

The position of cadastre in the academic curricula of the geodetic academic specialization in Romania

**Gheorghe M.T. RADULESCU, Ovidiu STEFAN, Adrian T.G. RADULESCU,
Virgil M.G. RADULESCU and Mihaela SOPONAR, Romania**

Key words: academic training, geodetic education, role of cadastre in curriculum

SUMMARY

This paper continues the series of materials regarding geodetic education in Romania presented at previous FIG conferences (Accra 2006, Munich 2006, HK 2007, Sydney 2010, Marrakech 2011) this time addressing the analysis of the role of cadastre in the training of geodetic specialists in Romania.

The paper makes an initial overview of the activity of cadastre in Romania, the current state of land records, elements on the computerization of this activity, particularities of the cadastre in Transylvania, and the organization of activity, nationally and regionally. The paper points out that, at present, cadastre holds a much higher position in the Science of land measurement in Romania than it should, but not because it is believed it must be so, but for the simple reason that the request for works in other areas: general and engineering topography, geodesy, cartography, photogrammetry, etc. is very low. The authors consider that this is temporary situation, amid the global crisis, and that the share of cadastre in the academic curricula in the field of Geodesy should be maintained within a normal balance with the other subjects studied.

This paper presents the share of the subject in the curriculum of the specialization of Land Measurements and Cadastre of the North University in Baia Mare, the structure of the subject, the didactic methods used in teaching, the syllabus, the connection with other subjects, the structuring of the teaching on semesters, and the forms of verification. It stresses that, in accordance with the latest provisions of the Ministry of Education in Romania, only the teachers who have graduated from a university in the field and have a PhD are allowed to teach or hold laboratory classes.

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1. CADASTRE ACTIVITY IN ROMANIA

Cadastre is the official record system of land (lot) that represents the national territory. This record includes the position, shape, size, ownership and value of each lot. Cadastre is based on Geodesy and Cartography to determine position, shape and size (area) of lots in record. A rigorous and objective cadastral record must ensure:

- Ensuring security of land ownership;
- Support for taxation of land and land properties;
- Security of loans secured by land properties;
- Development and monitoring of land market;
- Protection of State land;
- Reduced disputes over land rights;
- Improved urban planning and infrastructure development;
- Environmental management and protection;
- Obtaining statistics on occupation and use of land.

A rigorous and objective cadastral record is one of the conditions strictly necessary for ensuring sustainable development and for attracting long-term investments, including for Romania's EU integration. The cadastre activity in Romania is regulated by the Law of cadastre and real estate advertising, law no. 7/1996, republished in 2006, whose basic provisions are set in Title I - General status of cadastre and real estate advertising, Chapter I - General Provisions, Article 1, namely:

1. General cadastre is the unitary and compulsory system of technical, economical and legal record of real estate all across the country.
2. The basic entities of the system are the lot, building and owner.
3. By real estate, in the sense of the present law, we understand one or more adjacent lots, with or without buildings, belonging to the same owner.
4. Lot means the surface of land with the same category of use.
5. The record system of general cadastre has the purpose of enrollment in the real estate advertising register.

The central authority that coordinates cadastre activity, generally land measurements, in Romania is the National Agency of Cadastre and Land Registration (ANCPI), body under the coordination of the Ministry of Development, which has territorial units in all 41 counties in the country. On short and medium term, **ANCPI** priorities are channeled towards achieving and implementing an efficient recording system of properties throughout the country, in accordance with European standards in the field of cadastre and real estate advertising.

2. TRAINING OF SPECIALISTS FOR TERRESTRIAL MEASUREMENTS IN ROMANIA

This activity of executing and verifying specialty papers in the fields of cadastre, geodesy and cartography is made by natural and legal persons authorized by the above mentioned institution under a single national law. Depending on the qualification of candidates for authorization they may be authorized in one of five classes, namely depending on the complexity of the works they are entitled to carry out after authorization: Class C, simple topographic and cadastral works, Classes B and A, complex works, and Class D, any category of works in the field, including verification. For employees of municipalities and other state units an E class is possible, which grants the right to perform specialized works solely for the units where they are employed.

Applicants for authorization must be graduates of specialty education, provided through post-secondary schools, for two years, qualifying for authorization, only after an internship in classes C and B and four-year university degree education, namely two years - masters, possibly doctoral degree, through which, after an internship, authorization is given in all five classes, obviously based on seniority.

Nationally there are 15 specialized faculties, 13 of cadastre and land measurements, bachelor level, mentioned in previous works of the authors, a higher military school training specialists in geodesy and one for mine surveying, a subject of our paper presented at FIG 2011.

3. CURRICULAR STRUCTURE OF HIGHER EDUCATION FOR LAND MEASUREMENTS AND CADASTRE IN ROMANIA

In 2005, a shift from a technical higher education of 5 years to one of 4 years was decided upon, Bologna system, respectively, in the field, a switch to the 4 year Land Measurements and Cadastre, in the field of Geodetic Engineering. The mission proposed by the academic program mentioned is the initial training, at college graduate level, of specialists in Land Measurements and Cadastre. The objectives of the academic program are the formation of basic knowledge and skills necessary for a highly dynamic field regarding issues necessary to further research (MA) but also current research, meant to find direct application in the professional career of graduates. The Land Measurements and Cadastre academic program meets the business sector seeking specialists with both theoretical and practical knowledge, able to select, integrate and use technology, methods and appropriate tools for the logistics and activity of each specialized work (topographic, geodetic, cadastre, etc.) separately. The Curriculum of the "Land Measurements and Cadastre" academic program includes: fundamental subjects, field subjects, specialized subjects, optional subjects, complementary subjects and extra disciplines. The share of these disciplines, according to the legal provisions currently in force, is presented in table below:

TABLE 1 SHARE OF SUBJECTS IN THE CURRICULUM, PERCENTAGE

Subjects	Min. no. of hours	Total no. of hours	Minimum percentage
Fundamental	560	3292= 100%	17%
In the field	1251		38 %
Specialized	823		25 %
Complementary	263		Max. 8%

Optional- specialized			
Total optional	395	3292	Max. 12% Min. 10%
Extra	329		Min. 10%

This ratio is required to authorize university education programs in the field. Study subjects in the curricula of the "Land Measurements and Cadastre" academic program are provided in a logical order and precisely define the general and specialized skills in the field of undergraduate study, and ensures compatibility with the national qualifications environment and compatibility with similar academic plans and programs in European Union countries, the share of subjects being expressed in ECTS study credits.

4. POSITION OF CADASTRE IN THE TRAINING OF SPECIALISTS IN ROMANIA

Each educational institution organizing a study program in the field of "Land Measurements and Cadastre" is free to distribute the subjects in the percentages mentioned, but based on a minimum schedule approved by the law. This schedule is mandatory for the study of the subjects in the field and Cadastre, without specifying a minimum or maximum number of hours. The practice and structure of the subject lead to a division of the material in two, with study in semesters 5 and 6, after studying some subjects in the area of Topography and Geodesy, without which the understanding of the issues regarding Cadastre would not be possible. Thus, in table 2, the number of hours (i.e. the curriculum of the specialization organized in Baia Mare, but generally observed by the other universities) for preparatory subjects, for subjects in the area of Cadastre, or complementary to the discipline, are presented:

TABLE 2 SHARE OF SUBJECTS IN THE CURRICULUM, NAME OF SUBJECT

Type of subject	Description of subject	Name of subject	Number of hours
Mandatory	FUNDAMENTAL SUBJECTS (PF)	Applied informatics 1,2	140
	FIELD SUBJECTS (PD)	Measuring methods and instruments 1,2	140
		Topography 1,2	154
		Fotogrammetry 1	42
		Geodetic information systems	42
		Mathematical geodesy 1	28
		Mathematical cartography	56
		Engineering measurements in construction and industry 1	84
		Mathematical geodesy 2	42
		Fotogrammetry 2	42
		Cadastre I	84
		Mathematical geodesy 3	56
		Cadastre 2	56
		Organization of territory	28
		Land-cadastre legislation	56
Management	56		

Type of subject	Description of subject	Name of subject	Number of hours	
	SPECIALIZED SUBJECTS (PS)	Territory development and urbanism	42	
		Geodetic instruments and measuring methods 3	56	
		Mapping 1	42	
		Mapping 2	56	
		Information systems in cadastre	42	
		Spatial geodesy	56	
		Design and optimization of geodetic networks	42	
		Management of geodetic works	28	
	Optional SPECIALIZED SUBJECTS (PS)	1	Specialized cadastre	42
			Digital cadastre	
		7	Geographic Information Systems	56
			Information systems in land measurements	
		8	Land evaluation	42
			Real estate evaluation	
TOTAL NUMBER OF HOURS (MANDATORY DIDACTIC ACTIVITIES)			3052	
PRACTICE			240	
TOTAL HOURS, FOR REFERENCE			3292	

Note that the three subjects in cadastre, Cadastre 1, 2 and Specialized Cadastre optional in the Digital cadastre subjects occupy 182 hours, representing 5.52% of the total number of 3292 hours. If we include the directly connected subjects, Information systems in cadastre and Real estate evaluation with a total of 84 hours it accumulates to 266 hours, representing 8.08% of the total number of 3292 hours and by adding the 60 hours of practice in Cadastre in the third year we exceed 10%, a significant share, which we consider to be sufficient to ensure appropriate training in the field.

5. CADASTRE SYLLABUS

The three aspects of technical, economic and legal cadastre are discussed in courses, practical applications and specialized design, providing students with all the necessary data for a thorough training in the field. The academic curriculum also includes:

- notions of land and real estate cadastre;
- analysis of data provided in and from the system (which must be realistic, complete and current);
- notions of use, owner, lot and building;
- finding that topographic measurements are the technical basis of cadastral works and the link between the two subjects studied;
- concepts of topographic plan, cadastral plan, cadastral registration, land registry;

- guidance, control and organization of cadastre works, by the National Agency of Cadastre and Real Estate Advertising, represented in the territory by the County Offices.

The courses are: Cadastre 1 and 2:

1. General concepts
2. The land
3. Administrative and cadastral units
4. Delimitation of administrative territories
5. The contents of cadastral plans
6. Workflow of technical cadastre
7. General cadastre - Introduction
8. Maintenance of cadastral works
9. Preparing specific documents for the cadastre activity
10. The economic element of general cadastre
11. Cadastral reliability of terrains
12. The legal element of cadastre
13. Legal concepts of land cadastre
14. Real estate advertising

Specialized cadastre:

- 1 General concepts
- 2 Examination and characterization of land
- 3 Classification and evaluation of land
- 4 Norms and classification cadastre works
- 5 Land cadastre
- 6 Forest cadastre
- 7 Water fund cadastre
- 8 Mining cadastre
- 9 Urban real estate cadastre
- 10 Railway cadastre
- 11 Cadastre of land with special usage
- 12 Land record
- 13 Record of land taken out of agriculture and those given to agriculture
- 14 Land registry

Themes:

Cadastre 1 and 2:

1. Calculation of surfaces
2. Specific calculations for cadastre activities
3. Assignments and lots
4. Rectification of boundaries
5. Preparing the project to introduce general cadastre in a locality
6. Specific measurements to introduce general cadastre
7. Stages of preparing a topographic documentation for the registration of facts in the Land Registry
8. Preparing the topographic documentation required for registration in the Land Registry Cadastral reliability of land

Specialized cadastre:

1. Classification and evaluation of land,
2. Forest cadastre,
3. Mining cadastre,
4. Water fund cadastre,
5. Railway cadastre,
6. Urban real estate cadastre,
7. Cadastre of land with special usage,
8. Land records. Record of land taken out of agriculture and those given to agriculture,
9. Land Registry.

CONCLUSIONS

The activity of cadastre in Romania, at present, is in decline, compared to the years 2000-2008, but it remains as the main activity in the field of land measurements. What effect this phenomenon had on the demand for academic training is a topic which has been analyzed at the end of the paper.

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BIOGRAPHICAL NOTES



Gheorghe M. G. RADULESCU, Date of birth: April 17, 1950 Teaching position: professor, Tehnical University of Cluj, North University of Baia Mare Center, **Undergraduate education:** The Faculty of Geodesy, Bucharest, 1974, The Faculty of Mathematics, Cluj-Napoca, 1990, **Scientific titles and activity:** PHD Doctor of Engineering Sciences, with the major of Civil Engineering, in the area of expertise of Geodesy, Cartography, Fotogrammetry and Teledetection, **Professional activity:** Geodesy engineer, 1974-1978, Energoconstructia Trust, Bucharest, Teacher, 1978-1980, Agricultural high school with specialization in topography, Branesti, Ilfov County, Assistant, 1980-1990, Institute of Polytechnics, Cluj-Napoca, 1980-1985, TS04I - Curriculum and the Survey Body of Knowledge, 5833 8/8
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Engineering Institute, Baia Mare, 1985-1990, Senior lecturer, 1990-2004, the teaching lines of Topography, Cadastre, Engineering Topography, The Northern University, Baia Mare, Professor, 2004- the teaching lines of Topography, Cadastre, Engineering Topography, The Northern University, Baia Mare, **Articles** published abroad, in international field journals, in the books of several international scientific meetings; 134, **Published Books, Manuals, Workbooks** of problems and Tutorials: 31.

Ștefan Ovidiu, Assoc.professor, Tehnical University of Cluj, North University of Baia Mare Center,

Adrian T.G. Radulescu, Assistant Professor, Tehnical University of Cluj, North University of Baia Mare Center, Romania, PHD, Doctor of Engineering Sciences, with the major of Mining Engineering, in the area of expertise of Surveying,

Virgil M.G. Radulescu, Assistant Professor, North University Baia Mare, Romania, PHD candidat Doctor of Engineering Sciences, with the major of Mining Engineering, in the area of expertise of Surveying,

Mihaela Soponar Assistant Professor, North University Baia Mare, Romania, PHD candidat Doctor of Engineering Sciences, with the major of Mining Engineering, in the area of expertise of Surveying,

CONTACTS

Gheorghe M.T. RADULESCU

Technical University of Cluj Napoca

North University of Baia Mare Center

Str.dr.Victor Babes, nr.62A

430083 Baia Mare, Romania

Tel. +40721942189

Fax + 40262276153

Email: gmtradulescu@yahoo.com

Web site: www.utcluj.ro, www.ubm.ro