| Program | 09TT- Engineering in Telecommunication Technologies and Services |
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| Course number and name | |
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| **Number** | 95000096 |
| **Name** | Geographic Information Systems for Engineering<br>Sistemas de Información Geográfica y Territorial |
| **Semester** | Y3 - S6 |

| Credits and contact hours | |
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| **ECTS Credits** | 4.5 |
| **Contact hours** | 45 |

| Coordinator's name | Julián Robledo Candela |
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## Specific course information

**Description of course content**

The subject of GEOGRAPHIC INFORMATION SYSTEMS FOR ENGINEERING belongs to graphic expression in engineering. The management of geographical information systems, allows you to scan, edit and display geographically referenced information. It is a system of management of information of great extension, able to integrate map data with numerical data, text and image.

You will provide a high level of use of SIG software, currently most widespread in information systems, geography, as well as knowledge of other software, both commercial and free.

Students will be trained for the reading, understanding and analysis of geographic data and editing of cartographic maps and associated geo-referenced databases.

You can make digital elevation models and you can integrate existing or designed elements from other programs, such as CAD design programs.

The course will not require attendance at classes since is offered as e-learning through the MOODLE platform

**List of topics to be covered**

Module 1 Fundamentals of the SIG

- 1.1 Introduction to geomatics. Geoid and ellipsoid. Dimensions and altitudes
- 1.2 Reference systems. Representation of the territory. Cartographic projections. Cartographic symbols
- 1.3 Data capture for SIG

Module 2 Representation of the Geographic Information

- 2.1 Vector data model
- 2.2 Raster data model
- 2.3 Digital elevation models

Module 3 Exploitation of a SIG

- 3.1 Work with geographic data. Introduction to the program
- 3.2 Working with Raster SIG

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| 3.3 Working with Vector SIG<br>Module 4 Searches and queries to SIG<br>4.1 Database. Selection of elements and<br>4.2 Searching by geographic attributes<br>Module 5 Spatial analysis<br>5.1 Spatial analysis operations<br>5.2 Construction of continuous surfaces |
| **Prerequisites or co-requisites** |
| There is no recommended previous subjects.<br>Prior knowledge: geometry and mathematics studied in high school |
| **Course category in the program** |

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| __ **R (required)** | _X_ **E (elective)** | __ **SE (selective elective)** |

| **Specific goals for the course** |
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| **Specific outcomes of instruction** |
| RA1 Understanding and application of basic concepts of geomatics and representations of geographic information.<br>RA2 Understanding and knowledge of the different systems of data geomatics and application of the resulting data. Knowledge of the structure of the data.<br>RA3 Ability to integrate two-dimensional and three-dimensional data in a geographical information system. Realization of operations and spatial analysis of the same. Map editing<br>RA4 Capacity for the realization of three-dimensional models of lifting and securing of data and derived cartography |
| **Student outcomes addressed by the course** |
| CG1- CG13, CECT1, CECT2, CECT3 |

| **Bibliography and supplemental materials** |
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| “Topografía y Cartografía”, Francisco Javier Polidura (2004)<br>“Principles of Geographic Information Systems”, P. A. Burrough et al(2005)<br>“Geographic Information Systems: Principles, Techniques, Management, and Applications”, P. A. Longley et al (2005).<br>“GIS for Everyone”, David E.David (2003)<br>“Getting to know arcgis”, Robert Bure (2004)<br>“Spatial and modeling GIS”, David Maguire (2005)<br>“SIG: Sistemas de Información Geográfica”, J. Gutiérrez Puebla, M. Gould, (1994).<br>“Geographic Information Systems and Science”, P. A. Longley et al, (2005).<br>“A White Paper of Lidar Mapping”.Ambercore. LIDAR: (2008). http://www.ambercore.com/files/TerrapointWhitePaper.pdf,<br>“Sistemas de Información Geográfica”, J. Bosque Sendra, (1997). |

| **Teaching methodology** | | | |
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| _X_ **lectures** | _X_ **problem solving sessions** | _X_ **collaborative actions** | __ **laboratory sessions** |

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| **Other:** | Case study |