60402 - Analysing Geographical Information: GISs

Información del Plan Docente

Academic Year	2016/17
Academic center	103 - Facultad de Filosofía y Letras
Degree	352 - Master's in Geographical Information Technology for Territorial Development: Geographical Informations Systems and Teledetection
ECTS	12.0
Course	1
Period	Annual
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning and teaching methodology developed in the course has an eminently practical nature, being based on the explanations by the lecturer. For each of the subjects, a set of theoretical and practical principles are presented, being later applied by the students. Thus, explanations - on the fashion of masterclass - introduce theoretical concepts which are combined with more interactive sessions where practical application to real data and cases is conducted. The application tasks are always tutored by the professor, who is showing at all times the possibilities and options of the software used. By doing so the student is able to connect and understand each of the steps already presented in the theoretical part.

5.2.Learning activities

Subject 3.1.- "Spatial analysis basics".

- Theoretical and practical lecture sessions: 35 hours
- Private study: 25 hours
- Assessment: 1 hour

Subject 3.2.- "Advance spatial analysis: Digital Elevation Models":

- Theoretical and practical lecture sessions: 15 hours
- Private study: 25 hours

Subject 3.3.- " Advance spatial analysis: network analysis":

- Theoretical and practical lecture sessions: 9 hours
- Practical activities: 11 hour
- Directed activities: 4 hours
- Private study: 7 hours

Subject 3.4.- "Advance spatial analysis: interpolation":

- Theoretical and practical lecture sessions: 15 hours
- Private study: 16 hours
- Assessment: 1 hour

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

- Theoretical and practical lecture sessions: 5 hours
- Practical activities: 15 hours
- Private study and preparation of the assessment work: 44 hours

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

- Theoretical and practical lecture sessions: 10 hours
- Practical activities: 15 hours
- Private study and preparation of the assessment work: 10 hours

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

- Theoretical and practical lecture sessions: 5 hours
- Practical activities: 10 hours
- Private study and preparation of the assessment work: 25 hours

5.3.Program

The lecture course will address the following main issues:

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.

3.2. Advanced Spatial Analysis: Digital Elevation Model

- DTM and DEM. Types of models.

- Generation of Digital Elevation Models.
- Analysis of error in the DEMs.
- Derived models.

3.3. Advanced Spatial Analysis: Network Analysis

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

3.4. Advanced Spatial Analysis: interpolations

- basics 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.

3.5a. Programming languages: Python

- History of programming languages.
- Description development environment.
- Programming Basics I.
- Programming Basics II.
- Introduction to ArcPy.

3.5b. Open source GIS applications.

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.

5.4.Planning and scheduling

The subject is divided into 7 thematic blocks, starting after "Obtaining and organization of geographic information". This responds to a logical sequence. Once "1.4 GIS Basics" and "1.2a Software learning: basic ArcGIS management" are taught, the student will have acquired the fundamental theoretical and practical knowledge of GIS as well as basic skills in the reference GIS software required to assimilate the current subject. The blocks will run sequentially, from the end of November until March.

The practical work of the blocks within this module must be delivered before the completion of their respective written tests. However, those students who have not given it at the time, may do so before the first (June) or second (September) official calls.

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

5.5.Bibliography and recomended resources

- Bernhardsen, Tor. Geographic information systems : an introduction / Tor Bernhardsen . 3rd ed. New York : John Wiley & Sons, cop. 2002
- Bosque Sendra, Joaquín. Sistemas de información geográfica / Joaquín Bosque Sendra . - 2a. ed. corr. Madrid : Rialp, 1997

60402 - Analysing Geographical Information: GISs

- Bosque Sendra, Joaquín. Sistemas de información geográfica / Joaquín Bosque Sendra . - [1a ed.] Madrid : Rialp, 1992
- SIG y localización óptima de instalaciones y equipamientos / coordinadores, Joaquín Bosque Sendra, Antonio Moreno Jiménez Madrid : Ra-ma, D.L. 2004
- Buzai, Gustavo D.. Análisis socioespacial con sistemas de información geográfica. Tomo 1, Perspectiva científica. Temáticas de base raster / Gustavo d. Buzai y Claudia A. Baxendale Buenos Aires : Lugar, 2011
- Comas, David. Fundamentos de los sistemas de información geográfica / David Comas y Ernest Ruiz Barcelona : Ariel, 1993
- Geographic information system and science / Paul A. Longley [et. al] . - 2nd ed. Chichester : John Wiley & Sons, cop. 2005
- Gómez Delgado, Montserrat. Sistemas de información geográfica y evaluación multicriterio en la ordenación del territorio / Montserrat Gómez Delgado, José Ignacio Barredo Cano . - 2ª ed. actualizada Madrid : Ra-ma, 2005
- Gutiérrez Puebla, Javier. SIG : Sistemas de Información Geográfica / Javier Gutiérrez Puebla, Michael Gould . 1a. reimp Madrid : Síntesis, 2000
- Gutiérrez Puebla, Javier. SIG : Sistemas de Información Geográfica / Javier Gutiérrez Puebla, Michael Gould . Madrid : Síntesis, D.L. 1994
- Geographic information system and science / Paul A. Longley [et. al] . 2nd ed. Chichester : John Wiley & Sons, cop. 2005
- Mitchell, Andy. The ESRI guide to GIS analysis. V. 1. Geographic patterns & relationships / Andy Mitchell. Redlands, Calif. : ESRI Press, cop. 1999
- Mitchell, Andy. The ESRI guide to GIS analysis. V. 2. Spatial measurements & Statistics / Andy Mitchell. Redlands (California) : ESRI, 2009
- Sistemas y análisis de la información geografica : manual de autoaprendizaje con ArcGIS / Coordinador, Antonio Moreno Jiménez ; autores, Rosa Cañada Torrecillas ... [et al.] . - 2ª ed. Madrid : Ra-Ma, 2007
- Quirós Hernández, M.. Tecnologías de la Información Geográfica (TIG) : Cartografía, fotointerpretación, teledección y SIG / M. Quirós Hernández Salamanca : Ediciones Universidad de Slamanca, 2011
- Sommer, Shelly. A to Z GIS : An illustrated dictionary of geographic information systems / Shelly Sommer, Thasa Wade. Redlands : ESRI Press, 2001
- Geospatial Analysis : A Comprehensive Guide to Principles : Techniques and Software Tools / P. Longley, M. Smitth y M. Goodchild Leicester : Matador,2007
- Sistemas y análisis de la información geografica : manual de autoaprendizaje con ArcGIS / Coordinador, Antonio Moreno Jiménez ; autores, Rosa Cañada Torrecillas ... [et al.] . 2ª ed. Madrid : Ra-Ma, 2007