PLAN DE ÎNVĂȚĂMÂNT

Valabil începând cu anul universitar 2024-2025, ciclul de studii 2024-2026

Facultate:	Chimie, Biologie, Geografie
Ciclul de studii universitare:	Masterat
Denumirea programului de studii universitare de masterat:	Geographic Information Systems
Denumirea calificării[1] dobândită în urma absolvirii programului de studii:	Specialist in Geographic Information Systems
Titlu acordat:	Master în geografie
Durata studiilor (în ani):	2 ani
Forma de învățământ[2]:	Învățământ cu frecvență
Limba de predare:	Limba engleză
Locația geografică de desfășurare a studiilor:	Timișoara
Încadrarea programului de studii în domenii de știință	
Domeniul fundamental:	Matematică și științe ale naturii
Ramura de știință:	Științele pământului și atmosferei
Domeniul de studii universitare de masterat:	Geografie
Denumirea domeniului <u>larg</u> de studii (conform DL-ISCED F-2013):	Științe naturale, matematică, statistică
Denumirea domeniului <u>restrâns</u> de studii (conform DR-ISCED F-2013):	Științe fizice 0532
Denumirea domeniului <u>detaliat</u> de studii (conform DDS-ISCED F-2013):	Științele pământului 053

1 Qualification is the formal result of an assessment and validation process, which is obtained when a competent body/authority establishes that a person has acquired learning outcomes corresponding to predetermined standards. The qualifications acquired by graduates of higher education study programs are attested by diplomas, certificates and other study documents issued only by accredited higher education institutions.certificate și prin alte acte de studii eliberate numai de către instituțiile de învățământ superior acreditate.

2 Full-time education (IF), part-time education (IFR) or distance education (ID).

THE GENERAL OUTLINE OF THE STUDY PROGRAM

1. THE MISSION OF THE STUDY PROGRAM[3]

This Master studies program aims to implement advanced research as it is a scientific master program aiming to direct the graduates to follow the doctoral and advanced research program of the university and to prepare graduates with remarkable abilities and competencies which can be easily integrated on the Romanian labor market. The mission of the study program is in closely relation to the general mission of UVT, both in didactic activities as well as in research.

The general objective of the program is to provide complex training in spatial analysis by high level teaching by offering the necessary concepts and instruments for implementing GIS and Remote sensing techniques both in scientific research as well as on the labor market. The main objectives and competences are corroborated to the needs identified on the labor market and to the national frame of occupations. These are shortly presented below and are fully detailed in detail in the syllabus:

Specific objectives:

By following the program, the students will be able to:

- Understand and use the newest and most advanced concepts and methods in the field of GIS/ Remote sensing.

[3] *The mission and objectives of the study program must be consistent with the mission of the West University of Timisoara and the requirements identified on the labor market.*

According to the University Charter (Article 5), the general mission of UVT is advanced scientific research and education, generating and transferring knowledge to society through:

a) scientific research, development, innovation and technological transfer, through individual and collective creation, in the field of sciences, engineering sciences, letters, arts, by ensuring physical and sports performance and development, as well as the valorization and dissemination of their results.

b) initial and continuous training, at university level, for the purpose of personal development, the professional insertion of the individual and meeting the skills needs of the socio-economic environment.

UVT assumes its own mission as a catalyst for the development of Romanian society by creating an innovative and participatory environment for scientific research, learning, cultural-artistic creation and sports performance, transferring skills and knowledge to the community through education, research and consulting services which they offer to partners from the economic and socio-cultural environment.

The achievement of the UVT mission is embodied in (Article 6 of the UVT Charter):

- *promoting scientific research, literary-artistic creation and sports performance.*
- *initial and continuous training of qualified and highly qualified human resources.*
- *development of critical thinking and creative potential of members of the university community.*
- *creating, hoarding, and spreading the values of human culture and civilization.*
- *promoting multicultural, plurilingual and interfaith interference.*
- *affirmation of Romanian culture and science in the world circuit of values.*
- *the development of Romanian society within a free and democratic state of law.*

- understand and use various geospatial data in quantitative and qualitative research by using GIS principles and methods of analysis.
- use ground knowledge to create and use models and simulations by using GIS methods.
- find new directions of research and practice in geography and in other research areas that make use of geospatial data.
- know and use various methods and techniques to analyze remote sensing in a GIS environment.
- write, manage, and conduct research projects or other specialized services, as well as gain the ability to work in a team and to build cross-disciplinary relations.
- develop the necessary skills and abilities for scientific research and occupational training and for further use in in doctoral training programs.

2. Competences and expected learning outcomes acquired by following the Master program

A. Competences[4]

Key-competences[5]:

- Multilingual skills;
- Skills in science, technology, engineering, and mathematics;
- Digital skills;
- Personal, social, and learning-to-learn skills;
- Entrepreneurial skills.

Professional competences[6]

- **Uses geographic information systems** - work with computer data systems such as Geographic Information Systems (GIS).
- **Collect mapping data** - collect and conserve mapping resources and mapping data.
- **Process collected survey data** - analyse and interpret survey data acquired from a wide variety of sources e.g. satellite surveys, aerial photography and laser measurement systems.

[4] Competence is the proven ability to select, combine and adequately use personal, social and/or methodological knowledge, skills and abilities and other acquisitions consisting of values and attitudes, for successfully solving a certain category of work or learning, as well as for professional or personal development in conditions of effectiveness and efficiency.

[5] Key competences for lifelong learning are those competences that all citizens need for personal fulfillment and development, employment, social inclusion, and active citizenship, being developed in a lifelong learning perspective, starting from early childhood and throughout adult life through formal, non-formal and informal learning.

[6] Professional competences represent the ability to perform the activities required at the workplace at the qualitative level specified in the occupational standard. They are acquired formally, respectively by completing a program organized by an accredited institution.

- **Environmental design** - The approach that is used to face environmental problems related to buildings, plans, and products in various fields such as engineering, interior design and architecture.
- **Perform surveying calculations** - perform calculations and gather technical data in order to determine earth curvature corrections, traverse adjustments and closures, level runs, azimuths, marker placements, etc.
- **Apply digital mapping** - make maps by formatting compiled data into a virtual image that gives a precise representation of a specific area.
- **Create thematic maps** - use various techniques such as choropleth mapping and dasymetric mapping to create thematic maps based on geospatial information, using software programmes.
- **Use databases** - use software tools for managing and organising data in a structured environment which consists of attributes, tables and relationships in order to query and modify the stored data.
- **Execute analytical mathematical calculations** - apply mathematical methods and make use of calculation technologies in order to perform analyses and devise solutions to specific problems.
- **Apply statistical analysis techniques** - use models (descriptive or inferential statistics) and techniques (data mining or machine learning) for statistical analysis and ICT tools to analyse data, uncover correlations and forecast trends.
- **Compile GIS data** - gather and organise GIS-data from sources such as databases and maps.
- **Create GIS reports -** use relevant geographic informations systems to create reports and maps based on geospatial information, using GIS software programmes**.**
- **Analyze environmental data** - analyse data that interpret correlations between human activities and environmental effects.
- **Interpret geophysical data -** interpret data of a geophysical nature: Earth's shape, its gravitational and magnetic fields, its structure and composition, and geophysical dynamics and their surface expression in plate tectonics.
- **Perform image editing** - edit various types of images such as analogue and digital photographs or illustrations.
- **Prepare visual data** - prepare charts and graphs in order to present data in a visual manner.
- **Write work-related reports** - compose work-related reports that support effective relationship management and a high standard of documentation and record keeping. Write and present results and conclusions in a clear and intelligible way so they are comprehensible to a non-expert audience.
- **Apply scientific methods** - apply scientific methods and techniques to investigate phenomena, by acquiring new knowledge or correcting and integrating previous knowledge.

- **Communicate with a non-scientific audience** - communicate about scientific findings to a non-scientific audience, including the general public. Tailor the communication of scientific concepts, debates, findings to the audience, using a variety of methods for different target groups, including visual presentations.
- **Find trends in geographic data** - analyse geographic data to find relationships and trends such as population density.
- **Manage research data** - produce and analyse scientific data originating from qualitative and quantitative research methods. Store and maintain the data in research databases. Support the re-use of scientific data and be familiar with open data management principles.
- **Study aerial photos** - use aerial photos/satellite images to study phenomena on Earth's surface.

Transversal competences[7]

- Active learning ability, and self-control in learning.
- Identification of training needs, reflexive analysis of occupational career about the use of efficient and responsible work strategies.
- Performing complex professional tasks independently
- Critical and innovative thinking
- Analytical and synthesis skills to make responsible decisions.
- Concern for environmental protection
- The ability to interact with various people and groups, with various cultural patterns, and to work in multi-cultural environments.
- Taking roles/management positions in complex occupational groups or institutions and using efficient multi-disciplinary team working techniques on various hierarchy levels.
- Ethics and academic integrity

B. EXPECTED LEARNING OUTCOMES[8]

a) Highly specialized **knowledge** and ability for critical analysis of cutting-edge information in the research area, grounded in original thinking and/or research:

- Understand and apply concepts such as geospatial data structures, topology, georeferencing, spatial databases, remote sensing image processing, and geostatistics.
- Knowledge and application of advanced methods to identify patterns and trends in geographic data, and to develop models and scenarios for the evolution of geographic processes and phenomena.

[7] Transversal competences represent value and attitudinal acquisitions that go beyond a certain field/study program and are expressed through the following descriptors: responsibility and autonomy, social interaction, personal and professional development.

[8] Learning outcomes mean statements that refer to what a learner knows, understands and is able to do at the end of a learning process and are defined as knowledge, skills, responsibility and autonomy.

- Knowledge and use of standards and protocols to ensure the efficient management of geospatial data and to guarantee their quality and consistency.
- Knowledge of concepts used in cartography.
- Knowledge of tools and devices used for mapping (land and air) and methods of working with them.
- Understand and explain the methods used for terrestrial and aerial mapping (DGPS; total station, GPR, ERT, magnetometry)
- Knowledge and understanding of the techniques and methods used in determining the geographical position of objects on the globe and the inherent limitations.
- Knowledge of the main methods and instruments for measuring the Earth's surface.
- Knowledge of distance and area measurements on a map.
- Interpret and analyze topographic data for generating maps and geospatial projects.
- Understand the cartographic generalization process and how to manage detail through the scale of maps.
- Knowledge of the basic principles of digital cartography and the role of maps in representing geospatial data.
- represent the topography using different types of digital elevation models and integrate them in thematic maps.
- knowledge of cartographic standards to create accurate and relevant thematic maps.
- Understand the link between scale and resolution of remotely sensed images to produce relevant cartographic products.
- Understand and apply fundamental principles and concepts of cartography for thematic geomorphological, climatic, hydrological, biogeographical, and pedogeographic maps.
- Understanding foundational principles and techniques in probability and mathematical statistics and their application in problem-solving.
- Knowledge of concepts of probability and mathematical statistics.
- Recognizing suitable concepts and methods for specific problems and devising solutions within the realm of probability and mathematical statistics.
- Advanced knowledge of statistical concepts like mean, mode, median, correlations, regressions, Moran's index, multiple linear regression, spatial regression, interpolation, and cluster analysis.
- Interpreting statistical analysis outcomes within a geographical framework to inform decision-making and bolster geospatial initiatives.
- Knowledge of GIS data compilation standards and protocols, as well as good practice in managing and updating geospatial data.
- Identifying relevant geospatial information and presenting it in appropriate scientific reports to support geospatial analysis and decision-making processes.
- Knowledge of standards and protocols for creating GIS reports, as well as geospatial data presentation technologies.

- Conveying GIS analysis findings and model outcomes effectively via comprehensive reports.
- Good knowledge of methodologies employed in analyzing and monitoring environmental factors such as vegetation, climatic parameters, and land cover /land use classes.
- Knowledge of methodologies for monitoring and assessing the hazards and risks associated with floods, droughts, wildfires, landslides, avalanches, and soil degradation, encompassing the analysis of satellite data for detecting and characterizing these occurrences.
- Knowledge of shallow geophysics for process analysis, identification of geological, and geomorphological characteristics, and associated risks.
- Knowledge of fundamental concepts and basic elements regarding digital image processing.
- Contextualize the problem or research questions addressed in a spatial analysis.
- Outline the objectives of spatial analysis and the methodologies employed to acquire and interpret the findings.
- Provide a comprehensive overview of the data used in the analysis, including data type (vectorial, raster), data sources, and timeframe.
- Describe the research methodologies and techniques applied, such as classification methods for remote sensing data, machine learning algorithms, neural networks, etc.
- Present the research results using graphs, thematic maps, diagrams, etc., to highlight the identified trends or patterns.
- Summarize the main findings and conclusions of the research and discuss the implications of the results in the broader context of the research field or the addressed spatial issues.
- Knowledge of cluster analysis or density analysis to identify groups or areas with similar characteristics within geographic data.
- Identify and analyze geographic, socio-economic, or environmental factors that may influence observed trends in your geographic data.
- Apply principles of open data management, such as free access, reuse, transparency, and proper citation of data.
- Knowledge of remote sensing applications in various fields such as cartography, environmental monitoring, natural risk analysis, precision agriculture, or natural resource management.
- Understand and use specific methods for detailed analysis of multispectral satellite images and aerial photos.
- Knowledge of proper sampling techniques to ensure the representativeness of the collected data and to minimize errors or biases.

b) Specialized problem-solving **abilities** in research and / or innovation for the development of new information and procedures and for the use of information from various fields:

- Use specialized software and platforms to collect, manage, and analyze geospatial data.
- Carrying out projects in a GIS environment by integrating various geospatial data and using spatial and statistical analysis methods
- Knowledge and application of quantitative geographic analysis methods and techniques in identifying and solving spatial problems related to the environment.
- Use techniques and algorithms that can extract the most important information from data, learn from it, and make predictions to be used for optimization in GIS environment.
- Advanced processing of collected data, detection, and delineation of structures of interest based on mapping data.
- Advanced data processing and production of thematic mapping material based on the identified structures.
- Preparation and processing of geospatial data collected from the field, ensuring appropriate completion and structuring.
- Analyzing and transforming geospatial data obtained from different sources and integrating for visualization in different software.
- Integrate data collected from the field with existing geospatial information to obtain a coherent picture of the geographical area under study.
- Knowledge and application of geoprocessing techniques, including raster and vector structures data processing, spatial analysis, interpolation, and thematic map generation.
- Perform accurate topographic calculations to determine the coordinates, elevation, and position of geospatial objects.
- Use topographic equipment and instruments to measure terrestrial data such as distances, angles, and heights.
- Determine the location of points on the map using several reference systems.
- Knowledge and application of machine learning methods for modeling various geographical features or phenomena: species distribution, climatic parameters, landslides, avalanches, etc.
- Knowledge and application of digital geospatial prediction methods for modeling various geographical elements (soils, species, landslides, avalanches, etc.)
- Understand and assess the accuracy of maps using geospatial prediction, including accuracy assessment of data from measurements and observations.
- Use methods and techniques for collecting and processing data from different sources, and further integrate them into geospatial prediction.
- Production of relevant graphics and their integration into scientific reports (e.g. cartodiagrams, maps)
- Knowledge and use of relevant symbol features on a map.

- proSkills in data processing with mapping software to create relevant thematic maps.
- Skills in georeferencing scanned maps and integrating them with other thematic layers in GIS projects.
- Skills in satellite image processing methods for thematic land cover mapping and corresponding change maps for pre-defined time intervals.
- Skills in applying methods and techniques to develop relational database applications.
- Proficiently deploying and harnessing systems revolving around relational databases.
- Utilizing both RDBMS and NoSQL databases alongside their management tools.
- Converting user specifications for a relational database application into SQL queries.
- Design, implement, and manage spatial databases to be efficient and easy to access.
- Proficient use of interrogations and specialized software to extract and analyze geospatial data from a database.
- Competence in employing geospatial databases to bolster analysis, planning, and decision-making endeavors within geospatial initiatives and applications.
- Implementing computational solutions for problems using probability and mathematical statistics.
- Apply mathematical principles and theories to tackle intricate geospatial challenges, employing suitable mathematical models and methodologies.
- Conducting rigorous mathematical computations, including statistical analysis, to ensure precision in outcomes.
- Applying quantitative analysis for processing and analyzing geospatial data, employing statistical methodologies to derive meaningful insights.
- Proficiency in statistical analysis software and tools to conduct both quantitative and qualitative analyses on geospatial data, uncovering patterns, trends, and correlations.
- Collecting, filtering, and integration of geospatial data from various sources.
- Employing specialized software to organize and manage geospatial data.
- Upholding the integrity and uniformity of geospatial data and accompanying documentation to maintain their integrity and consistency.
- Filter and integrate geospatial data into reports to highlight important information and relevant trends.
- Proficiency in integrating diverse geospatial technologies, including GIS, remote sensing, and modeling, to acquire pertinent insights into environmental changes.
- Skills in using specialized techniques for analyzing remote sensing data (such as satellite imagery and multi-temporal aerial images) to extract significant information regarding changes and trends in the geographic environment.
- Capability to conduct temporal analyses on data, identifying the evolution and patterns of changes across various geospatial contexts.
- Proficiency in using remote sensing methodologies, such as time series analysis of satellite imagery, to analyze the long-term trends and dynamics of diverse phenomena, such

as climate change, vegetation dynamics, habitat loss, degradation, fragmentation, invasive species, deforestation, etc.

- Employment of methods such as supervised/unsupervised classifications, segmentation, and algorithms like neural networks to derive pertinent insights in addressing contemporary environmental challenges.
- Collect geophysical data of various types and use them to interpret geographical phenomena.
- Employing specialized software to process and interpret geophysical data, aiming to delineate the structure of the underground.
- Integrating geophysical data with other types of spatial data to solve environmental problems.
- Skills in implementing digital image processing algorithms (e.g. in Python, Java, etc.).
- Performing graphical edits to manipulate and process images, including color adjustments, cropping, and image blending.
- Applying graphic effects and filters to produce informative visualizations in both images and graphics.
- Conducting corrections and improvements in image processing (including aerial and satellite images), essential for geospatial projects.
- Performing graphical edits to prepare and process maps.
- Design visually engaging statistical graphs, diagrams, and infographics to illustrate geospatial data effectively.
- Create thematic maps and 3D visualizations of spatial data, seamlessly integrating them into interactive presentations.
- Create dynamic representations of multitemporal series of satellite images.
- Produces captivating presentations of scientific content derived from spatial data analysis using platforms like Prezi, Visme, Keynote, and more.
- Apply specific Geographic Information Systems (GIS) methods to extract relevant information and identify patterns or relationships in geospatial data (e.g. interpolation, network analysis, terrain modeling, spatial correlation, etc.).
- Identify areas with extreme or outlier values that may indicate certain trends or anomalies in geospatial data.
- Use linear graphs or time series graphs to visualize the evolution of geographic data over time.
- Apply regression analysis to identify and quantify temporal trends or patterns.
- Evaluate correlations between geographic variables in different locations and at different times.
- Identify spatial and temporal relationships between variables to better understand the dynamics of the data.

- Employ mathematical or statistical models to predict the future evolution of geographic data or to identify factors influencing observed trends (e.g. regression, interpolation, etc.).
- Proficient in using techniques and algorithms to extract the most important information from data, learn from it, and make predictions for optimizing programs, adapting applications, pattern recognition, filtering, search engines, and computer vision.
- Use rigorous and valid methods for data collection.
- Document in detail the data collection processes, including the context, tools, and data standardization procedures.
- Apply appropriate statistical methods for the type of data and research objectives, including univariate analysis, correlation analysis, regression, etc.
- Skills in using specialized research databases or Database Management Systems (DBMS) capable of efficiently handling large volumes of data, including spatial databases, and providing advanced data querying, manipulation, and analysis functionalities.
- Skills in using applications for efficient management of bibliographic references used in research (e.g. Mendeley, EndNote, etc.).
- Label and document metadata associated with each dataset, including description, context, measured variables, and collection methodology.
- Publish and share data in open data resources and platforms to enable data access and use by other individuals and researchers.
- Perform radiometric, atmospheric, and topographic corrections on multispectral satellite images and prepare the images for further complex analyses.
- Skills in using methods and tools for photogrammetric interpretation and measurement on aerial photos.
- Apply methods such as change detection analysis to assess temporal changes and identify aspects related to terrain, vegetation, or infrastructure based on aerial photos.
- Skills in using pixel-based or object-based classifications (supervised or unsupervised) applied to satellite images or aerial photos to generate thematic maps such as land cover classes maps, vegetation maps, snow cover maps, etc.
- Integrate results of satellite image or aerial photo analysis with other geospatial data in a GIS environment to address environmental issues.
- Use appropriate tools and techniques to collect geographic data in the field (e.g. GPS, thematic and topographic maps, drones, etc.).
- Conduct detailed observations and record relevant information during fieldwork, including environmental features, weather conditions, geospatial data, etc.
- Use field journals, recording forms, or specialized mobile applications to document and organize the collected field information.
- Employ specialized software and methods to analyze the collected geospatial data and to generate relevant reports or thematic maps.

c) **Independence and responsibility** imply management and conversion of complex and unexpected work or research situations that require a new strategic approach by taking responsibility for the contribution to the knowledge and occupational know-how and/or for the adjustment of the strategic performance of work teams.

- Responsibility in scientific research and innovation.
- Managing complex technical and professional activities or projects assuming responsibility for decision-making in unpredictable work or study situations.
- Implementing efficient and conscientious work strategies grounded in the principles, norms, and values upheld by the professional code of ethics.
- Self-assessment of the need for ongoing professional training to enhance employability and adapt to the evolving demands of the job market.
- Implementing efficient work methodologies within a multidisciplinary team, demonstrating ethical conduct towards colleagues, and fostering respect for diversity and multiculturalism.

3. Occupations that can be performed on the labor market

- Geographic information systems specialist - code ESCO 2165.3
- Research assistant in geography – code ESCO 2632.5

4. Ensuring flexible learning paths within the program

The flexibility of the program is ensured by **compulsory elective courses**. These courses are to be followed in the third semester and are grouped into elective packages which complete the specialized training of the student. Students choose which subject matter they want to follow at the beginning of the second year of studies. The functioning rules of the master studies organized by the Department of Geography do not allow the distribution of the courses into distinct categories, such as fundamental, training, or complementary. Master studies are by nature specialized training studies therefore all the courses in the curricula are training courses even if, as a whole, the curriculum has a deep cross-disciplinary character.

Non-compulsory elective courses are to be held in semesters 1-4 by the department or Faculty which manages the learning program but may be chosen from the packages offered by other faculties of the university.

According to the regulation on the making of curricula for the studies at the West University of Timisoara, students need credits to perform volunteer activities according to the National Education Law 1/2011, further modified by article 203, section (9). The course Volunteering is available each semester in the curricula of all university programs, as a non-compulsory elective subject matter, with 2 ECTS credits. The electives are chosen by the students by their options after these elective disciplines are presented objectively by the teachers assuming them. After an optional was chosen it became a mandatory discipline. These aspects also fit to the facultative disciplines thus ensuring a specific educational avenue in line with the students' preferences to complete their transversal competencies.

5. Professional activity and student evaluation

The rights, obligations, and conditions for the professional activity of the students at the West University of Timisoara is regulated by the *Code of students rights and obligations* and the *Regulation on the professional activity of the bachelor and master students at UVT*, approved by the University Senate. The form and method of evaluation for each discipline is set by the syllabus of each discipline.

6. Final exam

According to the Regulation on the organization and progress of the final exams of bachelor and master studies at the West University of Timisoara, approved by the Senate, the final exam for each program consists of making and presenting a dissertation thesis which receives 10 credits. The subjects and bibliography for the exam are published on the faculty's Website at the beginning of each year. Students must choose a theme within 60 days from the beginning of the final year. The final version of the thesis must be uploaded on the e-learning platform prior to 5 days from the date of the exam.

Each thesis must be joined by the similarity report given when the thesis is uploaded on the e-learning platform which certifies the degree of originality of the thesis. At UVT final exams may be organized in 3 sessions, in July, September, and February.

7. Teacher training activities

Students who wish to pursue a teaching career in the undergraduate system must follow the Teacher training program and receive a certificate at the end of the program. The West University of Timisoara organizes such courses through the Teacher Training Department (DPPD). This training program may be followed simultaneously with bachelor's or master's studies. For more information visit: https://dppd.uvt.ro

THE COURSES LIST GROUPED BY YEARS OF STUDY AND SEMESTERS

Year of study I

Academic year 2024-2025

Nr. crt.	Discipline	C1	C2	Cod disciplină	Semestrul I					Semestrul II				
					Număr de ore/ săptămână				Număr de credite	Număr de ore/ săptămână				Număr de credite
					C	S	L	P		C	S	L	P	
1.	Spatial data acquisition methods	DS	DO	FCBGG140	2		2		**6**					
2.	Introduction to programming	DS	DO	FCBGG141	1		2		**6**					
3.	Introduction to databases	DS	DO	FCBGG142	1		2		**6**					
4.	Geovisualisation	DA	DO	FCBGG143	2		2		**6**					
5.	Ethics in scientific research	DS	DO	FCBGG110	1	1			**2**					
6.	Tutoring	DA	DO	FCBGG144	1	1			**4**					
7.	Programming	DA	DO	FCBGG145						1		2		**5**
8.	Databases	DA	DO	FCBGG146						1		2		**5**
9.	Spatial analysis and modeling in GIS	DA	DO	FCBGG147						1		2		**5**
10.	Methods and models for analyzing remote sensing data	DS	DO	FCBGG148						1		2		**5**
11	WebGIS	DA	DO	FCBGG149						1		2		**5**
12	Optional Geostatistics	DA	DOP	FCBGG150 FCBGG151						1		2		**5**
	Optional Digital cartography	DA												
Total					**8**	**2**	**8**		**30**	**6**		**12**		**30**
Total hours per week					**18**					**18**				

ELECTIVE SUBJECTS

Nr. crt.	Discipline	C1	C2	Cod disciplină	Semestrul I					Semestrul II				
					Număr de ore/ săptămână				Număr de credite	Număr de ore/ săptămână				Număr de credite
					C	S	L	P		C	S	L	P	
1.	Volunteer activities I	DC	DFAC	FCBGBC7			60 h.		2					
2	Volunteer activities II	DC	DFAC	FCBGBC8								60 h.		2
Total hours per week									2					2

Year of study II

Academic year 2025-2026

Nr. crt.	Disciplina	C1	C2	Cod disciplină	Semestrul I					Semestrul II				
					Număr de ore/ săptămână				Număr de credite	Număr de ore/ săptămână				Număr de credite
					C	S	L	P		C	S	L	P	
1.	Geomorphometry	DA	DO	FCBGG152	2		2		5					
2.	Object-based image analysis	DA	DO	FCBGG153	2		2		5					
3.	GIS Project management	DS	DO	FCBGG154	1		1		5					
4.	GIS analysis of natural hazards and risk phenomena	DS	DO	FCBGG155	1		2		5					
5.	Research and project supervision	DA	DO	FCBGG161			2		5					
6.	Optional Location-based services Optional Cadaster	DA	DOP	FCBGG156 FCBGG157	1		2		5					
7.	Internship 2 months	DA	DO	FCBGG158								240/8 săpt.		14
8.	Tutorial activities for MSc Thesis	DA	DO	FCBGG159								2		6
9.	MSc Thesis writing and defense	DA	DO	FCBGG160								40		10
Total					**7**		**11**		**30**			**2**		**30**
Total HOURS PER WEEK					**18**					**2**				

ELECTIVE DISCIPLINES

Nr. crt.	Disciplina	C1	C2	Cod disciplină	Semestrul I					Semestrul II				
					Număr de ore/ săptămână				Număr de credite	Număr de ore/ săptămână				Număr de credite
					C	S	L	P		C	S	L	P	
1.	Volunteer activities III	DC	DFAC	FCBGBC7			60 h.		2					
2	Volunteer activities IV	DC	DFAC	FCBGBC8								60 h.		2
Total hours per week									2					2

Correlation between competencies, expected learning outcomes and the studies disciplines can be visualized HERE.

Legendă

C1	criteriul conținutului
C2	criteriul obligativității
DS	discipline de sinteză
DA	discipline de aprofundare
DC	discipline complementare
DO	discipline obligatorii (impuse)
DOP	discipline opționale (la alegere)
DFAC	discipline facultative
CP	competență profesională
CT	competență transversală
C	activitate didactică de tip curs
S	activitate didactică de tip seminar
L	activitate didactică de tip laborator practic
P	activitate didactică de tip stagiu de practică

GENERAL BALLANCE I
(after content criteria)

Nr crt	Subject type	Total number of hours				Total		Forseen standard ARACIS
		year I		year II		Hours	% from total	
		Curs	S/L	Curs	S/L			
1.	Fundamentals	-	-	-	-	-	-	
2.	Domain (if any)	-	-	-	-	-	-	
3.	Specialization	196	308	98	462	1064	100%	Min. 756
4.	Complementary	-	-	-	-	-		
TOTAL		196	308	98	462	1064	100%	**Min. 756**

GENERAL BALLANCE II
(after mandatory criteria)

Nr. crt.	Subject type	Total number of hours				Total		Foreseen standard ARACIS
		Year I		Year II		Hours	% from total	
		Curs	S/L	Curs	S/L			
1.	Mandatory	182	280	84	434	980	92,11%	
2.	Opțional	14	28	14	28	84	7,89%	
3.	Facultative/Electives	-	120	-	120	240	-	***Nu intră în calculul totalelor***
TOTAL		**196**	**308**	**98**	**462**	**1064**	**100%**	**Minim 756**

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