COURSE OUTLINE

1. Study programme information

1.1 Higher education institution	Universitatea de Vest din Timişoara
1.2 Faculty / Department	Chimie-Biologie-Geografie/Departamentul de Geografie
1.3 Sub-department	Geografie
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

2.1 Course title			Spatial analysis and modelling in GIS				
2.2 Course convenor/ Lecturer			Conf. univ. dr. Marcel Török-Oance				
2.3 Teaching assistant			Conf. univ. dr. Marcel Török-Oance				
2.4 Year of study	I	2.5 Semester	II	2.6 Type of assessment	E	2.7 Course type	DI

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

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	20
Further research in libraries, on electronic platforms and in the field	25
Preparing seminars/ laboratories, homework, research papers, portfolios and essays	25
Tutoring	14
Examinations	10
Other activities ……	

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)

4.1 based on curriculum	• GIS, Remote Sensing
4.2 based on competencies	• Basic knowledges in GIS and Remote Sensing

5. Conditions (if applicable)

5.1 for the course	• at least 50% attendance at course activities; • Computer / laptop for the teacher, computers / laptops / tablets for each student, internet access, access to the Elearning UVT platform and Google Meet.
5.2 for the seminar/laboratory	• attendance is mandatory • complete fulfilment of tasks of laboratory work and projects • Computer with audio / video system and internet connection, GIS softwares (IDRISI, ArcgGIS) for online participation in practical work. The practical work will take place on the Google Meet platform. The support materials/tutorials, the data used for the practical works and the references will be accessible on the Elearning UVT platform.

6. Objectives of the discipline - expected learning outcomes to the formation of which contribute to the completion and promotion of the discipline

Knowledges	• Knowledge of concepts in Spatial Analysis • Students are able to choose and apply appropriate methods of spatial analysis in order to successfully solve geographical problems • Knowledge of concepts in and Spatial Analysis GIS modeling • Knowledge of Spatial Analysis methods • Knowledge of GIS modeling methods and algorithms • Correlative analysis of variation and dynamics of territorial components and processes using GIS techniques.
Skils	• Hands-on skills in Spatial Analyisis in various softwares • Developing an objective and analytical spirit in students; appreciating the advantages of each type of product or technique and understanding their complementarity; • Developing the ability of scientific analysis and communication in an academic environment
Responsibility and autonomy	• Applying efficient and responsible work strategies, based on the principles, norms and values of ethics in academic conduct; • Self-assessment of the need for continuous professional training in order to insert and adapt to the requirements of the labour market. • Applying efficient work techniques in a multidisciplinary team, ethical attitude towards the group, respect for diversity and multiculturalism; acceptance of diversity of opinion

6. Content

6.1 Lecture	Teaching methods	Observations
1. Introduction in Spatial Analysis.	Interactive presentations,	*** Course material posted on the elearning UVT platform Longley. P. A., Goodchild, M.F., Maguire, D.J., Rhind, D.W. (2006), Geographic Information

	heuristic conversation, problematization and hands-on examples	Systems and Science, Edit. John Wiley & Sons. Stillwell, J., Clarke, G.,. 2004, Applied GIS and Spatial Analysis, Edit John Wiley &Sons.
2. Spatial analysis of point data: spatial density analysis, spatial analysis of areas of influence		*** Course material posted on the elearning UVT platform Fischer, M., Getis, A., 2010, Handbook of Applied Spatial Analysis - Software Tools, Methods and Applications, Springer
3. Logical operators and Boolean analysis		*** Course material posted on the elearning UVT platform Eastman J., R., (2020) – TerrSet2020 Manual. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. Stillwell, J., Clarke, G.,. 2004, Applied GIS and Spatial Analysis, Edit John Wiley &Sons.
4. Using fuzzy membership family functions for standardizing geo-spatial data.		*** Course material posted on the elearning UVT platform Eastman J., R., (2020) – TerrSet2020 Manual. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts.
5. GIS as a decision support system: multicriterial analysis		*** Course material posted on the elearning UVT platform Eastman J., R., (2020) – TerrSet2020 Manual. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. Stillwell, J., Clarke, G.,. 2004, Applied GIS and Spatial Analysis, Edit John Wiley &Sons.
6. Raster and vector distance operators in GIS		*** Course material posted on the elearning UVT platform Longley. P. A., Goodchild, M.F., Maguire, D.J., Rhind, D.W. (2006), Geographic Information Systems and Science, Edit. John Wiley & Sons. Eastman J., R., (2020) – TerrSet2020 Manual. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts.
7. Focal operators in GIS		*** Course material posted on the elearning UVT platform Eastman J., R., (2020) – TerrSet2020 Manual. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts.
8. Regression analysis in GIS		*** Course material posted on the elearning UVT platform Eastman J., R., (2020) – TerrSet2020 Manual. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts.
9. Spatial and spatio-temporal modeling methods in GIS		*** Course material posted on the elearning UVT platform Eastman J., R., (2020) – TerrSet2020 Manual. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography Longley. P. A., Goodchild, M.F., Maguire, D.J., Rhind, D.W. (2006), Geographic Information Systems and Science, Edit. John Wiley & Sons., Worcester, Masachusetts. Longley. P. A., Goodchild, M.F., Maguire, D.J., Rhind, D.W. (2006), Geographic Information Systems and Science, Edit. John Wiley & Sons.
10. Object-oriented based image analysis,		*** Course material posted on the elearning UVT platform

bridging between spatial analysis and remote sensing.		Blaschke, T., Lang, S., Hay, G.J., (2008) Object-based image analysis, Spatial Concepts for knowledge-driven remote sensing applications, Lecture Notes in Geoinformation and Cartography

Bibliography

Blaschke, T., Lang, S., Hay, G.J., (2008) Object-based image analysis, Spatial Concepts for knowledge-driven remote sensing applications, Lecture Notes in Geoinformation and Cartography;
Briassoulis, H., Kavroudakis, D., Soulakellis, N., (2019), The Practice of Spatial Analysis, Springer.
Eastman J., R., (2020) – TerrSet2020 Manual. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts.
Longley. P. A., Goodchild, M.F., Maguire, D.J., Rhind, D.W. (2006), Geographic Information Systems and Science, Edit. John Wiley & Sons.
Fischer, M., Getis, A., 2010, Handbook of Applied Spatial Analysis - Software Tools, Methods and Applications, Springer.
Stillwell, J., Clarke, G.,. 2004, Applied GIS and Spatial Analysis, Edit John Wiley &Sons.
*** Course material posted on the elearning UVT platform

6.2 Seminar / laboratory	Teaching methods	Observations
1. Analysis of the spatial distribution of point data (ArcGIS)	Hands-on exercises, case studies, scientific explanation and demonstration.	McCoy, J., (2004), Geoprocessing in ArcGIS, ESRI, Redlands. *** Laboratory material/tutorials posted on the elearning UVT platform
2. Using fuzzy membership family functions for standardizing geo-spatial data in IDRISI TerrSet software		Eastman J., R., (2020) – TerrSet2020 Tutorial. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. *** Laboratory material/tutorials posted on the elearning UVT platform
3. Multicriteria evaluation in IDRISI TerrSet și ArcGIS		Eastman J., R., (2020) – TerrSet2020 Tutorial. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. McCoy, J., (2004), Geoprocessing in ArcGIS, ESRI, Redlands. *** Laboratory material/tutorials posted on the elearning UVT platform
4. Distance operators in IDRISI TerrSet si ArcGIS		Eastman J., R., (2020) – TerrSet2020 Tutorial. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. McCoy, J., (2004), Geoprocessing in ArcGIS, ESRI, Redlands. *** Laboratory material/tutorials posted on the elearning UVT platform
5. Modeling stochastic phenomena using Markov chains (IDRISI TerrSet software).		Eastman J., R., (2020) – TerrSet2020 Tutorial. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. *** Laboratory material/tutorials posted on the elearning UVT platform
6. Time series analysis in IDRISI TerrSet software		Eastman J., R., (2020) – TerrSet2020 Tutorial. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. *** Laboratory material/tutorials posted on the elearning UVT platform

7. Land Change Modeller for spatio-temporal changes analysis		Eastman J., R., (2020) – TerrSet2020 Tutorial. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. *** Laboratory material/tutorials posted on the elearning UVT platform
8. Building models with Macro Modeler (IDRISI) and Model Builder (ArcGIS); various applications.		Eastman J., R., (2020) – TerrSet2020 Tutorial. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts. *** Laboratory material/tutorials posted on the elearning UVT platform
9. Individual project / project assistance	Individual work, practical application, project presentation	The practical assignments are made individually by formulating problems that students will find solutions through spatial analysis.

Bibliography

Eastman J., R., (2020) – TerrSet2020 Tutorial. Geospatial Monitoring and Modeling System, Clark University, Graduate School of Geography, Worcester, Masachusetts.
McCoy, J., (2004), Geoprocessing in ArcGIS, ESRI, Redlands.
*** Laboratory material/tutorials posted on the elearning UVT platform

The bibliography for the students projects will be chosen individually, depending on their specific**.**

7. 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

The content of the course was developed in accordance with the curriculum and meets the didactic and scientific requirements corresponding to similar specializations from other universities. Course content will offer the students the necessary skills to start-up research projects leading to MSc Theses and to enroll in a PhD program. It stimulates the personal involvement of students in identifying problems that are suitable for spatial analysis and modelling in the GIS environment. It facilitates the initiation by students of contacts and possible collaborations with companies and institutions in the field of GIS. The softwares used in practical applications are one of the most modern and frequently used in specialized institutions.

8. Assessment

Type of activity	8.1 Assessment criteria	8.2 Assessment methods*	8.3 Weight in the final mark
8.4 Lecture	Course activity	Continuous evaluation	20%
8.5 Seminar / laboratory	Assessment of practical tasks during the semester	Practical tasks evaluation	30%
	Quality of the project and presentation. The degree to which students are able to conduct a spatial analysis approach.	Project evaluation	50%
8.6 Minimum performance standard			
• Minimum mark 5 at course evaluation. • Minimum mark 5 at practical activities. *If the exam takes place online, it will be held in Google Meet and the projects will be uploaded on the elearning platform.			

Date
27.01.2022

Course convenor's signature

Date of approval in the department

Head of department's signature
Lector univ. dr. Ioan-Sebastian JUCU