

**Table 5.2 The Book of subjects at study programme Ecological Agriculture**

<b>Study program: Ecological agriculture</b>				
<b>Type and level of study: Master academic studies</b>				
<b>Course Title: Methods of research in agrobiotechnology</b>				
<b>Teachers: Dr. Jovanović B. Ljubinko, full professor and Dr. Dejana M. Panković, full professor</b>				
<b>Status: Obligatory, semester I</b>				
<b>ECTS: 6</b>				
<b>Prerequisite: None</b>				
<b>The goal of course</b> To enable students to understand the problem, hypothesis, using appropriate methods and equipment in experiments, analysis of results by using appropriate software and literature and presentation in the form of papers, term papers, etc. Introduction to laboratory equipment used in agricultural research.				
<b>The outcome of the course</b> -Multidisciplinary approach to understanding and defining the research course -Understanding the importance of using a detailed literature review -Using different databases -Understanding the importance and identification of the basic hypothesis -Understanding and use of appropriate methodology in experimental work -Adequately presenting the results of research -Usage of laboratory and field equipments for various agricultural research -Biostatistic methods in research				
<b>Syllabus</b> <i>Theoretical study</i> – The basic characteristics of scientific research. The standard scientific method. Experimental methods. Hypothesis, the subject of the experiment, the realization of experiments, analysis of results. Interpretation of results, agreement with the hypothesis, compliance with national and international literature. Standardization of the term, and other measures. Searching the database. Software for statistical analysis of the results. Software for the graphical presentation the results. Introduction and work on different laboratory equipment as well as field equipment used in agriculture. <i>Practical classes</i> - Setting the experiments, conducting experiments, books, choice of methods, setting experiments, collecting the results, analysis of results with appropriate software, statistical processing, presentation of the results, the order of writing using appropriate literature, presentation of work.				
<b>Literature</b> Bojović, S., Mitrović S. (2010): Biostatistika - primena statističkih metoda u biologiji. Institut za šumarstvo, Beograd. pp. 1-125. Kimball Nill. (2013): Glossary of Biotechnology and Agrobiotechnology Terms. CRC Press  Kothari CR (2004) Research methodology, methods and techniques, New Age International Publishers, New Delhi, India, ISBN (13):978-81-224-2488-1, pp 1-401.  Lawal, Bay (2014): Applied Statistical Methods in Agriculture, Health and Life Sciences. Ed. Springer				
<b>Number of lectures: 4</b>				Other Classes
Lectures: 2	Practices: 2	Other forms of teaching:	Student research work:	
<b>Teaching methods:</b> Lectures, discussions with students, experimental exercises, preparation and public defense of practical applied work.				
Score (maximum 100 points)				

<b>Pre-exam commitments</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>
Activity during lectures	10	Written exam	20
Practical classes	10	Oral examination	30
Colloquia	10		
Seminars	20		
<i>Total</i>	<b>50</b>		<b>50</b>

<b>Study program: Ecological agriculture</b>
<b>Type and level of study: Master academic studies</b>
<b>Course Title: Sustainable agricultural systems</b>
<b>Professors: Dr. Milanko M. Pavlović, Associate Professor</b>
<b>Status:</b> Compulsory, semester I
<b>ECTS:</b> 6
<b>Prerequisite:</b> None
<p><b>The goal of the course</b> The goal of the course, sustainable agricultural systems is to introduce students to learning about development and importance of sustainable farming systems as a basis for sustainable managing agricultural production and a quality life style.</p>
<p><b>The outcome of the course</b> By acquiring the knowledge of the principles of development and multi functionality of sustainable agricultural systems, students can exhibit significant impact on biodiversity, development and conservation of ecosystems and improvement of the quality of life. The system of precision farming, management and sustainability of agroecosystems are main characteristics of sustainable agricultural systems, which form the basis of commitment to a way of agricultural production. By applying economic, social and ecological principles, students will be able to organize and manage various types of sustainable agriculture.</p>
<p><b>Syllabus</b> <i>Theoretical study -</i> Sustainable development (principles and aims), agricultural systems (traditional, conventional, sustainable agriculture), the concept and classification system of sustainable agriculture - sustainable agriculture (good agricultural practices, integrated agriculture, organic, biological and biodynamic production, alternative agricultural systems). Themes: sustainable land and water managing, agricultural production technology, crop protection, livestock production, animal health, livestock welfare, collection of products, processing and storage on the farm, energy management and waste, the benefits of human health and safety, wildlife and landscape. Economic goals of sustainability in various agricultural systems (traditional, industrial, good agricultural practices, integrated and ecological agriculture). Social goals of sustainability in various agricultural systems (traditional, industrial, good agricultural practices, integrated and ecological agriculture). Standards and quality systems in agriculture (ISO standards, HACCP, EuroGAP, GlobalGAP. EU Directive, NOP, Codex Alimentarius for organic agriculture, The Law on Organic Production, private standards,...). Multifunctional agriculture, the concept and importance, role – ecological control gaseous emission, transformation and recycling toxic matters, planning settlements, roads, industrial facilities, landfill, development of non-production sector, various types of tourism in rural areas, old crafts, cultural and other events. Protection of brands and products in geographical areas <i>Practical lessons–</i> Analysis of application, compliance with the principles of sustainability and standards in different agricultural systems, consideration of procedures in certification of products. Field Exercise: Visiting Eco farms and bio gardens.</p>
<p><b>Literature</b> 1. FAO/WHO: Codex Alimentarius Organiculy Produced Foods (2007) 2. Good Agricultural Practitices, SARD, (2002)<a href="http://www.fao.org/wssd/sard/documents/faogapen.doc">www.fao.org/wssd/sard/documents/faogapen.doc</a>.</p>

3. EuropGAP: Guideline, Group Protection Product and Water Quality Information Sources (2004).			
4. E.F. Boller, J. Avilla, E. Jörg, C. Malavolta, F. Wijnands & P. Esbjerg, Ed.(2004): Integrated Production: Principles and Technical Guidelines, 3rd edition, WPRS Bull. Vol. 27 (2),. 50 pp.			
<b>Number of lectures: 4</b>			Other Classes
Lectures: 2	Practices: 2	Other forms of teaching:	
<b>Teaching methods:</b> Lectures, discussions with students, experimental exercises, preparation and public defense of practical applied work.			
Score (maximum 100 points)			
<b>Pre-exam commitments</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>
Activity during lectures	10	Written exam	
Practical classes	10	Oral examination	40
Preliminary exam	20		
Seminars	20		
<i>Total</i>	<b>60</b>		<b>40</b>

<b>Study program: Ecological agriculture</b>
<b>Type and level of study: Master academic studies</b>
<b>Course Title: The production and processing of organic food</b>
<b>Teachers: Dr. Meho S. Bašić, associate professor</b>
<b>Status:</b> Obligatory, semester I
<b>ECTS:</b> 6
<b>Циљ предмета:</b> Acquiring knowledge and skills to work for organic final products of plant and animal production. The characteristics of the harvest, storage and processing of organic products. Also, students acquire the knowledge, skills and competencies in basic processing of organic production. Certification of the finished products and legislation.
<b>Исход предмета:</b> Upon completion of the semester, students will be well-known with the basic principles for the production processing and distribution of organic food as well as trained in the use of terminology and communication in the field of knowledge production, processing and distribution of organic food Possibility of your own thinking on improving the existing procedures in the production and processing of organic food . Graduates will be able to produce their own finished products from materials produced according to the principles of organic production.
<b>Садржај предмета</b> Theoretical teaching. Introduction to the subject. Organic production to the world and in Serbia. Harvesting, storage and packaging of products consists of organic origin. The importance of livestock production in organic production. Organic production of milk and meat. Processing of organic products of animal and plant origin. Legal frameworks in the processing of organic products. Labeling of products derived from organic production. Economic aspects of organic agriculture. Practical teaching: Visits Food processing plants, Selenča (organic crop ) and Curug (organic animal). Laboratory classes to determine the quality of conventional and organic food. Mycotoxins, the characteristics of the milk obtained from organic production.
<b>Literature:</b> J Fink-Gremmels (2012): Animal Feed Contamination, 1st Edition Effects on Livestock and Food Safety. Woodhead Publishing  USDA ORGANIC (2012): Guide for Organic Crop Producers.  Wright S., McCrea D. (2000): Handbook of organic food processing and production, Blackwell Science Ltd.

Oxford University, England.			
Lectures: 3	Practices: 3	Other forms of teaching:	
<b>Teaching methods:</b> The method of oral presentations and discussions, written work (essay and colloquium). The method of practical work on animal farms in clinical and chemical analytical laboratories.			
<b>Score (maximum 100 points)</b>			
<b>Pre-exam commitments</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>
Activity during lectures	<b>10</b>	Written exam	
Practical classes	<b>10</b>	Oral examination	<b>30</b>
Diary of work	<b>40</b>		
Expert report	<b>10</b>		
<i>Total</i>	<b>70</b>		<b>30</b>

<b>Study program: Ecological agriculture</b>			
<b>Type and level of study: Master academic studies</b>			
<b>Course Title: Practical work 1</b>			
<b>Professors: Dr. Olivera P. Nikolić, Associate Professor</b>			
<b>Status:</b> Compulsory, semester I			
<b>ECTS:</b> 1			
<b>Prerequisite:</b> None			
<b>The goal of the course</b> To familiarize students with the basic operations and processes in organic and conventional agriculture. Students should work independently in all agro operations and understand the importance of each operation and its specificity in organic compared to conventional farming.			
<b>The outcome of the course</b> After completing their practice, students should be able to independently perform basic working operation of some cultural practices. Students will acquire the approach to solving certain problems in organic production.			
<b>Syllabus</b> <i>Practical lessons-</i> Students will be involved in work on a farm with ecological and conventional type of production, and in the current seasonal jobs. This includes direct involvement in the work on soil preparation, fertilization, seeding, planting, application of measures of care, particularly integrated protection and biological control agents against diseases, pests and weeds, until harvest and yield evaluation. In parallel with the above work tasks, students will be informed of and involved in environmental, agro-technical and agro biological surveys that are carried out on the property, in the experimental field, as well as how to apply he acquired knowledge in practice. There are planned visits to important institutions, research centres and agricultural - professional services in the country and, depending on the conditions and the environment, students will learn about current trends and demands in agricultural practice and theory, in terms of researches in the field of biotechnology.			
<b>Literature</b>			
<b>Number of lectures: 1</b>			Other Classes
Lectures:	Practices:	Other forms of teaching:	

<b>Teaching methods:</b> Practical teaching in the field, oral explanation and practical introduction to the agro ecological work operations and work on performing research and development research.			
Score (maximum 100 points)			
<b>Pre-exam commitments</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>
Activity during lectures	40	Written exam	
Practical classes	.	Oral examination	
Diary of work	30		
Expert report	30		
<i>Total</i>	<b>100</b>		

<b>Study program: Ecological agriculture</b>
<b>Type and level of study: Master academic studies</b>
<b>Course Title: Soil fertility and soil biological activity</b>
<b>Teachers: Dr. Jovanović B. Ljubinko, full professor and Dr. Nataša Žugić-Drakulić, associate professor</b>
<b>Status:</b> Elective 1, semester I
<b>ECTS:</b> 6
<b>Prerequisite:</b> None
<b>The goal of course</b> To familiarize students with the characteristics of soil fertility and the role that microorganisms play in agricultural land. Interaction of microorganisms, understanding soil and plants and their complex interactions.
<b>The outcome of the course</b> Knowledge of the the basic processes in the interactions of plants, soil and micro-organisms in order to obtain optimal conditions for growing plants. Directing the production process in order to obtain healthy food.
<b>Syllabus</b> <i>Theoretical study</i> - Basic concepts of soil. Land as the main substrate for wildlife. Beneficial and harmful interactions of plants and microorganisms (MO) in the soil. The main groups of MO in the soil. Liquid phase, air and organic matter in soil and MO. Soil humification and dehumification: the role of MO. The role of MO in root mineral absorption. The role of plant root products and MO. The parameters of soil fertility and microorganisms as indicators of soil fertility. Microorganisms, pesticides and fertilizers. The use of microorganisms in production of safe food. Microbial fertilizers. Biodegradation of agricultural organic residues and the production of compost. Legislation in food safety related to the MO, pesticides and fertilizers. <i>Practical classes</i> - The exercises follow the theoretical classes, workshops, testing of bioproducts, presentations, and seminars.
<b>Literature</b> Huber, S., Prokop, G., Arrouays, D., Banko, G., Bispo, A (2009). Environmental Assessment of Soil for Monitoring Italy,  Patrick C. Kangas (2004): ECOLOGICAL ENGINEERING. Principles and Practice. LEWIS PUBLISHERS A CRC Press Company Boca Raton London New York Washington, D.C.  Andrew H. Cobb (2010): Herbicides and Plant Physiology. Second Edition. A John Wiley & Sons, Ltd., Publication.  Group of authors. (2007): Soil Microbiology, Ecology, and Biochemistry. Editor, Eldor A. Paul

Michael Gillings and Andrew Holmes. (2006): Plant Microbiology, University, Sydney, NSW 2109, Australia

Group of authors (2003): Environmental Soil Chemistry. Second Edition Donald L. Sparks Academic Press.

<b>Number of lectures:4</b>				Other Classes
Lectures: 2	Practices: 2	Other forms of teaching:	Student research work:	
<b>Teaching methods:</b> Practical teaching in the field, oral explanation and practical introduction to the agroecological work operations and work on performing research and development research.				
Score (maximum 100 points)				
<b>Pre-exam commitments</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>	
Activity during lectures	10	Written exam	30	
Practical classes	10	Oral examination	20	
Colloquia	20			
Seminars	10			
<i>Total</i>	<b>50</b>		<b>50</b>	

<b>Study program: Ecological agriculture</b>
<b>Type and level of study: Master academic studies</b>
<b>Course Title: Mycotoxins and phytotoxins in the chain of animal nutrition</b>
<b>Teachers: Dr. Midhat E. Jašić, full professor</b>
<b>Status:</b> Elective 1, semester I
<b>ECTS:</b> 6
<b>Prerequisite:</b> None
<b>The goal of course</b> The aim of the course is to learn the harmful effects of toxic metals and pesticides present in water, air and food of animals as well as the methods and procedures of laboratory diagnosis, and prevention.
<b>The outcome of the course</b> Students will gain the necessary scientific knowledge about the presence of toxic metals and pesticides in animal feed and adverse impacts on health, production characteristics and products of animals caused by toxic metals and pesticides. Students will also be introduced to the methods of the clinical and laboratory diagnosis and prevention, as well as analytical methods for the determination of toxic metals and pesticides in food animal excretions and secretions and organs and tissues of animals.
<b>Syllabus</b> <i>Theoretical study</i> - The health of animals occurred as a result of malnutrition and food intake of toxic substances in the body of animals. Nutritional deficits and surpluses of nutrients as a cause of health problems in animals. Deterioration and harmfulness of animal feed, physical, chemical, biological factors, bacteria, parasites, fungi. Toxins, microorganisms - bacteria, plant toxins - phytotoxins, animal toxins. Fungal toxins. Aspergilo-toxins, Penicilio-toxin; Fuzario-toxins. Poisoning of animals with organophosphate and organochlorine compounds, carbamates, herbicides. Poisoning of animals with inorganic compounds and metals, toxic metals and pesticides in air, water and soil. Adoption, distribution and accumulation in plants. Reabsorption of toxic metals and pesticides in animals, accumulation and excretion from the body. Toxicity and metabolic effects of toxic metals and pesticides. The residues in tissues and ecotoxicology of poisoning by toxic metals. How to prevent harmful effects of toxic metals and pesticides on animals. <i>Practical classes</i> - Going to the farms in order to examine the possibility of contamination of food and of animals with toxic metals and pesticides. Determination of metabolic disorders caused by animal poisoning by

heavy metals and pesticides, as well as determining the presence of toxic metals and pesticides in the air, water and food of animals.

**Literature**

French Food Safety Agency: Risk assessment for mycotoxins in human and animal food chains

Grazina Juodeikiene, Loreta Basinskiene, Elena Bartkiene and Paulius Matusevicius (2012): Mycotoxin Decontamination Aspects in Food, Feed and Renewables Using Fermentation Processes. INTECH

Srebočan, V. & Srebočan, E. 2009. Veterinarska toksikologija. Medicinska naklada, Zagreb.

FOOD QUALITY AND STANDARDS Kofi E. Aidoo (2007) Mycotoxins, Natural Contaminants in the Food Chain

International and national journals and proceedings of symposia and congresses devoted to poisoning and animal health disorders caused by the presence of toxic metals and pesticides in the food chain.

**Number of lectures:4**

Lectures: 2	Practices: 2	Other forms of teaching:	Student research work:	Other Classes

**Teaching methods:** The method of oral presentation and interview methods written work (essay and test). Method of practical work on the animal farm, as well as in clinical and analytical chemistry laboratories.

Score (maximum 100 points)

Pre-exam commitments	Points	Final exam	Points
Activity during lectures	10	Written exam	
Practical classes	10	Oral examination	30
Colloquia	20		
Seminars	10		
Laboratory exercise	20		
<i>Total</i>	<b>70</b>		<b>30</b>

**Study program: Ecological agriculture**

**Type and level of study: Master academic studies**

**Course Title: Agro-genetic resources and their conservation**

**Professors: Dr Dragan G. Perović, Full Professor**

**Status:** Optional 2, semester II

**ECTS:** 6

**Prerequisite:** None

**The goal of the course**

The aim of the course is to provide students with basic knowledge about the types and importance of agricultural genetic resources, their conservation as well as the methods and techniques of their utilization in organic production. The aim of this course is to teach students why the abundance of diversity of plants is necessary to keep land from further erosion and why it is important to protect the ecological balance for future generations.

**The outcome of the course**

After successfully completing the pre-exam and exam commitments student will have the basic knowledge about agricultural genetic resources as a starting material of natural variability of cultivated plants and methods, techniques and concepts that are used in the conservation and the use of agro-genetic resources in organic agriculture. An important aspect of this course is to examine the biological diversity and diversity within various species and between species and ecosystems as an important resource for human existence,

with a crucial role in sustainable development.

**Syllabus**

*Theoretical study* - Theoretical study involves systematizing individual components of genetic resources in agriculture and local population, genotypes, old and new varieties, plant breeding material of actual or potential value. Methods of conservation: Ex situ conservation, in situ conservation, on farm conservation. Conventional and marker-based estimation of the authenticity of the collected populations, ecotypes and old varieties. Preservation of duplicate genotypes of special significance (threatened, resistant and carrier etc.). The formation and maintenance of field collection, collection and preservation of wild relatives, standardization of evaluation methods.  
*Practical lessons* - Interactive teaching with laboratory and field exercises, discussions with experts on certain topics, essay.

**Literature**

1. Penčić, M. 2005. Biljni genetički resursi: izabrani radovi. Jugoslovenska inženjerska akademija. Beograd.
2. Engels, J.M.M. & Visser, L. 2003. A guide to effective management of germplasm collections. IPGRI. Rome, Italy.
3. Konvencija o zaštiti evropske flore i faune i prirodnih staništa, 1982. (Bernska konvencija) (<http://www.ecnc.nl/>)
4. Nagoya protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization to the convention on biological diversity. Convention on Biological Diversity United Nations <https://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf>
5. K.S. Varaprasad and N. Sivaraj (2010): Plant genetic resources conservation and use in light of recent policy developments Electronic Journal of Plant Breeding, 1(4): 1276-1293 (July 2010)

**Number of lectures: 4**

Lectures: 2	Practices: 2	Other forms of teaching:	Student research work:	Other Classes

**Teaching methods:** Practical teaching in the field, oral explanation and practical introduction to the agroecological work operations and work on performing research and development research.

Score (maximum 100 points)

Pre-exam commitments	Points	Final exam	Points
Activity during lectures	10	Written exam	
Practical classes	10	Oral examination	50
Preliminary exam	20		
Seminars	10		
<i>Total</i>	<b>50</b>		<b>50</b>

**Study program: Ecological agriculture**

**Type and level of study: Master academic studies**

**Course Title: Technology of the production and processing of bee products**

**Professors: Dr. Sladan B Rašić, assistant professor**

**Status:** Optional 2, semester II

**ECTS:** 6

**Prerequisite:** None

**The goal of the course**

The course should enable students to acquire knowledge about all bee products: honey, pollen, royal jelly, propolis, bee venom, wax, their obtaining and processing methods, the most modern methods of storing and



processing as well as fostering quality of bee products and the ecological aspects of modern beekeeping. The course also enables students to acquire knowledge in the field of organic production in beekeeping, learn to distinguish organic from non-organic bee products, master methods for the production of organic honey, organic royal jelly, organic pollen, organic propolis and organic wax and acquire the necessary knowledge of the permitted packaging and on the recommended storage conditions of organically produced bee products.

**The outcome of the course**

The students should demonstrate knowledge and understanding of the ways of production of bee products, master the knowledge in the field of production technology and proper storage and handling of bee products. Also, the students should acquire knowledge in the field of conventional, organic and organic production of bee products, and master the methods of production of organic honey, organic identification details, organic propolis and organic wax, methods of storage and packaging of the obtained organic bee products.

**Syllabus**

*Theoretical study* - The course is designed so that the first part of the process include production and obtaining of all bee products in the hive. The second part is processed in the area of the seizure, storage and packaging of bee products, with special emphasis on packaging and packaging decrystallization and equalization product. The third part provided for the study of technological properties of bee products and the study of critical points in the beekeeping production with special emphasis on the application of good beekeeping practices. About a quarter of the section deals with the organic production of bee products, technology of organic honey and other bee products, methods of storage, warehousing and packaging, and manner of their correct use. Also, special attention is paid to the economic effect of increasing the production of organic products in beekeeping

*Practical lessons*- Theoretical and practical introduction to beekeeping technologies and different ways of obtaining bee products; introduction to quality, storage, decrystallization, processing and packaging bee products conventionally and in organic production.

**Literature**

Кулинчевић Ј., Гачић Р (1991): Пчеларство, БИГЗ, Београд  
 Crane Eva (1979): Honey a Comprehensive Survey. Heinemann, London.  
 Јован Кулинчевић (2012): Пчеларство, Партенон, Београд  
 Зоран Станимировић, Богосав Солдатовић, Маријана Вучинић (2000): Медоносна пчела, Медицинска књига, Београд  
 Conrad R(2007): Natural Beekeeping: Organic Approaches to Modern Apiculture, Acres U.S.A.  
 Wang An and Peng Wen Jun (2011): Books ecological beekeeping ecological farming techniques, China Agricultural Pub  
 Mader, E., Spivak, M., Evans, E. (2010): Managing Alternative Pollinators, Ithaka, NewYork.

**Number of lectures: 4**

Lectures: 2	Practices: 2	Other forms of teaching:	Student research work:	Other Classes

**Teaching methods:** Oral presentation, presentations, demonstrative-illustrative method, laboratory exercises, seminars

Score (maximum 100 points)

Pre-exam commitments	Points	Final exam	Points
Activity during lectures	10	Written exam	20
Practical classes	10	Oral examination	30
Preliminary exam	10		
Seminars	20		
<b>Total</b>	<b>50</b>		<b>50</b>

<b>Study program: Ecological agriculture</b>
<b>Type and level of study: Master academic studies</b>
<b>Course Title: Specifics of organic crop production</b>
<b>Professors: Dr. Milanko M. Pavlović, Associate Professor and Dr. Olivera P. Nikolić, Associate Professor</b>
<b>Status: Optional 3, semester II</b>
<b>ECTS: 6</b>
<b>Prerequisite: None</b>
<p><b>The goal of course</b> The aim of this course is to acquire knowledge about the principles of field crop species in an organic cropping system and the ability of detecting substantial differences compared to conventional farming.</p>
<p><b>The outcome of the course</b> Enabling students for independent and professional implementation of principles in organization of organic crop production, with the proper selection of adaptable varieties and hybrids, GMO, and in accordance to specific agro-ecological conditions and in accordance with the requirements of a consumer market and the expected financial effects. An important place in crop production organizing is period of conversion including education, adaptability, evidence as well as just certification. This course makes ability for further research in improvement of crop production.</p>
<p><b>Syllabus</b> <i>Theoretical study -</i> Ecological guidelines for managing sustainable agroecosystems. Organic agriculture within system of sustainable agriculture. The principles and goals of sustainability of organic agriculture. Conversion from conventional organic crop production (control and certification). The concept and characteristics of organic crop production (field history, selection of plots and location, selection of previous crop, selection of plant species, hybrids and genotypes). Technology of organic crop production, depending on the biological characteristics of species and varieties of organic and microbial fertilizers, soil traits and its fertility. Sowing crop plants and reproductive material in organic system. Plant nutrition, irrigation, crop protection, harvesting and storage of products, the possibility of using organic products. Basic principles of organic farming conditions, the importance of biological properties of soil for plants and plant requirements under environmental conditions (temperature, water, aeration, mineral nutrition). ). Organic production of cereals (maize, sorghum, millet), pseudo-cereals (buckwheat, amaranth), grain legumes (soybean, peas, beans, lentils, Vigna, chickpeas, peanuts), oil crops (sunflower, poppy seed oil, black mustard, safflower, marigold), energy types (canola), sugar beet, yarn (textile) plants (hemp, flax) and root-tubers (potatoes, Jerusalem artichokes, chicory). Control and certification of organic agricultural production, the principles of Serbian Organic Agriculture regulations and EU regulations 834/2008, the Codex Alimentarius for organic production in 2007. The methods of production, processing, storage, transportation, marking, labelling and market of organic products, certification and re – certification, control and revision, import of organic products. <i>Practical lessons–</i> The evaluation of agritechnics of treatment and their impact on some soil traits. Completing crop rotation. Analysis of some procedures in certification. The morphology of crop species, the characteristics of varieties for different purposes of use, less cultivated species in our field exercise; tour of producers, organizations and institutes in the field.</p>
<p><b>Literature</b> Lampkin, N. H. (1994): Organic Farming. Farming Press, Ipswich, 1540. Soil fertility and fertilizers, Havlin J.L. et al., Pearson education, Inc. Upper Saddle River, New Jersey, 2005 Kirchmann, H., Bergstrom, L. (2008): Organic Crop Production – Ambitions and Limitations. Springer</p>

Science+Business Media B.V. Sweden.  
 Goldammer, T. (2016): Organic Crop Production. Management Techniques for Organic Farming. Apex Publishers.  
 Charles, L. M., Johnson, S. E. (2009): Crop Rotation on Organic Farms - a planning manual. NRAES.  
 ORGANIC CROP PRODUCTION OVERVIEW, George Kuepper and Lance Gegner, 2004.  
<file:///C:/Users/User/Downloads/organiccrop.pdf>  
 Guide for Organic Crop Producers, Pamela Coleman, 2012.  
<https://www.ams.usda.gov/sites/default/files/media/Guide-OrganicCropProducers.pdf>  
 FAO/WHO Codex Alimentarius commission: Codex Alimentarius. Organically Produced Foods, 2007.

<b>Number of lectures: 4</b>				Other Classes
Lectures: 2	Practices: 2	Other forms of teaching:	Student research work:	

**Teaching methods:** Practical teaching in the field, oral explanation and practical introduction to the agroecological work operations and work on performing research and development research.

Score(maximum 100 points)

Pre-exam commitments	Points	Final exam	Points
Activity during lectures	10	Written exam	50
Practical classes	10	Oral examination	
Preliminary exam	2 x 10 = 20		
Seminars	10		
<i>Total</i>	<b>50</b>		<b>50</b>

<b>Study program: Ecological Agriculture</b>
<b>Name of Subject: The specifics of organic livestock production</b>
<b>Lecturer: Sladan B. Rašić</b>
<b>Course status: Optional 3, II semester</b>
<b>Number of ESPB: 6</b>
<b>Requirement: None</b>
<b>Course objective:</b> To acquaint students with the use of appropriate methods and enable them to understand the most important principles of organic livestock production, relationships between organic livestock systems, proper choice of breeds of domestic animals in organic livestock production, the importance of proper application of animal husbandry practices (nutrition, selection, placement, care, etc.) in organic livestock production.
<b>Outcome:</b> Students should be able to explain the importance of organic livestock production and describe necessary changes which should be made on a farm registered for organic livestock production; describe and distinguish the most important breeds of domestic animals that are grown in organic livestock production; explain the most important farm operations that are used in organic livestock production; describe, compare and contrast various methods of cultivation which are used in organic livestock production.
<b>Course content:</b> Production systems in organic livestock production: manure and grazing systems, intensive and extensive systems, the impact of livestock production on the environment; The choice of breeds of farm animals for organic livestock production; Principles; The production of organic livestock - food, accommodation, selection, care and welfare of farm animals in organic livestock production; Control of productivity, safety and product

quality in organic livestock production.

**Literature:**

1. Jovanović i sar. (2014): Proizvodnja i menadžment u organskoj poljoprivredi, Univerzitet Edukons.
2. Terri Paajanen. 2011: The Complete Guide to Organic Livestock Farming, Atlantic publishing.
3. Mitić, N., Ferčej, J., Zeremski, D., Lazarević, L.J.: Govedarstvo, Zavod za udžbenike i nastavna sredstva, Beograd, 1987.
4. Mitić N.: Ovčarstvo, Zavod za udžbenike i nastavna sredstva, Beograd, 1987.
5. Flack S. (2011) Organic Dairy Production, Chelsea Green Publishing
6. Laura Telford & Anne Macey (2014): Organic Livestock Handbook, Acres, U.S.A.

<b>Number of lectures: 4</b>	<b>Lectures: 2</b>	<b>Practical classes: 2</b>
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**Teaching methods**  
The method of oral presentations and discussions, written work (seminars and preliminary exam)

**Evaluation of knowledge (maximum score 100)**

<b>Pre exam duties</b>	points	<b>Final exam</b>	points
Activity during the lectures	<b>10</b>	written exam	<i>30</i>
Practical lessons	<b>10</b>	oral exam	
Preliminary exams	<b>20</b>	.....	
Laboratory works	<b>10</b>		
Seminar works	<b>20</b>		

<b>Study program: Ecological agriculture</b>
<b>Type and level of study: Master academic studies</b>
<b>Course Title: Special plant protection in Ecological Agriculture</b>
<b>Professors: Dr. Slobodan N. Milenković, Full Professor and Dr. Olivera P. Nikolić, Associate Professor</b>
<b>Status:</b> Optional 4, semester II
<b>ECTS:</b> 6
<b>Prerequisite:</b> None
<b>The goal of the course</b> Provide students with the knowledge of biological plant protection measures and the use of bio agents for combating phytopathogenic microorganisms, insects and weeds in order to protect the environment.
<b>The outcome of the course</b> The acquired knowledge is the basis for the application of biological measures in the protection of cultivated plants from harmful microorganisms, insects and weeds in order to reduce waste and pollution of the environment, which encourages agro-environment agriculture.
<b>Syllabus</b> <i>Theoretical study</i> - Biological control, definition, history and development. Mechanisms of biological control. Biological products in agriculture. Micro parasites, microorganisms, antagonists, antibiotics, bacteriophages, isolation, obtaining pure cultures. Results of application. Bioinsecticides. Predators and parasites, relationship to their host, the most important species. Results of application. Microbial components as potential herbicides. Biology and environmental conditions for the occurrence of the most important plant pathogenic microorganisms (fungi, bacteria, viruses, mycoplasmas), insects and weeds. Short-term and long-term prognosis phenomenon. Signalling. Preventive direct actions in the protection of cultivated plants. Software programs forecasts in crop protection.

<i>Practical lessons-</i> Isolation and Identification of <i>Bacillus subtilis</i> and <i>Bacillus thuringiensis</i> . Antagonism. Results of biological agents. Bioinsecticides. Determination of predators of the order <i>Coleoptera</i> , <i>Diptera</i> , <i>Neoptera</i> . Determination of parasites from the order <i>Hymenoptera</i> and <i>Diptera</i> . Results of application.			
<b>Literature</b>			
1. Campbell, R. 1989. Biological control of microbial plant pathogens. Cambridge University Press.			
2. Campbell, R. (1989): Biological control of microbial plant pathogens. Cambridge University Press.			
3. Copping, L.G.: The Manual of Biocontrol Agents, BCPC, UK, 2009.			
4. Roy van Driesche, et al. (2008) Control of Pests and Weeds by Natural Enemies: An Introduction to Biological Control. Wiley-Blackwell;			
<b>Number of lectures: 4</b>			Other Classes
Lectures: 2	Practices: 2	Other forms of teaching:	
<b>Teaching methods:</b> Oral presentation, presentations, demonstrative-illustrative method, laboratory exercises, seminars			
Score (maximum 100 points)			
<b>Pre-exam commitments</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>
Activity during lectures	10	Written exam	25
Practical classes	10	Oral examination	25
Preliminary exam	20		
Seminars	10		
<i>Total</i>	<b>50</b>		<b>50</b>

<b>Study program: Ecological agriculture</b>
<b>Course Title: The application of modern technologies in livestock production</b>
<b>Teacher: Dr Aleksandar Z. Masic, Associate Professor</b>
<b>Status: Elective 4, II semester</b>
<b>ECTS: 6</b>
<b>Prerequisite: None</b>
<b>The course objective</b>
Course objective is to provide information on the modern technologies, farm practices and application of new products as an antibiotic alternative to improve production of food producing animals, their daily weight gain, immunity and meat quality
<b>Course outcome</b>
Students will receive and learn new scientific information on modern technologies that are applied or could be applied in organic production of food producing animals. In addition, students will learn about importance of finding and using products as alternatives to antibiotics in organic livestock production.
<b>Course Syllables</b>
<i>Theory-lectures</i>
Open and closed types of livestock production, use of high quality food in improving meat quality. Basic knowledge on embryo transfer and semen selection based on sex in order to improve genetics of livestock in particular cattle. Use of immunomodulators as alternatives to antibiotics and mechanism of action.
<i>Practical/lab</i>
Lecture notes, site visits (dairy and beef cattle farms) to demonstrate application of immunomodulators, monitoring of daily weight gain and clinical signs in order to reduce and control infectious diseases and

reduce use of antibiotics.			
<b>Литература</b>			
1. Lecture notes			
2. National and international peer-reviewed manuscripts, abstracts from scientific conferences			
3. Thomas, Heather Smith ; Storey's Guide to Raising Beef Cattle, 3rd Edition: Health, Handling, Breeding ; Storey Publishing, LLC; 3 <sup>rd</sup> edition (Oct. 28 2009)			
<b>Number of lecture hours: 4</b>	<b>Lectures: 2</b>	<b>Practice: 2</b>	
<b>Teaching methods:</b> The method of oral presentations and discussions, written work (seminars and colloquium). The method of clinical, practical work on animal farms and chemical analytical laboratories.			
Grade (maximum 100 points)			
Pre-commitments	Points	The final exam	Points
Activity during lectures	10	Written exam	30
Practical classes	10	Oral examination	
Colloquia	20		
Laboratory work	10		
Seminars	20		

<b>Study program: Ecological agriculture</b>
<b>Type and level of study: Master academic studies</b>
<b>Course Title: Practical work 2</b>
<b>Professors: Dr. Olivera P. Nikolić, Associate Professor</b>
<b>Status:</b> Compulsory, semester II
<b>ECTS:</b> 3
<b>Prerequisite:</b> None
<b>The goal of course</b> The practice is aimed to provide students with the knowledge of scientific and professional issues of growing agricultural ecological system, in particular, the characteristics of specific agro-technical measures and measures which contribute to the conservation of ecosystems and agricultural landscapes.
<b>The outcome of the course</b> The practice allows students to organize optimal organic production, to apply the acquired theoretical knowledge; the practical work is done in different organizations with open and closed type of organic farming and other systems of organic farming, and allows involvement in research projects.
<b>Syllabus</b> <i>Practical lessons-</i> During manufacturing practice within the scientific research unit, students are acquainted with the conditions, manner, time and purpose of ecological research in the domain of production of field and vegetable crops in terms of sustainable agricultural production. This practice means acquiring knowledge from a variety of ecological systems both in production the method of execution and summarizing research results, necessary for the production of multi-functionality. At the same time, students will be involved in the development of research that is carried out at the ECOFARM company and method of application thereof. Within the content of practical work 2, it is planned that on the basis of acquired knowledge in various fields of agriculture, students design their own plan of some form of production (mainly vegetables expected), in the form of essays, work on implementation and the adequate interpretation of planned and implemented measures, and choice of species through fertilization of accompanying species. This should achieve a kind of sublimation of theoretical knowledge acquired during their studies.
<b>Literature</b>

<b>Number of lectures: 3</b>				Other Classes
Lectures:	Practices:	Other forms of teaching:	Student research work:	
<b>Teaching methods:</b> Practical teaching in the field, focused on the production system as a whole and scientific research units, and different ways of organic farming				
Score (maximum 100 points)				
<b>Pre-exam commitments</b>		<b>Points</b>	<b>Final exam</b>	<b>Points</b>
Activity during lectures		40	Written exam	
Practical classes		-	Oral examination	
Diary of work		30		
Expert report		30		
<i>Total</i>		<b>100</b>		

<b>Study program: Ecological agriculture</b>
<b>Type and level of study: Master academic studies</b>
<b>Course Title: Final work – Master thesis</b>
<b>Teachers:</b> Mentors
<b>Status:</b> Obligatory
<b>ECTS:</b> 9
<b>Prerequisite:</b> 25 ECTS
<p><b>The goal of course</b> Preparation and defense of the final thesis student proves that he has acquired the necessary competence for independent scientific / research and practical work in the field of quality and safe food - from agro-ecological production, primarily from organic agriculture, the analysis of literature relevant to the setting and goal work, the choice of the appropriate methodology, analysis of the obtained results and concluding remarks.</p>
<p><b>The outcome of the course</b> With final work student integrates and applies the acquired knowledge in solving specific problems within the educational and scientific fields of study program where students attend. At the same time, students in this paper shows that they are able to present the material and the key conclusions of the scientific and professional and the general public.</p>
<p><b>Syllabus</b> The final paper is a scientific research paper written, in which the students unite, expand and round thematic content, which have been course to investigations of selected areas of organic agriculture during graduate studies. Students can apply to do the final master work after passing all the curriculum provided for the exams, and with achieved 25 ECTS. Student applies to master work with the prescribed form. Consultation on the topic and structure of work is done with the selected mentor. After the adoption of the theme, student is writing a paper and acquires the right to defense after evaluating the work and written consent of the supervisor. When defending the final master work, student gains a title "agriculture engineer-master."</p>
<p><b>Score (maximum 100 points)</b> - Assessment of the work - maximum 50 points - An assessment presentation - maximum 30 points - Evaluation of Defense - maximum 20 points</p>