

## CURRICULUM DESIGN OF “SUSTAINABLE FOOD PRODUCTION SYSTEMS” MASTER PROGRAMME IN WESTERN BALKANS

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### Abstract

*The economic sectors involved in the search for a new balance in era of globalization and labour market flexibility are crying out for human resources capable of performing job activities to required standards in a variety of contexts and conditions. In this context, food sector and the education system are facing a lot of issues that are related not only with the strengthening of policies but also with the modernization of food engineering and food management practice. This paper presents the curriculum design of Master programme of Sustainable Food Production Systems according to the specific training needs of target groups, the vision and the strategic goals of the national educational policies regarding food sector for six universities from Western Balkans: Agricultural University of Tirana and European University of Tirana (Albania); University “Haxhi Zeka” of Peje and Univerzum College (Kosovo); University of Bihac and University of Sarajevo (Bosnia and Herzegovina). University of Agronomic Sciences and Veterinary Medicine of Bucharest was responsible to design this Curriculum, as partner of Erasmus plus project “MSc in sustainable Food Production Systems”.*

**Key words:** curriculum, master program, sustainable food production, Western Balkans.

### INTRODUCTION

A sustainable food system is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised (FAO, 2018). Sustainable food is food that is healthy for the consumers and produced in ecologically and socially responsible and economically fair way (Byloo, 2011). Also, sustainable food production systems offer opportunities for economic benefits, creation of jobs, enhanced food safety and security. According to European Commission (EU), on the Common Agriculture Policies, there are many different views as respect to what constitutes a “sustainable” food system, and what falls within the scope of the sustainability” term (EU, Sustainable Development Strategy, 2016). For food, a sustainable system might be seen as encompassing a range of issues such as security of the supply of food, health, safety, affordability, quality, a strong food industry in terms of jobs and growth and, at the same time, environmental sustainability, in terms of issues

such as climate change, biodiversity, water and soil quality (EU, Sustainable Development Strategy, 2016).

According to the Institute of Food Technologists (IFT), a global organization with members in more than 90 countries, dedicated to advancing the science of food and its application across the global food system, “the food sciences draws from many disciplines, including biology, chemical engineering, and biochemistry to better understand food processes and improve food products for the general public” (Food Sciences Institute, 2020).

The economic sectors involved in the search for a new balance in this era of globalization and labour market flexibility are crying out for human resources capable of performing job activities to required standards in a variety of contexts and conditions. In different EU countries the competency certification of training systems is in an advanced stage of development, the training on offer already incorporates a competency-based approach, whereas for other countries this objective has yet to be achieved. The absence of a system of competency standards appears to be the brake that is holding back its adoption, although the

need to modernize training has been clearly expressed in recent policies, legal instruments and educational reforms (“Steps” project proposal, 2018).

On the other hand, Western Balkans countries (in this case, Albania, Bosnia and Herzegovina, Kosovo) are all facing similar challenges regarding agricultural and food production and rural development (D1.1 report of “Steps” project). The latter are mostly related to the modernization of food engineering and food management practices. Organic agriculture production, post-harvest processes, environmental footprints, supply chain management, industrial ecology have to be addressed by educational programmes on the road to social, economic growth and integration with the EU (D2.1 report of “Steps” project). Such challenges are not limited within national borders; they are related to regional and global issues and call for cooperative actions. The Western Balkans region has clear aspirations to improve its economic competitiveness and integrate further into Europe. A highly skilled population is critical to achieving these goals, which makes creating and maintaining high quality and equitable education systems a vital part of regional development efforts (OECD, 2020).

In this context, the motivation behind the Erasmus plus project “Steps – Master Sciences of Sustainable Food Systems” is to build the capacity of partner countries from Western Balkans, to improve the quality of the education offered, and provide an education that is more aligned to the needs of the labour market and society. Capacity building of these countries will also offer the opportunity to engage in research, innovate, collaborate with EU and international partners in joint programmes and activities and face the challenges of the modern world. This programme offers advanced knowledge to graduates who work or aim to work in private companies and national bodies or start new businesses in particular, in rural, agricultural areas and in this way, can contribute to the transition to sustainable food production systems. The consortium includes partners that have diverse backgrounds and expertise’s, so that they deal successfully with the complexities of project: Agricultural University of Tirana (coordinator) and European University of Tirana

(Albania); University of Sarajevo, University of Bihac and Ministry of Education, Sciences, Culture and Sport of Una-Sana Canton (Bosnia and Herzegovina); University “Haxhi Zeka” of Peje and Universum College (Kosovo); Czech University of Life Sciences (Czech Republic); University of Agronomic Sciences and Veterinary Medicine of Bucharest (Romania); Agricultural University of Athens and Research Innovation and Development Organisation (Greece).

## **MATERIALS AND METHODS**

In order to design the Curriculum, in the first year of the “Steps” project (2019), the stakeholders of MSc in Sustainable Food Systems: private sector companies SMEs and industry and SMEs, in terms of engineers and managers, rural society, farmers, students, national organizations, policy makers, national priorities, teaching staff, etc., from Higher Educations Institutions (HEIs) partners from Albania, Bosnia and Herzegovina and Kosovo, were investigated about topics of training needs. Also, other elements were analysed and taken into account for developing of specialised Curriculum, such as: the scientific background and the experience of the universities; the vision and the strategic goals of the national educational policies, other best practice in MSc in Food Sciences in the world.

The “Steps” Curriculum was developed by each HEIs partners through complex work teams (see name in Curriculum tables), which included both teaching staff and staff with experience in the certification of study programs, also, teams of EU project partners. University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania, due to its previous experience in creating educational curricula was coordinator of Working Package which had as subject the “Steps” structure and course design (WP2). MSc “Steps” Curriculum includes: the Core (mandatory, compulsory) Courses (subjects, disciplines) and Elective (optional); the number of hours reserved per week for a subject (and how many are intended for lectures, seminar, laboratory or projects); the type of assessment (evaluation, verification during the course); the number of related European Credit Transfer and Accumulation System (ECTS) per semester.

## RESULTS AND DISCUSSIONS

The Curriculum is a set of courses that are considered basic and essential for future class work and graduation. Students may receive a grade and academic credit after completion of the course.

The Curriculum is the document that includes all the disciplines that must be passed in order to obtain a university qualification, divided by years of studies.

The list of disciplines included in the Curriculum, as well as their content, reflected in the analytical programmes, correspond to the legal profile and respond to the current training requirements of lawyers, with fundamental knowledge and the ability to adapt to the requirements of the practical activity,

The “Steps” MSc programme was designed according to the Bologna convention.

According to the target groups, the needs analysis, the scientific background, the expertise of the partners, and laboratories that were set up during the project (Figure 1), the Core Courses and Elective Courses will be organized in two working groups: *Food engineering, quality and safety* and *Food production systems management*.

Workloads were measured in ECTS credits and have defined 60 ECTS as a fulltime year of studies. The number of credits differs from country to country and is specified when the master's program is accredited. ECTS credits assigned to courses, in accordance with the estimated workload in terms of formal lectures, laboratory activities, projects and reports to be delivered by students, individual or team-based activities.

MSc Steps programme targets graduates of agriculture, food science and engineering, management, economics, business, engineers and managers already working in private companies or national organizations.

Attendees will have the opportunity to acquire knowledge of sustainability as related to the engineering and socio-economic aspects of food production systems. New teaching methodologies will focus on equip them with soft skills, including problem solving, team work, decision making.

**Curriculum Design in Albania.** For Agricultural University of Tirana (AUT) and European University of Tirana (EUT), the master program will be organizing by 6 ECTS credits per course, 30 ECTS per semester and 120 ECTS of two study years. The two universities offer a joint master's program in Albania. AUT will contribute with courses in the category of Food Engineering Quality and Safety and Master thesis and EUT will contribute with courses in the category of Food Production Systems Management and Master thesis. The Curriculum has the 6 common Core Courses, 7 Elective Courses for 1st year, 8 Elective Courses for 2nd year, with a total of 21 courses (Table 1).

**Curriculum Design in Bosnia and Hertegovina.** In University of Sarajevo (UNSA), the Master program was organised into four semesters and account for a total of 120 ECTS credits (Table 2). The Curriculum has a total of 26 courses, from which 6 Core Courses, 10 Elective Courses for 1<sup>st</sup> year and 10 elective courses for 2<sup>nd</sup> year. University of Bihac (UNBI) organise only one year of study, with 60 ECTS, and 6 Core Courses and 10 Elective Courses (Table 3). Jointly on the national level based on a bilateral agreement between UNSA and UNBI meaning: exchange all teaching staff during the first semester of the Master study, and joint mentoring and co-mentoring on student Master's thesis and membership in the Master's thesis defence commissions.

**Curriculum Design in Kosovo.** University of Peja decide to have 30 ECTS credits per semester, divide by 5 ECTS per course, with a total of 120 ECTS. Also, it has 6 Core Courses, 7 Elective Courses in 2<sup>nd</sup> semester, and 10 Elective Courses for 3<sup>rd</sup> semester (Table 4). Universum College will have the same structure in first year of study and in second year will have 7.5 ECTS per each course (Table 5). The two universities agree to do joint Master program to following principles: University of Peje should be home University and will prepare Self Evaluation Report; advertisement and enrolment conditions will be decided by home University; first semester with obligatory courses will be organised at University of Peje; second and third semesters and Master thesis will be organised in both universities based on student's interests.

Table 1. MSc - Sustainable Food Production Systems in Albania  
 Course Curriculum for Agricultural University of Tirana and European University of Tirana  
 (Renata Kongoli, Luziana Hoxha, Enkeleda Berberi, Anila Kopali, Myqerem Tafaj, Klotilda Marku, Alketa Shehaj,  
 Anisa Peculi, Spase Shumka, Mariola Kodra, Erjon Mamoci (AUT); Kebjana Haka, Blerjana Bino, Elena Kokhti,  
 Ermira Qosja, Arlinda Ymeraj, Klementin Mile, Kreshnik Bello, Irina Canco, Besarta Vladi, Selami Xhepa (EUT))

No.	Course title	Formative category	1 <sup>st</sup> Semester (15 weeks)						2 <sup>nd</sup> Semester (15 weeks)						Total per sem.	
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET		
<b>I. CORE COURSES</b>																
1	Fundamentals of sustainable agri food systems	Core; FEQS	30	6	8	16	6	Written and oral								6
2	Agricultural and food industry waste management	Core; FEQS	30	12	0	18	6	W+O								6
3	Advanced food science and technology	Core; FEQS	30	6	8	16	6	W+O								6
4	Governance, policy and legislation in the agri-food sector	Core; MFPS	30	30			6	W+O								6
5	Food Ethics	Core; MFPS	30	30			6	W+O								6
6	Research methodologies and tools	Core; MFPS							30	6	6	18	6	W+O	6	
Total core courses: ECTS/semester							30									30
<b>II. ELECTIVE COURSES</b>																
2	Quality System Development, Management and Shelf Life Assessment of Food	Elective; FEQS							30	12	0	18	6	W+O	6	
3	Quality and Sustainability of Animal-source Food Production	Elective; FEQS							30	8	10	12	6	W+O	6	
4	Traceability systems of food products	Elective; FEQS							30	10	10	10	6	W+O	6	
5	Innovative product development	Elective; FEQS							30	6	12	12	6	W+O	6	
6	Innovative practices of harvesting and post harvesting	Elective; FEQS							30	2	10	18	6	W+O	6	
7	Ecological sustainability for Fish Management and Conservation	Elective; FEQS							30	6	8	16	6	W+O	6	
8	Environmental Chemistry towards Food Processing	Elective; FEQS							30	12	8	10	6	W+O	6	
Total elective courses: ECTS/semester													30		30	
Total year courses: ECTS/year							30						30		60	
			3 <sup>rd</sup> Semester (15 weeks)						4 <sup>th</sup> Semester (15 weeks)							
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET		
<b>III. ELECTIVE COURSES</b>																
9	Management of Sustainable Food Supply Chain	Elective; MFPS	30	30			6	W+O								6
10	Marketing of Sustainable Agri-Food Products	Elective; MFPS	30	30			6	W+O								6
11	Innovation and Entrepreneurship for Sustainable Food Production Systems	Elective; MFPS	30	30			6	W+O								6
12	Sustainable Food Value Chain Management	Elective; MFPS	30	30			6	W+O								6
13	Consumer science and sustainable consumption	Elective; MFPS	30	30			6	W+O								6
14	Data Analysis and Decision-making	Elective; MFPS	30	30			6	W+O								6
15	Total Quality Management in the Agri-Food Sector	Elective; MFPS	30	30			6	W+O								6
16	Business economics and international trade in the agri-food sector	Elective; MFPS	30	30			6	W+O								6
Total elective courses: ECTS/semester							30									30
Professional Practice			Compulsory						0			60	6	W+O	6	
MASTER THESIS			Compulsory						0		240		24	W+O	24	
Total compulsory professional practice and master thesis: ECTS/semester													30		30	
Total year courses: ECTS/year							30						30		60	

Lect. – Lectures; S – Seminars; Lab.- Laboratory; P – Projects (hours/week); ECTS – credits/semester; ET – Evaluation type  
 FEQS – Food Engineering, Quality & Safety; MFPS – Management of Food Production Systems

Table 2. MSc - Sustainable Food Production Systems in Bosnia and Hertegovina  
 Course Curriculum for University of Sarajevo  
 (Sabahudin Bajramović, Milenko Blesić, Zlatan Sarić, Dragana Ognjenović, Nermina Spaho, Asima Akagić,  
 Emir Džomba, Emir Bećirović)

No.	Course title	Formative category	1 <sup>st</sup> Semester (15 weeks)						2 <sup>nd</sup> Semester (15 weeks)						Total per sem.	
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET		
<b>I. CORE COURSES</b>																
1	Fundamentals of sustainable agri food systems	Core; FEQS	30	-	15	-	5	W								5
2	Agricultural and food industry waste management	Core; FEQS	30	15	-	-	5	W								5
3	Advanced food science and technology	Core; FEQS	15	-	30	-	5	W								5
4	Governance, policy and legislation in the agri-food sector	Core; MFPS	30	15	-	-	5	W + O								5
5	Food Ethics	Core; MFPS	30	15	-	-	5	W								5
6	Research methodologies and tools	Core; MFPS	15	15	-	15	5	W+O								5
Total core courses: ECTS/semester							30									30
<b>II. ELECTIVE COURSES</b>																
7	Sustainable land management	Elective; MFPS							30	-	15	-	5	W + O		5
8	Waste and recycling technologies in agriculture	Elective; FEQS							30	-	-	15	5	W + O		5
9	Nutritionism	Elective; FEQS							30	15	-	-	5	W		5
10	Rural development	Elective; MFPS							30	15	-	-	5	W		5
11	Harvesting and post-harvesting technologies for agricultural products	Elective; FEQS							30	15	-	-	5	W		5
12	Low input agriculture	Elective; FEQS							30	-	15	-	5	W		5
13	Consumer science and sustainable consumption	Elective; MFPS							30	15	-	-	5	W		5
14	Total quality management in the agri-food sector	Elective; MFPS							15	-	15	15	5	W + Practical		5
15	Agri-food economics	Elective; MFPS							30	-	-	15	5	W		5
16	Business economics and international trade in the agri-food sector	Elective; MFPS							30	-	-	15	5	W		5
Total elective courses: ECTS/semester													30			30
Total year courses: ECTS/year							30						30			60
			3 <sup>rd</sup> Semester (15 weeks)						4 <sup>th</sup> Semester (15 weeks)							
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET		
<b>III. ELECTIVE COURSES</b>																
17	Sustainable technology of dairy products	Elective; FEQS	30	-	15	-	5	W + O								5
18	Sustainable technology of fruit and vegetable processing products	Elective; FEQS	30	-	15	-	5	W + O								5
19	Sustainable technology of meat products	Elective; FEQS	30	-	15	-	5	W + O								5
20	Sustainable technology of wine, beer and spirits	Elective; FEQS	30	-	15	-	5	W + O								5
21	Sustainable technology of bakery products	Elective; FEQS	30	-	15	-	5	W + O								5
22	Packaging technology	Elective; FEQS	15	-	15	15	5	W + O								5
23	Innovation and entrepreneurship for sustainable food production systems	Elective; MFPS	30	15	-	-	5	W								5
24	Marketing of sustainable agri-food products	Elective; MFPS	30	15	-	-	5	W								5
25	Project cycle management	Elective; MFPS	30	-	-	15	5	W								5
26	Sustainable food value chain management	Elective; MFPS	30	-	-	15	5	W								5
Total elective courses: ECTS/semester							30									30
MASTER THESIS		Compulsory							0		240		30	O		30
Total compulsory master thesis: ECTS/semester													30			30
Total year courses: ECTS/year							30						30			60
Lect. – Lectures; S – Seminars; Lab.- Laboratory; P – Projects (hours/week); ECTS – credits/semester; ET – Evaluation type FEQS – Food Engineering, Quality & Safety; MFPS – Management of Food Production Systems																

Table 3. MSc - Sustainable Food Production Systems in Bosnia and Hertegovina

Course Curriculum for University of Bihać

(teaching staff: Emir Mujić, Refik Šahinović, Suzana Jahić, Halid Makić, Jasmine Ibrahimpašić, Husein Vilić, Vildana Jogić Aida Džaferović, Melisa Oraščanin; students: Adnan Kovačević Amina Selimanović, (UNBI); Adnan Kreso (Ministry of Education, Science and Sport USK))

No.	Course title	Formative category	1 <sup>st</sup> Semester (15 weeks)						2 <sup>nd</sup> Semester (15 weeks)						Total per sem.		
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET			
<b>I. CORE COURSES</b>																	
1	Fundamentals of sustainable agri food systems	Core; FEQS	45	15	-	15	5	W+O									5
2	Agricultural and food industry waste management	Core; FEQS	30	15	15	-	5	W+O									5
3	Advanced food science and technology	Core; FEQS	30	15	15	-	5	W+O									5
4	Governance, policy and legislation in the agri-food sector	Core; MFPS	15	15	-	15	5	W+O									5
5	Food Ethics	Core; MFPS	30	15	-	15	5	W+O									5
6	Research methodologies and tools	Core; MFPS	30	15	-	15	5	W+O									5
Total core courses: ECTS/semester							30										30
<b>II. ELECTIVE COURSES</b>																	
7	Sustainable Land Management	Elective; MFPS							30	15	15	-	5	W+O			5
8	Harvesting and Post-Harvesting Technologies for Agricultural Products	Elective; FEQS							30	15	15	-	5	W+O			5
9	Low Input Agriculture	Elective; FEQS							30	15	-	15	5	W+O			5
10	Total Quality Management in the Agri-Food Sector	Elective; MFPS							30	15	-	15	5	W+O			5
11	Sustainable Technology of Dairy Products	Elective; EQS							30	15	15	-	5	W+O			5
12	Sustainable Technology of Meat Products	Elective; EQS							30	15	15	-	5	W+O			5
13	Sustainable Animal Production	Elective; FEQS							30	15	-	15	5	W+O			5
14	Sustainable Plant Production	Elective; FEQS							30	15	-	15	5	W+O			5
15	Animal Food Technology Science	Elective; FEQS							30	15	15	15	5	W+O			5
16	Marketing of Sustainable Agri-Food Products	Elective; MFPS							30	15	-	15	5	W+O			5
Total elective courses: ECTS/semester													15				15
	MASTER THESIS	Compulsory							0					15	O		15
Total compulsory master thesis: ECTS/semester														15			15
Total year courses: ECTS/year									30					30			60

Lect. – Lectures; S – Seminars; Lab.- Laboratory; P – Projects (hours/week); ECTS – credits/semester; ET – Evaluation type  
FEQS – Food Engineering, Quality & Safety; MFPS – Management of Food Production Systems



Figure 1. Aspects of laboratories that were set up during the “Steps” project (WP5, Development of infrastructures, 2020)

Table 4. MSc - Sustainable Food Production Systems in Kosovo

Course Curriculum for University of Peja

(Nexhdet Shala, Agym Rysha, Florin Peci, Ibish Mazreku, Afrim Selimaj, Fadil Millaku, Sabiha Shala, Ibrahim Hoxha, Defrime Berisha, Arsim Elshani, Naser Bajraktari, Astrit Bilalli, Bakir Kelmendi, Nazmi Hasanaj)

No.	Course title	Formative category	1 <sup>st</sup> Semester (15 weeks)						2 <sup>nd</sup> Semester (15 weeks)						Total per sem.	
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET		
<b>I. CORE COURSES</b>																
1	Fundamentals of sustainable agri food systems	Core; FEQS	30		30		5	W+ O							5	
2	Agricultural and food industry waste management	Core; FEQS	30		30		5	W+ O							5	
3	Advanced food science and technology	Core; FEQS	30		30		5	W+ O							5	
4	Governance, policy and legislation in the agri-food sector	Core; MFPS	30	15	15		5	W+ O							5	
5	Food Ethics	Core; MFPS	30	15	15		5	W+ O							5	
6	Research methodologies and tools	Core; MFPS	30	15	15		5	W+ O							5	
Total core courses: ECTS/semester							30								30	
<b>II. ELECTIVE COURSES</b>																
7	Quality System Development, Management and Shelf Life Assessment of Food	Elective; FEQS							30		30		5	W+ O	5	
8	Quality and Sustainability of Plant-source Food Production	Elective; FEQS							30		30		5	W+ O	5	
9	Traceability systems of food products	Elective; FEQS							30		30		5	W+ O	5	
10	Nutrition	Elective; FEQS							30		30		5	W+ O	5	
11	Innovative practices of harvesting and post harvesting	Elective; FEQS							30		30		5	W+ O	5	
12	Sustainable Ecology for Fish Management and Conservation	Elective; FEQS							30		30		5	W+ O	5	
13	Environmental Chemistry towards Food Processing	Elective; FEQS							30		30		5	W+ O	5	
Total elective courses: ECTS/semester													30		30	
Total year courses: ECTS/year							30						30		60	
			3 <sup>rd</sup> Semester (15 weeks)						4 <sup>th</sup> Semester (15 weeks)							
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET		
<b>III. ELECTIVE COURSES</b>																
14	Sustainable technology of dairy products	Elective; FEQS	30		30		5	W+ O							5	
15	Sustainable technology of fruit and vegetable processing products	Elective; FEQS	30		30		5	W+ O							5	
16	Sustainable Use of the plant protection products	Elective; FEQS	30		30		5	W+ O							5	
17	Sustainable technology of wine, beer and spirits	Elective; FEQS	30		30		5	W+ O							5	
18	Sustainable technology of bakery products	Elective; FEQS	30		30		5	W+ O							5	
19	Consumer science and sustainable consumption	Elective; FEQS	30		30		5	W+ O							5	
20	Innovation and entrepreneurship for sustainable food production systems	Elective; MFPS	30		30		5	W							5	
21	Marketing of sustainable agri-food products	Elective; MFPS	30		30		5	W							5	
22	Total quality management in the agri-food sector	Elective; MFPS	30		30		5	W							5	
23	Sustainable food value chain management	Elective; MFPS	30		30		5	W							5	
Total elective courses: ECTS/semester							30								30	
MASTER THESIS			Compulsory						0				30	O	30	
Total compulsory master thesis: ECTS/semester														30		30
Total year courses: ECTS/year							30						30		60	
Lect. – Lectures; S – Seminars; Lab.- Laboratory; P – Projects (hours/week); ECTS – credits/semester; ET – Evaluation type FEQS – Food Engineering, Quality & Safety; MFPS – Management of Food Production Systems																

Table 5. MSc - Sustainable Food Production Systems in Kosovo  
 Course Curriculum for Universum College  
 (Uran Rraci, Elejtin Berisha, Luan Vardari, Gezim Turkeshi, Muhamet Hajdari)

No.	Course title	Formative category	1 <sup>st</sup> Semester (15 weeks)						2 <sup>nd</sup> Semester (15 weeks)						Total per sem.		
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET			
<b>I. CORE COURSES</b>																	
1	Fundamentals of sustainable agri food systems	Core; FEQS	30		30		5	W+O									5
2	Agricultural and food industry waste management	Core; FEQS	30		30		5	W+O									5
3	Advanced food science and technology	Core; FEQS	30		30		5	W+O									5
4	Governance, policy and legislation in the agri-food sector	Core; MFPS	30	15	15		5	W+O									5
5	Food Ethics	Core; MFPS	30	15	15		5	W+O									5
6	Research methodologies and tools	Core; MFPS	30	15	15		5	W+O									5
Total core courses: ECTS/semester							30										30
<b>II. ELECTIVE COURSES</b>																	
7	Quality System Development, Management and Shelf Life Assessment of Food	Elective; FEQS							30		30		5	W+O			5
8	Quality and Sustainability of Plant-source Food Production	Elective; FEQS							30		30		5	W+O			5
9	Traceability systems of food products	Elective; FEQS							30		30		5	W+O			5
10	Nutrition	Elective; FEQS							30		30		5	W+O			5
11	Innovative practices of harvesting and post harvesting	Elective; FEQS							30		30		5	W+O			5
12	Sustainable Ecology for Fish Management and Conservation	Elective; FEQS							30		30		5	W+O			5
13	Environmental Chemistry towards Food Processing	Elective; FEQS							30		30		5	W+O			5
Total elective courses: ECTS/semester													30				30
Total year courses: ECTS/year							30						30				60
			3 <sup>rd</sup> Semester (15 weeks)						4 <sup>th</sup> Semester (15 weeks)								
			Lect.	S.	Lab.	P.	ECTS	ET	Lect.	S.	Lab.	P.	ECTS	ET			
<b>III. ELECTIVE COURSES</b>																	
14	Management of Sustainable Food Supply Chain	Elective; FEQS	30	5	13	25	7.5	W+O									7.5
15	Marketing of Sustainable Agri-Food Products	Elective; FEQS	26	8	13	30	7.5	W+O									7.5
16	Innovation and Entrepreneurship for Sustainable Food Production Systems	Elective; FEQS	30	5	13	25	7.5	W+O									7.5
17	Sustainable Food Value Chain Management	Elective; FEQS	30	8	8	30	7.5	W+O									7.5
18	Consumer science and sustainable consumption	Elective; FEQS	26	13	5	30	7.5	W+O									7.5
19	Data Analysis and Decision-making	Elective; FEQS	30		13	30	7.5	W+O									7.5
20	Total Quality Management in the Agri-Food Sector	Elective; MFPS	30	13	13	15	7.5	W+O									7.5
Total elective courses: ECTS/semester							30										30
MASTER THESIS		Compulsory							39	20	50	45	30	W+O			30
Total compulsory master thesis: ECTS/semester													30				30
Total year courses: ECTS/year							30						30				60

Lect. – Lectures; S – Seminars; Lab.- Laboratory; P – Projects (hours/week); ECTS – credits/semester; ET – Evaluation type  
 FEQS – Food Engineering, Quality & Safety; MFPS – Management of Food Production Systems

The courses efficiency and relevance are presented based on high-level learning outcomes. The design provided guidelines for the development of the content of the courses, the educational methodologies and material, the utilisation of Information and communications technology (ICT) tools, the combination of

traditional teaching with student-centred or blended learning approaches etc. Scientific staff of the Agricultural University of Tirana, University of Peje, University of Bihac, University of Agronomic Sciences and Veterinary Medicine of Bucharest and Research Innovation and Development – ReadLab design



the courses related to food engineering, quality and safety.

Scientific staff of the European University of Tirana, Universum College, University of Sarajevo, Czech University of Life Sciences, and Agricultural University of Athens design the courses related to Food production systems management. Ministry of Education, Science, Culture and Sport of Una-Sana Canton provided guidelines in order to ensure that the courses of the MSc programme are designed in accordance with the requirements of the educational systems of the partner countries.

The level of education offered by Western Balkans Higher Education Institutions has to be improved, in order to support the implementation of national policies and priorities related to agriculture restructure, rural development, food safety and security and sustainable food production systems (D1.1 report of “Steps” project).

By taking advantage of the technological growth, the existing agriculture-related study programmes, do not need to increase but rather be combined with Curriculum based on Science, Technology, Engineering, and Mathematics (STEM) oriented subjects (“Steps” project proposal).

Universities themselves need to enhance their networks with the labor market and society, improve the quality of the education offered, help graduates to be engaged with the world of work according to their skills and increase their perception and role considering social and economic growth (EU Commission, 2006). Update of educational programs, modernization of teaching methodologies, development of infrastructures and professional development of scientific staff are critical, if the educational systems of Western Balkans countries are expected to develop the human capital that will be able to tackle the challenges of modern food production systems .

The goal is to develop capacities and infrastructures and improve the level of education offered, by delivering a new joint MSc programme, which, compared to existing courses and learning programmes, will offer a holistic approach of sustainability aspects of food production systems.

The Core Courses of Curriculum for all HEIs institutions are: Fundamentals of Food

Production Systems, Food Industry Waste Management, Advanced Food Science and Technology, Food Legislation, Food Ethics, and Research Methodologies and Tools.

Elective Courses will have subjects: food engineering, including food quality monitoring techniques and safety and management, including supply chain, economics and environmental management of food production systems, sustainable of vegetal and animal production, environment protection issues, agroecology, organic agriculture, etc.

Each Course Description will include:

- course unit title;
- type of course (compulsory or optional);
- semester of delivery;
- number of ECTS credits;
- course description and link with the problems and needs that it intends to address;
- scientific topics, methods and approaches that will be analysed in relation to the specific problems and needs;
- high-level learning outcomes;
- course contents and proposed sections;
- teaching methods and learning activities proposed, including laboratory experiments and software simulations;
- proposed evaluation methods and grading criteria.

The working groups are comprised by scientific staff participating also in seminars/lectures during the workshops and open seminars in HEIs countries and it's are involved in the development of research labs and the experiments and simulations after the installation of the modern equipment in partner countries HEIs.

Institutions participating in the “Steps” project should assure themselves of the competence of their teachers. They should apply fair and transparent processes for the recruitment and development of the staff (D2.2 report of “Steps” project). The teacher's role is essential in creating a high quality student experience and enabling the acquisition of knowledge, competences and skills. Also, scientific staff of HEIs partners will be involved in the development of educational material, research labs, experiments simulations and accompanying material for the STEPS platform.

## CONCLUSIONS

The MSc Steps program aims to analyse and to put into service the agri-food production chains, while it is considered to have a considerable impact on economic, social and environmental points.

The mission of the STEPS MSc program is justified by elements of relevance and opportunity in relation to the objectives of education and scientific research, as well as with the national qualification list and, respectively, with the requirements of the labor market.

All documents (Course Curriculum, List of Courses – Core and Elective, Number of Hours per activity, Number of ECTS per course, Names of Teachers, List of Topics for lectures and List of topics for practical applications) were in direct connection with the documents for the accreditation elaborated at National level by HEIs universities.

Descriptions of the MSc programme courses will be provided along with the key scientific topics addressed.

Courses efficiency and relevance will be presented based on high-level learning outcomes.

The design of courses will also provide guidelines for the development of the content of the courses, the educational methodologies and material, the utilisation of ICT tools, the combination of traditional teaching with student-centred or blended learning approaches etc.

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