


On Computerising Geodetic Surveys in the Context of Higher Education

Luciana Oprea, Ioan Ienciu, Romania

Abstract

The external academic quality appraisal of Romanian higher education institutions in the fundamental subject area of Engineering Sciences and its respective study programmes is based on (reference) standards and performance indicators set by a number of documents. These are the methodology, the reference standards and the performance indicators list approved by the Government Decision no. 1418 of 11.10.2006, with which operates the Romanian Agency for Quality Assurance in Higher Education (ARACIS). There are also the specific standards applying to all fundamental subject areas, approved by ARACIS, in accordance with the Law no. 87/10 April 2006, Article 17.

Regarding of this Government Decision, the curricula must specify the volume in hours for teaching activities with students and the number of hours required for the student's individual training as well as the number of credits for each discipline, both for coursework and project work or other applied activities.

In order to analyse the quality of Romanian higher education for the "Geodetic Engineering" domain, in the field of *'Land surveying and Cadastre'* and the universities' role in training new experts in the field, we want to present the curriculum of a young university – 'December 1st 1918' University of Alba Iulia, in relation to a university with a long tradition of Romanian geodetic education – the Technical University of Civil Engineering, Bucharest.

Also, as computer technologies evolve rapidly, the training of future university graduates has to be tuned to the latest developments, so as to offer them better qualifications for the labour market. By this way, all the university including 'December 1st 1918' University of Alba Iulia and „The Technical University of Civil Engineering" of Bucharest through its Bachelor's degree programme "Territory measurements and cadastre", has included in the curricula a series of specialty disciplines that will help future geodetic engineers acquire competences in computerising geodetic surveys. The future graduates will also be able to adjust to the constant dynamics of this line of work.

The description of the curricula shows that surveying students, during the four years of study, acquire enough knowledge and practical skills to work with computers and specialized surveying software. These skills may increase the quality and productivity of the surveyor's work. They also become a huge advantage when using other computer software and other types of equipment in other surveying-related areas.

All these accomplishments are the result of the connection between theory and practice, of a syllabus that is competitive with the dynamics of development in the field of land measurement and cadastre and also of the ease in assimilating all new information in the field.

Trough the study of a wide range of topographic equipment and of computer software that are presently used in Romania and abroad, our young engineers are prepared to apply for jobs in Romania or in any member state of the European Union. They are familiar with or they can adjust very easily to the specific topographical and computer technology that they may be required to use.

As regards the access to further studies, the holders of a Bachelor's degree in Engineering will have access to Master studies and then to doctoral studies not only in Romania but also in the European Union or elsewhere.

1. The legislative framework for assuring the quality of Romanian higher education

The external academic quality appraisal of Romanian higher education institutions in the fundamental subject area of Engineering Sciences and its respective study programmes is based on (reference) standards and performance indicators set by a number of documents. These are the methodology, the reference standards and the performance indicators list approved by the Government Decision no. 1418 of 11.10.2006, with which operates the Romanian Agency for Quality Assurance in Higher Education (ARACIS). There are also the specific standards applying to all fundamental subject areas, approved by ARACIS, in accordance with the Law no. 87/10 April 2006, Article 17.

The following items of legislation were considered when the Specific standards were elaborated:

- Law 288/24 June 2004 on the organization of higher education;
- The Government Decision 1175/06 Sept. 2006 on the organization of undergraduate studies and on the approval of the list containing subject areas and undergraduate study programmes,
- The Government Decision 404/29 March 2006 on the organization of higher education;

Indicator	*Full-time courses, Distance education, Part-time courses*	*Evening classes*
Length of studies, of which:	8 sem.	10 sem.
Minimum semester length	14 weeks	14 weeks
Number of hours/ week	26 –28	21 – 22
Added length of practical activities	4 – 6 weeks	4 – 6 weeks
Length of practical activities dedicated to the preparation of the Thesis/Diploma project	2 – 3 weeks (during the last year of studies)	2 – 3 weeks (during the last year of studies)

Table 1: Length of studies and the volume of teaching activities.

- Law 87/10 Apr. 2006 on the approval of the Government Emergency Ordinance No. 75/ 2005 regarding the assurance of education quality.

2. Contents of education as a process

The educational contents in the fundamental area of Engineering Sciences contains the general standards common to all fundamental areas and forms of education approved by the ARACIS Council, to which the following specific standards are added.

The length of studies and the volume of teaching activities must be as shown in table 1.

The required total number of hours of activity organized according to the curriculum is between 3152 and 3376, for full-time courses, distance courses and part-time courses, to which the specialty practice is added. The minimum volume of practical activities is 240 hours.

The curricula must specify the volume in hours for teaching activities with students and the number of hours required for the student's individual training as well as the number of credits for each discipline, both for coursework and project work or other applied activities.

The curricula of the study programmes in the fields from the fundamental field of Engineering Sciences must contain the following categories of disciplines, with the following percentages (the percentages are calculated to the total volume of hours, the 240 hours of minimum practical activity included):

- fundamental disciplines, minimum 17%;
- disciplines of the study area minimum 38 %;
- specialty disciplines, minimum 25 %;
- complementary disciplines, maximum 8%.

3. A comparative curricula study

In order to analyse the quality of Romanian higher education in the field of 'Land surveying and Cadastre' and the universities' role in training new experts in the field, we would like to show the curriculum of a young university – 'December 1st 1918' University of Alba Iulia, in relation to a university with a long tradition of Romanian geodetic education– the Technical University of Civil Engineering, Bucharest.

'December 1st 1918' University of Alba Iulia, Romania was established in 1991. In 1997, the Bachelor's degree programme 'Cadastre' was introduced. In 2001, the long-term form of education for the same the programme was approved and in 2005, it changed according to the Bologna process, into a new programme called 'Land surveying and Cadastre', subject area: Geodetic engineering.

Currently, the approved curriculum for this study programme is shown in table 2.

Cr. No.	Designation of Disciplines	Type of Discipline	Tuition and individual study hours									Numberofcredits
			Number of weeks	Tuition hours						Individual study		
				Teaching activities				Totalhours/week	Totalhours/semester	Totalhours/week	Totalhours/semester	
				Course	Seminar	Laboratory	Project					
1st YEAR												
1ST SEMESTER												
1	Mathematical analysis	F	14	2	1	–	–	3	42	3	42	4
2	Linear algebra	F	14	1	1	–	–	2	28	3	42	3
3	Descriptive geometry	F	14	2	–	2	–	4	56	3	42	4
4	Physics	F	14	2	–	1	–	3	42	2	28	4
5	Topography 1	F	14	2	–	2	–	4	56	3	42	5
6	Chemistry	F	14	2	–	2	–	4	56	3	42	4
7	Geodetic instruments and surveying methods	D	14	2	–	2	–	4	56	3	42	4
COMPLEMENTARY DISCIPLINES												
8	Foreign language 1	C	14	–	2	–	–	2	28	1	14	2
9	Sport	C	14	–	2	–	–	2	28	0	0	–
	TOTAL – 1st semester	–	14	13	6	9	0	28	392	21	294	30
2ND SEMESTER												
1	Special mathematics	F	14	2	1	–	–	3	42	1.5	21	3
2	Differential and analytical geometry	F	14	2	1	–	–	3	42	1.5	21	3
3	Technical and map drawing	F	14	2	–	1	–	3	42	2	28	3
4	Topography 2	F	14	2	–	2	2	6	84	3	42	6
5	Measurements compensation and statistics 1	F	14	2	–	1	–	3	42	1.5	21	4
6	General geology	D	14	2	–	2	–	4	56	1.5	21	3
7	Geography	D	14	2	–	–	–	2	28	1.5	21	3
COMPLEMENTARY DISCIPLINES												
8	Foreign language 2	C	14	–	2	–	–	2	28	1.5	21	2
9	Sport	C	14		2	–	–	2	28			–
	TOTAL – 2nd semester (without the practical activities)	–	14	14	6	6	2	28	392	14	196	27
10	Practical activities 1 (Topography)	D	2	–	–	–	–	0	60	30	60	3
	TOTAL / YEAR	–	28	27	12	15	2	56	844	65	550	60

2ND YEAR												
1st SEMESTER												
1	Computer programming and numerical methods	F	14	2	–	2	–	4	56	3	42	5
2	Soil study	D	14	2	1	–	–	3	42	2.5	35	4
3	General course in Civil, Industrial and Agricultural Engineering	D	14	2	–	1	–	3	42	3	42	4
4	Geodesy I	S	14	2	–	2	–	4	56	3	42	5
5	Measurements compensation and statistics 2	F	14	2	2	–	–	4	56	3	42	5
ELECTIVE DISCIPLINES												
6	Geo-technique	D	14	2	–	2	–	4	56	2	28	5
	Tectonics											
COMPLEMENTARY DISCIPLINES												
7	Foreign language 3	C	14	–	2	–	–	2	28	1.5	21	2
8	Sport	C	14		2	–	–	2	28		0	
	TOTAL 1st Semester	–	14	12	7	7	0	26	364	18	252	30
2ND SEMESTER												
1	Land laws and cadastral legislation	D	14	2	2	–	–	4	56	3	42	4
2	Geodetic surveying by waves	S	14	2	–	2	–	4	56	3	42	5
3	Geodesy 2	S	14	2	–	2	2	6	84	3	42	6
4	Photogrammetry 1	S	14	2	2	–	–	4	56	3	42	5
5	Automatic processing of geodetic data	S	14	2	–	2	–	4	56	2	28	5
	Programme operation in topography and cadastre											
COMPLEMENTARY DISCIPLINES												
6	Foreign language 4	C	14	–	2	–	–	2	28	1.5	21	2
7	Sport	C	14		2	–	–	2	28		0	
	TOTAL – 2nd semester (without the practical activities)	–	14	10	8	6	2	26	364	15.5	217	27
8	Practical activities 1 (Topography)	D	2	–	–	–	–	–	60	30	60	3
	TOTAL / YEAR	–	28	22	15	13	2	52	788	63.5	529	60

3RD YEAR												
1ST SEMESTER												
1	Remote sensing and Photo interpretation	D	14	2	–	2	–	4	56	3	42	4
2	Mathematical cartography	D	14	2	–	2	–	4	56	2.5	35	4
3	Computer graphics for topography and cadastre	S	14	2	–	2	–	4	56	3	42	4
4	Cadastre 1	S	14	2	–	2	–	4	56	3	42	5
5	Photogrammetry 2	S	14	1	–	1	–	2	28	3	42	4
ELECTIVE DISCIPLINES												
6	Automation of the topographical and geodetic surveys	S	14	2	–	2	–	4	56	2	28	5
	Measurement and data processing techniques											
7	Archaeology	D	14	2	–	2	–	4	56	2	28	4
	Archaeological topography											
	TOTAL – 1st semester	–	14	13	0	13	0	26	364	18.5	259	30
2ND SEMESTER												
1	Engineering Photogrammetry	D	14	2	–	2	–	4	56	2	28	4
2	Satellite geodesy	S	14	2	–	2	–	4	56	3	42	4
3	Cadastre 2	S	14	2	–	1	2	5	70	3.5	49	5
4	Cartographic projections	D	14	1	–	1	–	2	28	2	28	3
5	Town planning	D	14	2	–	1	–	3	42	1	14	2
6	Land improvement	D	14	2	–	1	–	3	42	3	42	3
ELECTIVE DISCIPLINES												
7	General ecology	D	14	2	–	1	–	3	42	2	28	3
	Environment protection and sustainable development											
8	Cadastral rating	D	14	2	–	1	–	3	42	1	14	3
	Agro-chemistry											
	TOTAL – 2nd semester (without the practical activities)		14	15	0	10	2	27	378	16.5	231	27
9	Practical activities 1 (Topography)	D	2	–	–		–	–	60	30	60	3
	TOTAL / YEAR	–	28	28	0	23	2	53	802	–	490	60

4TH YEAR												
1ST SEMESTER												
1	Cadastre 3	S	14	2	–	1	–	3	42	2	28	5
2	Monitoring land and construction behaviour	S	14	2	–	2	–	4	56	3	42	4
3	Mining topography	S	14	2	–	1	–	3	42	3	42	4
4	The evaluation of fixed assets	D	14	2	–	2	–	4	56	3	42	4
5	Funding projects	C	14	1	–	1	–	2	28	3	42	3
ELECTIVE DISCIPLINES												
6	Engineering surveying for civil engineering and industry 1 *	S	14	2	–	2	2	6	84	3	42	6
	Engineering topography *											
7	Computer systems in Cadastre	S	14	2	–	2	-	4	56	3	42	4
	Geographic information systems											
	TOTAL – 1st semester	–	14	13	0	11	2	26	364	20	280	30
2ND SEMESTER												
1	Design and optimization of geodetic networks	S	12	2	–	1	–	3	36	3	36	4
2	Management of geodetic surveys	D	12	2	2	–	–	4	48	2	24	5
3	Land and town planning	S	12	2	–	2	–	4	48	3	36	4
4	Methods and techniques for project presentation	D	12	–	2	–	–	2	24	2	24	3
5	Career guidance	D	12	2	–	1	–	3	36	3	36	3
6	Core accounting	D	12	2	–	1	–	3	36	3	36	3
7	Hydrotechnical constructions	D	12	2	–	1	–	3	36	3	36	3
ELECTIVE DISCIPLINES												
8	Geoinformatics	S	12	2	–	2	–	4	48	3	36	5
	Computerized record keeping of the agricultural real estate											
	TOTAL – 2nd semester (without the practical activities)		12	14	4	8	0	26	312	22	264	30
9	Practical activities (drawing up the Diploma thesis)	D	2	–	–	–	–	0	60	3	6	4
	TOTAL / YEAR	–		–	–	–	–	–	736	–	544	60

SUMMARY:	
– Fundamental disciplines (F):	644 hours, 20.32%;
– Disciplines of the field (D):	1232 hours, 38.86%;
– Specialty disciplines (S):	1042 hours, 32.87%;
– Complementary disciplines (C):	252 hours, 7.95%;
– Elective disciplines (O):	496 hours, 15.65%.
Total hours –	3170

Table 2: The curriculum for 'Land surveying and Cadastre' – 'December 1st 1918' University of Alba Iulia.

The Technical University of Civil Engineering of Bucharest, and the Faculty of Geodesy has a rich history. It begins in the year 1813 with the first school of topographic engineers. Its current mission is to provide engineering education which favours the acquisition of skills for scientific research and computer-aided design.

The programme 'Land surveying and Cadastre' helps the students learn:

- The most recent and the most advanced techniques in the field of Geodesy, Engineering Topography, Photogrammetry and Remote sensing, Cadastre and Real estate evaluation;
- Develop increased scientific research abilities;
- Draw up studies and reports;
- Act on their own, in a creative manner, in approaching and solving specific engineering problems;
- To lead teams and communicate with official institutions in the field.

The curriculum for this specialty is presented in table 3.

Cr. No.	*Designation of Discipline*	*C*	*S*	*L*	*P*	*SI*	*TO*	*CR*	*Form of evaluation*
1st Semester									
1.	Higher Mathematics I	2	2	–	–	2	6	4	Written Examination
2.	Algebra	2	2	–	–	2	6	5	Written Examination
3.	Geometric representations of topographical surfaces	2	–	2	–	3	7	5	Written Examination
4.	Physics I	3	–	1	–	2	6	5	Written Examination
5.	Surveying instruments and methods I	2	–	2	–	3	7	5	Written Examination
6.	Physical geography	2	–	–	–	1	3	2	Oral examination
7.	Disciplines of the social sciences and humanities area	2	2	–	–	1	5	3	Oral examination
8.	Foreign Language I	–	(2)	–	–	(1)	(3)	1	Oral examination
9.	Sport I	–	(2)	–	–	–	–	–	–
	TOTAL 26	15	6	5	-	14	40	30	5 Written Examinations + 3 Oral examinations

2nd Semester									
1.	Higher Mathematics II	2	2	–	–	2	6	4	Written Examination
2.	Analytical and differential geometry	2	2	–	–	2	6	4	Written Examination
3.	Physics II	3	–	1	–	2	6	4	Written Examination
4.	Geometric bases of Photogrammetry (GBP)	2	–	1	–	1	4	2	Oral examination
5.	Surveying instruments and methods II	2	–	2	–	2	6	5	Written Examination
6.	Cartographic drawing	–	–	2	–	1	3	2	Oral examination
7.	The basics of physical geodesy I	2	–	–	–	2	4	3	Written Examination
8.	Geodetic astronomy	2	–	1	–	2	5	2	Oral examination
9.	Foreign languages II	–	(2)	–	–	(1)	(3)	1	–
10.	Sport II	–	(2)	–	–	–	–	–	Practical examination *
11.	Practical activities I	3 weeks x 30 hours	–	–	3	C			
	TOTAL 26	15	4	7	-	14	40	30	5 Written Examinations + 5 Oral examinations
3rd Semester									
1.	Higher Mathematics III	3	2	–	–	2	7	5	Written Examination
2.	Automatic processing of geodetic data	3	–	3	–	2	8	5	Oral examination
3.	Measurement compensation and statistics I	3	–	2	–	3	8	6	Written Examination
4.	The basics of Physical Geodesy II	2	–	1	–	3	6	4	Written Examination
5.	Mathematical Geodesy I	2	–	–	–	2	4	4	Written Examination
6.	Topography I	2	–	2	–	3	7	5	Written Examination
7.	Foreign language III	–	(2)	–	–	(1)	(3)	1	Oral examination
8.	Sport III	–	(2)	–	–	–	–	–	–
	TOTAL 25	15	2	8	-	15	40	30	5 Written Examinations + 2 Oral examinations

4th Semester									
1.	Measurement compensation and statistics II	3	–	2	–	2	7	5	Written Examination
2.	Topography II	2	–	–	2	3	7	3+2	Written Examination + Project work
3.	Planimetric Photogrammetry	2	–	1	–	2	5	3	Written Examination
4.	Computer systems in land surveying	3	–	2	–	2	7	5	Written Examination
5.	The basics of geodetic surveying by waves	2	–	1	–	1	4	2	Oral examination
6.	Mathematical Geodesy II	2	–	1	–	2	5	4	Written Examination
7.	General course in Civil, Industrial and Agricultural Engineering	2	–	2	–	1	5	2	Oral examination
8.	Foreign language IV	–	(2)	–	–	(1)	(3)	1	Oral examination
9.	Sport IV	–	(2)	–	–	–	–	–	Practical examination *
10.	Practical activities II	3 weeks x30 hours	–	–	3	C			
	TOTAL 27	16	-	9	2	13	40	30	5 Written Examination +5 Oral examinations + 1Project work
5th Semester									
1.	The basics of engineering surveying	2	–	2	–	2	6	5	Written Examination
2.	Mathematical Geodesy II	–	–	–	1	1	2	2	Project work
3.	Mathematical Geodesy III	2	–	–	–	1	3	4	Written Examination
4.	Map projections	2	–	1	–	3	6	4	Written Examination
5.	Electronic distance measurement	2	–	2	–	2	6	4	Written Examination
6.	Stereo-Photogrammetry and Photo-interpretation	2	–	1	–	2	5	4	Written Examination
7.	Roads and works of art	2	–	2	–	2	6	3	Oral examination
8.	Hydrotechnical constructions and public technical utility systems	2	–	2	–	2	6	3	Oral examination
9.	Foreign language V	–	(2)	–	–	(1)	(3)	1	Oral examination
	TOTAL 25	14	-	10	1	15	40	30	5 Written Examinations + 3 Oral examinations + 1Project work

6th Semester									
1.	Mathematical Geodesy III	–	–	–	2	1	3	2	Project work
2.	Cadastre I	2	–	1	–	1	4	3	Written Examination
3.	Map modelling I	2	–	2	–	2	6	3	Written Examination
4.	Engineering surveying for civil engineering and the industry I	3	–	–	2	3	8	3+ 2	Written Examination + Project work
5.	Analytical Photogrammetry	2	–	–	1	2	5	2+ 2	Written Examination + Project work
6.	Legal institutions and laws on the agricultural real estate and cadastre	3	–	2	–	2	7	3	Oral examination
7.	Practical activities III	3 weeks x 30 hours	–	–	4	C			
8.	Elective disciplines MODULE 1 (*)	1	–	1	–	1	3	2	Oral examination
		2	–	1	–	1	4	4	Written Examination
9.	Elective disciplines MODULE 2 (*)	2	–	–	–	1	3	2	Oral examination
		2	–	1	–	1	4	4	Written Examination
	TOTAL 27	15/16	-	7/6	5	13	40	30	5 Written Examinations + 3 Oral examinations +3Project work
7th Semester									
1.	Space Geodesy I	2	–	2	–	2	6	4	Written Examination
2.	Engineering Photogrammetry	3	–	1	–	3	7	6	Written Examination
3.	Engineering surveying for civil engineering and the industry II	2	–	2	–	2	6	6	Written Examination
4.	Cadastre II	3	–	2	–	3	8	5	Written Examination
5.	Accounting	2	1		–	1	4	3	Oral examination
6.	Elective disciplines MODULE 1 (*)	2	–	1	–	1	4	2	Oral examination
		2	–	–	2	1	5	4	Written Examination + Project work
7.	Elective disciplines MODULE 2 (*)	2	–	1	–	1	4	4	Written Examination
		2	–	2	–	1	5	2	Oral examination
	TOTAL 27	16	1	8/10	2/0	13	40	30	5 Written Examinations + 1 Oral examination +1 Oral examination /+ Project work

8th Semester									
1.	The design and optimization of geodetic networks	2	–	–	–	2	4	3	Written Examination
2.	Digital Photogrammetry	2	–	1	–	2	5	5	Written Examination
3.	Remote sensing	2	–	2	–	3	7	5	Written Examination
4.	Land improvement and town planning	2	–	1	–	1	4	3	Oral examination
5.	Monitoring the behaviour of lands and construction works	2	–	1	–	3	6	5	Written Examination
6.	Organizing geodetic works	2	–	2	–	1	5	3	Oral examination
7.	Elective disciplines MODULE 1 (*)	2	–	1	–	1	4	2	Oral examination
		2	–	1	–	2	5	4	Written Examination
8.	Elective disciplines MODULE 2 (*)	2	–	2	–	2	6	4	Written Examination
		1	–	1	–	1	3	2	Oral examination
	TOTAL	16/15	-	9/10	-	15	40	30	5 Written Examinations + 3 Oral examinations

Table 3: The curriculum for 'Land surveying and Cadastre' – the Technical University of Civil Engineering.

The analysis of the two curricula shows an almost 90% similarity of fundamental disciplines, as some of them have close designations and an identical content. The disciplines in the field and the specialty disciplines are almost identical from the point of view of designations and syllabi. The complementary disciplines and the specialty practical activities at the two Universities are identical.

From the point of view of study year structure and the number of hours for each semester, both programmes meet the Bologna requirements.

4. Automation of geodetic surveys in an educational context

As computer technologies evolve rapidly, the training of future university graduates has to be tuned to the latest developments, so as to offer them better qualifications for the labour market. In this context, 'December 1st 1918' University of Alba Iulia, Romania, through its Bachelor's degree programme 'Territory measurements and cadastre', has included in the curricula a series of specialty disciplines that will help future geodetic engineers acquire competences in computerising geodetic surveys. The future graduates will also be able to adjust to the constant dynamics of this line of work.

In order for students to become acquainted with the topographic technical equipment and software, the first year of studies includes courses such as 'General topography', 'Topographical tools and measurement methods' and 'Computer programming.' Thus, students in topography acquire abilities in using the topographic instruments, both in theory and in practice, as the courses and their practical applications include.

In the second year of studies, there is a gradual passage towards the use of the electronic equipment required by the course and laboratory activities of the discipline 'Geodetic surveys by waves'. The computerized processing of data is studied within software applications that are used both nationally and internationally (Caltop, Caltop8, Toposys).

The automation of topographic and geodetic surveys (third year of studies) is studied in the context of creating the link between geodetic equipment and computers. Thus, students are introduced to the software that allows data transfers from and to the memory of devices

and machines, to the facilities that they offer and to the possibilities of creating topographic applications in programming environments.

The computer design of a project's graphics is exemplified through drawing software used worldwide such as AutoCAD, Surfer etc., and also through national software that satisfies the requirements of the Romanian market, such as MapSys.

The last stage (the fourth year of study) in the training of future geodetic surveyors includes the study of satellite methods of surveying in view of creating a unitary geodetic network at the national level and which can be part of the European geodetic network. Also, Photogrammetry and its methods for point determination are considered, with examples of specific pieces of equipment. The purpose is to integrate the information specific to a project in a geographic system of information.

The description of the curricula shows that surveying students, during the four years of study, acquire enough knowledge and practical skills to work with computers and specialized surveying software. These skills may increase the quality and productivity of the surveyor's work. They also become a huge advantage when using other computer software and other types of equipment in other surveying-related areas.

5. Conclusion

All these accomplishments are the result of the connection between theory and practice, of a syllabus that is competitive with the dynamics of development in the field of land measurement and cadastre and also of the ease in assimilating all new information in the field.

Trough the study of a wide range of topographic equipment and of computer software that are presently used in Romania and abroad, our young engineers are prepared to apply for jobs in Romania or in any member state of the European Union. They are familiar with or they can adjust very easily to the specific topographical and computer technology that they may be required to use.

As regards the access to further studies, the holders of a Bachelor's degree in Engineering will have access to Master studies and then to doctoral studies not only in Romania but also in the European Union or elsewhere.

References

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Contact

Assist. Lect. Phd. stud. eng. Luciana Oprea, 'December 1st 1918' University of Alba Iulia, 11-13 Nicolae Iorga street, Alba County, Postal Code 510009, Romania
E-mail: loprea@uab.ro, lucii_oprea@yahoo.com
Assoc. Prof. Phd. eng. Ioan Ienciu, 'December 1st 1918' University of Alba Iulia, 11-13 Nicolae Iorga street, Alba County, Postal Code 510009, Romania
E-mail: iienciu@uab.ro, iienciu@yahoo.com