# COURSE OUTLINE

## 1. Study programme information

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|---|---|
| 1.1 Higher education institution | West University of Timisoara |
| 1.2 Faculty / Department | Chemistry, Biology, Geography / Geography |
| 1.3 Sub-department | |
| 1.4 Field of study | Geography |
| 1.5 Level of study | Master's degree |
| 1.6 Study programme / Qualification | Geographic Information Systems |

## 2. Course information

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|---|---|---|---|---|---|---|---|
| 2.1 Course title | | | | Spatial data acquisition methods | | | |
| 2.2 Course convenor/ Lecturer | | | | Assoc. Prof. Alexandru Onaca | | | |
| 2.3 Teaching assistant | | | | Assoc. Prof. Alexandru Onaca | | | |
| 2.4 Year of study | I | 2.5 Semester | I | 2.6 Type of assessment | E | 2.7 Course type | |

## 3. Total estimated time (hours of didactic activities per semester)

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|---|---|---|---|---|---|
| 3.1 Number of hours per week | 4 | of which: 3.2 lecture | 2 | 3.3 seminar/laboratory | 2 |
| 3.4 Total hours in the curriculum | 56 | of which: 3.5 lecture | 28 | 3.6 seminar/laboratory | 28 |
| **Time distribution:** | | | | | **hours** |
| Studying textbooks, course materials, bibliography and notes | | | | | 15 |
| Further research in libraries, on electronic platforms and in the field | | | | | 25 |
| Preparing laboratories, homework, research papers, portfolios and essays | | | | | 35 |
| Tutoring | | | | | 15 |
| Assignments/Exams | | | | | 4 |
| Other activities …… | | | | | |

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| **3.7 Total hours of individual study** | **94** |
| **3.8 Total hours per semester** | **150** |
| **3.9 Number of credits** | **6** |

## 4. Prerequisites (if applicable)

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| 4.1 based on curriculum | • |
| 4.2 based on competencies | • Basic knowledge of GIS concepts and related applications |

## 5. Conditions (if applicable)

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| 5.1 for the course | • Lectures will be thought online using Google Meet; all materials related to this course will be uploaded on Moodle platform https://elearning.e-uvt.ro/ |
| 5.2 for the seminar/laboratory | • Several applications will be done in the field using data acquisitions equipment and the others online; |

## 6. Accumulated specific competencies

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| Professional competencies | • Knowledge of concepts in Geographic Information Systems<br>• Understanding of the conceptual model of spatial data, concepts of scale, resolution and spatial data integration in GIS<br>• Describe and implement data collection workflows<br>• Capabilities to collect, record, and use the spatial data within a variety of environments<br>• Knowledge and operational skills on DEM data analysis and integration in GIS projects<br>• Knowledge and operational skills on satellite images processing and integration in GIS projects<br>• Operational skills in ArcGIS, ENVI, QGIS, Agisoft Professional |
| Transversal competencies | • Understanding of ethics in academic conduct (correct citations, avoiding plagiarism)<br>• Developing team working abilities. |

## 7. Course objectives (as resulting from the accumulated specific competencies)

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| 7.1 General objective | • Students are able to integrate and analyze appropriate spatial data types from different sources into a GIS project |
| 7.2 Specific objectives | • Students are able to identify, acquire and integrate satellite imagery, aerial photos, DEMs, field data and other spatial data from various sources<br>• Students are able to process and analyze different types of spatial data in a GIS project |

## 8. Content

| **8.1 Lecture** | **Teaching methods** | **Observations** |
|---|---|---|
| Introduction to spatial data and its acquisition; current trends in geographical data acquisition<br>*Chen Q.Y., Lee, C.Y., 2001, Geographical Data Acquisition, New York, Springer-Verlag, 265 p.* | Lectures | 2 |
| Conceptual models of reality and data structures used in GIS<br>*Chen Q.Y., Lee, C.Y., 2001, Geographical Data Acquisition, New York, Springer-Verlag, 265 p.* | Lectures | 2 |
| Structure of a GIS project – examples of data types, formats, attribute types, metadata, scale, resolution, accuracy<br>*http://www.spatialanalysisonline.com/HTML/index.html* | Lectures | 2 |
| Primary and secondary spatial data acquisition methods<br>*ch.9, 10, 12 from Chen Q.Y., Lee, C.Y., 2001, Geographical Data Acquisition, New York, Springer-Verlag, 265 p.* | Lectures | 2 |
| In situ measurements, GPS data, terrestrial scanning - characteristics and integration in a GIS projects | Lectures | 4 |
| Aerial photos and satellite images – types, sources, acquisition and processing<br>*ch.9 from Chen Q.Y., Lee, C.Y., 2001, Geographical Data Acquisition, New York, Springer-Verlag, 265 p.*<br>*Mather, P., Koch, M., 2011, Computer Processing of Remotely-Sensed Images: An Introduction, 4th Edition, Wiley, 460 p.* | Lectures | 4 |

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|---|---|---|
| Digital Elevation Models – types, sources, acquisition and processing<br>*Wilson, J., 2018, Environmental applications of digital terrain modelling, Wiley-Blackwell, 359 p.*<br>*Fleming, C, Marsh, S.H., Cabrera, M.C., 2010, Elevation Models for Geoscience: Geological Society Special Publication 345, Geological Society of London, 146 p.* | Lectures | 4 |
| Type of climate data – acquisition and integration in a GIS project<br>https://www.worldclim.org/data/index.html<br>https://power.larc.nasa.gov/data-access-viewer/<br>https://www.ncdc.noaa.gov/IPS/mcdw/mcdw.html<br>https://neo.sci.gsfc.nasa.gov/view.php?datasetId=GISS_TA_M<br>https://climate.esa.int/en/odp/#/dashboard | Lectures | 2 |
| Administrative and statistical data<br>https://www.naturalearthdata.com/downloads/<br>https://www.diva-gis.org/gdata<br>http://download.geofabrik.de/europe/romania.html<br>https://ec.europa.eu/eurostat/data/database | Lectures | 2 |
| Derived spatial data (digitizing, editing, indices, landcover, thematic classification) | Lectures | 2 |
| Online platforms and services for spatial data and maps<br>*https://earthengine.google.com/*<br>*https://www.globalforestwatch.org/*<br>*https://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1000* | Lectures | 2 |
| **References**<br>Casagrande, G., Sik, A., Szabo. G., 2017, Small Flying Drones: Applications for Geographic Observation, Springer, 168 p.<br>Chen Q.Y., Lee, C.Y., 2001, Geographical Data Aquisition, New York, Springer-Verlang, 265 p.<br>Fleming, C, Marsh, S.H., Cabrera, M.C., 2010, Elevation Models for Geoscience: Geological Society Special Publication 345, Geological Society of London, 146 p.<br>Longley, P.A., Goodchild, M., Maguire, D.J., Rhind, D.W., 2010, Geographic Information Systems and Science, John Wiley & Sons, 560 p.<br>Mather, P., Koch, M., 2011, Computer Processing of Remotely-Sensed Images: An Introduction, 4th Edition, Wiley, 460 p.<br>Wilson, J., 2018, Environmental applications of digital terrain modelling, Wiley-Blackwell, 359 p.<br>*http://2012books.lardbucket.org/pdfs/geographic-information-system-basics.pdf*<br>*http://www.spatialanalysisonline.com/HTML/index.html* | | |
| **8.2 Seminar / laboratory** | **Teaching methods** | **Observations** |
| Spatial data acquisition and integration in a GIS project – study area chosen by students (administrative, DEMs, satellite images, statistical data etc. ) | Lecture and hands-on exercises | 6 |
| GPS data integration and analysis in a GIS project<br>*Ch. 6 and 7 from Chen Q.Y., Lee, C.Y., 2001, Geographical Data Acquisition, New York, Springer-Verlag, 265 p.* | Lecture, data acquisition in the field and hands-on exercises | 6 |
| Data acquisition and processing using UAV<br>*Casagrande, G., Sik, A., Szabo. G., 2017, Small Flying Drones: Applications for Geographic Observation, Springer, 168 p.* | Lecture and hands-on exercises | 6 |
| Data acquisition and processing using terrestrial laser scanner<br>*Telling, J., Lyda, A., Hartzell, P., Glennie, C., 2017. Review of Earth science research using terrestrial laser scanning. Earth-Science Rev. 169, 35–68, doi.org/https://doi.org/10.1016/j.earscirev.2017.04.00* | Lecture, data acquisition in the field and hands-on exercises | 6 |

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| Student projects and exercises evaluation | Presentation of the project results | 4 |

**References**

Casagrande, G., Sik, A., Szabo. G., 2017, Small Flying Drones: Applications for Geographic Observation, Springer, 168 p.
Chen Q.Y., Lee, C.Y., 2001, Geographical Data Acquisition, New York, Springer-Verlag, 265 p
Mather, P., Koch, M., 2011, Computer Processing of Remotely-Sensed Images: An Introduction, 4th Edition, Wiley, 460 p.
Telling, J., Lyda, A., Hartzell, P., Glennie, C., 2017. Review of Earth science research using terrestrial laser scanning. Earth-Science Rev. 169, 35–68. https://doi.org/https://doi.org/10.1016/j.earscirev.2017.04.007

*All the necessary materials for learning will be uploaded in electronic format on e-learning platform.*

## 9. Corroborating course content with the expectations held by the representatives of the epistemic community, professional associations and typical employers in the field of the study programme

Course content will offer the students the necessary skills to acquire, integrate, process and analyze different types of spatial data in order to start-up GIS projects in the field of geosciences. The course will offer several software solutions (commercial and open-source) used by companies in the field of GIS.

## 10. Assessment

| Type of activity | 10.1 Assessment criteria | 10.2 Assessment methods | 10.3 Weight in the final mark |
|---|---|---|---|
| 10.4 Course | Knowledge and understanding related to spatial data acquisition and integration | Intermediate evaluation: Oral evaluation of preliminary results: Design of approach (spatial data acquisition project)<br><br>Final presentation of the spatial data acquisition project - Oral evaluation of results | 25%<br><br>25% |
| 10.5 Laboratory | Digital elevation models: acquisition and data processing in GIS | Intermediate evaluation: Oral evaluation of results and processing skills | 10% |
| | Spatial data acquisition in the field (field application) | Intermediate evaluation: Oral evaluation of results and processing skills | 20% |
| | GIS project (geodatabase and project presentation) | Intermediate evaluation: Presentation of the project results | 20% |
| 10.6 Minimum performance standard | | | |
| • grade 5 as a mean of evaluation from the above mentioned compulsory activities | | | |

Date

14.09.2024

Course convenor's signature

Date of approval in the department

Head of department's signature