Universidad Zaragoza

Year : 2020/21

60402 - Geographic Information Analysis: Geographic Information Systems

Syllabus Information

Academic Year: 2020/21
Subject: 60402 - Geographic Information Analysis: Geographic Information Systems
Faculty / School: 103 - Facultad de Filosofía y Letras
Degree: 352 - Master's in Geographic Information Science and Technology for Land Management: Geographic Information Systems and Remote Sensing
ECTS: 12.0
Year: 1
Semester: Annual
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The learning and teaching methodology developed in this course has a practical nature, being based on the lecturer's explanations. For each of the topics, a set of theoretical and practical principles are presented, which later on are applied by the students. Thus, explanations - lecture format - introduce theoretical concepts which are combined with more participative sessions where practical application to real data and cases is conducted. The application tasks are always guided by the lecturer, who shows all the possibilities and options that can be done with the software. By doing so, the student is able to connect and understand each of the steps already presented in the theoretical part.

4.2.Learning tasks

The course includes the following learning tasks:

Topic 3.1.- "Spatial analysis basics?:

- Lectures and practice sessions: 35 hours
- Study: 25 hours
- Assessment: 1 hour

Topic 3.2.- "Advanced spatial analysis: Digital Elevation Models":

- Lectures and practice sessions: 15 hours

- Study: 25 hours

Topic 3.3.- "Advanced spatial analysis: network analysis":

- Lectures and practice sessions: 9 hours
- Practical activities: 11 hour
- Guided tasks: 4 hours
- Study: 7 hours

Topic 3.4.- "Advanced spatial analysis: interpolation":

- Lectures and practice sessions: 15 hours
- Study: 16 hours
- Assessment: 1 hour

Topic 3.5a.- "Programming languages: Python":

- Lectures and practice sessions: 5 hours
- Practical activities: 15 hours
- Study and preparation of assignments: 44 hours

Topic 3.5b.- "GIS Open Source desktop applications":

- Lectures and practice sessions: 10 hours
- Practical activities: 15 hours
- Study and preparation of assignments: 10 hours

Topic 3.6.- "Parametric and no-parametric models":

- Lectures and practice sessions: 5 hours
- Practical activities: 10 hours
- Study and preparation of assignments: 25 hours

4.3.Syllabus

The course will address the following topics:

Topic 3.1. Basic spatial and GIS analysis.

- Spatial analysis with vector data
- Analysis and modeling with raster data.
- Introduction to multicriteria evaluation techniques using GIS.

Topic 3.2. Advanced Spatial Analysis: Digital Elevation Model

- DEM concept and datasets. ~~Types of models.~~
- Methods to generate DEM. ~~Generation of Digital Elevation Models.~~
- Validation and error analysis. ~~Analysis of error in the DEMs.~~
- Derived models.

Topic 3.3. Advanced Spatial Analysis: Network Analysis

- Definition and basic concepts.
- Editing and preparation of a network.
- Types of networks.

Topic 3.4. Advanced Spatial Analysis: interpolations

- Basic principles and theoretical fundamentals of interpolation.
- Exact and inexact interpolators.
- Local interpolation methods.
- Global interpolation methods: trend surfaces and regression models.
- Mixed methods.
- Cross-validation and validation by reserving an independent sample. Statistical error.

Topic 3.5a. Programming languages: Python

- History of programming languages.
- Description of the development environment.

- Programming Basics I.
- Programming Basics II.
- Introduction to ArcPy.

Topic 3.5b. Open source GIS applications.

Topic 3.6. Programming with R

- Basic principles of statistical modeling with R.
- Using R for working in GIS environment.
- Principles of creating the statistical model.
- Classification of digital satellite image models "Random Forest".
- Risk modeling using "Binary Logistic Regression".
- Automation of statistical and spatial modeling.

4.4.Course planning and calendar

The course is divided into 7 main topics and runs from the end of November until March. This course is organized according to a logical sequence, starting once the courses and contents from "60401 Obtaining and organization of geographic information", "1.4 GIS Basics", and "1.2a Software learning: basic ArcGIS management" are taught. In this way, students will acquire the fundamental theoretical and practical knowledge as well as the basic skills required to use the GIS software.The topics will run in order,

The practical part of the topics must be delivered before the completion of their respective written tests. For those students who have not submitted them within the established deadlines, they may do it before the first (June) or second (September) official exam periods.

For further details concerning the timetable, classroom and other information of the course please refer to the ?Facultad de Filosofía y Letras? website (https://fyl.unizar.es/horario-de-clases#overlay-context=horario-de-clases)

4.5.Bibliography and recommended resources

http://psfunizar7.unizar.es/br13/eBuscar.php?tipo=a