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Strengthening capacities for the implementation of dual education in BH higher education
(DUALSCI)

Generic model for dual education in higher education (DUALSCI model) for Bosnia and Herzegovina

Doc. dr Nenad Marković, naofficeuis@gmail.com

Contacts:

Prof. dr Dejan Bokonjić, dbokonjic@gmail.com



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Abstract	<p>This document presents the characteristics and variants of the generic model of dual higher education. The minimum of common elements that need to be defined by law in order to ensure an efficient dual model in higher education is presented. The generic model includes variants within which the working hours of students in economic institutions take place in parallel with the teaching hours and within which the working hours take place after the teaching hours. A total of 6 different variants of the generic model are presented, within which the number of teaching hours and the semester load with different forms of teaching are shown.</p>
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Contents

1. INTRODUCTION	5
2. CHARACTERISTICS OF THE GENERIC MODEL.....	6
3. GENERIC MODEL OF DUAL HIGHER EDUCATION	8
3.1. VARIANT I OF THE GENERIC MODEL.....	9
3.2. VARIANT II OF THE GENERIC MODEL.....	11
3.3. VARIANT III OF THE GENERIC MODEL.....	13
3.4. VARIANT IV OF THE GENERIC MODEL	15
3.5. VARIANT V OF THE GENERIC MODEL	17
3.6. VARIANT VI OF THE GENERIC MODEL	19
4. REFERENCES	21

1. Introduction

In Bosnia and Herzegovina, classical academic studies have been conducted for a long time at all licensed and accredited higher education institutions. Due to better and more efficient cooperation with the economy, and primarily due to better preparation of graduates for the labor market with a focus on increasing practical working hours of students in various companies / organizations during their studies, University of East Sarajevo, University of Sarajevo, University of Zenica and University of Mostar with the support of the ministries in the cantons / entities in which they are located and the chambers of commerce of the entities, they decided to implement the project of introducing dual studies in the higher education system. In order to introduce dual studies in the higher education system in general, it is necessary to understand the higher education system and its restrictions and freedoms, ie it is necessary to create an appropriate model that would be applicable.

Within the second work package of the project application, a dual higher education model for cantons and entities in Bosnia and Herzegovina was developed. The model was created as a result of the expressed needs of economic entities in Bosnia and Herzegovina and the expressed opinion and needs of higher education institutions to increase hours of practical work.

The model offered several solutions in terms of teaching organization, practical work in companies, duration of practical work in companies, learning time. The model must be flexibly accepted by higher education institutions in terms of student workload, working hours, type of contract, mentoring / tutoring, student selection, dual student assessment, and other organizational characteristics.

The model offers several variants with the aim of finding a suitable application for a specific study program. All variants differ in terms of theoretical teaching hours and practical work hours, so that higher education institutions have more options for choosing the appropriate variants of the generic model.

The developed model is the basis for the development of specific dual models as well as a proposal for improving the legal framework of the involved entities and cantons in Bosnia and Herzegovina. Specific models refer to the application of a generic model of an appropriate variant to a specific study program that has its own specifics.

The generic dual higher education model developed in this document is proposed to higher education institutions involved in this DUALSCI project that will implement a pilot dual study program, as well as to all those higher education institutions in Bosnia and Herzegovina that want to introduce dual studies in higher education.

2. Characteristics of the generic model

The generic model with its variants should help higher education institutions to develop their specific models of dual higher education in study programs. The generic model contains generalized and common elements for all its variants on the basis of which specific models of dual higher education can be developed, which may differ slightly due to the different organization of study programs.

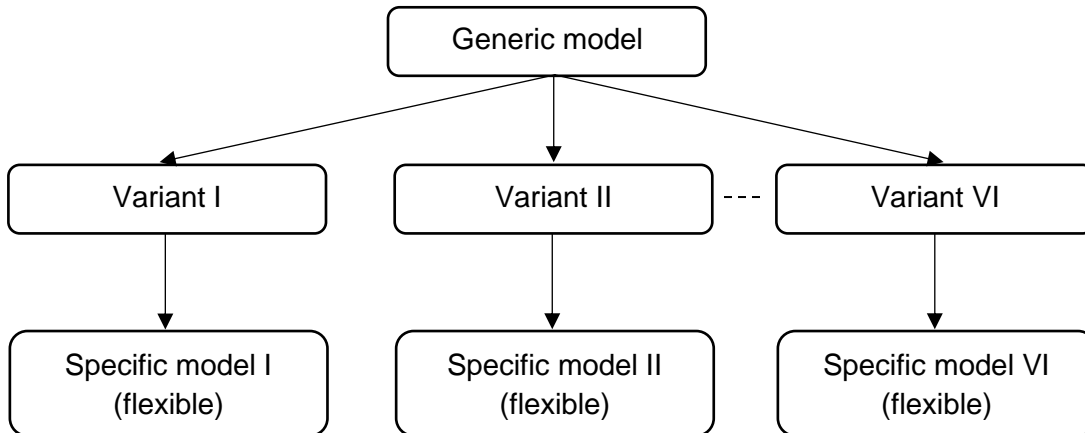


Figure 1. Generic model of dual higher education with variants

The generic model primarily depends on the legal framework defined at the level of entities and cantons, which can be a limiting factor depending on the number of defined elements on the basis of which the dual model is established. In essence, the legal framework is the basis for establishing a dual model at the cantonal and entity levels. There are very rigid and very free legal solutions in the world in terms of meeting the conditions for establishing a dual model. The minimum common elements that need to be defined by law to ensure an effective dual model in higher education is the following¹:

1. Status of the student
2. Legal relationship between the student and the companies
3. Legal relationship between the HEI and the company
4. Educational programs and specification of competences of dual students
5. Evaluation of acquired competences
6. The approach to dual higher education (DHE) implementation
7. Accreditation of Dual programs
8. Supporting documents required by officials for accreditation/ registration of dual programs

¹ Zrnić, N. Mišković, Ž. (2018) D2.1 Development of the Generic and Flexible Model of Dual Higher Education in Serbia, First draft. DualEdu Erasmus+, Implementation of dual education in higher education in Serbia, Belgrade, Serbia, 8 pp.

9. Entity/ cantonal organizational structure to support DHE
10. Regulatory framework to support collaboration and partnerships between different universities for DHE
11. Financing of DHE
12. Tuition fees for Dual programs
13. Eligibility criteria for the company to hire dual students
14. Incentives for companies

The key factor of the dual model of higher education is the working time in the appropriate organization / institution, which must be foreseen by the educational process at the higher education institution. Working hours within the educational process can be predicted after classes at the faculty as well as in parallel with classes ².

² Zrnić, N. Mišković, Ž. (2018) D2.1 Development of the Generic and Flexible Model of Dual Higher Education in Serbia, First draft. DualEdu Erasmus+, Implementation of dual education in higher education in Serbia, Belgrade, Serbia, 34 pp.

3. Generic model of dual higher education

The generic model of dual higher education proposed in this document has several variants primarily due to the treatment of working time that the student must spend in companies / organizations that represent a subcontractor to higher education institutions in performing this study model. The context of higher education in Bosnia and Herzegovina differs slightly in all cantons of the entities of the Federation of Bosnia and Herzegovina and the entity of Republika Srpska, so it can be said that all higher education systems in Bosnia and Herzegovina have similar elements on which a generic model of dual higher education can be proposed education.

The generic model of dual education must be based on the assumptions that follow concluding with the total semester workload of students.

In one academic year, it contains about 45 weeks of total student workload according to the valid study rules, ie 22.5 weeks of total workload per semester.

In one semester, there are 15 weeks of classes during which the student attends classes in the form of lectures, exercises, seminars, professional practice, fieldwork, etc.

The remaining weeks in the 7.5-week semester are provided for other forms of teaching in the form of group consultations, final exams and breaks between semesters.

The first cycle of studies envisages a minimum of 20 and a maximum of 25 hours of teaching per week, which means four or five hours of teaching each day, in 15 weeks of teaching.

The student, like any worker, is burdened with obligations (teaching, learning, exams) on weekdays in the amount of 8 hours. The semester load of the student contains the following elements:

A - 22.5 weeks of student workload per semester

B - 5 working days

C - 8 working hours of daily load.

The total semester workload of the student is $A \times B \times C = 900 \text{ h}$.

3.1. Variant I of the generic model

Within this variant, the assumption is that the teaching hours in the organization / company are performed in parallel with the teaching classes during the teaching weeks. This variant envisages 25 hours of teaching at a higher education institution during 15 weeks of teaching. Teaching hours include all previous forms of teaching, lectures and exercises, as well as other established forms of teaching. The hours of work in the company within this model are performed within 15 weeks of teaching, ie in parallel with the teaching hours at the higher education institution, and last for 3 hours a day.

Table 1. Teaching and hours in companies according to variant I of the generic model

	Monday	Tuesday	Wednesday	Thursday	Friday
Teaching hours	5	5	5	5	5
Company hours	3	3	3	3	3
Learning hours	0	0	0	0	0

During this variant, within 15 weeks of teaching and working in companies / institutions, learning during 8 hours of daily workload with teaching hours and working hours in the company / institution is not planned.

This variant assumes the functioning of a dual model in one city, where the journey from classes from a higher education institution to a company or institution (practical education through work) would take a very short time.

Variant I of the generic model may be a constraint for those higher education institutions that plan to realize hours of work in a company or institution located in another city outside the seat of the higher education institution.

Duration	Theories		Practice	SUM	
	Classes	Self-learning			
15 working weeks	375		225	600	[h]
7.5 weeks		300		300	[h]
ECTS	12.5	10	7.5	30	[ects]
Self-learning	10	ects		300	[h]
Teaching units	12.5	ects		375	[h]
Practice	7.5	ects		225	[h]
Sum ects	30	ects		900	[h]
Add. Required internship				0	[h]
Sum workload				900	[h/semester]
Workload (15 + 7.5)	22.5	weeks		40	[h/week]
1 academic year = 1800 h					
1 semester = 900 h					
1 academic year = 45 working weeks					
1 semester = 22.5 working weeks					
1 ects = 30 h					
1. In one semester there are 15 weeks of classes during which the student attends classes in the form of lectures, exercises, seminars, professional practices, fieldwork, etc.					
2. The remaining weeks in the semester of 7.5 weeks are provided for holding other forms of teaching in in the form of group consultations, final exams and breaks between semesters.					

Figure 2. Semester load of variant I of the generic model

3.2. Variant II of the generic model

Variant II assumes that classes in the organization / company are performed in parallel with the teaching classes during the teaching weeks. This variant envisages 20 hours of teaching at a higher education institution during 15 weeks of teaching. Teaching hours include all previous forms of teaching, lectures and exercises, as well as other established forms of teaching. Hours of work in the company within this model are performed within 15 weeks of teaching, ie in parallel with the teaching hours at the higher education institution, and last 4 hours a day.

Table 2. Teaching and hours in companies according to variant II of the generic model

	Monday	Tuesday	Wednesday	Thursday	Friday
Teaching hours	4	4	4	4	4
Company hours	4	4	4	4	4
Learning hours	0	0	0	0	0

During this variant, in 15 weeks of teaching and working in companies / institutions, learning during 8 hours of daily workload with teaching hours and working hours in the company / institution is not planned.

This variant assumes the functioning of a dual model in one city, where the journey from classes from a higher education institution to a company or institution (practical education through work) would take a very short time.

Variant II of the generic model, as well as variant I, may be a restriction for those higher education institutions that plan to realize working hours in a company or institution located in another city outside the seat of the higher education institution.

Duration	Theories		Practice	SUM	
	Classes	Self-learning			
15 working weeks	300		300	600	[h]
7.5 weeks		300		300	[h]
ECTS	10	10	10	30	[ects]
Self-learning	10	ects		300	[h]
Teaching units	10	ects		300	[h]
Practice	10	ects		300	[h]
Sum ects	30	ects		900	[h]
Add. Required internship				0	[h]
Sum workload				900	[h/semester]
Workload (15 + 7.5)	22.5	weeks		40	[h/week]
1 academic year = 1800 h					
1 semester = 900 h					
1 academic year = 45 working weeks					
1 semester = 22.5 working weeks					
1 ects = 30 h					
1. In one semester there are 15 weeks of classes during which the student attends classes in the form of lectures, exercises, seminars, professional practices, fieldwork, etc.					
2. The remaining weeks in the semester of 7.5 weeks are provided for holding other forms of teaching in in the form of group consultations, final exams and breaks between semesters.					

Figure 3. Semester load of variant II of the generic model

3.3. Variant III of the generic model

Variant III assumes that classes continue to perform during the first four working days, and that the fifth working day takes place in companies/ institutions that offer dual education. This variant envisages 20 hours of teaching at a higher education institution during 15 weeks of teaching. Teaching hours include all previous forms of teaching, lectures and exercises, as well as other established forms of teaching. Hours of work in the company within this model are performed within 15 weeks of classes, only on Fridays or the fifth working day and lasts 8 hours per week.

Table 3. Teaching and hours in companies according to variant III of the generic model

	Monday	Tuesday	Wednesday	Thursday	Friday
Teaching hours	5	5	5	5	0
Company hours	0	0	0	0	8
Learning hours	3	3	3	3	0

During this variant, in 15 weeks of teaching and work in companies / institutions, learning during 4 working days lasting 3 hours is planned.

This variant does not assume the functioning of a dual model in one city as is the case in the first two variants of the generic model.

Duration	Theories		Practice	SUM	
	Classes	Self-learning			
15 working weeks	300	180	120	600	[h]
7.5 weeks		300		300	[h]
ECTS	10	16	4	30	[ects]
Self-learning	16	ects		480	[h]
Teaching units	10	ects		300	[h]
Practice	4	ects		120	[h]
Sum ects	30	ects		900	[h]
Add. Required internship				0	[h]
Sum workload				900	[h/semester]
Workload (15 + 7.5)	22.5	weeks		40	[h/week]
1 academic year = 1800 h					
1 semester = 900 h					
1 academic year = 45 working weeks					
1 semester = 22.5 working weeks					
1 ects = 30 h					
1. In one semester there are 15 weeks of classes during which the student attends classes in the form of lectures, exercises, seminars, professional practices, fieldwork, etc.					
2. The remaining weeks in the semester of 7.5 weeks are provided for holding other forms of teaching in in the form of group consultations, final exams and breaks between semesters.					

Figure 4. Semester load of variant III of the generic model

3.4. Variant IV of the generic model

Variant IV assumes that classes continue together with study hours are foreseen in the first 12 working weeks, while in the remaining 3 weeks they are dedicated only to the classes that students spend in companies / institutions. This variant envisages 25 hours of teaching at a higher education institution during 12 weeks of teaching. Teaching hours include all previous forms of teaching, lectures and exercises, as well as other established forms of teaching. Hours of work in the company under this model are performed within the last 3 weeks of classes, and last every day for the last three weeks, 8 hours a day.

Table 4. Teaching hours according to variant IV of the generic model in 1-12 working weeks

	Monday	Tuesday	Wednesday	Thursday	Friday
Teaching hours	5	5	5	5	5
Company hours	0	0	0	0	0
Learning hours	3	3	3	3	3

Table 5. Hours in companies according to variant IV of the generic model in the last 3 working weeks (13-15 working weeks)

	Monday	Tuesday	Wednesday	Thursday	Friday
Teaching hours	0	0	0	0	0
Company hours	8	8	8	8	8
Learning hours	0	0	0	0	0

This variant fits perfectly into the dual education system in which companies or institutions in which practical classes or work processes would be conducted are located in cities outside the seat of the higher education institution that the student attends.

Duration	Theories		Practice	SUM	
	Classes	Self-learning			
1-12 working weeks	300	180		480	
13-15 working weeks			120	120	[h]
7.5 weeks		300		300	
ECTS	10	16	4	30	[ects]
Self-learning	16	ects		480	[h]
Teaching units	10	ects		300	[h]
Practice	4	ects		120	[h]
Sum ects	30	ects		900	[h]
Add. Required internship				0	[h]
Sum workload				900	[h/semester]
Workload (15 + 7.5)	22.5	weeks		40	[h/week]
1 academic year = 1800 h					
1 semester = 900 h					
1 academic year = 45 working weeks					
1 semester = 22.5 working weeks					
1 ects = 30 h					
1. In one semester there are 15 weeks of classes during which the student attends classes in the form of lectures, exercises, seminars, professional practices, fieldwork, etc.					
2. The remaining weeks in the semester of 7.5 weeks are provided for holding other forms of teaching in in the form of group consultations, final exams and breaks between semesters.					

Figure 5. Semester load of variant IV generic model

3.5. Variant V of the generic model

Variant V assumes the classes according to the established regime as it was before the introduction of the dual system, with the hours of work in the company / institution planned during the holidays (last two weeks of July and August) for 6 weeks.

This variant envisages 25 hours of teaching at a higher education institution during 15 weeks of teaching. Teaching hours include all previous forms of teaching, lectures and exercises, as well as other established forms of teaching. During the 15 weeks of classes, individual student learning is planned for 3 hours every day, so that each working day is 8 hours.

Hours of work in the company under this model are performed during the holidays in the last two weeks of July and in August.

Table 6. Teaching hours according to variant V of the generic model during 15 working weeks

	Monday	Tuesday	Wednesday	Thursday	Friday
Teaching hours	5	5	5	5	5
Company hours	0	0	0	0	0
Learning hours	3	3	3	3	3

Table 7. Hours of work in companies / institutions during the holidays

	July III week	July IV week	August I week	August II week	August III week	August IV week
Monday	8	8	8	8	8	8
Tuesday	8	8	8	8	8	8
Wednesday	8	8	8	8	8	8
Thursday	8	8	8	8	8	8
Friday	8	8	8	8	8	8
	Total hours (h)					240

This variant is assumed to fit perfectly into the dual education system in which companies or institutions in which practical classes or work process would be conducted are located in cities outside the seat of the higher education institution that the student attends.

Duration	Theories		Practice	SUM	
	Classes	Self-learning			
15 working weeks x 2	750	450		1200	[h]
7.5 weeks x 2		600		600	[h]
ECTS	25	35		60	[ects]
July, August			240	240	[h]
Self-learning	35	ects		1050	[h]
Teaching units	25	ects		750	[h]
Practice	0	ects		0	[h]
Sum ects	60	ects		1800	[h]
Add. Required internship				240	[h]
Sum workload				2040	[h/semester]
Workload (15 + 7.5)	22.5	weeks		40	[h/week]
1 academic year = 1800 h					
1 semester = 900 h					
1 academic year = 45 working weeks					
1 semester = 22.5 working weeks					
1 ects = 30 h					
<p>During the 15 weeks, the student regularly attends classes and learns. During the remaining 7.5 weeks the student also learns and attends exams. He works for the company for two weeks in July, which does not refer to weeks of learns and exams, and 4 weeks in August.</p>					

Figure 6. Semester load of variant V of the generic model

3.6. Variant VI of the generic model

In variant VI of the generic model, classes are divided into lectures and exercises, with exercise classes assigned to classes in the company / institution. If, as a standard, 25 hours of classes (lectures and exercises) are held per week, which amounts to a total of 375 hours, we divide those hours into 225 hours of lectures and 150 hours of exercises. We assign 150 hours of exercises to classes in the company / institution. If the university study rules require 20-25 hours of teaching, it means that this variant of the generic model would require a change in the university study rules.

Table 7. Teaching hours according to variants of the VI generic model during 15 working weeks

	Monday	Tuesday	Wednesday	Thursday	Friday
Teaching hours	3	3	3	3	3
Company hours	5	5	5	5	5
Learning hours	0	0	0	0	0

During 15 working weeks, individual learning during 8 hours within one working day is not planned, but individual learning is planned during 7.5 weeks after 15 working weeks.

This variant in this setting of one working day consisting of 3 teaching hours and 5 hours of work in a company / institution would correspond to those dual systems that would function in one city. If this system were to be applicable to companies / institutions outside the seat of the higher education institution, then the modification would have to be done as follows: first classes would be held, a total of 225 hours during the first 5.6 working weeks, while the rest of the 9.4 working weeks were planned for work in the company. Precisely this way would enable the functioning of this variant in two different places (higher education institutions and companies / institutions).

Duration	Theories		Practice	SUM	
	Classes	Self-learning			
15 working weeks	225		375	600	[h]
7.5 weeks		300		300	[h]
ECTS	7.5	10	12.5	30	[ects]
Self-learning	10	ects		300	[h]
Teaching units	7.5	ects		225	[h]
Practice	12.5	ects		375	[h]
Sum ects	30	ects		900	[h]
Add. Required internship				0	[h]
Sum workload				900	[h/semester]
Workload (15 + 7.5)	22.5	weeks		40	[h/week]
1 academic year = 1800 h					
1 semester = 900 h					
1 academic year = 45 working weeks					
1 semester = 22.5 working weeks					
1 ects = 30 h					
1. In one semester there are 15 weeks of classes during which the student attends classes in the form of lectures, exercises, seminars, professional practices, fieldwork, etc.					
2. The remaining weeks in the semester of 7.5 weeks are provided for holding other forms of teaching in in the form of group consultations, final exams and breaks between semesters.					
In this model, we divide classes into lectures and exercises, with the proviso that we "give away" exercise classes to classes in the company.					
We will assume that the semester number of teaching hours is 375, namely 225 hours of lectures and 150 hours of exercises.					
We give 150 hours of exercises to the company and we get the situation as shown in the table below.					
If the first cycle envisages 20-25 hours per week, such a model would require a change in the Rules of Study at the University.					

Figure 6. Semester load of variant V of the generic model

4. References

Zrnić, N. Mišković, Ž. (2018) D2.1 Development of the Generic and Flexible Model of Dual Higher Education in Serbia, First draft. DualEdu Erasmus+, Implementation of dual education in higher education in Serbia, Belgrade