SYLLABUS

1. Information about the program

1.1 Institution of higher education	„Babeş-Bolyai" University, Cluj-Napoca
1.2 Faculty	Geography
1.3 Department	Physical and Technical Geography
1.4 Study area	Geography
1.5 Level of study	Master
1.6 Program of study	Evaluarea și gestiunea Hazardelor și Riscurilor Geografice / Assessment and management of Geographical Hazards and Risks

2. Information about the course

2.1 Title of the course	**GEOSPATIAL ANALYSIS**						
2.2 Course taught by:			Dr. Titus MAN, Associate Professor				
2.3 Seminar by:			Dr. Titus MAN, Associate Professor				
2.4 Year of study	**I**	2.5 Semester	**I**	2.6 Method of assessment	**E**	2.7 Type of course	**RQ**

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

3.1 Hours per week	3	of which: 3.2 course	1	3.3 seminar	2
3.4 Total hours – semester	42	of which: 3.5 course	14	3.6 seminar	28

Time allocation	hours
Study for exams	36
Additional documentation in the library, on the internet and in the field and working on the semester project and presentation	32
Reading for the seminar and writing the projects	24
Tutoring	4
Exam	2
Other activities	10

3.7 Total hours for individual study	**83**
3.8 Total hours per semester	**42**
3.9 Number of credits	**5**

4. **Prerequisites** (if any)

4.1 curriculum-related	-
4.2 competence-related	-

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

5.1 for the course	• Classroom with desktop/laptop, projector and power point software, access to internet.
5.2 for the seminar	• Computer room, Internet connection

6. Competencies

Generic competencies	• C1 Ability to solve problems. • C2 Ability to organize and plan ahead. • C3 Ability to analyze, synthesize, interpret and communicate information. • C4 Ability to create new ideas
Specific competencies	• CT 1 The student will be able to work with information resources in geospatial analysis. • CT 2 The student will be able to use and describe the tools used to manage geodatabases. • CT 3 The student will be able to apply the gained knowledge in practice.

7. **Course objectives**

7.1 General goals	• To address the full spectrum of spatial analysis and associated modeling techniques that are provided within currently available and widely used geographic information systems (GIS) and associated software
7.2 Specific objectives	• Students will be able to address the central issues and problems associated with spatial data that need to be considered in any analytical exercise • Students will gain understanding of the methodological background of GIS analysis • Students will extend their understanding of more specialized tools, designed to address the needs of specific sectors or technical problems that are otherwise not well-supported within the core GIS packages at present

8. Outline

8.1 Course	**Teaching method(s)**	**Observations**
1. Open/free software for hazards	• lecturing	2 hours
2. WebGIS for hazards and risks	• lecturing	2 hours
3. Core components of geospatial analysis, including distance and directional analysis, geometrical processing, map algebra, and grid models	• lecturing	2 hours

4. Exploratory Spatial and Spatio-temporal Data Analysis (ESDA, ESTDA) and spatial statistics, including spatial autocorrelation and spatial regression	• lecturing	2 hours
5. Surface analysis, including surface form and flow analysis, gridding and interpolation methods, and visibility analysis	• lecturing	2 hours
6. Network and locational analysis, including shortest path calculation, travelling salesman problems, facility location and arc routing	• lecturing	2 hours
7. Geocomputational methods, including agent-based modelling, artifical neural networks and evolutionary computing	• lecturing	2 hours
8.2 Seminar	**Teaching method(s)**	**Observations**
1. Spatial analysis, GIS, software tools	• Instructor-led seminar	2 hours
2. Conceptual frameworks for spatial analysis I: basic primitives, spatial relationships	• Instructor-led seminar	2 hours
3. Conceptual frameworks for spatial analysis II: spatial statistics, spatial data infrastructure	• Instructor-led seminar	2 hours
4. Spatial analysis and the PPDAC model	• Instructor-led seminar	2 hours
5. Spatial Analysis I: Spatial and Spatio-temporal Data Models and Methods, Geometric and Related Operations, Queries, Computations and Density	• Instructor-led seminar	2 hours
6. Spatial Analysis II: Distance Operations, Directional Operations, Grid Operations and Map Algebra	• Instructor-led seminar	2 hours
7. Data Exploration and Spatial Statistics I: Statistical Methods and Spatial Data, Exploratory Spatial Data Analysis, Grid-based Statistics and Metrics	• Instructor-led seminar	2 hours
8. Data Exploration and Spatial Statistics II: Point Sets and Distance Statistics, Spatial Autocorrelation, Spatial Regression	• Instructor-led seminar	2 hours
9. Surface and Field Analysis	• Instructor-led seminar	2 hours
10. GIS & WebGIS: server	• Instructor-led seminar	2 hours
11. WMS (Web Map Service): Geoserver, ArcGIS Server, Open Layers	• Instructor-led seminar	2 hours
12. Web Mappig and API (Application Program Interface): ArcGIS Online, QGIS2Web	• Instructor-led seminar	4 hours
13. WebGIS models	• Instructor-led seminar	2 hours

9. **Bibliography**

1. Allen, D., W. (2016), GIS Tutorial 2: Spatial Analysis Workbook, ESRI Press
2. Allen, D., W., Coffey, J., M. (2010), GIS Tutorial 3: Advanced Workbook, ESRI Press
3. de Smith, M., J., Goodchild, M., F., Longley, P., A. (2015), Geospatial Analysis. A Comprehensive Guide to Principles, Techniques and Software Tools, The Winchelsea Press, Winchelsea, UK, 750p

4. Docan, Daniela (2016), Learning ArcGIS for Desktop, Packt Publishing, 331p
5. Gomarasca, M., A. (2009), Basics of Geomatics, Springer Netherlands, 656p
6. Gorr, W., L., Kurland, Kristen (2016), GIS Tutorial 1: Basic Workbook, 10.3.x edition, ESRI Press
7. Graser, Anita, Mearns, B., Mandel, A., Ferrero, V., O., Bruy, A. (2017), QGIS. Becoming a GIS Power User, Packt, 727p
8. Kennedy, M., D., Goodchild, M., F., Dangermond, J. (2013), Introducing Geographic Information Systems with ArcGIS: A Workbook Approach to Learning GIS [3 ed.], Wiley, 672p
9. Liu, J., G., Mason, Philippa (2016), Image Processing and GIS for Remote Sensing: Techniques and Applications [2ed.], Wiley Blackwell, 472p
10. Longley, P., A., Goodchild, M., F., Maguire, D., J., Rhind, D., W. (2010), Geographic information systems and science. 3rd ed., J Wiley, Chichester, UK
11. Mitchell, A. (2001), The ESRI Guide to GIS Analysis, Volume 1: Geographic Patterns and Relationships, ESRI Press
12. Mitchell, A. (2005), The ESRI Guide to GIS Analysis, Volume 2: Spatial Measurements and Statistics, ESRI Press
13. Mitchell, A. (2012), The Esri Guide to GIS Analysis, Volume 3: Modeling Suitability, Movement, and Interaction, ESRI Press
14. Pinde Fu, Sun Jiulin, WebGIS Principles and Applications, ESRI Press, 2011
15. Pinde Fu, Getting to Know Web GIS (Getting to Know ArcGIS), ESRI Press, 2017
16. Wang, F. (2014), Quantitative Methods and Socio-Economic Applications in GIS [2 ed.], CRC Press, 333p

11. Assessment and evaluation

Type of activity	10.1 Criteria for assessment	10.2 Method of assessment	10.3 Percent of final grade
11.1 Course	To be announced	Final exam	35%
		Final project and its presentation	35%
11.2 Seminar	To be announced	Individual projects (2)	20%
		Attendance and active participation	10%

Date | Signature course lecturer | Signature seminar instructor

Nov. 23th, 2021 ....

Date of departmental approval
Nov. 29th, 2021

Signature department chair