**SYLLABUS**

**1. Information about the program**

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| 1.1 Institution of higher education | „Babeş-Bolyai” University, Cluj-Napoca |
| 1.2 Faculty | Geography |
| 1.3 Department | Regional Geography andTerritorial Planning |
| 1.4 Study area | Geography |
| 1.5 Level of study | Master |
| 1.6 Program of study | Geomatics |

**2. Information about the course**

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| 2.1 Title of the course | GIS modeling of natural processes and phenomena |
| 2.2 Course taught by: | Dr. Titus MAN, Associate Professor |
| 2.3 Seminar by: | Dr. Titus MAN, Associate Professor |
| 2.4 Year of study | **II** | 2.5 Semester | **4** | 2.6 Method of assessment | **E** | 2.7 Type of course | **DS** |

**3. Time allocation (hours per semester of pedagogical activities)**

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| --- | --- | --- | --- | --- | --- |
| 3.1 Hours per week | 4 | Of wich: 3.2 course | 2 | 3.3 seminar | 2 |
| 3.4 Total hours - semester | 48 | Of wich: 3.5 course | 24 | 3.6 seminar | 24 |
| Time allocation | hours |
| Study for exams | 40 |
| Additional documentation in the library, on the internet and in the field and working on the semester project and presentation | 30 |
| Reading for the seminar and writing the projects | 21 |
| Tutoring |  |
| Exam | 3 |
| Other | - |
| 3.7 Total hours for individual study | **94** |  |
| **3.8 Total hours per semester** | **150** |
| Number of credits | **6** |

**4. Prerequisites** (if any)

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| 4.1 curriculum-related |  |
| 4.2 competence-related |  |

**5. Other requirements** (if any)

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| 5.1 for the course | * Classroom with desktop/laptop, projector and power point software, access to internet.
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| 5.2 for the seminar | * Computer room, Internet connection, specific software: ArcGIS, QGIS
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**6. Competencies**

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| **Competenţe** **profesionale** | * Ability to perform operations on raster structures: slope, aspect, hillshade, viewing surfaces, line of sight. Distance, Cost, and Allocation Functions. Spatial interpolation (IDW, Spline, Kriging). Geo-processing graphics.
* Generating 3D structures. Handling and coupling with other structures including satellite imagery.
* Creating spatial patterns associated with processes and natural phenomena.
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| **Competenţe transversale** | * The knowledges gained in this course can be applied in hydrology (hydrological models), geomorphology, spatial planning, environment.
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**7.** **Course objectives**

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| 7.1 General goals | * Creating conceptual models associated with natural phenomena
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| 7.2 Specific objectives | * Construction of raster structures, operations to create spatial models
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**8. Outline**

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| **8.1 Course** | **Teaching methods** | **Observations** |
| General considerations on the modeling of natural phenomena. | * lecturing
 | 2 hours |
| Vector modeling and raster modeling | * lecturing
 | 2 hours |
| Cartographic models vs process models  | * lecturing
 | 2 hours |
| General principles of raster modeling  | * lecturing
 | 2 hours |
| Indicators and functions in raster modeling  | * lecturing
 | 2 hours |
| Generate surface patterns. Interpolation. Geometric transformations and change of raster resolution  | * lecturing
 | 2 hours |
| Functions of distance, allocation, direction and cost. Statistical functions on growth. The reclassification operation  | * lecturing
 | 4 hours |
| Map Algebra. Raster calculator. Digital elevation models in TIN format  | * lecturing
 | 4 hours |
| Conversion TIN - grid. Generation of contours. 3D surface analysis | * lecturing
 | 4 hours |
| **References (provided by the instructor)**1. Bernhardsen, T. - ***Geographical Information System***, Viak IT, Arendal, Norway, 1997.
2. Heywood I., Cornelius S., Carver S., (1995), ***An Introduction to Geographical Information Systemms***, Longman, Harlow, England
3. Imbroane A.M., Moore D. – ***Iniţiere în GIS şi Teledetecţie***, Presa Universitară Clujană, Cluj-Napoca, 1999.
4. Kennedy Melita, Kopp S., ***Understanding Map Projection***, ESRI press, Redland, CA, USA, 2002.
5. Minami M., ***Using ArcMap***, ESRI press, Redland, CA, USA, 2002
6. Vieneau Aleta, ***Using ArcCatalog***, ESRI press, Redland, CA, USA, 2002.
7. Zeiler M., ***Modeling our world***, ESRI press, Redland, CA, USA, 2002.
8. \*\*\*, ***What is ArcGIS***, ESRI press, Redland, CA, USA, 2002.
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| **8.2 Seminar** | **Teaching methods** | **Observations** |
| Straight Line, Allocation and Cost functions | * Instructor-led seminar
 | 2 hours |
| Interpolation methods | * Instructor-led seminar
 | 2 hours |
| Zonal statistics  | * Instructor-led seminar
 | 4 hours |
| Raster calculator | * Instructor-led seminar
 | 2 hours |
| Generating a model | * Instructor-led seminar
 | 2 hours |
| Generate TIN structures | * Instructor-led seminar
 | 4 hours |
| Deriving slopes and aspects from TIN structures | * Instructor-led seminar
 | 4 hours |
| 3D Visualization in GIS | * Instructor-led seminar
 | 4 hours |
| **References (provided by the instructor)**1. Bernhardsen, T. - ***Geographical Information System***, Viak IT, Arendal, Norway, 1997.
2. Heywood I., Cornelius S., Carver S., (1995), ***An Introduction to Geographical Information Systemms***, Longman, Harlow, England
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4. Kennedy Melita, Kopp S., ***Understanding Map Projection***, ESRI press, Redland, CA, USA, 2002.
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6. Vieneau Aleta, ***Using ArcCatalog***, ESRI press, Redland, CA, USA, 2002.
7. Zeiler M., ***Modeling our world***, ESRI press, Redland, CA, USA, 2002.

\*\*\*, ***What is ArcGIS***, ESRI press, Redland, CA, USA, 2002. |

**9. Harmonize the content of the discipline with the expectations of representatives of the epistemic community, professional associations and representative employers in the field of the program**

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| * The content of the discipline is consistent with what is done in other university centers in the country and abroad.
* The analysis of the employers' opinions on the preferential attributes of the specialists group has resulted in a high degree of appreciation of their professionalism, which confirms that the structure and content of the curriculum built for this study program is fair, comprehensive and effective.
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**10.** **Assessment and evaluation**

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| Type of activity | 10.1 Criteria for assessment | 10.2 Method of assessment | 10.3 Percent of final grade |
| 10.4 Course | * Verifying the degree of systematization and use of the acquired concepts
* degree of assimilation of specialized terminology
* the ability to operate with new assimilated knowledge
 | Exam | 50% |
| 10.5 Seminar | * the ability to apply theoretical knowledge in practice
* the ability to operate with assimilated knowledge
* the ability to operate with GIS software
 | Practical evaluation  | 50% |
| **10.6 Minimum performance standard*** the level of knowledge of the theoretical and practical aspects of GIS modeling of natural data using ArcGIS.
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Date Signature course lecturer Signature seminar instructor

05.05.2020 Conf.univ.dr Titus Man Conf.univ.dr Titus Man

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 Date of departmental approval Signature department chair

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