## ADVANCED GEOINFORMATION SYSTEM

### 1. About Course unit/module data

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| **Faculty** | Construction, Geodesy and Cadastre |
| **Department** | Civil Engineering and Geodesy |
| **Cycle of studies** | License, cycle I. |
| **Studies programme** | 0731.2 Geodetic Engineering and Cadastre |

| **Year of study** | **Semester** | **Type of evaluation** | **Formative category** | **Optionality category** | **ECTS credits** |
|---|---|---|---|---|---|
| III (full-time and part-time education) | 5 | E | S - specialized course unit | O - compulsory course unit | 5 |

### 2. Estimated total time.

| Total hours in the curriculum | From which | | | | |
|---|---|---|---|---|---|
| | Auditorium hours | | Individual work | | |
| | course | Laboratory / seminar | Year project | Study of theoretical material | Application preparation |
| 150 | 30 | 45 | 0 | 30 | 45 |

### 3. 3. Prerequisites for access to the course unit / module

| 3. Prerequisites for access to the course unit / module | Automation of topographic works. Informational Systems. Numerical analysis and computer programming. Cartography. Cadastre |
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| According to the competencies | To possess and apply knowledge regarding the Collection, Systematization, Integration and analysis of spatial data. Development of applications, thematic projects. |

### 4. Conditions for carrying out the educational process for

| course | For the presentation of the theoretical material in the classroom it must be equipped with multimedia techniques (projector, screen computer). Student delays, telephone conversations and other discussions during the course will not be tolerated. |
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| Laboratory / seminar | The classes will take place in the Geoinformation Technologies laboratory, equipped with computer technology (specialized hardware and software). Deadline for submission of laboratory work - one week after its completion. |

### 5. Specific skills acquired

| Professional skills | **CP 3**. Implementation and use of new software and technologies for solving / solving the specific task of geodesy and cadastre (measurement and data processing). <br>• Defining basic concepts, theories and methods in the field Spatial Analyses in line with the of software applications and digital technologies, mainly in the field of geodetic engineering and cadastre; <br>• Appropriate use of basic knowledge to explain and interpret the GIS tools, procedures, techniques and methods required in the use of software applications and digital technologies to solve tasks specific to the field. <br>• Application of basic principles and methods Overlay Spatial Analyses via interpolation procedure, database creation, assisted graphics, modeling, computer aided design of works, computerized processing of data specific to geodetic engineering and cadastre. |
|---|---|
| Transversal | **CP5.** Carrying out activities and exercising the specific roles of teamwork on different |

| skills | hierarchical levels. Promoting the spirit of initiative, dialogue, cooperation, positive attitude and respect for others, diversity and multiculturalism and continuous improvement of one's activity: |
|---|---|
| | • Description of specific procedures, techniques and methods for planning, coordinating and monitoring works in the field of geodetic engineering and cadastre, |
| | • Use of basic knowledge to explain and interpret projects and technical and technological files specific to the professional field, including the use of modern topo-geodetic technologies specific to the field, |
| | • Application of basic principles and methods for the realization of projects and technical and technological files specific to the field, in conditions of qualified assistance, |
| | • Appropriate use of standard assessment criteria and methods for the adoption of specific procedures, techniques and methods applied for the planning, coordination and monitoring of works in the field of geodetic engineering and cadastre, |
| | • Development of professional projects using procedures, techniques and methods established in the field for planning, coordinating and monitoring works in the field of geodetic engineering and cadastre |

### 6. Course unit / module objectives

| The general objective | Deep knowledge and understanding of the basic concepts, theories and methods of GIS, use and operation with GIS, including Spatial Analyses in solving geographical problems, projects in the field of cadastre, territorial organization, environment, etc.. |
|---|---|
| Specific objectives | o Mastering the GIS philosophy, by operation with the most used GIS software (ArcGIS, MapINFO. OpenSourse (QGIS)). |
| | o Ability to create spatial databases. Collection, systematization and integration of geospatial and non-geospatial data from various sources. Date formats. |
| | o Knowledge of the methodology for organizing and creating GIS projects, including the integration of satellite images and aerial photographs, as a cartographic base and source of geographical data. Vector and Raster operations. |
| | o Use of open-source software, WebGIS applications and online geospatial databases (Google Earth, Open Street Maps, etc.) and online applications (BlogSpot etc.) |

### 7. 7. Content of the course unit / module

| The theme of teaching activities | Number of hours | |
|---|---|---|
| | full-time education | part-time education |
| **The theme of the lectures** | | |
| T.1. Synthesis of the discipline GeoInformation Systems. | 2 | - |
| T.2. Perspectives on Information Systems (Functional, Technical, Organizational, Human). Challenges. Problems and approaches in the field of terrestrial measurements. Projects. ArcGIS applications. Common and specific for projects in the field of environmental, cadastral, territorial organization, tourism, etc. | 6 | - |
| T3. Data and data base. Types, sources and formats. Date base operation, topological rules between objects. GIS Web applications and online geospatial databases (Google Earth, Open Moldova Street Maps, map24.com, etc.). Open-source software (QGIS). | 4 | - |
| T.4. Geographical analysis. Types of spatial (geographical) analyzes. Analytical operations on a single layer. Analytical operations on several layers (multiple spatial analyses). Network analysis. Using GIS spatial analysis to characterize resources. The study of locations and forms of geographical features and the relationships between them. Geoprocessing tools. | 4 | - |
| T.5. Interpolation methods. Triangulation (TIN). Inverse Distance Weighted. | 4 | - |

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|---|---|---|
| Natural Neighbor. Nearest Neighbor. Regular spline with tension. Kriging. Co-Kriging | | |
| T6. Open-source software (QGIS). Open source applications | 4 | |
| T.7. WEB GIS technologies. Web Mapping. Project application in the field of environment, cadastral and geodetical works. | 6 | |
| **Total lectures:** | **30** | |

| The theme of teaching activities | Number of hours | |
|---|---|---|
| | full-time education | full-time education |
| **The theme of laboratory works / seminars** | | |
| LL.1. Course synthesis. Recaps (data, DB, GIS Models, reference system, etc.). | 2 | |
| LL.2. Data and date Base operation. Creating the digital relief model. Creating the mosaic. Creating contours. | 4 | |
| LL.3. Statistical Surveys. Linking geometry with demographic data and other statistics (data collection from various sources (National Bureau of Statistics, Central Authorities). | 4 | |
| LL.4. Statistical Surveys. Data classification. | 2 | |
| LL.5. Statistical Surveys. Map design, clasification and printing layout | 2 | |
| LL.6. Geodata for Urbanism and Spatial Planning. Import data in GIS software | 2 | |
| LL.7. Geodata for Urbanism and Spatial Planning. Data integration with other spatial data sets in GIS. | 4 | |
| LL.8. Open-source software. QGIS introduction. | 2 | |
| LL.9. QGIS. Practical use of mainstream data format. | 4 | |
| LL.10. QGIS. Spatial analyses. | 5 | |
| LL.11. QGIS. Web services. | 2 | |
| LL.12. Utility and Government Services. Geoinformation modelling for the utility register | 2 | |
| LL.13. Utility and Government Services. Migration of digital legacy data into the utility register GIS. | 4 | |
| LL.14. Utility and Government Services. Geodata integration into a single database and accessing the data via web services. | 4 | |
| | | |
| **Total laboratory works / seminars:** | **45** | |

8. **Bibliographic references**

| Main | 1. Peter A. Burrough ... Principles of Geographical Information System.<br>2. V. Dilan, V. Mamomont, Geoinformatica Suport de curs, UST, 200 ex., 2012,<br>3. N. Popovici, Gabriela Biali, Sisteme Geoinformationale, Gh. Asachi, Iashi, 2000<br>4. Săvulescu C. Fundamente GIS. Bucureşti 2000;<br>5. Şisteme Informatice de evidenţă cadastrală. Bucureşti, 2004;<br>6. Lzn Manole... Mapping our Word. 2002 ESRI<br>7. Software ArcGIS ESRI – licentiat 2005, Server catedra GCG, instructiuni.<br>8. Bofu Constantin, Grama Vasile, Tehnologii GIS, Aplicaţii cu Autodesck Map. 2005, edit UTM. Bib FCGC 150 ex.<br>9. GeoBIZ platform: http://geobiz.eu/moodle/login/index.php ; http://geobiz.eu/moodle/ |
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| Additional | 1. Lexiconul Cadastral, UTM, 2010. |