	Course: **ENOLOGY**			
Code	**Status of the course**	**Semester**	**ECTS**	Lecture classes
291107093	**Required**	**VI**	**4**	**2P+1L**
Academic Study Program: Basic academic studies - Fruit growing and Viticulture (studies last 2 semesters, 180 ECTS credits)				
Prerequisites: No				
Course aims: Acquring knowledge about: wine production, the chemical composition of must and wine, procedures of primary processing of grapes and must, fermentation process, wine stabilization, care and treatment of wine and determination of quality of wine.				
Teacher and assistants: Prof. Dr Radmila Pajović-Šćepanović				
The course consists of: Lectures, laboratory analyses, practical work in the winery of Biotechnical faculty, colloquiums, consultation, seminar paper and final exam.				
Course content:				
Week for preparation	Preparation and a enrollment of students;			
I week	Introducing students to the course and importance of wine culture;			
II week	The history of wine making; Introducing with the major wine-growing regions and wine countries in the world;			
Practical 1:	Visit to the winery of Biotechnical faculty for introducing with technological process of wine production;			
III week	Characteristics of grapes as base for wine production; Mechanical and chemical composition of grapes;			
Practical 2:	Analyses of mechanical composition of grapes;			
IV week	Grapes ripening and harvesting; Primary processing of grapes;			
Practical 3:	Analyses of chemical composition of must (density and content of sugar);			
V week	Vinification; Alcoholic fermentation; The strains of wine yeasts;			
Practical 4:	Analyses of acidity must and wine (total acidity and pH);			
VI week	*Colloquium I;*			
VII week	The application of SO_2 in wine production;			
Practical 5:	Analyzes of total and free SO_2 in wine;			
VIII week	Technology of producing white wine;			
Practical 6:	Analyses of wine density and content of alcohol - fast methods;			
IX week	Technology of production red and rose wine;			
Practical 7:	Analyses of wine density and content of alcohol by using distillation unit and hydrostatic balance;			
X week	Maturation, care and storage of the wine; Technological procedures and operations and equipment;			
Practical 8:	Visit to winery "13 Jul Plantaze" for introducing with technological procedures, operations of finalization wine and equipment;			
XI week	Spoilage and defects of wine; Preventing the emergence of these processes in wine;			
Practical 9:	Analyses of content of volatile acid in wine (fast method and with distillation unit);			
XII week	The technology of special vinification; Process of producing of liqueurs and sparkling wines;			
Practical 10:	Analyze of content of residual sugar in wine;			
XIII week	*Colloquium II;*			
XIV week	Quality evaluation of the wines: Sensory evaluation and analysis of the chemical composition of wine;			
Practical 11:	Techniques of sensory evaluation assessment of wines (OIV official *method*) and *Buxbaum method;*			
XV week	Protection designations and origin of names wines;			
Practical 12:	Interpretation parameters of the chemical composition of wine;			
XVI week	*Final exam;*			
End week	Verification of semester and enrollment of grade;			
XVIII-XXI week	Additional lessons and extra examination session.			
Student obligation:				

Weekly	***In semester***
4 credits x 40/30= 5 hours 20 min **Structure:** - 2 hours of teaching - 1 hours of practical work including colloquiums - 1 hour 20 min of individual work	Teaching and the final exam: (5 hours 20 min) x 16 = 85 hours 20 min Preparation before the beginning of the semester (administration, enrollment, etc) 2x(5 hours) = 10 hours 40 min Total work hours for the course: 4 x 30 = 120 hours Additional hours for preparing of examines in additional examination's period 0-24 hours Structure: 85 hours 20 min (lectures), 85 hours (preparation) and 24 hours (additional work)

Literatura:

1. Radovanović, V. (1986): Tehnologija vina, Građevinska knjiga, Beograd.
2. Daničić, M. (1988): Tehnologija vina – Praktikum, Poljoprivredni fakultet Beograd – Zemun.
3. Stanka Herjavec Skripta »Tehnologija vina«Agron*omski fakultet, Zagreb*
4. C. Flanzy(1998). Oenologie. Fondements scientifiques et technologiques Tech.& Doc./Lavoisier, Paris.
5. P. Ribereau-Gayon et al (2000)., Handbook of enology, Vo1 2. The Chemistry and wine stabilization and treatments, Chapman&Hall; Dunod, Paris.
6. B. W. Zoecklein, K. C. Fugelsang, B. H. Gump, F. S. Nury, Wine Analysis and Production, The Chapman-Hall Enology Library, June 1995.

T**he forms of knowledge testing and grading:**

- Class attendance: 3 points
- Colloquiums 2x20 40 points
- Attendance at practices 3 points
- Seminar 5 points
-Final exam 49 points

Passing grade gets after cumulative collect at least 51 points.

Teacher, which gave information: Prof. Dr Radmila Pajović-Šćepanović

Special remarks for the course: The teaching is organized in their native language with the help of audio-visual devices

Note:

Learning outcomes:

The student have demonstrated the ability to:

- Being familiar with culture of wine (wine regions, types and categories of wine);
- Analyze the parameters of the mechanical composition of grape and chemical composition of must;
- Determine the best moment for harvesting;
- Analyze the process of fermentation;
- Organize technological process in the producing of red and white wine;
- Organize technological process during the treatment, care, storage and aging of wine;
- Analyze the sensory properties of wine;
- Recognize the primary defects and spoilage of wine;
- Analyze the chemical properties of wine in laboratory.

	Course: **ENOLOGY WITH GRAPE PROCESSING**			
Code	**Status of the course**	**Semester**	**ECTS**	Lecture classes
291107093	**Required**	**I**	**5**	**3L+2L**

Academic Study Program: Master academic studies - Fruit growing and Viticulture (studies last 4 semesters, 240 ECTS credits)

Prerequisites: No

Course aims: Acquring knowledge about: wine production, the chemical composition of must and wine, procedures of primary processing of grapes and must, fermentation process, wine stabilization, care and treatment of wine and determination of quality of wine.

Teacher and assistants: Prof. Dr Radmila Pajović-Šćepanović

The course consists of: Lectures, laboratory analyses, practical work in the winery of Biotechnical faculty, colloquiums, consultation, seminar paper and final exam.

Course content:

Week for preparation	Preparation and a enrollment of students;
I week	Introducing students to the course and importance of wine culture;
II week	The history of wine making; Introducing with the major wine-growing regions and wine countries in the world;
Practical 1:	Visit to the winery of Biotechnical faculty for introducing with technological process of wine production;
III week	Characteristics of grapes as base for wine production; Mechanical and chemical composition of grapes;
Practical 2:	Analyses of mechanical composition of grapes;
IV week	Grapes ripening and harvesting; Primary processing of grapes;
Practical 3:	Analyses of chemical composition of must (density and content of sugar);
V week	Vinification; Alcoholic fermentation; The strains of wine yeasts;
Practical 4:	Analyses of acidity must and wine (total acidity and pH);
VI week	*Colloquium I;*
VII week	The application of SO_2 in wine production;
Practical 5:	Analyzes of total and free SO_2 in wine;
VIII week	Technology of producing white wine;
Practical 6:	Analyses of wine density and content of alcohol - fast methods;
IX week	Technology of production red and rose wine;
Practical 7:	Analyses of wine density and content of alcohol by using distillation unit and hydrostatic balance;
X week	Maturation, care and storage of the wine; Technological procedures and operations and equipment;
Practical 8:	Visit to winery "13 Jul Plantaze" for introducing with technological procedures, operations of finalization wine and equipment;
XI week	Spoilage and defects of wine; Preventing the emergence of these processes in wine;
Practical 9:	Analyses of content of volatile acid in wine (fast method and with distillation unit);
XII week	The technology of special vinification; Process of producing of liqueurs and sparkling wines;
Practical 10:	Analyze of content of residual sugar in wine;
XIII week	*Colloquium II;*
XIV week	Quality evaluation of the wines: Sensory evaluation and analysis of the chemical composition of wine;
Practical 11:	Techniques of sensory evaluation assessment of wines (OIV official *method*) and *Buxbaum method;*
XV week	Protection designations and origin of names wines;
Practical 12:	Interpretation parameters of the chemical composition of wine;
XVI week	*Final exam;*
End week	Verification of semester and enrollment of grade;
XVIII-XXI week	Additional lessons and extra examination session.

Student obligation:	
Weekly	***In semester***
5 credits x 40/30= 6 hours and 40 min **Structure:** - 3 hours of teaching - 2 hours of practical work including colloquiums - 2 hours and 40 min of individual work	Teaching and the final exam: (6 hours and 40 min) x 16 = 160 hours and 40 min Preparation before the beginning of the semester: 2x(6 hours and 40 min) = 13 hours and 20 min Total work hours for the course: 5 x 30 = 150 hours Additional hours for preparing of examines in additional examination's period 0-30 hours Structure: 106 hours and 40 min. (lectures), 13 hours and 20 min. (preparation) and 32 hours (additional work)

Literatura:

1. Radovanović, V. (1986): Tehnologija vina, Građevinska knjiga, Beograd.
2. Daničić, M. (1988): Tehnologija vina – Praktikum, Poljoprivredni fakultet Beograd – Zemun.
3. Stanka Herjavec Skripta »Tehnologija vina«Agron*omski fakultet, Zagreb*
4. C. Flanzy(1998). Oenologie. Fondements scientifiques et technologiques Tech.& Doc./Lavoisier, Paris.
5. P. Ribereau-Gayon et al (2000)., Handbook of enology, Vo1 2. The Chemistry and wine stabilization and treatments, Chapman&Hall; Dunod, Paris.
6. B. W. Zoecklein, K. C. Fugelsang, B. H. Gump, F. S. Nury, Wine Analysis and Production, The Chapman-Hall Enology Library, June 1995.

T**he forms of knowledge testing and grading:**

- Class attendance: 3 points
- Colloquiums 2x20 40 points
- Attendance at practices 3 points
- Seminar 5 points
- Final exam 49 points

Passing grade gets after cumulative collect at least 51 points.

Teacher, which gave information: Prof. Dr Radmila Pajović-Šćepanović

Special remarks for the course: The teaching is organized in their native language with the help of audio-visual devices

Note:

Learning outcomes:

The student have demonstrated the ability to:

- Being familiar with culture of wine (wine regions, types and categories of wine);
- Analyze the parameters of the mechanical composition of grape and chemical composition of must;
- Determine the best moment for harvesting;
- Analyze the process of fermentation;
- Organize technological process in the producing of red and white wine;
- Organize technological process during the treatment, care, storage and aging of wine;
- Analyze the sensory properties of wine;
- Recognize the primary defects and spoilage of wine;
- Analyze the chemical properties of wine in laboratory.

	Course: QUALITY WINE AND WINE STORAGE			
Code	**Status of the course**	**Semester**	**ECTS**	Lecture classes
	optional	2	5	3P+2L

Academic Study Program: Master academic studies - Fruit growing, Viticulture and Enology (studies last 4 semesters, 240 ECTS credits)

Prerequisites: No

Course aims: To introduce students with: wine production, methods of determining the quality of wine (physico-chemical analysis and sensory evaluation of wine), as well as, conditions and techniques of care and storage of wine

Teacher and assistants: Prof. Dr Radmila Pajović-Šćepanović

The course consists of: Lectures, practical work – preparation wines in the winery of Biotechnical faculty, laboratory analyses, seminar paper and final exam.

Course content:

Week for preparation	Preparation and a enrollment of students;
I week	Introducing students with course, method and plan;
II week	The parameters of the chemical composition of grape, must and wine;
Practical 1:	Crushing of the grapes, addition of SO_2 in crashed grape, and filling vessels for fermentation;
III week	Factors of wine's quality; Physico-chemical analysis parameters of wine quality;
Practical 2:	Analyses of chemical composition must: sugar, total acidity and pH;
IV week	Instrumental methods of analysis parameters in wine (spectrophotometry and HPLC);
Practical 3:	Monitoring of the fermentation (measuring the specific density of must);
V week	Quality evaluation of wine;
Practical 4:	Analysis of the fermentation process; Racking wine from the mark;
VI week	*Seminar paper I;*
VII week	Sensory evaluation characteristic of wine;
Practical 5:	Analyses of density of wine and content of alcohol - fast methods;
VIII week	The techniques of degustation of wine; the terms of the sensory evaluation of wine;
Practical 6:	Techniques of sensory evaluation assessment of wines (OIV official *method*) and *Buxbaum method;*
IX week	Legislation in the field of wine's quality control;
Practical 7:	Racking wine from the sediment, aeration and it's filling in the closed vessels;
X week	Technological procedures for basic operations in the preparation of wines and their impact to the quality of the wine;
Practical 8:	Analyses of density of wine and content of alcohol by using distillation unit and hydrostatic balance;
XI week	Treatment of wine during maturing and aging; Techniques of stabilization of wine;
Practical 9:	Spectrophotometric analysis of polyphenol compounds in wine;
XII week	Chemical changes in the wine during maturation and aging; Wine bottling;
Practical 10:	Interpretation parameters of the chemical and sensorial composition of wine;
XIII week	Wine cellars; Wine barrels ; Equipment and installations in the winery;
Practical 11	Visit wine cellar;
XIV week	Technique of microoxygenation wine, Storing wine in barrels bariqque;
Practical 12	Second racking wine from the sediment;
XV week	*Seminar paper II;*
XVI week	*Final exam;*
End week	Verification of semester and enrollment of grade;
XVIII-XXI week	Additional lessons and extra examination session.

Student obligation

Weekly	***In semester***
5 credits x 40/30= 6 hours and 40 min **Structure:** - 3 hours of teaching - 2 hours of practical work including colloquiums - 2 hours and 40 min of individual work	Teaching and the final exam: (6 hours and 40 min) x 16 = 160 hours and 40 min Preparation before the beginning of the semester: 2x(6 hours and 40 min) = 13 hours and 20 min Total work hours for the course: 5 x 30 = 150 hours Additional hours for preparing of examines in additional examination's period 0-30 hours Structure: 106 hours and 40 min. (lectures), 13 hours and 20 min. (preparation) and 32 hours (additional work)

Literature:

1. M. Daničić (1988): Tehnologija vina – Praktikum, Poljoprivredni fakultet Beograd – Zemun;
2. B. W. Zoecklein, K. C. Fugelsang, B. H. Gump, F. S. Nury, (1995): Wine Analysis and Production, The Chapman-Hall Enology Library, New York.;
3. T. Košmarel, Milica Kač (2003): Osnovne kemijske analize mošta i vina; Laboratorijske vežbe za predmet Tehnologija vina, Biotehnički falultet, Univerzitet u Ljubljani;
4. P. Ribereau-Gayon et al (2000)., Handbook of enology, Vo1 2. The Chemistry and wine stabilization and treatments, Chapman&Hall; Dunod, Paris;
5. V. Radovanović (1986): Tehnologija vina, Građevinska knjiga, Beograd.; .

T**he forms of knowledge testing and grading:**

- Class attendance: 3 points
- Colloquiums 2x20 40 points
- Attendance at practices 3 points
- Seminar 5 points
- Final exam 49 points

Passing grade gets after cumulative collect at least 51 points.

Teacher, which gave information: Prof. Dr Radmila Pajović-Šćepanović

Special remarks for the course: The teaching is organized in their native language with the help of audio-visual devices

Note:

Learning outcomes:

The students have demonstrated the ability to:

Being familiar with procedure of preparation red wines in the winery;
Analyze the parameters of the chemical composition of crushed grape/must;
Analyze the process of fermentation;
Analyze the parameters of the chemical composition of wine (classical - reference methods and fast methods in cellar);
Analyze the sensory properties of wine;
Organize technological process of producing white and red wines
Organize technological process during the treatment, care, storage and aging of wine.

Course: **Fruit tree and grapevine diseases**		
Semester	ECTS	Teaching hours
II	**6**	**3L + 2P**

Master academic studies: Plant production – Plant protection

Course description

The aim of the course is to enable students to adopt scientific knowledge about the most important fruit tree and grapevine diseases, their distribution and economic importance, main symptoms, causal agents, pathogenesis and spread of the disease, in relation with possible protection measures.

Learning outcomes

After passing the exam, the student will acquire knowledge that allows him to:

- define the role and significance of diseases in the cultivation of fruit trees and vine
- recognize symptoms of the most significant diseases of fruit trees and grapevine
- describe the disease distribution and harmfulness, symptoms, pathogen characteristics, life cycle development and possible control measures in the most significant diseases of pome and stone fruits, berries, nuts, subtropical fruits, diseases caused by polifagous pathogens and diseases of grapevine
- choose the most adequate control measures of pathogens in fruit and vineyard production.

Lecturer: Prof. Jelena Latinović, PhD

Learning methods: Lectures, Laboratory practice, Field work, Seminars

Weekly class schedule

I week	Lectures	Introduction to fruit tree and grapevine diseases
	Practicum	Lab exercise: basic characteristics of fruit and grape pathogens
II week	Lectures	Introduction to fruit tree and grapevine diseases
	Practicum	Lab exercise: basic characteristics of fruit and grape pathogens
III week	Lectures	Pome fruit diseases
	Practicum	Recognizing the symptoms of diseased plants
IV week	Lectures	Pome fruit diseases
	Practicum	Observation on herbarized material
V week	Lectures	Pome fruit diseases, Stone fruit diseases
	Practicum	Laboratory exercises: microscopy
VI week	Lectures	Stone fruit diseases
	Practicum	Recognizing the symptoms of diseased plants
VII week	Lectures	Stone fruit diseases
	Practicum	Observation on herbarized material
VIII week	Lectures	Stone fruit diseases
	Practicum	Laboratory exercises: microscopy
IX week	Lectures	Small fruit diseases
	Practicum	Recognizing the symptoms of diseased plants
X week	Lectures	Small fruit diseases
	Practicum	Observation on herbarized material
XI week	Lectures	Nut tree diseases
	Practicum	Laboratory exercises: microscopy
XII week	Lectures	Grapevine diseases
	Practicum	Field practice
XIII week	Lectures	Grapevine diseases; Diseases of subtropical plants
	Practicum	Sample processing and microscopy
XIV week	Lectures	Diseases of subtropical plants
	Practicum	Recognizing the symptoms of diseased plants
XV week	Lectures	Diseases caused by polifagous pathogens
	Practicum	Observation on herbarized material

Literature: Compendium of pome fruit diseases, Compendium of stone fruit diseases, Compendium of small fruit diseases, Compendium of grapevine diseases. American Phytopathological Society, USA. Material from Internet; Lecture presentations.

Forms of knowledge assessment and grading:

Activities in lectures and exercises: 5 points
Seminar paper: 5 points
Two colloquia: 40 points
Final exam: 50 points
A passing grade is obtained if at least 50 points are accumulated cumulatively

Grading	A	B	C	D	E
Number of points	90-100	80-89	70-79	60-69	50-59

Data prepared by: Prof. dr Jelena Latinović

	Tittle of the course: **INSECTS VECTORS OF PLANT PATHOGENS**			
Module code	***Status of the module***	***Semester***	***ECTS***	***Fund of hours***
	Compulsory	**II**	**4**	**2P +1L**

Study program for which is organized: Academic master studies: **PLANT PROTECTION** (studies lasts 4 semesters, 120 ECTS credits)		
Conditionality of other courses: No		
Aims of the course*:* The aim of the course is students to cope and understand the most important groups of insects vectors of plant pathogens (aphids, cicadas, thrips and other insect species) and the morphology and anatomy of vectors of plant pathogens (viruses, phytoplasmas, bacteria, fungi), modes of viral, phytoplasmatic, bacterial and fungal transmission and control measures applying against vector species		
Learning outcomes: After the student passes this exam will be able to: - Recignize the role of insect vectors and recognize vectors of plant pathogens - Recognize and connects the symptoms of damage with the appearance of a certain disease - Acquire knowledge and skills in terms of monitoring of vectors of plant pathogens - Understand the mechanisms/modes of transmission of plant pathogens by different insect species - Understand laboratory methods used in the identification of various plant pathogens transmitted by vector species - Apply appropriate control measures to prevent the spread of certain diseases		
Name and surname of the reacher and assistant: prof. dr Sanja Radonjić		
Teaching methods used: Lecture, practical work, independent/group student work, consultations		
***PLAN*:**		
Weeks		
I week	Lecture	Introductory remarks. Systematics and the main characteristisc of vestors of plant pathodgens
	Practical work/exerecise	Systematic place of insects vectors of plant pathogens
II nedjelja	Lecture	Aphids (Aphididae) – vectors of plant pathogens
	Practical work/exerecise	Morphology and anatomy characteristics of aphids
III nedjelja	Lecture	Whiteflies (Aleyrodidae) - vectors of plant pathogens
	Practical work/exerecise	Morphology and anatomy characteristics of whiteflies
IV nedjelja	Lecture	Leafhoppers and planthoppers – vectors of plant pathogens
	Practical work/exerecise	Morphology and anatomy characteristics of leafhoppers and planthoppers
V nedjelja	Lecture	Psyllids (Hemiptera, Psylloidea) and thrips (Thysanoptera) – vectors of plant pathogens
	Practical work/exerecise	Morphology and anatomy characteristics of psyllids and thrips
VI nedjelja	Lecture	Psyllids (Hemiptera, Psylloidea) and thrips (Thysanoptera) – vectors of plant pathogens
	Practical work/exerecise	Colloquium I
VII nedjelja	Lecture	Other insects vectors of plant pathogens
	Practical work/exerecise	Presentation of independent/group students work
VIII nedjelja	Lecture	Colloquium I - correctional
	Practical work/exerecise	Methods of collecting and growing vector insects in the laboratory..

IX nedjelja	Lecture	Plant viruses
	Practical work/exerecise	Rearing of aphids, whiteflies and thrips colony
X nedjelja	Lecture	Phytoplasmas
	Practical work/exerecise	Rearing of aphids, whiteflies and thrips colony
XI nedjelja	Lecture	Phytopathogenic bacteria and fungi
	Practical work/exerecise	Independent/group students work
XII nedjelja	Lecture	Transmission of plant pathogens by aphids, whiteflies, leafhoppers, planthoppers, psyllids, thrips
	Practical work/exerecise	Independent/group students work
XIII nedjelja	Lecture	Transmission of plant pathogens by aphids, whiteflies, leafhoppers, planthoppers, psyllids, thrips
	Practical work/exerecise	Independent/group students work
XIV nedjelja	Lecture	Molecular techniques used in identification and diagnosis of plant disease transmitted by vectors
	Practical work/exerecise	Molecular techniques - introduction
XV nedjelja	Lecture	Molecular techniques used in identification and diagnosis of plant disease transmitted by vectors
	Practical work/exerecise	Molecular techniques - introduction

***Student obligations during the semester**: Students are required to attend classes, complete all exercises, to present independent/gruoup work, required - colloquia and the final exam.*

Consultations: In accordance with students

STUDENT WORKLOAD

weekly:	**in semester:**
4 credits x 40/30 = 5 hrs and 20 min. **Structure:** 2 hrs lecturers 1 hrs exerecise 2 hrs and 20 min. individual mwork of students (preparations for exerecise including consultations)	Teaching and final exam: (5 hrs and 20 min.) x 16 = 85 hrs and 20 min. Necessary preparation before the beginning of the semester (administration, enrollment, certification): 2x (5 hrs and 20 min.) = 10 hrs and 40 min. Total load for the course: 4x 30 =120 hrs Additional work for exam preparation in the remedial period (0 – 24 hrs) Load structure: 85 hrs and 20 min. (teaching) + 10 hrs and 40 min. (preparation) + 24 hrs (additional work)

Literature: Chapman R. F. (1998): The Insects, Structure and Function. Cambridge, University Press.; Blackman, R.L., Eastop, V.F. (2000): Aphids on the world's crops. An identification guide. A Wiley – interscience publication; Maramorosch, K., Harris, K (1979): Leafhopper Vectors and Plant Disease agents. Academic press, INC. New York; Cravedi, P., Mazzoni, E., Pasqualini, G., Pellizzari, G., Rapisarda, C., Russo, A., Suma, P., Tranfaglia, A. (2008): Psille, cocciniglie e aleirodidi- fruttiferi, agrumi, vite, olivo e otricole.Bayer Crop Science. Edizioni L'Informatore Agrario; Lewis, T. (1997): Thrips as Crop Pests. CABI;

Forms of knowledge assessment and grading:

Activity during teaching and ecerecise: 5 points
Colloquium: 30
Final exam: 65

***Marks and grading*: A** (≥ 90 - 100 points); **B** (≥ 80 - < 90); **C** (≥ 70 - < 80); **D** (≥ 60 - < 70); **E** (≥ 50 - < 60); **F**< od 50

Course code	Course title : **Microbiology**			
	Subject Status	Semester	ECTS credits	Number of hours
	Obligatory	II	5	3P + 1L

Study program is organized: at undergraduate academic study programme Plant Production		
Prerequisites other subjects (recommendation): There are no requirements for reporting and lecture of this course		
Course aims: introduction of students to morphology, physiology, ecology, systematics of microorganisms and microorganisms in envoronment.		
The name of teacher and assistant: assis.prof Igor Pajović		
Method of Teaching: Lectures, seminars, consultations, colloquiums and final exam.		
WORK PLAN**:**		
Week and date		
Preliminary weeks		Preparation and semester enrollment
I Week	Lecture	Subject, significance and historical development of microbiology
	Exercises	Microbiological laboratory, types of laboratories and required space
II Week	Lecture	Morphology of microorganisms
	Exercises	Description of job place and jobs in the microbiological laboratory
III Week	Lecture	Ecology of microorganisms
	Exercises	Instructions for work in the microbiological laboratory
IV Week	Lecture	Metabolism of microorganisms
	Exercises	Microbiological utensils and equipment for microbiological laboratory
V Week	Lecture	Growth, reproduction and movement of microorganisms
	Exercises	Laboratory apparatus
VI Week	Lecture	Colloquium I
	Exercises	Test 1
VII Week	Lecture	Corrective Colloquium I
	Exercises	Corrective Test 1
VIII Week	Lecture	Microorganisms with special characteristics (Energy groups of microorganisms)
	Exercises	Sterilization and Pasteurization
IX Week	Lecture**.**	Pathogenicity of microorganisms
	Exercises	Nutritious substrates
X Week	Lecture	The role and distribution of microorganisms in nature
	Exercises	Cultivation of microorganisms on nutrient media
XI Week	Lecture	Genetics of microorganisms (variability of microorganisms)
	Exercises	Microscope
XII Week	Lecture	Basic characteristics of systematic groups of microorganisms
	Exercises	Microscopy technique and making microbiological preparations
XIII Week	Lecture	Colloquium II
	Exercises	Test 2
XIV Week	Lecture	Corrective Colloquium II
	Exercises	Corrective Test 2
XV	Lecture	Final Exam
	Exercises	
XVI		Semester verification
XVII-		Additional classes
XVIII-XXI-		Corrective Final Examination

Consultations: 2 hours during the week

Load students in hours:

A week	***During the semester***:
5 x 40/30 = 6 hours 40 min. **Structure:** 2 hours lectures 2 hours exercises and laboratory 2 hours and 40 minutes individual work of student (preparation for exercises, seminar work) including consultation	Teaching and the final exam**:** 6 h 40 min x 16 = 106 h 40 min. Necessary preparation (before semester administration, enrollment and verification)**:** 2 x 6 h 40 min = 13 h 20 min Total hours for the course: 5 x 30 = 150 hours Additional work to prepare the corrective final exam, including the exam taking 0 – 30 hours Structure: 106 h 40 min (teaching) + 13 h 20 min (preparation) + 30 h (additional work)

State of student during course: Students are required to attend lectures and exercises, seminar work, both tests and final exam.

Recommended literature:

1. Mirjana Jarak, Govedarica Mitar (2000): Mikrobiologija. Poljoprivredni fakultet Novi Sad.
2. Mirjana Bojanić Rašović (2020): Mikrobiologija za studente animalne proizvodnje, Univerzite Crne Gore.

***Additional literature*:**

3. Mirjana Jarak, Simonida Đuric (2004): Praktikum iz Mikrobiologije. Poljoprivredni fakultet Novi Sad.

Forms of assessment and evaluation:

homeworks _____ 10 points
two tests _____ 5 points each (in total 10 points)
tvo colloquiums _____ 15 points each (in total 30 points)
final exam_____ 50 points
Passing grade is obtained if the cumulative accumulates at least 51 points.

Learning outcomes:

After completing lectures, exercises and the exam student will be able to recognize and know:
1. microbiological scientific disciplines and their subdivisions
2. different types of microorganisms
3. morphological, physiological and ecological characteristics of microorganisms
4. the role and distribution of microorganisms in nature
5. the way of infection in plants and the ways of transmitting microorganisms by species
6. parts of the microbiological laboratory, the purpose of laboratory equipment and apparatus
7. microscopy techniques

Teacher who provided the information*:* assistant professor Igor Pajović
e-mail: pajovicb.igor@gmail.com*; igorp@ucg.ac.me*

Course title: *NEMATOLOGY*				
Course code	Subject Status	Semester	ECTS credits	Number of hours
291108133	Obligatory	***II***	***3***	***2P+1V***

INFORMATION FOR STUDENTS AND WORK PLAN

Study program is organized: Specialists studies in agriculture. Study program **Plant Production**, field of study **Plant Protection** (duration 2 semesters, 60 ECTS credits, after completing undergraduate studies during 3 years and 180 ECTS credits)		
Prerequisites other subjects (recommendation): There are no requirements for reporting and lecture of this course		
Course aims: The aim of the course is to familiarize students with the morphology, anatomy, ecology, relations with vectors and systematic of nematodes. Teaching the skills of identifying types and symptoms of damage created by nematodes, in order to enable students to make a decision about plant protection.		
The name of teacher and assistant: dr Igor Pajović		
Method of Teaching: Lectures, seminars, consultations, colloquiums and final exam.		
WORK PLAN		
Week and date	Synopsis of lectures (L), exercise (V); Planned form of Assessment (MA: homework, colloquiums, tests)	
Preliminary weeks		Preparation and semester enrollment
I Week	Lecture	Introduction to Nematology, classification and systematization of nematodes
	Exercises	Introduction to nematological laboratory, usage of various taxonomies of nematodes
II Week	Lecture	Morphology and anatomy of nematodes
	Exercises	Microscopy of nematodes, basics
III Week	Lecture	The relationship between nematodes and other living beings (parasitism, phytoparasitism, antagonists, nematophags, predators, vectors of viruses ...); Relationship with vectors; Ecology of nematodes
	Exercises	Demonstration symptoms of nematode attacks on other living beings
IV Week	Lecture	Characteristics of the most important groups, queues, families and genera of phytoparasitic nematodes
	Exercises	Microscopy nematodes in order to distinguish the most important groups of nematodes, advanced
V Week	Lecture	Working techniques with nematodes
	Exercises	The systems of fieldwork with nematodes, sampling
VI Week	Lecture	Working techniques with nematodes, Colloquium I
	Exercises	The systems of fieldwork with nematodes, processing the samples
VII Week	Lecture	Nematodes in orchards and vineyards
	Exercises	Demonstration microscopy - nematodes sampled on fruit trees and vineyards
VIII Week	Lecture	Nematodes on crops
	Exercises	Demonstration microscopy - nematodes sampled on field crops
IX Week	Lecture.	Nematodes of potato plants
	Exercises	Demonstration microscopy - nematodes sampled on potatoes plants
X Week	Lecture	Nematodes on vegetable crops
	Exercises	Demonstration microscopy - nematodes sampled on vegetable crops
XI Week	Lecture	Nematodes in greenhouses I
	Exercises	Demonstration microscopy - nematodes sampled from greenhouses
XII Week	Lecture	Nematodes in greenhouses II, Colloquium II
	Exercises	Demonstration microscopy - nematodes sampled from greenhouses
XIII Week	Lecture	Nematodes on tobacco, ornamental plants and in forests
	Exercises	Demonstration microscopy - nematodes sampled on tobacco, ornamental and forest plants

XIV Week	Lecture	Possibilities of protection against nematodes
	Exercises	Methods of protection from nematodes
XV	Lecture	Possibilities of protection against nematodes
XVI		Final exam
XVII-		Verification of semester and enrollment rating
XVIII-XXI-		Additional lessons, correction of exam period

Responsibilities of students during teaching: the presence of lectures and exercises, doing the homework, tests, seminar paper

Consultations: 2 hours during the week

Load students in hours:

A week: 3 x 40/30=4 hours Structure: 2 hours of lectures 1 hour of exercises 1 hour of individual work of student (preparation for exercises, seminar work) including consultation	***During the semester***: Teaching and the final exam: 4 hours x 16 = 64 hours. Necessary preparation (before semester administration, enrollment and verification): 2 x 4 hours = 8 hours. Total hours for the course: 3 x 30 = 90 hours. Additional work to prepare the corrective final exam, including the exam taking 0-18 hours Structure: 64 hours (teaching) + 8 hours (preparation) + 18 hours (additional work)

State of student during course: Students are required to attend lectures and exercises, seminar work, both tests and final exam.

Recommended literature:

1. Krnjajić Đ. i Krnjajić S. (1987). Fitonematologija.
2. Jama N. (1983). Nematofauna nekih povrtarskih kultura gajenih u zaštićenom prostoru.

***Additional literature*:**

3. Barker K.B., C.C. Carter and Sasser, J.N. (1985). An Advanced Treatise on Meloidogyne: Volume I i II.
4. s'Jacob J.J. and Bezooijen J.V., (1977). A manual for practical work in nematology.

Special remarks for the course:

Teaching (P + V) is performed for a group of 30 students.

Forms of assessment and evaluation:

seminar_____ 10 points
two colloquiums _____ 20 points each (in total 40 points)
final exam_____ 50 points
Passing grade is obtained if the cumulative accumulates at least 51 points.

Learning outcomes:

After completing lectures, exercises and the exam student will be able to:
1. Understand morphological and anatomic structure of nematodes;
2. Explain relation between nematodes and other living creatures, above all vectors;
3. To determinate most important nematodes pests;
4. To use knowledge in plant protection and prevention on nematodes;
5. Use chemical plant protection measures on nematodes.

Teacher who provided the information*:* assistant professor Igor Pajović
e-mail: pajovicb.igor@gmail.com

	Tittle of the module: **OLIVE GROWING AND OLIVE OIL TECHNOLOGY**			
Module code	Status of the module	Semester	No. of ECTS	Fund of hours
	Compulsory	II	5	3+1

Study program for which is organized: Master studies in Agriculture Field: Fruit growing and viticulture (studes last 4 semesters, 120 ECTS).	
Conditionality of other modules: No	
Aims of the module: Introduce the students with conditions, agro and pomotechnics for temporary olive growing, conditions for the production of good olive oil, and evaluation of its quality.	
Name and surname of the reacher and assistant: Prof. Dr. Biljana Lazović, Dr. Mirjana Adakalić	
Teaching methods used: Lecture, practical work, field excursions, colloquia, and final exam.	
Module content:	
I week	Botanical affiliation and history of olive cultivation globally and in our country, Biology and morphology
II week	Assortment of olives, the most important varieties grown in the world, Assortment of olives of Montenegro
III week	Ecological conditions for olive cultivation, Fertility, Ripening, Specifics of olive propagation
IV week	Establishing new plantations, choosing a place for planting, choosing varieties, planting
V week	Plantation maintenance; Harvesting of olives, table varieties, and oil varieties **Colloquium** I
VI week	Pruning of olives (cultivation forms, young plant, genus, regenerative) ***Test I***
VII week	Olive oil throughout history, production in the world and in our country; Factors affecting the quality
VIII week	Influence of variety on olive oil quality, ripening, harvesting, transport, and storage of fruit until processing
IX week	Fruit processing: grinding, mixing, phase separation; different processing systems
X week	Oil storage, oil packaging, cleaning, and maintenance of processing plants
XI week	Secondary olive processing products, Biomass, Composition, and characteristics of olive oil
XII week	Analysis and classification of olive oil, quality standards
XIII week	Chemical analysis of olive oil (purity, origin)
XIV week	Sensorial analysis of olive oil **Colloquium** *II*
XV week	Marketing, labeling, protection of origin; olive oil and health ***Test** 2*
XVI week	Final exam
Closing week	Semester verification and grade entry
XVIII-XXI week	Additional classes and remedial exam

STUDENT WORKLOAD	
Weekly	During the semester
5 credits x 40/30= 6 hours and 40‘ Structure: - 3 hours of lecturing - 1 hour of practical work - 2 hours and 40‘ individual work of student involving consultations	Teaching and final exam: (6 hours and 40 minutes) x 16 = 106 hours and 40 minutes Necessary preparation before the beginning of the semester (administration, enrollment, certification) 2 x (6h and 40 ') = 13 hours and 20 min. Total load for the subject: 5 x 30 = 150 hours Additional work for exam preparation in the remedial period (up to 30 hours) Load structure: 106 hours and 40 min. (teaching) + 13 hours and 20 min (preparation) +30 hours (additional work)

Literature: K. Miranović (2006): Maslina, Pobjeda, 1-520, Podgorica; I. Kovačić, S. Perica, (1994): Suvremeno maslinarstvo, Dalmacija papir, 1-114, Split; IOOC (1989): Olive pruning, 1-111, Madrid; Barranco: (2002): El Coltivo del Olivo, Madrid; B. Škarica, I. Žužić, M. Bonifačić (1996): Maslina i maslinovo ulje visoke kakvoće u Hrvatskoj, Tisak; O. Koprivnjak (2006): Djevičansko maslinovo ulje, MIH d.o.o., Poreč

Forms of knowledge assessment and grading:

- Attendance: 5 points
- Test: (8 + 7) 15 points
- Colloquium: (2 x 15) 30 points
- Final exam: 50 points

A passing grade is obtained when at least 50 points are collected

Learning outcomes: After passing the exam, the student: Know the history, distribution and importance of olive growing globally and in our country; Can describe the ways and the basic requirements for olive growing according to environmental conditions; Can explain the way of establishing olive groves and the application of agro-technical measures, propagation, pruning, specifics of harvest; He is able to use a descriptor to describe varietal characteristics, to assess the degree of fruit maturity and to determine the moment of harvest; Knows the process of producing olive oil and the factors that affect its quality; Can recognize quality olive oil and distinguish

oils positive and negative attributes; Knows the factors that affect the conditions required for storing olive oil; He is trained for teamwork, critical thinking, knowledge presentation, and teaching evaluation.

Course: **Phytopharmacy**		
Semester	ECTS	Teaching hours
V	**5**	**3L + 1P**

Basic undergraduate academic studies: Plant production (6 semester, 180 ECTS)

Course description

Introducing students to the basic concepts of pesticides, as well as issues related to their application, movement in the environment and the legal basis related to pesticides trade. Also, introduction to pesticide active substances that are on the list of permitted for use in agriculture and other areas. The aim of the course is to instruct students on personal and collective protection in the application of pesticides, as well as measures to be taken in case of their inadequate application.

Learning outcomes

After passing the exam, the student will acquire knowledge that allows him to:

- Define different groups of pesticides with special reference to plant protection products
- Know the physical and chemical properties of pesticides and the formulations that are applied
- Describe the mechanisms of pesticides action and all the basic groups of fungicides, insecticides and herbicides and active substances that are classified by groups
- acquire knowledge on the basic regulations related to plant protection products in the European Union and Montenegro
- Choose protective equipment for working with pesticides and know their impact on human health and the environment
- Calculate the dose and concentration of applied fungicides, insecticides and herbicides

Lecturer: Prof. Nedeljko Latinović, PhD

Learning methods: Lectures, Laboratory practice, Field work, Seminars

Weekly class schedule

I week	Lectures	Introduction. Areas of pesticides application. Plant protection products. Control of vector-borne diseases
	Practicum	Instructions for the application of plant protection products
II week	Lectures	Classification and nomenclature of pesticides
	Practicum	Calculation of water consumption for treatment
III week	Lectures	Physical and chemical properties of pesticides
	Practicum	Dose and concentration calculation
IV week	Lectures	Forms of pesticide formulation. Integrated plant protection
	Practicum	Organizing the treatment of field crops
V week	Lectures	Mode of action of pesticides
	Practicum	Organizing the treatment of vegetable crops
VI week	Lectures	Mode of action of pesticides
	Practicum	Organizing the treatment of vegetable crops
VII week	Lectures	Fungicides
	Practicum	Organizing orchard treatment
VIII week	Lectures	Fungicides, bactericides
	Practicum	Organizing orchard treatment
IX week	Lectures	Zoocides
	Practicum	Organizing vineyard treatment
X week	Lectures	Zoocides. Plant protection products in organic agriculture. Pesticides and bees
	Practicum	Use of protective equipment
XI week	Lectures	Herbicides
	Practicum	Handling of devices for application of plant protection products
XII week	Lectures	Herbicides
	Practicum	Field practice
XIII week	Lectures	Legal bases of production, trade and application of pesticides
	Practicum	Legislation in the field of plant protection products
XIV week	Lectures	Pre-harvest interval. MRL. Consequences of pesticide application.
	Practicum	Field practice

XV week	Lectures	Pesticide toxicology and first aid.
	Practicum	Field practice

Literature: Matthews, G. (2016): Pesticides – Health, Safety and the Environment (sec. ed.). Wiley Blackwel, UK; O'Connor-Marer, P.J (2000): The Safe and Effective Use of Pesticides. University of California, Oakland, California; Material from Internet; Lectures presentation.

Forms of knowledge assessment and grading:

Activities in lectures and exercises: 5 points
Seminar paper: 5 points
Two colloquia: 40 points
Final exam: 50 points
A passing grade is obtained if at least 50 points are accumulated cumulatively

Grading	A	B	C	D	E
Number of points	90-100	80-89	70-79	60-69	50-59

Data prepared by Prof. dr Nedeljko Latinović

	Course title**: PLANT GENETIC RESOURCES**			
Course code	Subject Status	Semester	ECTS credits	Number of hours
291106100	**Obligatory**	**II**	**4**	**3L + 1E**

The course is organized for: Academic basic studies of agriculture, Stady program Crop production (studies last for 6 semesters, 18 ECTS credits)		
Prerequisites: No prerequisites required		
Course aims: The cours aims to provide students with knowledge about the importance of biodiversity and agro-biodiversity as its most important component, as well as introduce students to the possibility and the need for conservation and sustainable use of plant genetic resources for food and agriculture		
The name of the teacher and assistant: Prof. Dr. Zoran Jovović		
Teaching method: Lectures, exercises, laboratory exercises, field activities, seminar papers, consultations and others.		
WORK PLAN:		
Preparatory weeks		Preparation and semester enrollment
Week 1	Lectures	Introductory remarks; Biodiversity; The importance of agro-biodiversity
	Exercises	Inventory and collection of plant genetic resources
Week 2	Lectures	Basic data on Montenegrin agriculture
	Exercises	Conservation of the collected plant material
Week 3	Lectures	State of plant genetic resources in Montenegro; The existing collection
	Exercises	Regeneration of the deposited plant material
Week 4	Lectures	Legislation and other relevant documents related to plant genetic resources
	Exercises	Laboratory exercises
Week 5	Lectures	COLLOQUIUM 1
	Exercises	Laboratory exercises
Week 6	Lectures	The program on conservation of plant genetic resources in agriculture
	Exercises	Laboratory exercises
Week 7	Lectures	Inventory and collection of plant genetic resources; Passport data
	Exercises	TEST 1
Week 8	Lectures	Plant Gene Bank
	Exercises	Characterization and evaluation of conserved samples
Week 9	Lectures	*In situ* conservation; *On farm* conservation
	Exercises	Assessment of agronomic traits
Week 10	Lectures	COLLOQUIUM 2
	Exercises	Montenegrin plant gene bank - a system of functioning
Week 11	Lectures	*Ex situ* conservation
	Exercises	Field collection of plant genes
Week 12	Lectures	Characterization and evaluation of accessions by applying modern methods; Descriptors
	Exercises	*On farm* conservation
Week 13	Lectures	Information and documentation system; Database
	Exercises	Documentation
Week 14	Lectures	Sustainable use of genetic resources for food and agriculture
	Exercises	Database
Week 15	Lectures	Strengthening the public awareness about the importance of preserving agro-biodiversity; National and international organizations involved in the conservation and sustainable use of genetic resources for food and agriculture
	Exercises	TEST 2
Week 16		FINAL EXAM
Week 17		Semester verification and enrollment rating
Weeks 18-21		Additional lessons and corrective exam

Obligations of students during classes:	Students are required to attend classes and all other planned activities and actively participate in making set tasks within the group

Student workload in hours:

Weekly:	**During the semester:**
6 credits x 40/30 = 8 hours Structure: 2 hours of lectures, 1 hour of exercises and 5 hours of student work including consultations	Teaching and the final exam: 8 hours x 16 = 128 hours Necessary preparation (before semester administration, enrollment and verification)**:** 2 x 8 hours = 16 hours Total hours for the course: 6 x 30 = 180 hours Additional work: 36 hours Structure: 128 hours (lectures) + 16 hours (preparation) + 36 hours (additional work)

Recommended literature:

- Salgotra, R.K. and Zargar, S.M. (2020): Rediscovery of Genetic and Genomic Resources for Future Food Security, Springer
- Salgotra, R.K. and Gupta, B.B. (2016): Plant Genetic Resources and Traditional Knowledge for Food Security. Springer
- M. Penčić (2005): *Biljni genetički resursi* (izabrani radovi), Beograd
- Z. Jovović, D. Stešević, V. Meglič, P. Dolničar (2013): *Old potato varieties in Montenegro*. University of Montenegro, Biotechnical faculty Podgorica
- FAO (2012): *Conservation and sustainable use under the International treaty*, Rome
- FAO (2010): *The second report on The state of the world's plant genetic resources for food and agriculture*, Rome

Additional literature:

- N. Maxted, M. Ehsan Dulloo, B.V. Ford-Lloyd, L. Frese, J. Irionado, M.A.A. Pinheirode Carvalho (2011): *Agrobiodiversity conservation, securing the diversity of crop wild relatives and landraces*, CABI, UK, CABI, USA
- L. Glowaka, F. Burhenne-Guilmin, H. Synge (1994): *A guide to the convention on biological diversity,* IUCN, Gland, Switzerland and Cambridge, UK

Knowledge testing and grading:

- Presence 5 points
- Colloquium 2 x 15, total 30 points
- Test 10 points
- Seminar paper 15 points
- Final exam 40 points

The student passed the exam if cumulatively collected 50 points

Learning outcomes:

After successfully passing the exam student will be able to:

- recognize the importance of biodiversity and the potential that Montenegro has in this area
- understand the impact of agricultural production on biodiversity
- apply knowledge in the field of management, access and sustainable use of plant genetic
- understand the functioning of the system of plant gene bank
- to contribute to raising the public awareness about the importance of plant genetic resources
- contribute to their conservation and sustainable use

Teacher who provided the information: Prof. Dr. Zoran Jovović
e-mail: zoran.jovovic.btf@gmail.com

Course: **Plant Pathology**		
Semester	ECTS	Teaching hours
V	**6**	**4L + 1P**

Basic undergraduate academic studies: Plant production (6 semester, 180 ECTS)

Course description

The aim of the course is to enable students to adopt scientific knowledge about plant diseases, mechanism of their genesis, causal agents, interaction of causal agents, host plants and environmental conditions, as well as on the distribution and economic significance, symptoms, morphological description of pathogens, life cycle development, hosts and possible control measures of the most important diseases of cultivated plants.

Learning outcomes

After passing the exam, the student will acquire knowledge that allows him to:

- distinguish the causes of plant diseases
- recognize the symptoms of the most significant diseases of agricultural crops
- describe the basic characteristics of plant disease agents
- explain the interaction of pathogens, host plants and environmental conditions
- describe the most important fungal, bacterial and viral diseases of cultivated plants, their causal agents, life cycle development and ways of their transmission
- list the control measures that can be applied in the protection of agricultural crops from the most significant diseases

Lecturer: Prof. Jelena Latinović, PhD

Learning methods: Lectures, Laboratory practice, Field work, Seminars

Weekly class schedule

I week	Lectures	Introduction, significance and causes of plant diseases
	Practicum	Introduction to work in the plant pathology laboratory - equipment
II week	Lectures	Non-parasitic, Parasitic diseases
	Practicum	Work in the plant pathology laboratory - nutrient media
III week	Lectures	Basic characteristics of plant disease causal agents
	Practicum	Work in the plant pathology laboratory - microscope and microscopy
IV week	Lectures	Symptomatology, Pathogenesis
	Practicum	Recognizing the symptoms of diseased plants
V week	Lectures	Epidemiology
	Practicum	Recognizing the symptoms of diseased plants
VI week	Lectures	Plant resistance to diseases, Control measures
	Practicum	Observation on herbarized material
VII week	Lectures	Mycoses: Classification of fungi, Kingdom of Protozoa, Kingdom of Chromista
	Practicum	Observation on herbarized material
VIII week	Lectures	Kingdom of Fungi: Division Chytridiomycota, Division Ascomycota
	Practicum	Laboratory exercises: microscopy
IX week	Lectures	Kingdom of Fungi: Division Ascomycota
	Practicum	Laboratory exercises: microscopy
X week	Lectures	Kingdom of Fungi: Division Ascomycota
	Practicum	Laboratory exercises: microscopy
XI week	Lectures	Kingdom of Fungi: Fungi Imperfecti
	Practicum	Laboratory exercises: microscopy
XII week	Lectures	Kingdom of Fungi: Fungi Imperfecti
	Practicum	Field practice
XIII week	Lectures	Kingdom of Fungi: Division Basidiomycota
	Practicum	Sample processing and microscopy
XIV week	Lectures	Plant bacteria and bacterial diseases, Parasitic flowering plants
	Practicum	Basic methods in the identification of plant pathogenic bacteria
XV week	Lectures	Plant viruses and viral plant diseases
	Practicum	Basic methods in the identification of plant pathogenic viruses

Literature: Agrios, G.N. (2005): Plant Pathology. Academic Press, USA. Material from Internet;

Lecture presentations.

Forms of knowledge assessment and grading:

Activities in lectures and exercises: 5 points
Seminar paper: 5 points
Two colloquia: 40 points
Final exam: 50 points
A passing grade is obtained if at least 50 points are accumulated cumulatively

Grading	A	B	C	D	E
Number of points	90-100	80-89	70-79	60-69	50-59

Data prepared by: Prof. dr Jelena Latinović

Course: PLANT PROTECTION PRODUCTS		
Semester	ECTS	Teaching hours
II	6	3L+2P

Master academic studies: Plant protection (4 semesters, 120 ECTS)

Course description

Introducing students to the areas of pesticides application and use of active substances in agricultural production and communal hygiene. During the lecture, chemical groups of pesticides with active substances, their mechanism of action and application will be discussed, with special emphasis on pesticides used in agriculture (plant protection products).

Learning outcomes

After passing the exam, the student will acquire knowledge that allows him to:

• Present the most important areas of pesticide application with special reference to plant protection products

• Select pesticides for application in non-agricultural areas

• Describe all chemical groups of plant protection products and active substances that are in these groups

• Apply all active substances in order to control harmful organisms in agriculture

Lecturer: Prof. Nedeljko Latinović, PhD

Learning methods: Lectures, Laboratory practice, Field work, Seminars

Weekly class schedule

I week	Lectures	Introduction, areas of pesticide application
	Practicum	Introduction to application of pesticides
II week	Lectures	Pesticides - biocides
	Practicum	Application of pesticides in communal hygiene
III week	Lectures	Pesticides - biocides; fungicides
	Practicum	Laboratory exercises: fungicides
IV week	Lectures	Fungicides
	Practicum	Laboratory exercises: fungicides, bactericides
V week	Lectures	Fungicides, bactericides
	Practicum	Laboratory exercises: bactericides
VI week	Lectures	Insecticides
	Practicum	Laboratory exercises: Insecticides
VII week	Lectures	Insecticides
	Practicum	Laboratory exercises: insecticides
VIII week	Lectures	Insecticides, nematocides
	Practicum	Laboratory exercises: Insecticides, nematocides
IX week	Lectures	Nematocides, molluscicides, repellents
	Practicum	Field practice
X week	Lectures	Rodenticides
	Practicum	Field practice
XI week	Lectures	Rodenticides, herbicides
	Practicum	Laboratory exercises: herbicides
XII week	Lectures	Herbicides
	Practicum	Laboratory exercises: herbicides
XIII week	Lectures	Herbicides
	Practicum	Field practice
XIV week	Lectures	Arboricides, desiccants, growth regulators
	Practicum	Field practice
XV week	Lectures	Pesticide application
	Practicum	Calculation of dose and concentration of various plant protection products

Literatura: MacBean, C. (2012): The Pesticide Manual: A World Compendium. British Crop Protection Council; Material from Internet; Lectures presentation.

Forms of knowledge assessment and grading:

Activities in lectures and exercises: 5 points
Seminar paper: 5 points
Two colloquia: 40 points
Final exam: 50 points

A passing grade is obtained if at least 50 points are accumulated cumulatively

Grading	A	B	C	D	E
Number of points	90-100	80-89	70-79	60-69	50-59

Data prepared by: Prof. dr Nedeljko Latinović

Course: PLANT PROTECTION TECHNOLOGY		
Semester	ECTS	Teaching hours
III	5	2L+2P

Master academic studies: Plant protection (4 semesters, 120 ECTS)

Course description

Introducing students to Integrated Pest Management programs for different agricultural crops, the application of plant protection products, as well as non-pesticide measures. The aim of the course is to acquire knowledge about the importance of certain control measures in the appropriate phenophases of crop development. In addition to the use of plant protection products in the plant protection from harmful organisms, the possibilities of agrotechnical and other measures in the protection of cultivated plants from diseases, pests and weeds will be presented.

Learning outcomes

After passing the exam, the student will acquire knowledge that allows him to:

- Select the most appropriate measures of integrated plant protection and assess the importance of their implementation,
- Organize protection of fruit trees and grapevine,
- Organizes protection of vegetables and field crops,
- Apply adequate protection measures in organic production.

Lecturer: Prof. Nedeljko Latinović, PhD

Learning methods: Lectures, Laboratory practice, Field work, Seminars

Weekly class schedule

I week	Lectures	Introduction, Integrated Pest Management
	Practicum	Introduction to Integrated Pest Management programs for different agricultural crops
II week	Lectures	Forecasting of diseases and pests
	Practicum	Introduction to the possibilities of forecasting the occurrence of harmful organisms
III week	Lectures	Development of a program for the pome fruit protection
	Practicum	Data processing and protection measures of fruit trees (practical application)
IV week	Lectures	Development of a program for the stone fruit protection
	Practicum	Field exercises
V week	Lectures	Development of a program for the nut trees protection
	Practicum	Data processing and protection measures of fruit trees (practical application)
VI week	Lectures	Development of a program for the small fruit protection
	Practicum	Data processing and protection measures (practical application)
VII week	Lectures	Development of a grapevine protection program
	Practicum	Data processing and grapevine protection measures (practical application)
VIII week	Lectures	Development of a program for the protection of subtropical fruit trees
	Practicum	Data processing and fruit protection measures (practical application)
IX week	Lectures	Development of potato protection program
	Practicum	Field exercises
X week	Lectures	Development of a program for the protection of field crops
	Practicum	Protection measures and organization of crop treatment
XI week	Lectures	Development of outdoor vegetable protection programs
	Practicum	Protection measures and organization of vegetable treatment
XII week	Lectures	Development of vegetable protection programs in open and protected areas
	Practicum	Protection measures and organization of vegetable treatment
XIII week	Lectures	Development of a program for the protection of vegetables
	Practicum	Field exercises
XIV week	Lectures	Development of a program for the protection of small crops
	Practicum	Protection measures (practical application)
XV week	Lectures	Development of protection programs in organic agriculture

	Practicum	Field exercises

Literatura*:* Strand, L.L. (1999): Integrated Pest Management for Stone Fruits. IPM handbook published by University of California; Ohlendorf, B.L.P. (1999): Integrated Pest Management for Apples and Pears (sec. ed.). IPM handbook published by University of California; Finckh, M. R., van Bruggen, A.H.C., Tamm, L. (2015): Plant Diseases and Their Management in Organic Agriculture; Wilcox, W.F. Gubler, W.D., Uyemoto, J. K. (2015): Compendium of Grape Diseases, Disorders, and Pests. American Phytopathological Society; Material from Internet; Lectures presentation.

Forms of knowledge assessment and grading:

Activities in lectures and exercises: 5 points
Seminar paper: 5 points
Two colloquia: 40 points
Final exam: 50 points
A passing grade is obtained if at least 50 points are accumulated cumulatively

Grading	A	B	C	D	E
Number of points	90-100	80-89	70-79	60-69	50-59

Data prepared by: Prof. dr Nedeljko Latinović

Course code	Course title : **URBAN ZOOLOGY**			
	Subject Status	Semester	ECTS credits	Number of hours
	Obligatory	I	4	2P + 1V + 1L

Study program is organized: at Master studies, Study program Plant Production, field of study Plant Protection (duration 4 semesters, 120 ECTS credits, after completing undergraduate studies during 3 years and 180 ECTS credits)		
Prerequisites other subjects (recommendation): There are no requirements for reporting and lecture of this course		
Course aims: Introducing students to the basics of zoology in urban areas. Enabling students to assess the state of diversity of animal species in urban areas, their impact on humans and domestic animals. Considering the anthropogenic impact on urban populations of different animal species in order to enable students to make a decision on the manner and time of their control using pesticidal and non-pesticidal pest control measures.		
The name of teacher and assistant: assis.prof Igor Pajović		
Method of Teaching: Lectures, seminars, consultations, colloquiums and final exam.		
WORK PLAN**:**		
Week and date		
Preliminary weeks		Preparation and semester enrollment
I Week	Lecture	Introduction to Urban zoology
	Exercises	Introduction to laboratory work, use of keys for determination
II Week	Lecture	The concept and characteristics of urban habitats
	Exercises	Field work techniques, sampling
III Week	Lecture	Characteristics of animal populations in urban habitats
	Exercises	Animal groups of importance for urban habitats: Protozoa, Plathelminthes, Nematodes
IV Week	Lecture	Causes and consequences of urban habitats by various animal species important in communal, medical and veterinary hygiene
	Exercises	Animal groups of importance for urban habitats: Annelida
V Week	Lecture	Vector species and their relationship to humans and other organisms in urban areas
	Exercises	Animal groups of importance for urban habitats: Arthropoda
VI Week	Lecture	Animals of importance in urban habitats from the Protozoa, Plathelminthes, Nematode and Annelida groups. Colloquium I
	Exercises	Animal groups of importance for urban habitats: Insecta
VII Week	Lecture	Animals of importance in urban habitats from the group Arthropoda I part
	Exercises	Animal groups of importance for urban habitats: Mollusca
VIII Week	Lecture	Animals of importance in urban habitats from the groups Arthropoda II part and Mollusca
	Exercises	Animal groups of importance for urban habitats: Pisces
IX Week	Lecture**.**	Animals of importance in urban habitats from the Pisces, Amphibia and Reptilia groups.
	Exercises	Animal groups of importance for urban habitats: Amphibia
X Week	Lecture	Animals of importance in urban habitats from the Aves group.
	Exercises	Animal groups of importance for urban habitats: Reptilia
XI Week	Lecture	Animals of importance in urban habitats from the group Mammalia II colloquium
	Exercises	Animal groups of importance for urban habitats: Aves
XII Week	Lecture	Monitoring of potential pests and vectors
	Exercises	Animal groups of importance for urban habitats: Mammalia
XIII Week	Lecture	Possibilities of non - pesticidal control of potential pests and vectors
	Exercises	Methods of application of non-pesticide protection measures
XIV Week	Lecture	Use of biocides and pesticides in communal, medical and veterinary hygiene
	Exercises	Methods of application of biocides and pesticides
XV	Lecture	Monitoring of protected species and maintenance of populations in urban areas
	Exercises	Planning and monitoring of pests, vectors and protected species
XVI		
XVII-		
XVIII-XXI-		

Consultations: 2 hours during the week

Load students in hours:

A week	***During the semester***:
5 x 40/30 = 6 hours 40 min. **Structure:** 2 hours lectures 2 hours exercises and laboratory 2 hours and 40 minutes individual work of student (preparation for exercises, seminar work) including consultation	Teaching and the final exam**:** 6 h 40 min x 16 = 106 h 40 min. Necessary preparation (before semester administration, enrollment and verification)**:** 2 x 6 h 40 min = 13 h 20 min Total hours for the course: 5 x 30 = 150 hours Additional work to prepare the corrective final exam, including the exam taking 0 – 30 hours Structure: 106 h 40 min (teaching) + 13 h 20 min (preparation) + 30 h (additional work)

State of student during course: Students are required to attend lectures and exercises, seminar work, both tests and final exam.

Recommended literature:

1. Robinson W.H. (2005): Urban Insects and Arachnids: A Handbook of Urban Entomology. Cambridge University Press.
2. Bonnefoy X., Kampen H., Sweeney K. (2008): Public Health Significance of Urban Pests. World Health Organization.

***Additional literature*:**

3. Hickman, Jr. C.P., Roberts, L.S., Keen, S.L., Larson, A., I'Anson, H., Eisenhour, D.J. (2008): Integrated Principles Of Zoology, 14th Ed. McGraw-Hill, New York, USA.
4. Rajković D. i Kostić D. (1995): Praktikum iz poljoprivredne zoologije. Univerzitet u Novom Sadu, Prirodno-matematički fakultet, Institut za biologiju, Novi Sad.

Forms of assessment and evaluation:

seminar_____ 10 points
two colloquiums _____ 20 points each (in total 40 points)
final exam_____ 50 points
Passing grade is obtained if the cumulative accumulates at least 51 points.

Learning outcomes:

After completing lectures, exercises and the exam student will be able to:
1. Uses theoretical and practical knowledge of zoology in urban areas
2. Evaluates the interactive impact of anthropogenic factors on populations of different animal species
3. Considers the risk to human and domestic animal health from vector animal species
4. Uses biocides and pesticides against vector species in communal, medical and veterinary hygiene
5. Uses the acquired knowledge in order to protect the environment from the communal-medical and veterinary aspect

Teacher who provided the information*:* assistant professor Igor Pajović
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