Similarities and Differences Between Surveyor's Education in Kiev and Belgrade at University Level

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Kew wards: Ukraine, Serbia, Higher Education, Surveying.

SUMMARY

Homogenization of the higher education area in accordance to the Bologna process is one of the priority task in both countries. Faculties especially responsible for education of surveyors in both countries have started to develop new curricula, rules and new standards aimed to unify the education and support the efforts to obtain a new global market of surveyors capable to satisfy everyday's needs and successfully compete in the EU labor market. The teachers of two Universities, Kyiv National university of Construction and Architecture (KNUCA), Faculty of GIS & Land Management – Department of surveying and cadastre (Ukraine) and University of Belgrade - Faculty of Civil Engineering - Department of geodesy and geoinformatics (Serbia) found the very interesting to analyze actual situation in both countries. The analysis and comparing of the surveyor's education programs investigate and appreciate the possibilities for mutual recognition of studies and facilitate student's and teacher's mobility. This research is very important as an idea how to define the minimum of common program content that is enough for diploma recognition or mobility requirements for the new student's generation.

REZIME

Запровадження Болонської системи освіти є одним із приоритетних завдань в Україні та Сербії. Створення єдиного освітнього простору є дуже важливим для розвитку спільного європейського ринку за умовами загальної глобалізації. В обох країнах триває процес розробки нових учбових планів, правил та стандартів які мають за мету уніфікацію освітніх підходів в сфері підготовки сервейєрів, спроможних задовольнити сучасні потреби на європейському ринку. Керівники та викладачі двох університетів, відповідальних за випуск фахівців з землеустрою і кадастру в Сербії та Україні, вважають за необхідне проведення порівняльного аналізу учбових планів та освітніх програм з метою оцінки можливостей студентської та викладацької мобільності. Запропоноване дослідження є важливим також точки зору визначення мінімуму загальних програм необхідних і достатніх для визнання дипломів та задоволення вимог щодо мобільності студентів нової генерації.

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1. INTRODUCTION

One of the most important measures of the academic reforms is the development and use of qualifications frameworks. Qualification Framework (QF) describes the qualifications obtained at Bachelor's, Master's and Doctor's level related to achievement level, learning outcomes and competence profile. QF has central place in achieving the Bologna objectives. On the other side, QF helps in comparing National QF (NQF) and to get decision in the process of recognition of qualification as a mean in facilitating the mobility of students and profession. Together with QF for European Higher Education Area, NQF on international level promote: transparency, recognition and students mobility. Creating NQF is not simple and easy work. Only several countries finished this job so far. Most of the countries are in the process of making draft version of the NQF, but they are still hardly working to satisfy all prerequisites and expectations. Ukraine and Serbia are two countries that this process started but nobody could imagine what time this work would be finished.

For the analysis of surveying education programme at Ukraine (Faculty of GIS and Land Management) and Serbia (Faculty of Civil Engineering – Department of Geodesy and Geoinformatics), we took into account: - Ukraine's BSc program "Geodesy, cartography and surveying" and Serbian's BSc program "Geodesy" and - Ukraine's MSc program - modulo Surveying and Cadastre and Serbian MSc program Geodesy - modulo Land Management. In order to make the analysis easier, two programmes were divided into seven general groups: I) Fundamental subjects (mathematics, physics, descriptive geometry, electronics, …), II) Surveying subjects (all subjects related to measurements, equipment, processing and mapping), III) GeoInformation technology courses (GIS, Databases, Informatics, Programming, etc.), IV) Land Management courses (Cadastre, Spatial Planning, Land Consolidation, etc.), V) Legal courses, VI) Economic courses, VII) Others (general background courses) and practice which is included into one of the previous mentioned groups dependently of the contents. Final work is the last obligation prepared at the end of BSc and MSc levels.

2. EDUCATION REFORM IN UKRAINE

At the beginning of this century Ukraine accepted Bologna model of education and has started to reform actual education system. By legislation there are three qualification levels in process of university education: bachelor (basic academic studies), specialist and master (graduate academic studies). A degree of specialist has been kept from previous soviet education system and degrees of bachelor and master have been taken according to the European Higher

Education qualification framework. New curricula were made and included in academic process. Bachelor study lasts four years. After that the students take 245 ECTS and qualified to attend next levels – specialist or master level (depending on studying results of students and their abilities to scientific works). In KNUCA specialist and master levels last one year with 60 ECTS. One semester students are dealing with theoretical and practice courses. At the same time specialist studying is oriented to practice tasks and master studying to scientific methods of decision making. On second semester, specialist works on their diploma project and master on master thesis. Academic degrees are divided into two levels: PhD (candidate of science) and doctor of science, both of them take 3 years. In 2009 the draft of new Law on High Education was proposed. According to proposed Law specialist level should be cancelled and master studying have to last 2 years. But till now these proposals have not been accepted (Petrakovska, 2009).

Surveying education in Ukraine has started in the middle of the 90s and is getting on technical and agricultural universities. The technical universities are focused on engineering sciences while agricultural is oriented toward solving problems and tasks in agricultural land management area. European Credit and Transfer System (ECTS) were adopted on both.

The structure of BSc study program at the Faculty of GIS and Land Management is shown in Table 1 and Figure 1 (the meaning of the subject blocks is shown in Table 5). Except lectures, the students have survey practice in first (6 ETCS), second (6 ECTS) and third (6 ECTS, including GPS practice 2 ETCS and IT practice 2 ECTS) study years. The students have 32 exams with 1 ECTS per exam, separately accounted and State examination which takes 3 ECTS. The total number of ETCS in four year study program takes 245 ECTS.

Table 1: The structure of BSc study programme at the Faculty of GIS and Land Management in ECTS Education direction "Geodesy, cartography and surveying", speciality "Surveying and cadastre"

I	II	III	IV	V	VI	VII	State examination + Exams	Total ECTS
35,25	79	15,75	27,25	7,5	15,25	30	3 + 32	245

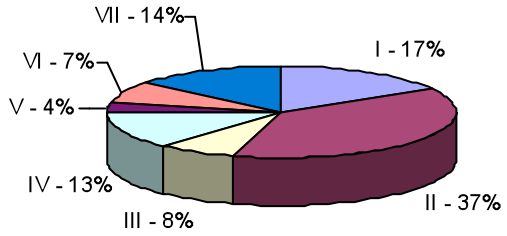

Figure 1: Structure of the BSc level at the Faculty of GIS and Land Management in ECTS Education direction "Geodesy, cartography and surveying" speciality "Surveying and cadastre"

The structure of MSc study programme at the Faculty of GIS and Land Management is shown in Table 2 and Figure 2 (the meaning of the subject blocks is shown in Table 5).

Table 2: The structure of MSc study programme at the Faculty of GIS and Land Management in ECTS Speciality "Surveying and cadastre"

I	II	III	IV	V	VI	VII	Final work	Total ECTS
0	0	5,25	8,75	6,75	2,25	7	30	60

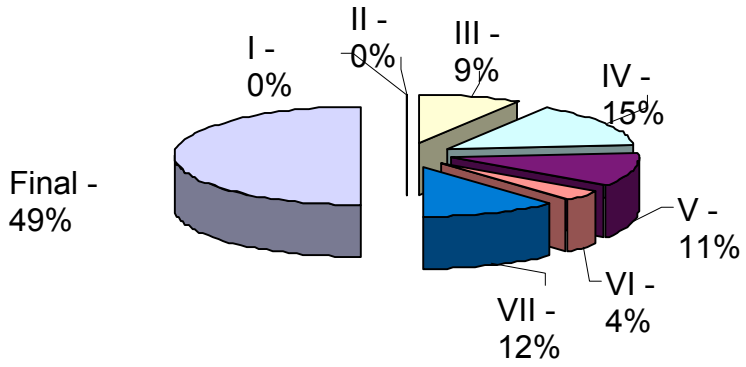

Figure 2: Structure of the MSc level at the Faculty of GIS and Land Management in ECTS Speciality "Surveying and cadastre"

3. EDUCATION REFORM IN SERBIA

The Faculty of Civil Engineering has a rich history. It's foundation dated back to the 1846 when the Serbian ruler Aleksandar Karadjordjevic signed decree and established the first engineering school – licei. Its current mission is to provide education in the area engineering, focusing on Civil Engineering and Geodesy. Studies of Geodesy and Geoinformatics on the equally named section of the Faculty of Civil Engineering is in line with new Law on high education and Bologna process. Studies are divided into three levels: basic academic studies (BSc), graduate academic studies (MSc) and PhD studies. The basic studies last for three years (six semesters) and have the value of 180 ECTS credits, graduate academic studies (master studies) last for additional two years (four semesters) with the additional value of 120 ECTS credits. PhD studies last three years and takes 180 ECTS. The program of basic academic studies of Geodesy and Geoinformatics is common to all students, after which the students choose one of three existed modulos. After finishing the studies, the students acquire the degree of university Geodesy and Geoinformatics engineer, and could employed or continue academic studies [Bozic and Raskovic, 2008], [Bozic at all., 2009]. The structure of BSc study programme is shown in Table 3 and Figure 3.

Table 3: The structure of BSc study programme at FCE in ECTS

I	II	III	IV	V	VI	VII	Final work	Total ECTS
36	97	22	10	3	0	3	9	180

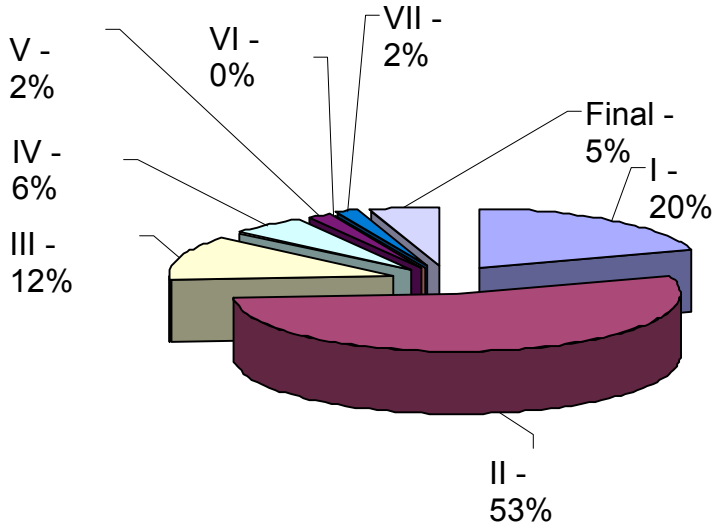

Figure 3: Structure of the BSc level at the FCE in ECTS

Graduate academic studies are divided into three main disciplines: Geodesy, Geoinformatics and Land Law and Economy. They consist of the set of obligatory courses (approximately 70% of total classes), choice courses (approximately 30% of total classes) and graduate (master) thesis, for which the last semester of studies is reserved. The Master's Program in Land Law and Economy - is a four semester program developed under the Tempus program with the cooperation of professor Hans Mattsson from Royal Institute of Technology (KTH, Stockholm). The first semester introduces students to the area of law and gives them some basic information on property market, geographical information systems and project methodology. In the second semester students are trained in land cadastre, land consolidation, urban land management and receive knowledge in real property investment. In the third semester students, continue their education choosing the courses which give them more managerial skills and exercise in group work doing projects in urban planning or real estate. At the end of the third semester students, spend two weeks in adequately chosen geodesy office where they are faced with practical problems of the profession. The fourth semester is dedicated to the Master's Thesis. Master's Thesis could be written in Serbian or English. The structure of MSc study programme is shown in Table 4 and Figure 4.

Table 4: The structure of MSc study programe at FCE – modulo Land Management in ECTS

I	II	III	IV	V	VI	VII	Final work	Total ECTS
0	0	11	50	12	17	0	30	120

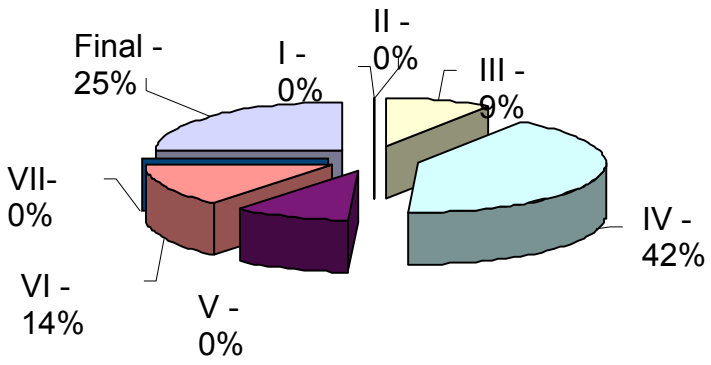

Figure 4: Structure of the MSc level
Modulo Land Management at the FCE in ECTS

4. SIMILARITIES AND DIFFERENCES BETWEEN SURVEYOR'S EDUCATION

In order to analyze the similarities and differences between Ukraine and Serbian higher education of academic type in the area of surveying, seven general groups of subjects were identified. Practice is included into the groups related to the contents and final work is separately extracted. We are aware that this classification as any other is not maybe the best but we tried to find an easy way for comparing the contents of curricula. Comparative analysis BSc and MSc program (modulo Land Management at FCE) structures are shown in Table 5.

Regarding the BSc program structure, we can conclude (Table 5):

- The programmes duration are unequal (the Ukraine's program lasts four years and takes 245 ECTS, the Serbian's program lasts three years and takes 180 ECTS);
- There are significant differences in Surveying and Land Management area (II and IV groups, Serbian program has more surveying while Ukraine's has more land management contents);
- The programmes are similar in mathematical and informatics backgrounds of study (I and III groups), but they significantly differ in Legal- Economic's subjects (V and VI groups, with more ECTS on Ukraine's side); and
- There is essential difference in final works: State exam in Ukraine and Final synthetic work in Serbia;
- Special attention should be paid on VII group with general courses, they do not exist in Serbian curricula, but occupy about one semester in Ukraine's.

Table 5: Number of ECTS on BSc and MSc levels in Ukraine and Serbia

	Block	Ukraine			Serbia		
		BSc	MSc	**Total**	BSc	MSc	**Total**

I	Mathematics, Physics, Descriptive geometry, Electronics, …	35,25	0,00	**35,25**	36,00	0,00	**36,0**
II	Plane Surveying, Surveying equipment, Engineering surveying, Measurement processing, Metrology, Photogrammetry and Remote Sensing, Cartography, …	79,00	0,00	**79,0**	97,00	0,00	**97,0**
III	Informatics, Database, GIS, …	15,75	5,25	**21,0**	22,00	11,00	**33,0**
IV	Land Management and Development, Planning, Infrastructure, Soil, Ecology, Geology, Industrial safety, Cadastre,…	27,25	8,75	**36,0**	10,00	50,00	**60,0**
V	Legal courses	7,50	6,75	**14,25**	3,00	12,00	**15,0**
VI	Economic courses	15,25	2,25	**17,50**	0,00	17,00	**17,0**
VII	Others (history, philosophy, psychology, religion, language,…)	30,00	7,00	**37,0**	3,00	0,00	**3,0**
IX	Final Work (diploma work, examinations)	35,00	30,00	**65,0**	9,00	30,00	**39,0**
	Total number of ECTS:	245,00	60,00	**305,0**	180,00	120,00	**300,0**

Regarding the MSc program structure (Surveying and cadastre and Land Management modulo) it is possible to conclude (Table 5):

- The programs duration are unequal (the Ukraine's program lasts one year and takes 60 ECTS, the Serbian's program lasts two years and takes 120 ECTS);
- Two MSc programmes are similar in I and II groups (there were no any subjects related to the mathematics and surveying);
- Serbian students have more informatics courses (III group),
- In Land Management group (IV group) there is significant difference, in favour to Serbian's side; and
- Legal and Economics' subjects are more presented in Serbian curricula, and
- Final work is the same.

Taking into account differences between BSc and MSc program's structures it is interesting to compare total amount of knowledge that is taken after university education overall. Regarding that, we can conclude:

- The total durations and ECTS are nearly equal (not counting the difference in 5 ECTS);
- Two total programs are nearly equal in Fundamental subjects, Legal and Economic courses, differences consist in proportions of disciplines in BSc and MSc programs;
- There are significant difference in Surveying, Land Management and Geonformation groups in favour to Serbian's side.

5. CONCLUSIONS

Analysing two education levels we opened many interesting questions. Are these two programmes obtain similar profiles of the future professions? What are the basic aims of BSc and MSc programmes in both countries? Are these differences results of the market profession needs or teaching staffs made seriously imposed on curricula contents? In spite of all the differences when we see BSc and MSc programme together in both countries, they are more similar and in final produce similar skills and knowledge. Only one significant difference could be pointed out. It is a very large block of general, humanitarian disciplines on Ukraine's BSc level curricula. The main conclusion should be that the efforts on making the education process in accordance to the Bologna rules and to the future market needs both sides should continue. Both countries agree, the overarching framework of qualifications made on European level should be the basement for the future activities.

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BIOGRAPHICAL NOTES

Branko Bozic
From 1982 to 2006 employed at the Military Geographic Institute in Belgrade. Work activities related to surveying lasted until going to the Faculty. Since 2000 assistant professor at the Department of geodesy at the Faculty of Civil Engineering in the area of surveying. From 2003 to 2005 head of the Institute for geodesy at the same Faculty. From 2001 to 2005 head of Belgrade's Geodetic Society. Since 2006 as associate professor engaged in several subjects related to the adjustment and calculation. During the same period head of Belgrade's other technical discipline designers in Serbian Engineering chamber. Local coordinator in TEMPUS III project – MsC study programme in Land Law and Economy. Author of more than 30 articles and projects and editor of 3 University books.

Olga Petrakovska
Petrakovska O. graduated from Kyiv National University of Construction and Architecture as civil engineer. Petrakovska O. defended Ph.D. thesis and obtained the degree of candidate of science in speciality "Urban and spatial planning" in 1994. From 1994 to 2004 employed as assistant professor at the Urban planning department. Since 2004 has taken up a position of vice dean of faculty of GIS and land management. The thesis for a Doctor's degree was presented in 2006 the degree of Doctor of Science was obtained. Since 2006 she is head of surveying and cadastre department. Author of more than 50 scientific articles and 10 methodical books. Local coordinator in international project "MSc study programme in Land Management".

Violeta Vasilic
I was born in 1968. Graduated in 1994 as Dipl.-Ing. in Geodesy and obtaining Master of Science degree in 2009, both from Belgrade University, until 2003 teaching assistant at Belgrade University. Since 2006 Secretary of the Chair of Geodesy and Geoinformatics, Faculty of Civil Engineering, Belgrade University.

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