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DIGITAL PHOTOGRAMMETRY

1. About Course unit/module data

Faculty	Construction, Geodesy and Cadastre				
Department	Civil Engineering and Geodesy				
Cycle of studies	License, cycle I.				
Studies programme	0731.2 Geodetic Engineering and Cadastre				
Year of study	**Semester**	**Type of evaluation**	**Formative category**	**Optionality category**	**ECTS credits**
III-IV (full-time and part-time education)	6	E	S - specialized course unit	O - compulsory course unit	6

2. Estimated total time.

Total hours in the curriculum	From which				
	Auditorium hours		Individual work		
	course	Laboratory / seminar	Year project	Study of theoretical material	Application preparation
180	30	60/0	0	30	60

3. Prerequisites for access to the course unit / module

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According to the competencies	Cadastral plans, digital cadastral plans, instrumental errors, cartographic projections, field coordinate systems, frame coordinate systems

4. Conditions for carrying out the educational process for

course	A video projector and a computer are needed to present the theoretical material in the classroom.
Laboratory / seminar	Students will complete reports according to the conditions presented on the MOODLE, TUM platform for the Photogrammeters III discipline. Deadline for submission of laboratory work - one week after its completion. For the late delivery of the paper, it is deducted with 1 point / week of delay.

5. Specific skills acquired

Professional skills	**CP 4**. Application of methods and technologies in accordance with the requirements, normative and legislative acts in the field of geodesy, photogrammetry, cartography and cadastre. • Description of concepts, theories and methods specific to the field of geodetic engineering and cadastre.; • Use of basic knowledge to explain and interpret methods and technologies in accordance with the requirements, normative and legislative acts in the field of geodetic engineering and cadastre. • Application of efficient methods for organizing geodetic and cadastral activities in accordance with the provisions of normative acts, under conditions of qualified assistance. • Appropriate use of international and national normative acts, observance of work

	and ecological safety in geodetic and cadastral activities. • Elaboration of professional projects for the accomplishment of geodetic and cadastral works in accordance with the requirements, normative and legislative acts in the field of geodetic engineering and cadastre.
Professional skills	**CP5.** Carrying out activities and exercising the specific roles of teamwork on different hierarchical levels. Promoting the spirit of initiative, dialogue, cooperation, positive attitude and respect for others, diversity and multiculturalism and continuous improvement of one's activity: • Description of specific procedures, techniques and methods for planning, coordinating and monitoring works in the field of geodetic engineering and cadastre, • Use of basic knowledge to explain and interpret projects and technical and technological files specific to the professional field, including the use of modern topogeodetic technologies specific to the field, • Application of basic principles and methods for the realization of projects and technical and technological files specific to the field, in conditions of qualified assistance, • Appropriate use of standard assessment criteria and methods for the adoption of specific procedures, techniques and methods applied for the planning, coordination and monitoring of works in the field of geodetic engineering and cadastre, • Development of professional projects using procedures, techniques and methods established in the field for planning, coordinating and monitoring works in the field of geodetic engineering and cadastre
Transversal skills	**CT1.** Application of professional values and ethics of engineering and responsible execution of professional tasks, in conditions of limited autonomy and qualified assistance. Promoting logical, convergent and divergent reasoning, practical applicability, evaluation and self-evaluation in decision making. **CT2.** Carrying out activities and exercising the specific roles of teamwork on different hierarchical levels. Promoting the spirit of initiative, dialogue, cooperation, positive attitude and respect for others, diversity and multiculturalism and the continuous improvement of one's activity. **CT3.** Objective self-assessment of the need for continuous vocational training in order to enter the labor market and adapt to the dynamics of its requirements and for personal and professional development. Effective use of language skills and knowledge of information and communication technology.

6. Course unit / module objectives

The general objective	Determination in time and space of fixed, mobile or deformable objects and with their photographic, graphic or numerical representation based on special photographs, called frames for the elaboration of cartographic materials, elevations, topographic and cadastral plans, linear maps, digital land models in order their use for design and execution works.
Specific objectives	To know the basic notions in the fields: electromagnetic theory, applied-optics, mathematics, physics, etc. To constitute the main basis that ensures the great importance of photogrammetry in the field of terrestrial measurements. To master the applications that allow the management of information digitally.

	To know, be able to edit geospatial data photogrammetrically for the creation of geographic information systems (GIS). To know how to create the digital terrain model (DTM) by photogrammetric means.

7. Content of the course unit / module

The theme of teaching activities	Number of hours	
	full-time education	part-time education
The theme of the lectures		
T1. Introduction.	2	-
T2. General notions of digital photogrammetry.	2	-
T3. Automatic generation of digital models.	4	-
T4. Methods of obtaining the Digital Terrain Model (MDT / DTM)	4	-
T5. Methods for obtaining DTM by scanning.	2	-
T6. Methods for checking and improving the quality of the Digital Terrain Model (DTM) obtained manually or automatically.	2	
T7. Methods for checking and improving the quality of the Digital Terrain Model (DTM) obtained by scanning.	2	
T8. Completing the DTM to improve quality.	2	
T9. Photogrammetric methods for automatic DTM verification.	4	
T10. Existing specifications, standards and recent DEM projects.	2	
T11. Creating a new product - three-dimensional photorealistic metric scenes.	4	
Total lectures:	**30**	

The theme of teaching activities	Number of hours	
	full-time education	full-time education
The theme of laboratory works / seminars		
LL1. DELTA digital photogrammetric station.	6	
LL2. Stages of bulk orientation of digital images.	6	
LL3.Preparation of materials for vectorization.	6	
LL4. Vectorization of elements on a couple of frames.	6	
LL5. Deciphering and recognizing elements on a stereo model.	6	
LL6. Notification of the earth's surface and tracing of contours.	6	
LL7. Automatic editing of secondary contours.	4	
LL8. Creating the Digital Terrain Model.	4	
LL9. Automatic verification of the DTM.	4	
LL10. Digitization of stereomodels to obtain a topographic plan.	4	
LL11. Cover/land use. Reference data collection and LC/LU nomenclature analysis	4	
LL12. Cover/land use. Images pre-processing and identification of LC/LU classes.	4	
Total laboratory works / seminars:	**60**	

8. Bibliographic references

Main	1. Zăvoianu, F Îndrumător de lucrări practice şi proiect de fotogrammetrie, ICB, 1986 – 178 pag.; 2. Zăvoianu, F. Îndrumător de lucrări practice, proiect şi practică de fotogrammetrie, UTCB, 1997 -353 pag ;

	3. Zăvoianu, F. Stereofotogrammetrie , UTCB, 1997 -402 pag; 4. Zăvoianu, F; Pârţac, I;. Fotogrammetrie Patrea I, TEHNICA, 1998 -198 pag; 5. Ionescu, I. Fotogrammetria inginerească. Matrix, Bucureşti, Romania. 2005 -211pag. ; 6. Îndrumar cu privire asupra lucrului la Staţia digitală fotogrammetrică „DELTA”, Ucraina, Viniţa, 2006 – 120 pag.; Course notes, PowerPoint presentations, conditions for elaboration of laboratory works at Photogrammetry II on the MOODLE Platform, UTM, author Nistor-Lopatenco Livia and Mnogodetnâi Angela, 2015, 2016
supplemental	