Universitat Autònoma de Barcelona

2019/2020

Geospatial Services

Code: 43849
ECTS Credits: 6

Degree	Type	Year	Semester
4315985 Geoinformation	OB	0	1

Contact

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Use of Languages

Principal working language: spanish (spa)

External teachers

Víctor Pascual

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Prerequisites

This course has no specific requirements. Students should only have a basic knowledge of using general software such as Windows, Excel and Word.

Objectives and Contextualisation

1. Sytematic coverage of web technology for implementing spatial data infrastructures as well of the different types of servers of geospatial information web services (map servers, metadata, geoprocessing, etc.) based on the standards of geospatial information services from OGC and ISO (WMS, WMTS, WFS, WPS, etc.).

2. Knowledge of the main free and commercial software for creating, publishing and managing the different types of geospatial information web services.

Competences

- Apply programming methodologies and procedures, and those for implementation of geospatial applications for different types of platforms (desktop, web, mobile), using different programming paradigms and environments.
- Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
- Continue the learning process, to a large extent autonomously.
- Design and elaborate cartographic documents and, in general, geovisualization of geospatial data products, and implement the corresponding production and publication processes using analogue and digital media.
- Develop and apply monitoring and evaluation procedures for geoinformation products and services.
- Develop imaginative, creative and innovative ideas in projects for geospatial information systems, services, products or applications.
- Differentiate between and use different data models and standard of geospatial information (digital cartography, spatial databases and metadata), and be able to recognise their respective components and capacities.

- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
- Use knowledge critically and understand and take on board the ethical responsibility, legislation and social implications of the use and diffusion of geospatial information and its derived products.

Learning Outcomes

1. Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
2. Continue the learning process, to a large extent autonomously.
3. Create and publish web geoservices of different types, contents and capacities using standard protocols and the principal programmes for map servers and other types of geoservices.
4. Develop imaginative, creative and innovative ideas in projects for geospatial information systems, services, products or applications.
5. Implement automatic processes for producing cartographic documents.
6. Implement metadata catalogue servers.
7. Implement the usual geoservices of a spatial data infrastructure.
8. Implement web geoservice servers of different types, contents and capacities using standard protocols and the principal programmes for map servers and other types of geoservices.
9. Integrate external geoservices into internal geoservice servers.
10. Integrate information about quality, traceability and the implantation of metadata for geoinformation products and services.
11. Know the characteristics of the standard data models for the metadata of geospatial information.
12. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
13. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
14. Use knowledge critically and understand and take on board the ethical responsibility, legislation and social implications of the use and diffusion of geospatial information and its derived products.

Content

Spatial data infrastructures and standards for geospatial services

1. Introduction to spatial data infrastructures (SDI).

    SDI concept.

    Background.

    Human components.

    Technical components.

    IDEC.

    IDEE.

    INSPIRE.

    Other examples of SDI.

2. Geospatial service standards of the *Open Geospatial Consortium* (OGC).

    Presentation of OGC.

    WMS standard.

    WMTS standard.

WFS standard.

SLD standard.

SOS standard.

GML standard.

CSW standard.

Other OGC standards.

Examples of implementation of OGC standards.

3. Metadata and geospatial service standards of the ISO TC211 Technical Committee.

Presentation of the ISO TC211 Technical Committee.

ISO 19115 standard.

ISO 19119 standard.

ISO 19139 standard.

Examples of implementation of ISO TC211 standards.

4. Map servers.

Geospatial service concept.

Map server concept.

Standard map servers.

ArcGIS Online.

Other cloud platforms of geospatial services (*Google Maps, Instamaps, Carto*,...).

5. Map service clients.

Web clients.

Desktop clients.

Geospatial service consumption by means of *JavaScript* libraries.

Mobile apps from geospatial services.

6. Preparing geoinformation to creare map services.

Map services from data (spatial databases, shape files, GeoJSON files)

Tile cache map services (WMTS)

Tools for creating tiled map services (*GeoServer, ArcGIS Online*).

7. Creating and publishing metadata.

Metadata creation tools (*MetaD, ArcCatalog*).

Standard metadata service publishing tools (*GeoNetwork*).

Geospatial services for smart cities

1. Introduction to smart cities.

    Open data concepts.

    Use of Open data services.

    Realtime Open data services.

    Open data services visualization tools.

    Examples of Open data services viewers.

2. Introduction to web sensors.

    Concepts of sensors.

    Realtime sensor services.

    Examples of sensor services viewers.

3. Introduction to geospatial services.

    Basic concepts of geospatial services.

    Realtime geospatial services.

    Geospatial services visualization tools.

    Examples of geospatial services

4. Introduction to *VectorTiles*.

    VectorTiles basics.

    VectorTiles sample viewer

Methodology

Learning is achieved by means of three types of activities.

Directed activities: Directed activities are theoretical and practical lectures in a computer lab. They include solving case studies and practical exercises. Lectures are the common thread of the course. Lectures serve to systematize all the content, to present the state of the art of the different subjects, to provide methods and techniques for specific tasks, and to sum up the knowledge to learn. Lectures organize also the autonomous and complementary work done by the students

Supervised activities: Supervised activities are focused on the execution of a semester project, consisting of a real case study, carried out through workshop hours, autonomous work and tutorials. This semester project allows to apply together all the knowledge and technical skills learnt in all the courses of the semester. The semester project is a milestone for the students and the actual demonstration that they had achieved the learning goals of all the courses of the semester. It is also the main evidence for evaluation as students should have to submit at the end of the semester a report that summarizes the whole project and do an oral presentation.

Autonomous activities: Autonomous work of the students includes personal readings, data and documentation search, complementary exercises and the personal development of the semester project.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures and practical exercises in a computer lab	36	1.44	11, 3, 7, 5, 6, 8, 9, 1, 13
Type: Supervised			
Individual and group practical work guided by teachers	15	0.6	11, 3, 4, 7, 5, 6, 8, 9, 12, 1, 2, 13
Type: Autonomous			
Solving practical exercies	69	2.76	11, 3, 4, 7, 5, 6, 8, 9, 12, 2, 14

Assessment

CONTINUOUS EVALUATION

a) Evaluation procedure and activities:

Evaluation of the course is based mostly on the semester project, that comprises two evaluation activities. The elaboration and submission of a synthesis report and the oral presentation of the project done. Given the technical content of the course, the weight assigned to the project report is 45% of the total course grading, assuming that it is the most appropriate means to explain all the technical details of the project, and a weight of 25% at the oral presentation. The course assessment is completed with the evaluation of the practical exercises done along the course, that account for another 30% of the total course grading.

Except when expressly noticed, all the evaluation activities (report and oral presentation of the semester project, as well as practical exercises) have to carried out individually.

Time assigned to each evaluation activity includes the time spent in making all the material evidences for evaluating each activity (e.g., writing of the report, preparing the presentation slides, etc.).

b) Evaluation schedule:

1st semester project report: Making during all the semester. Submission at the end of semester, on January 24 th 2020.

1st semester project oral presentation: Making during all the semester. Oral presentation at the end of semester, on January 30th and 31st 2020.

Course practical exercises: Making and submission weekly or biweekly along the semester.

c) Grade revision:

Once the grades obtained are published, students will have one week to apply for a grade revision by arranging an appointment with the corresponding teachers.

d) Procedure for reassessment:

1st semester project report: It could be reassessed in the following two weeks after the submission date scheduled. Reassessment will require the submission of a new whole report in case of negative evaluation of the former report submitted.

1st semester project oral presentation: It could be reassessed in the following week after the date scheduled for the oral presentation. Reassessment will require doing again the oral presentation in case of negative evaluation of the former presentation done.

Course practical exercises: Can not be reassessed.

To have right to a reassessment the student will have to have been previously evaluated in a set of activities that account for at least two thirds of the total course grading. Therefore he or she will have to have been evaluated of the 1st semester project report (45%) and of the 1st semester project oral presentation (25%) in the dates scheduled.

The right to a reassessment will only be granted to students that, having not passed the course (e.g., having a total course grade below 5 over 10), had obtained at least a total course grade above 3,5 over 10.

Plagiarism or copying in any activity will deserve a grade of 0 in this activity and could not be recovered. In case of repeated offence all the course grade will be FAIL. It is considered "copy" a work that reproduces all or a sunstantial part of another student's work. It is considered "Plagiarism" to present all or part of an author's published work without citation of the original sources, either analogic (e.g., paper) or digital. See more information over plagiarism at http://wuster.uab.es/web_argumenta_obert/unit_20/sot_2_01.html.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Oral presentations	25	7.5	0.3	10, 1, 14
Practical exercises	30	9	0.36	11, 3, 4, 7, 5, 6, 8, 9, 12, 1, 2, 13
Report submissions	45	13.5	0.54	11, 3, 4, 7, 5, 6, 8, 9, 10, 12, 1, 2, 13, 14

Bibliography

Fu, Pinde and Sun, Jiulin (2010). *Web GIS: Principles and Applications*. Redlands, California: ESRI Press. 450 pp. (ISBN-10: 978-1589482456)

Nogueras, Javier; Zarazaga, F.Javier and Muro, Pedro (2010) *Geographic Information Metadata for Spatial Data Infrastructures: Resources, Interoperability and Information Retrieval*. Springer.

Kopla, Bill (2009) *Beginning MapServer: Open Source GIS Development*. Apress.

YoungBlood, Brian and Iacovella, Stefano (2013) *Geoserver Beginner's Guide*. Packt Publishing.