COURSE SYLLABUS 2019-20

Basic information on the course			
Course:	Geographical Information Systems and Environmental Remote Sensing		
Course code:	45093216	Plan:	2009
Academic Year:	2019-20	Undergraduate/Graduate:	Degree
Degree Year:	3th	Type:	Obligatory
Duration:	Annual		

TIME DISTRIBUTION ACCORDING TO REGULATIONS	
Credits:	12
Total time:	300
USE OF LEARNING PLATFORM:	Yes (teaching support)

TEACHERS			
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OTHER IMPORTANT INFORMATION
Content justification
Environmental Remote Sensing and GIS is an instrumental subject, with a strong methodological component that is used to solve a wide range of issues related to the acquisition, storage and analysis of information where the location of features is of particular importance. The subject is directly linked to cartography and mapping, incorporating the use of satellite imagery for the acquisition of information. To develop the course, firstly basic concepts on the conception and cartographic representation of earth's surface are analyzed, as well as on geographical space, introducing geodesy basic notions for understanding technical aspects such as datum, projection systems or coordinate systems, with particular attention to the various and important implications of the scale in the representation of space-time processes. Subsequently, the nature of geographic data will be addressed including spatial, temporal and thematic components. Also the importance of metadata and the quality of information will be explained. The second thematic unit is dedicated to Geographic Information Systems (GIS) and it is focused on technical-instrumental aspects and also on theoretical and methodological facets. Data structure in GIS and its representation by two basic models (raster and vector) will be studied. General strategies for geographic information processing (i. e. spatial analysis) will be addressed. The next section will be devoted to Remote Sensing, which will focus on one of the main sources of spatial information. Physical principles involved on images acquisition and their relations with Earth's surface characteristics will be studied. Finally, the extraction and interpretation of environmental information from image processing will be treated. Once the student knows the sources of geographic information and is able to manipulate and get new information, we will address Thematic Cartography, in which the student will learn how to produce thematic maps. The last lessons will be devoted to solve a environmental problem involving decision support tools for Multi-Criteria Evaluation and the student´s work will be implemented in a design problem-based learning. This block will allow the student to integrate all the acquired information in previous blocks and to implement most studied techniques and tools to solve a real environmental problem. .
Courses related in Study Plan
The need to handle a lot of information on land for any type of study, project report, etc. requires to have available tools able to obtain, organize and analyze this extensive information in a fast way and also able to easily update it. Taken into account that the acquired knowledge and skills facilitate the analysis and understanding of ecological processes and enable the management of environmental information, the course will have direct application in other subjects of the Degree in Environmental Sciences, and it will be essential in the professional future of the student. Currently, the application of these techniques,

which are essential for better management of the territory, environmental planning and sustainable use of natural resources is spreading fast in practice, both in public and private contexts. This together with the fact that the development of these technologies is recent and it is increasing rapidly lead to a shortage of professionals capable of handling such tools, so the presence of this subject in the student´s curriculum will favor its rapid incorporation into professional practice. The subject is also related with those subjects of the Environmental Sciences Degree that involve the above mentioned aspect, and it relates directly to: - Planning and Urbanism, third year - Fundamentals of Environmental Engineering, second year -Techniques for soil, water and landscape restoration and conservation, third year – Natural spaces conservation and management- third year.

Pre-required knowledge

None.

COMPETENCES

General competences

Key competences University of Almeria

- - Problem solving skills

Basic competences

- Application of knowledge

Specific competences

- Application of knowledge of the profession
- To be able to generate and interpret thematic maps
- To manage, analyze and graphically represent spatial information.
- Awareness of the temporal and spatial dimensions of environmental processes

LEARNING OUTCOMES

During the course, students will develop the skills mentioned above, so, in the end, they should be able to:

1. Generate conceptual maps on the main theoretical aspects of the subject
2. Regarding to the ability to solve problems, it will involve: i) recognition of a problem and ability to decompose it into manageable parts. ii) To develop an action plan and an appropriate experimental design to build a solution or different solutions to the considered problem. iii) To prepare reports to describe, analyze, diagnose and validate the solution or different solutions to the problema
3. Regarding the awareness of the temporal and spatial dimensions of environmental processes, the student should be able: i) to understand, compare and link spatial and temporal scale concepts in environmental processes; ii) to select appropriate materials to solve environmental problems at different scales.; iii) to use spatial and temporal scales concepts to design the solution of the problema
4. To manage, analyze and plot the spatial information, the student should be able to handle the appropriate software to store, view and analyze georreferenced data and should be able to apply concepts from graphic design to mapping thematic layers.
5. With respect to the ability to create and interpret thematic maps it requires: i) identification of mapping properties (reference system, datum, projection, scale and legend) for the thematic data;

ii) harmonisation of mapping properties between different layers of thematic information; iii) application of appropriate software to produce different types of thematic maps.

COMPETENCY ASSESSMENT

Criteria and assessment tools

During the evaluation process we will take into account:

- The acquisition of contents and basic concepts related to the subject

- The capacity of applying specific software tools related to GIS and Remote Sensing, and

- The ability to search, manage and integrate spatially distributed information from different sources.

It will be also valued the ability of the student to recognize and address a problem involving spatially distributed information, to design an action plan and the application of appropriate tools to solve it. Also it will be recognised the worth of their ability to diagnose the validity of the result.

For all this will make use of multi-objective written exams. Oral presentation of bibliographic work and the project developed during the last module by means of Project Learning Based system will be also evaluated.

Attendance and participation during theoretical and practical classes will be taken into account for evaluation.

Assesment Instruments:

Progress report

Process observations

Final evaluation of projects, works, exercises etc.

Final tests (written and oral)

Follow-Up Mechanisms

Tutories

Assistance and participation in classes and seminars

Conceptual maps, practical exercises, tasks and projects delivery

Registering and number of accesses to the virtual learning platform

COURSE MATERIALS

Recommended course materials

- A visual Guide to Map Design (Krygier, J. and Wood, D.) - Basic
- Geographic Information Systems and Science (Longley, P.A.; Goodchild, M.F.; Maguire, D.J.; and Rhind, D.W.) - Basic
- Principles of Geographic Information Systems Rolf A. de By, Knippers, Weir, Georgiadou, Kraak, van Western and Sun). 2004. . International Institute for Geo-Information Science and Earth Observation. 2004. ITC
- Remote Sensing and Image Interpretation (Lillesland, T.M.; Kiefer, R.W. and Chipman, J.W.) - Basic
- Remote Sensing for Natural Resources Management and Environmental Monitoring. (Ustin, S.L)
- Remote Sensing Digital Image Analysis An Introduction (John A. Richards)

Complementary

Borrough, P.A. y McDonell, R.A., 1988. Principles of Geographical Information Systems. Oxford University Press, 333pp.(*)

Hutchinson, M.F., 1989. A new procedure for gridding elevation and stream line data with automatic removal of spurious pits. Journal of Hydrology, 106: 211-232.

Jansen, L. and Hurneman, G.C. 2001. Principles of Remote Sensing. ITC Ed. Manual disponible en Aula Virtual.

Montmellier, M., 1993. Mapping It Out. University of Chicago Press. Chicago. 301pp

Other materials

Lessons prepared by the teacher and available in the virtual platform

Couse materials available in UAL's library

http://almirez.ual.es/search/x?SEARCH=70534211

WEBSITE

http://www.mappinginteractivo.com/
http://telenet.uva.es/promotores/revista
http://geofocus.rediris.es/principal.html
http://www.dices.net
http://www.clarklabs.org
http://www.geogra.uah.es
http://www2.ncdc.noaa.gov
http://rst.gsfc.nasa.gov/Homepage/Homepage.html
http://www.nosolosig.com/
https://lpdaac.usgs.gov/lpdaac/get_data/
http://www.geogra.uah.es/gisweb/