Course Syllabus

Geographic Information System

August – December 2018

VI Ciclo

Lecturer

Wayne Menary PhD

I. General course details

Subject	: Geographic Information System	Code	: 10345
Requirement	: None	Semester	: 2018-II
Credits	: 3	Ciclo	: VI
Hours	: 4 (2 hours theory / 2 hours practical)		

II. Summary

This course introduces students to the fundamentals of Geographical Information Systems (GIS) and Geospatial Technology, including cartography, remote sensing and spatial analysis. It examines the processes involved in the capture, storage, manipulation, analysis, presentation and output of digital geographical data in a GIS and provides opportunities for the development of practical skills in processing data using a leading Open Source GIS software package, Quantum GIS.

III. Course Objectives

To critically assess how GIS is currently used in environmental sciences and management and to apply the acquired knowledge of GIS tools and software to real life situations.

IV. Learning Outcomes

By the end of this course students will be able to:

- Understand the fundamental concepts of Geographic Information Science and Technology
- Demonstrate basic proficiency in the creation and acquisition of spatial data.
- Analyse the fundamentals of GIS data storage and interoperability and remote sensing.
- Apply GIS tools and techniques to resolve real life situations.
- Construct datasets for use in geo-analysis
- Execute the results of a geospatial analysis using appropriate models, terminology and visualizations.
- Evaluate types of geographic information analysis and geostatistics
- Analyse GIS innovations and industry applications.

V. Methodology

The course comprises a series of lectures, presentations and computer-based practical sessions using Quantum GIS software, with example data sets taken from a variety of fields. The computer-based practical sessions will be based on the QGIS training manual. Quizzes will take place each week and will cover all the material discussed.

Students will complete a practical assignment designed to provide practical experience with the software while simultaneously illustrating and reinforcing theoretical concepts.

Contact and communication between the student and lecturer will be vía the virtual campus, where all the course resources will also be available. It is recommended that the student read the texts indicated in the bibliography, as well as material that will be made available to encourage students to explore topics in greater depth.

VI. Evaluation

The integrated evaluation system is continuous. The grade of the subject is obtained by averaging the continuous evaluation (50%), the partial exam (20%) and the final exam (30%).

The average grade for the continuous assessment results from the average of assessed research reports, integrative activities and creation and presentation of an individual map.

The weighting within the continuous evaluation are described in the following table:

PROMEDIO DE EVALUACIÓN PERMANENTE 50%		
Type of evaluation	**Description**	**Weighting %**
Research Report	Research Report evaluation	15
Application of GIS tools	Presentation of map and summary report	20
	Presentation of map and summary report	25
Project	Problem solving using GIS	40

The final average grade (FA) is obtained as follows:

$$\mathbf{FA} = (0{,}20 \times MTE) + (0{,}50 \times CEA) + (0{,}30 \times FE)$$

Where:

FA = Final Average
MTE = Mid-Term Exam
CEA = Continuous Evaluation Average
FE = Final Exam

VII. Programme Content

WEEK	*CONTENTS*	*ACTIVITIES / EVALUATION*
UNIT OF LEARNING I: Communication and Geographic Understanding. **1.** Understand the fundamental concepts of Geographic Information Science and Technology **2.** Demonstrate basic level proficiency in the creation of spatial data.		
1° *Aug 20th – 25th*	What are Geographic Information Systems (GIS). Spatial Thinking and Geographical concepts.	QGIS Practical I Google My Maps
2° *Aug 27nd – Sep 1st*	Map Anatomy Maps and Map types Map Scale, Coordinate Systems and Map projections	QGIS Practical II
3° *Sep 3rd* – 8th	Cartographic Principles - colour, symbology, cartographic design; Displaying Geospatial Data; Creation of cartographic products by applying cartographic principles	QGIS Practical III
4° *Sep 10th* – 15th	Geospatial Intelligence (GEOINT) What is Geospatial Intelligence? GEOINT Data, Data Sources, & Collection Strategies	QGIS Practical IV **Evaluation I**
UNIT OF LEARNING II: Principles of GI and Cartography. Part II provides students with the opportunity to acquire the skills and techniques required to become proficient GIS professionals. **3.** Analyse the fundamentals of GIS data storage and interoperability and remote sensing. **4.** Evaluate and apply different types of geospatial analysis techniques		
5° *Sep 17th* – 22nd	Geospatial Data Management Geographic Data Acquisition, Geospatial Database Management, File Formats, Data Quality.	QGIS Practical V
6° *Sep 24th* –29th	Understanding Remote Sensing and Aerial Photography	QGIS Practical VI
7° Oct 1st – 6th	Basic Geospatial Analysis Techniques	QGIS Practical VII **Evaluation II**
8° Oct 8th – 13th	**MID-TERM EXAMS**	

WEEK	*CONTENTS*	*ACTIVITIES / EVALUATION*
UNIT OF LEARNING III: Advanced Issues in GIS. Part III focuses on specific techniques and practices **5.** Construct datasets for use in geo-analysis **6.** Execute the results of a geospatial analysis using appropriate models, terminology and visualizations.		
9° Oct 15th – 20th	Geospatial Analysis: Vector Operations, Single Layer Analysis, Multiple Layer Analysis	QGIS Practical VIII
10° Oct 22nd – 27th	Geospatial Analysis: Raster data Basic Geoprocessing with Rasters, Scale of Analysis	QGIS Practical IX
11° Oct 29th – Nov 3rd	Surface Analysis: Spatial Interpolation, Terrain Mapping	QGIS Practical X **Evaluation III:**
UNIT OF LEARNING IV: GIS Analysis: Understanding Our World. **7.** Apply GIS tools and techniques to resolve real life situations. **8.** Analyse GIS innovations and industry applications.		
12° Nov 5th – 10th	Environmental Applications of GIS	QGIS Practical XI
13° Nov 12th – 17th	Energy Industry Applications of GIS	QGIS Practical XII
14° Nov 19th – 24th	Planning GIS for Emergency Management	QGIS Practical XIII
15° Nov 26th – Dec 1st	Independent project presentations	**Evaluation IV:**
16° Dec 3rd – 8th	**FINAL EXAMS**	

VIII. Bibliografía

- Sutton et al (2009). A Gentle Introduction to GIS. Department of Land Affairs.
- Graser, A (2016). Learning QGIS. Third Edition. Packt Publishing.
- Menke, K. (2016). Mastering QGIS. Second Edition. Packt Publishing.
- Graham, M, and Shelton, T (2013). Geography and the future of big data, big data and the future of geography. Dialogues in Human Geography. Vol 3, Issue 3, pp. 255 – 261
- Manuel Lima (2011). Visual Complexity. Mapping Patterns of Information. Princeton Architectural Press, New York.

IX. Lecturers

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