buffer analysis, Thiessen polygons).

Obtain sampling grids.

Multi-criteria analysis. Obtain optimum areas according to several criteria.

Guided exercise 2 (environmental surveillance): Creation of sampling grids and combining them with field data applied to the environmental surveillance of wind farms.

7 - SPATIAL ANALYSIS USING RASTER DATA

File conversion tools. File format conversion from vector to raster, and viceversa, ASCII or html files, and exporting files to KML (Google Earth) as well as CAD.

Create Digital Elevation Models from vector data, ASCII files and TIN files.

Extracting information from raster files by query, mask, entity and / or joining raster files.

Contour lines, slope calculation, hillshade maps, orientations and visibility studies.

Guided exercise 3 (landscape): Creating a visibility study through viewsheds from high precision digital terrain models, defining specific views and project elements.

8 - ADVANCED SPATIAL ANALYSIS

Reclassifying raster files. Euclidean distances, building Boolean layers, adding values to intervals or categories, and data conversion.

Map algebra (raster calculator), math calculations between raster layers, field statistics.

Guided exercise 3 (geomorphology/erosion): Territory erosion risk analysis through variables like slope, type of soile, presence of vegetation, etc.

Data interpolation. Different interpolation methodologies (IDW, kriging, natural neighbour).

Guided exercise 4 (fauna and vegetation): Calculate density fauna and vegetation distribution by interpolating field and bibliographic data.

9 - ADVANCED SPATIAL ANALYSIS II

Use in hydrology: obtaining a drainage system, flow direction, outlets, and identification of drainage basins.

Guided exercise 6 (hydrology): Obtain the drainage network, the main flow direction, accumulation areas and hydrographic basins, sub basins and micro basins.

Volume calculation.

Raster multi criteria analysis. Basic concepts and weightings. Weighted overlay. Non-compensatory analysis. Least cost route calculation.

Guided exercise 7 (selection of alternatives): Selecting a project alternative with smaller impact by multi criteria analysis of environmental variables.

Guided exercise 8 (selection of alternatives 2): Guided exercise 8 (selection of alternatives 2): Selecting a lineal construction route with smallet impact by multi criteria analysis.

10 - WEB INFORMATION SOURCES AND RESOURCES

Downloading digital maps (IGN) and using WMS cartographic servers.

Regional, European and international Spanish spatial data infrastructure (IDEE).

Arcgis Online Services

## 11- MAP CREATION

Adjusting the sheet.

Inserting basic elements (north, scale bar, numeric scale, map legend, etc.)

Adding UTM coordinates grid, composition with several "Data frames", images, excel tables, etc.

Including other elements: images, graphs and tables.

Printing options.

Guided exercise 9 (map composition): Create quality mapping focused on environmental studies according to the INSPIRE directive.
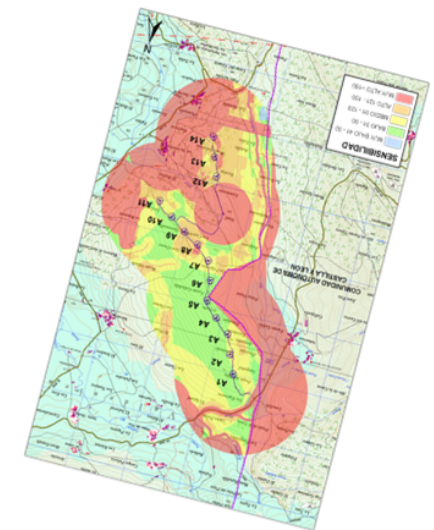
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