

Module title Spatial and Spatiotemporal Databases				
Module code DSTD	Level Bachelor (B.Sc.)	Hours per week 4	ECTS credits 5	Duration 2 weeks block course + virtual lectures
Module instructor Prof. José Moreira, Universidade de Aveiro, Portugal		Lecture type Regular lecture, on line consultations, in-class exercises	Prerequisite(s) Good database skills	Grading Project assignment
Objectives The focus of this course is on spatial and spatiotemporal databases with applications to Geographical Information Systems (GIS). Students will learn how to create, maintain, share and retrieve data from spatially enabled databases, and to apply these skills on the development of interactive web mapping applications. They will also learn about current trends in spatiotemporal databases, with emphasis on the representation and analysis of trajectories of moving objects (e.g., cars) in networks.				
Content <ol style="list-style-type: none"> 1. Spatial databases: Data models and reference systems for representation of geospatial data. Spatial query languages. Space-filling curves, spatial data structures (Quadtrees, Grid files, R-trees), access methods and algorithms. Spatial data formats and Open Geospatial Consortium (OGC) standards: WKT, WKB, KML, GML, GeoJSON and TopoJSON. OGC web services: WMS, WFS, WPS and CSW. Spatial networks. 2. Introduction to temporal databases: time dimensions, data model and query language. Temporal features in SQL:2011 standard. 3. Spatiotemporal databases: Introduction to spatiotemporal data models. Modelling and querying moving objects in road networks. Traffic data analysis. 4. GIS and WebGIS tools: PostGIS, Quantum GIS, Geoserver, Leaflet and Mapbox. 				
Textbook/teaching material <ul style="list-style-type: none"> • Nikos Mamoulis (2012). Spatial data management. Synthesis Lectures on Data Management, Morgan & Claypool publishers. • Additional recommended reading lists will be provided. 				

Note: this is not the official course descriptor according to the "Studien- und Prüfungsordnung" (SPO)