Code: 1319 **Geographical Information Systems**
Degree: 2nd cycle – Natural Resources Management and Conservation
Curricular Year: 1st **Semester Course: 2nd**
Credits: 6 ECTS **Compulsory**
Language: Portuguese/English
Responsible: Nuno Alexandre Gouveia de Sousa Neves
Other lecturer(s): -
Web Site: http://www.isa.utl.pt/home/node/3876

1. Contact hours:
Lectures 14 **Praticals/Laboratory** 32 **Others** 1 **Total** 47

2. Objectives:

1 – Description and evaluation of the fundamental computational models for the representation and storage of geographic information
2 – Description of fundamental spatial analysis processes and operations in geographical information systems.
3 – Evaluation of spatial data models considering their potential for spatial analysis operations.
4 – Evaluation of the implications of spatial data model characteristics for the definition of GIS applications and geographic modelling.
5 – Evaluation of potential future developments and research directions in relation to spatial data models and spatial analysis.

3. Programme:

1 – Geographic representation: Evaluation of the different representation metaphors and an introduction to a systemic approach to representation metaphors.
2 – Spatial data models: Detailed analysis of vectorial model, raster model and other data models.
3 – Unique layer spatial operations: Neighbourhood analysis, buffering, masks and filtering.
4 – Multiple layer spatial operations: Overlay analysis and geoprocessing operations.
5 – Dimensionality of geographic data: 3-dimensional models and an introduction to time modelling.
6 – Conceptual design of data models and geographic modelling: Geographic modelling concepts and flowcharts design including map algebra operations.
7 – Network analysis: Shortest path analysis, service area, cost distance functions
8 – Future perspectives: New spatial data models, new models for spatial relations and new spatial analysis processes.

4. Bibliography:

Main Bibliography

Maguire, D.J. , Batty, M. , and Goodchild, M.F., editors “GIS, Spatial Analysis, and Modeling”, Redlands, CA: ESRI Press, 2005.
Longley, P.A. Goodchild, M.F. , Maguire, D.J. and Rhind, D.W. “Geographic Information Systems and Science”, Second Edition. New York: Wiley, 2005.
Burrough, P., McDonnell, R., A., “Principles of Geographical Information Systems (Spatial Information Systems)”, Oxford, Oxford Univ Press, 2nd edition, 1998.
Longley, P., Batty, M., (Editors), “Spatial Analysis: Modelling in a GIS environment”, New York, John Wiley & Sons, 1997.
Laurini, R., Thompson, D., Fundamentals of Spatial Information Systems, London, The Apic Series, 1992.

5. Assessment:

The teaching method is based in the presentation of theoretical concepts and associated methodologies following the general structure of the course materials.
During the theoretical classes students are encouraged to participate and to debate the fundamental concepts and associated methodologies related to the presentation topics.
The course materials provided include the fundamental theoretical concepts, self-evaluation exercises, scientific papers and other relevant documentation.The assessment method is based in the following mandatory elements:
Examination – 40%

The final examination covers the whole course program and is divided into two sections – short questions with multiple choice answer options and open questions;
Final project – 60%
The final project is presented accordingly to an established structure, aiming to describe the design of a GI data model for spatial analysis operations.

6. Estimated Workload:	162	Hours
7. Last Update:	9/8/2010	