3OHK1O01 – Chemistry

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES *HORTICULTURE* |
| Table 5.2 Course specification |

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| Course: | *PRINCIPLES OF ECONOMICS* |
| Course id:3ОHК1002 |
| Number of ECTS:6 |
| Teacher:Exercises: | Radovan V. Pejanović, PhD, full professor, Danica M. Drakulić, PhD, full professorMirela J. Tomaš-Simin, Msc, Teaching Fellow, Danica B. Glavaš-Trbić, MSc, Research Assistant |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:3x15=45 | Practical classes:2x15=30 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

Introduce students to the fundamental principles of economic science. The course offers economic concepts, categories, processes and ways of thinking that apply to a modern market economy. |
| 1. Educational outcomes

Selected and key economic issues give students close interpretation of the principals of economic trends, economic developments and economic policy in general. In a theoretical frame and study of the economic concepts in the field of production, distribution and consumption of student acquires the necessary knowledge and guidance for the future economic life. |
| 1. Course content

*Lectures*On the concept and the importance of the economy. The basic components of production. Determinants of production. Enterprises and economic institutions. Economic factors (resources) of production. Specifics of agriculture and capital investment. The basic principles of economics. Principles of economics in agriculture. Markets and market relations. Pricing of goods and factors of production. Households and firms as market participants. The main economic issues and different economic systems. Money and monetary policy. The modern world development trends. Transition. Globalization.*Practical classes*The exercises are conducted through essays with the active participation of students in the discussion. Topics on exercises are adapted curriculum lectures. Some of the topics: Introductory categories of economics and basic concepts of economics, elements and mechanisms of classical and modern capitalist economy, the concept and history of money, basic production unit of social reproduction, market, market participants and market relations, multinational and transnational companies, Stock Exchange Operations, Crises in the economy, the causes and consequences of transition and privatization. Scientific-technical revolution and its impact on the world economy. |
| 1. Teaching methods

Theoretical and practical lecture are conducted in the classroom. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam | Yes | 50 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes | 5  |
| Essays | No | 10  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Pejanović Radovan | Principi ekonomije | Poljoprivredni fakultet, Novi Sad  | 2007 |
|  | Samuelson Pol | Ekonomija | Mate, Zagreb | 2000 |

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| Course: | *MICROBIOLOGY*  |
| Course id: 3OHK1O03 |
| Number of ECTS:6 |
| Teacher: | Ass. Prof. Simonida Djuric, PhD  |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:45 | Practical classes:30 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

To acquaint students with basic characteristics and strains of microorganisms and their role in the cycling of matter, the creation and maintenance of soil fertility, role in crop production and the possibilities of their application. |
| 1. Educational outcomes

Acquired knowledge in microbiology are the basis for understanding and monitoring teaching of agrochemicals, plant physiology, plant protection, general husbandry, farming, and forage crops |
| 1. Course content

Lectures:General part: Morphology of microorganisms. Ecology of microorganisms, systematic groups – viruses, bacteria, algae, protozoa, fungi, lichen. Microbial metabolism – absorption of nutrients, growth and reproduction, variability of microorganisms. Special part: Soil natural habitat for microorganisms. Diversity of microorganisms in soil. Relationships between microorganisms and between microorganisms, fauna and plants. Formation and composition of organic matter in soil. Microbial transformation of C, N, P, S, K, Fe and Mn. Microorganisms involved in synthesis and mineralization of humus. Effect of agrotechnical measures on microorganisms. Application of microorganisms in plant production. Biofertilizers, biopesticides, biostimants, bioremediation of soil.Practical classes:Microscopic techniques. Morphology and determination of protozoa, algae, fungi and bacteria. Methods for isolations and getting pure culture of microorganisms. Estimation of abundance and determination of microorganisms in soil. Microorganisms involved in cycles of N, C, F and S. Effect of pesticides on microorganisms. Characterization of microorganisms used in biopreparates production |
| 1. Teaching methods

Lectures and Practical classes, Consultations if needed. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | No |  | *Written part of the exam-tasks and theory* *Oral part of the exam* | YesYes | 3040 |
| Test | No |  |  |
| Exercise attendance | Yes | 2 - 10 |
| *Test* | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Prescott, L. M | Microbiology, 5th edition | 5th edition, McGraw Hill, NY | 2002 |
|  |  | Free Microbiology Books | http://www.wsmicrobiology.com/alcamos-fundamentals-of-microbiology/ | 2014 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES *Horticulture* |
| Table 5.2 Course specification |

3OHK1O04 – Meteorology

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES *Horticulture* |
| Table 5.2 Course specification |

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| --- | --- |
| Course: | *Sociology* |
| Course id: 3OHK2O05 |
| Number of ECTS: 5 |
| Teacher: | Assistant professor: Dejan R. Janković, Ph.D.Assitants: M.Sci. Marica D. Petrović, M.A. Marina D. Novakov |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Practical classes: 1 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

The sociology course will introduce students to the basic theoretical and methodological standpoints in relation to agriculture and rural areas, social changes that affect rural areas, as well as the interaction between rural and urban social phenomena. Changes of traditional social structures and patterns of behaviour are the starting point for the analysis of social change of peasantry and rural areas, agriculture and its functions, as well as various functions and transformations of social groups and institutions in the process of rural development. |
| 1. Educational outcomes

This course will provide students with: knowledge of the basic sociological categories and methods of research in (rural) sociology; ability to analyze social phenomena in terms of social (agrarian and rural) structure and social relations; understanding of the basic principles of traditional peasant economy and transformation of traditional structures in relation to social groups, institutions, cultural patterns; understanding of complexity of rural development process. |
| 1. Course content

Meaning and tasks of the sociology as a discipline. Development of sociology and rural sociology. Methods in (rural) sociology. Basic theoretical and methodological approaches in rural sociology. Meaning, dimensions and elements of social structure. Meaning and types of social change. Global development processes as agents of change of agrarian and rural structures. Ecological problems of agriculture and rural areas. Peasant economy and changes in the agrarian structure. The old agrarian relations in Europe and Balkans and recent changes in the agrarian structure in Balkans. Family farms and features of rural areas in Serbia in present time. Rural settlements and rural population. Rural development and rural policy. The peasantry as a social class and as a political-historical factor. The social organization of local rural communities. Social groups in rural areas. Social institutions and organizations in rural areas. Rural culture - between tradition and innovation. Diffusion of innovation in agriculture and rural areas. |
| 1. Teaching methods:

Lectures, Discussions, Group work, Research work, Consultations |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 10 | *Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory* | Yes | 30 |
| Test | Yes | 40 |  |
| Exercise attendance | Yes | 10 |
| *Term paper and students’ involvement in classroom activities* | Yes | 5 + 5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Шљукић, С и М. Шљукић | Земља и људи. Сељаштво и друштвена структура. | Mediterran Publishing. Нови Сад | 2012 |
|  | Стојанов М | Социологија сеоских колектива.  | Матица српска. Нови Сад | 2004 |
|  | Митровић, М.  | Социологија села | СДС. Београд | 1998 |
|  | M. Haralambos i M. Holborn.  | Sociologija: teme i perspektiveInternet sources; scientific journals | Golden marketing. Zagreb | 2002 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES *Horticulture* |
| Table 5.2 Course specification |

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| --- | --- |
| Course:  | ***BOTANY*** |
| Course id: ЗOXK2О06 |
| Number of ECTS: 6 |
| Teacher: | Aleksa Knežević, Ph.D., Branka Ljevnaić-Mašić, Ph.D. |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 4 | Practical classes: 3  | Lectures: 4 | Practical classes: 3  | Lectures: 4 |
| Precondition courses | None |
| 1. Educational goal

Acquiring the necessary knowledge concerning the structure of plants, their function, the systematics of plants with emphasis on taxa relevant for students of Agroecology and Environment Protection, as well as the relationships of plants to environmental conditions, which is a prerequisite for the proper and successful cultivation of plants. |
| 1. Educational outcomes

The knowledge obtained within the course of Botany is the basis for the study of other fundamental and applied scientific disciplines, as well as the basis for a proper understanding of plants and their use for human needs. |
| 1. Course content

*Lectures*:Organization of wildlife and the basic characteristics of life. Botany and Agronomy. Plant cell, plant cell components: protoplasm, products of protoplasmic activity, cytoplasmic organelles. Autotrophic based diet. The morphology and anatomy of cormus.Metamorphosis of vegetative organs. Reprodu;ction of plants. Flower, blossom, flowering, pollination, fertilization. Seed. Fruit. Taxonomic categories and their hierarchies.Classification of vascular macrophytes. Phytoecology. Autecology. Synecology. Practical classes: Exercise, Other modes of teaching, Study researchThe microscope and microscopic techniques. Plant cells. Cytoplasmic membranes. The cell organelles. Products of protoplasmic activity. Meristematic tissues. Premanent tissues. Anatomical structure of vegetative organs. Systematics of cormophytes. Field exercise. |
| 1. Teaching methods

Lectures - verbal-textual and illustrative demonstrative methodsPractical classes - management of students’ individual work and demonstrative-illustrative methods |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 0-5 | *Oral part of the exam* | Yes | 0-50 |
| Exercise attendance | Yes | 0-5 |  |  |  |
| Colloquium | Yes | 0-10 |  |
| Term paper | Yes | 0-5 |
| Tests | Yes | 0-20 |
| Herbarium | Yes | 0-5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Glimm-Lacy Janice and Kaufman B. Peter | Botany Illustrated – Introduction to Plants, Major Groups, Flowering Plants Families, second edition | Springer | 2006 |
|  | Kojić M., Pekić S., Dajić Z. | Botanika | Romanov, Banja Luka | 2003 |
|  | Janjatović, V. | Botanika | Naučna knjiga, Beograd | 1994 |
|  | Knežević, A., Stojanović, S., Lazić, D. | Botanika – udžbenik za praktičnu nastavu | Poljoprivredni fakultet, Univerzitet u Novom Sadu | 2007 |

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| Course: | *Soil science* |
| Course id: 3OHK2O07 |
| Number of ECTS: 6 |
| Teacher: | Milivoj Belic, PhD, full professor; Ljiljana Nesic, PhD, associated professor; Vladimir Ciric, PhD, assistant professor |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. **Educational goal** of the course is introducing students with the characteristics of soil processes; genesis, evolution, causes of variability and geographic distribution laws of soil cover and soil classification
 |
| 1. **Educational outcomes** - after passing the exam, students will have expanded knowledge that will be enabling to them to understand and solve problems related to soil in the complex process of planning.
 |
| 1. Course content

**Theoretical instruction**-Opening lecture, Minerals and rocks as a basis for the genesis of soil, Morphological characteristics, physical properties, soil as a dispersed system, mechanical composition, clay, organic matter, Soil colloids, Organo - mineral complex, structure, porosity, water and water regime, air and air regime, thermal properties and thermal regime, physic-mechanical properties, chemical properties, the elements that constitute the pedosphere, absorptive capacity, soil solution, reaction, acidity and alkalinity of soil pH, buffering and oxidation-reduction potential , biological soil properties, soil genesis, classification and soil classification,**Practical teaching**-primary-petrogene and secondary minerals, igneous rocks, sedimentary rocks, metamorphic rocks, field research plots, soil density, soil texture, Water permeability and capillary rise, Plasticity soil, Determination of humus in the soil, Determination of CaCO3, Determination of active soil acidity, potential acidity and determine the amount of lime needed funds for the repair of acid soils, Determination of adsorption complex, Determination of total soluble salts in the soil and the required quantity of plaster for the repair of alkaline soils. Field practice - Introducing different parent rocks and profiles of the most frequent types of soil in Vojvodina. |
| 1. Teaching methods

Lectures, Practice/ Practical classes, Consultations |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture and exercise attendance | Yes | 10 | *Written part of the exam-tasks and theory* | Yes | 30 |
| Test part Agrogeology and practice  | Yes | 20 | *Oral part of the exam* | Yes | 30 |
| Colloquium | Yes | 10 |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Aleksandar Kukin, Vladimir Hadžić, Ljiljana Nešić, Milivoj Belić | Agrogeologija | Poljoprivredni fakultet, Novi Sad | 2007 |
|  | Nikola Miljković | Osnovi Pedologije | Prirodno-matematički fakultet, Novi Sad | 1996 |
|  | Nikola Miljković | Meliorativna Pedologija | Poljoprivredni fakultet, Novi Sad | 2005 |
|  | Goran J. Dugalić, Boško A. Gajić | Pedologija  | Univerzitet u Kragujevcu, Agronomski fakultet u Čačku | 2012 |
|  | Milivoj Belić, Ljiljana Nešić, Vladimir Ćirić | Praktikum iz pedologije | Poljoprivredni fakultet Novi Sad | 2014 |
|  | Hillel, D. | Introduction to Environmental Soil Physics | Elsevier, Amsterdam, Netherlands. | 2004 |
|  | Robert E. White | Principles and Practice of Soil Science | Blackwell publishing, Fourth edition | 2006 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES*Horticulture* |
| Table 5.2 Course specification |

3OHK2O08 – Plant Biochemistry

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES Horticulture |
| Table 5.2 Course specification |

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| --- | --- |
| Course: | *Floriculture 1* |
| Course id:3OHK3O09 |
| Number of ECTS:6 |
| Teacher: | Doc.dr Emina Mladenović |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:3 | Practical classes:3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

Education and training students in the field of horticulture, in the knowledge of the decorative planting material for use on garden and other categories of green areas in order to improve and preserve the environment. The student should acquire knowledge of the morphology, biology, systematic and the usage of floral species. |
| 1. Educational outcomes

Forming of experts in the knowledge of biological, ecological and functional values of floral green areas. |
| 1. Course content

Theory: Students will learn about the types of flowers that are used for planting in parks, gardens, special purpose objects as well as landscapes in general. The course includes: annual and biennial flower species, perennials, bulbs, tubers and rhizomatic species and ornamental grasses. Students will learn what are the possibilities and ways of application of floral species, as well as how they can be used. It will familiarize the summer and autumn floral aspects, as well as perennial aspects planted on all categories of green spaces. Students will be able to transfer the project to the ground, soil preparation, planting method with the deployment of flower seedlings, as well as care.Practical classes: Getting to know fresh plant material outdoors. Exploring of plant materials. Project designing of floral areas. |
| 1. Teaching methods

Lectures, Practice,Consultations, research work |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Written part of the exam-tasks and theory* | Yes | 60 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes | 5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Hessayon D.G.  | The bulb expert | Transworld publishers | 2006 |
|  | Dole M. John and Wilkins F. Harold | Floriculture: Principles and Species | Prentice Hall | 2004 |

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| Course: | *Dendrology I* |
| Course id: 3ОХК3О10 |
| Number of ECTS: 6 |
| Teacher: | Prof. dr Jelena Ninić-Todorović, Aleksandar Kurjakov, MSc. |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 3 | Other teaching types: student`s papers (seminar) | Study research work: - | Other classes: - |
| Precondition courses | None |
| 1. Educational goal

To gain knowledge of ecology and production of gymnosperms using available literature and working practices in the field |
| 1. Educational outcomes

Eduction of professionals in biological, ecological and functional value of ornamental gymnosperms and monitoring of gymnosperms in urban areas. |
| 1. Course content

Theory: Division of woody species on form and height. Morphological and decorative features of gymnosperms (root, stem, leaf, flower). Phenological events (flowering, pollination, fruiting, seed maturation and decline, the length of fruiting periodicity and growth rate). Air pollution and gymnosperms. The life forms of plants. Natural distribution of gymnosperms. Autochthonous, introduced species, endemics and relics. Geographic floral elements. Gymnosperms and environmental conditions (climatic factors, soil conditions, relief, biotic factors). Basic concepts of the study of plant communities. Taxonomic categories of gymnosperms. Practical classes: Systematics of gymnosperms. Overview of fresh material. Determination by key to genera and species. Insight into the herbarium material of genotypes from Mediterranean area. Creating a herbarium. Field trip. |
| 1. Teaching methods

Lectures, Practical classes, Consultations, field trip, research work (optional) |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 10 | Written part of the exam-tasks and theory | Yes | 50 |
| Exercise attendance | Yes | 10 |  |
| Test, Term paper | Yes | 30 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Adrian Bloom | Gardening with conifers | Firefly books | 2007. |
|  | Owen Johnson | Collins Tree Guide | Collins | 2006. |
|  | Carol Usher, John White, Colin Ridsdale | Trees | Dorling Kindersley Publishers Ltd | 2005. |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES Horticulture |
| Table 5.2 Course specification |
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3OHK3O11 – Soil fertility and fertilizers

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| --- | --- |
| Course: | *Plant Physiology* |
| Course id: | 3OHK3O12 |
| Number of ECTS: | 5 |
| Teacher: | Ivana V. MaksimovićMarina I. Putnik- Delić |
| Course status | Mandatory/Elective : Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 4x15=60 | Practical classes: 45 | Other teaching types  | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

The aim of the course is to provide students with knowledge about the functioning of the organism of higher plants, as well as on the impact of environmental factors on physiological processes. Also, students will learn how and to what extent certain physiological processes can be controlled, which is important for agricultural production. |
| 1. Educational outcomes

The outcome is knowledge about physiological processes in higher plants and abiotic and biotic factors affecting them, with the aim to apply this knowledge in practice.  |
| 1. Course content

LecturesPhysiology of plant cells: types, structure, compartimentality. Biomembranes. Organelles, microbodies, cytoskeleton. Chemical and physical properties of plant cells. Tissue culture or cells. Water regime: features, uptake, transport and transpiration. Factors affecting water regime. Plant water requirements, the impact of the lack of water, mineral nutrition: Content, classification and physiological role of essential and useful elements in plants. Mechanism of the uptake and transport of mineral nutrients and organic compounds. Mineral nutrition and yield. Photosynthesis: importance, photosynthetic pigments, absorption and transformation of light. Photophosphorilation. C3, C4 and CAM photosynthetic paths. Photorespiration. Transport of assimilates. Photosynthesis and yield. Respiration: Glycolysis, Krebs cycle, oxidative phosphorylation, energy balance. Alternative pathways and ecology of respiration, growth and differentiation: phytohormones, cell growth and development. Biological rhythms, differentiation, correlations, abscission, senescence and death. Seed physiology: Pollen, pollination, fertilization. Regulation of seed and fruit development. Seed germination and factors affecting it. Practical workContents of practical work accompanies lectures (Physiology of the cell, water regime, mineral nutrition, photosynthesis, respiration and enzymes, growth and development) |
| 1. Teaching methods: Lectures
 |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Written entrance-exam | Yes | 20 | *Theoretical part of the exam/Oral part of the exam* | Yes | 40 |
| Test | No | 2x15 |  |
| Exercise attendance | Yes |  |
| *Term paper* | No | 10 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Kastori R, Maksimović I  | Ishrana biljaka | Vojvođanska akademija nauka | 2008 |
|  | Maksimović I, Pajević S.  | Praktikum iz fiziologija biljaka | Poljoprivredni fakultet i Prirodno-matematički fakultet, Novi Sad | 2002 |
|  | Lincoln Taiz and Eduardo Zeiger | Plant Physiology, Fifth Edition | Sinauer Associates | 2010 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationBACHELOR STUDIES OF HORTICULTURE  |

3OHK3O13 – Genetics

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| --- | --- |
| Course: | *Geodesy* |
| Course id: 3OHK4O14 |
| Number of ECTS: 5 |
| Teacher: | Pavel P. Benka PhD. |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:30 | Practical classes:30 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

Introduction to basic concepts of geodesy, surveying instruments, methods of measurement and processing of the measurement results. Introduction to survey techniques, production of topographic maps, measurements on maps, setting out to facilities. Introduction to the land cadastre and to the land consolidation. |
| 1. Educational outcomes

Students will use the acquired knowledge in applied geodesy in the further process of education as well as in future professional work and engineering problem solving. |
| 1. Course content

Introduction, map projections, coordinate systems, measurement units. Measuring distances, angles, vertical angles, height differences, measurement with total geodetic station. The Global Positioning System (GPS). Basic theory of measurement errors. Calculation of greed bearing and length from coordinates. Trigonometrical network, traverse networks, line network, leveling network. Basic concepts on the production and use of maps. Accessories and survey techniques: survey in orthogonal coordinates, survey by bearing and distance, photogrammetric survey, GPS survey. Detailed leveling. Production maps: classical method, digital form. The vertical presentation of the terrain, contour line interpolation, vertical terrain representation in digital form. Methods for calculating the surface area and volume. Setting out of facilities. Introduction to the land cadastre. Fundamentals of land consolidation. |
| 1. Teaching methods

Lectures, Practical classes, Consultations |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Written part of the exam-tasks and theory* | Yes | 30 |
| Test 1 | Yes | 15 | *Oral part of the exam* | No | 20 |
| Test 2 | Yes | 15 |  |
| Exercise attendance | Yes | 15 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Russel C. Brinker | *The Surveying Handbook* | Springer Science & Business Media | 1995 |
|  |  |  |  |  |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES HORTICULTURE |
| Table 5.2 Course specification |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES *(horticulture)* |
| Table 5.2 Course specification |

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| --- | --- |
| Course: | *Turfgrasses* |
| Course id: |
| Number of ECTS: |
| Teacher: | Prof. Dr Branko Ćupina, Dr Djordje Krstić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 2(30) | Practical classes: 2(30) | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

Theoretical and practical aspects of turfgrass establishment and maintaining  |
| 1. Educational outcomes

Acquiring knowledge in order to establish and maintain turfgrass in accordance with ecological principles |
| 1. Course content

*Lectures*Turfgrass basic principles. Significance and prevalence (distribution). General and agroecological importance. Grass taxonomy.Natural grasslands basic terms and melioration measures. Anthropological grasslands basic terms and establishment. Species ratio in mixtures. Turfgrass maintenance. Turfgrass evaluation. Functional turfgrasses, sports turfgrasses, turgrasses for recreation.*Research work*Laboratory, field and practical exercises of students. Work with fresh and herbarium material. |
| 1. Teaching methods

Lectures, Practice/ Practical classes, Consultations, study, Seminar  |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 10 | *Oral part of the exam* | Yes | 30 |
| Test | Yes | - |  |
| Exercise attendance | Yes | 10 |
| *Seminar* | Yes | 50 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Turgeon, A. J. | Turf grass management (sixth edition) | Copyright by Pearson Education, Inc. Uppere Saddle River, New Jersey 07458 (USA) | 2002 |
|  | Beard, J. B. | Turf Management for Golf Courses, 2nd Ed.  | Ann Arbor Press,  Chelsea, MI.  | 2002 |
|  | Gordon Witteveen and Mivhael Bavier | Practical Golf Course Maintenance The Magic of Greenkeeping (Second Editon) | Johan Wiley & Sons, INC | 2005 |

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| Course: | *Dendrology II* |
| Course id: 3OХК4О16 |
| Number of ECTS: 6 |
| Teacher: | Prof. dr Jelena Ninić-Todorović, Aleksandar Kurjakov, MSc. |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 3 | Other teaching types: student`s papers (seminar) | Study research work: - | Other classes: - |
| Precondition courses | None |
| 1. Educational goal

To gain knowledge of ecology and production of angiosperms using available literature and working practices in the field |
| 1. Educational outcomes

Eduction of professionals in biological, ecological and functional value of ornamental angiosperms and monitoring of angiosperms in urban areas. |
| 1. Course content

Theory: Division of woody species on form and height. Morphological and decorative features of angiosperms (root, stem, leaf, flower). Phenological events (flowering, pollination, fruiting, seed maturation and decline, the length of fruiting periodicity and growth rate). Air pollution and angiosperms. The life forms of plants. Natural distribution of angiosperms. Autochthonous, introduced species, endemics and relics. Geographic floral elements. Angiosperms and environmental conditions (climatic factors, soil conditions, relief, biotic factors). Basic concepts of the study of plant communities. Taxonomic categories of angiosperms.Practical classes: Systematics of angiosperms. Overview of fresh material. Determination by key to genera and species. Insight into the herbarium material of genotypes from Mediterranean area. Creating a herbarium. Field trip. |
| 1. Teaching methods

Lectures, Practical classes, Consultations, field trip, research work (optional) |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 10 | Written part of the exam-tasks and theory | Yes | 50 |
| Exercise attendance | Yes | 10 |  |
| Test, Term paper | Yes | 30 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Owen Johnson | Collins Tree Guide | Collins | 2006. |
|  | Carol Usher, John White, Colin Ridsdale | Trees | Dorling Kindersley Publishers Ltd | 2005. |
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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES Horticulture |
| Table 5.2 Course specification |
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| --- | --- |
| Course: | *Floriculture 2* |
| Course id:3OHK4O17 |
| Number of ECTS:6 |
| Teacher: | Doc.dr Emina Mladenović |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:3 | Practical classes:3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

Developing creative skills of students in order to create environments that allow physical health prosperity, moral psychological mood and optimism. |
| 1. Educational outcomes

The formation of experts with the ability of creative interior design where the floral material has artistic and figurative value. |
| 1. Course content

Theory: The plant material used in the interior, decorative leaf and flower pot species. Requests for accommodation and the possibility of their use. Possibility to use cut and dried flowers in the interior. Palms and other subtropical plants as mobile greenery. Care and maintenance of flowers in the interior. The interiors decorating, office and residential space.Practical classes: Introducing of plant material. Creating a sketch of interior design with appropriate plant material. |
| 1. Teaching methods

Lectures, Practical classes, Consultations, research work |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Written part of the exam-tasks and theory* | Yes | 60 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes | 5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Larson A. Roy | Introduction to Floriculture | Academic Press | 1992 |
|  | Griner Charles | Floriculture: Designing and Merchandising | Delmar, USA | 2011 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES Horticulture |

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| --- | --- |
| Course: | *The elements of architectural and landscape design* |
| Course id: 3OHK4O18 |
| Number of ECTS: 6 |
| Teacher: | Ass. Professor Ksenija Hiel |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Practical classes: 3 | Other teaching types:  | Study research work:  | Other classes:  |
| Precondition courses | None |
| 1. Educational goal

Introducing students to the basic principles of landscape and architectural design. Mastering the basic elements of design. Detailed and comprehensive forms and materials in shaping the landscape area with all types of spatial levels and architectural typologies. Getting to know the number of possible effects in accordance with the selected elements and their materialization. |
| 1. Educational outcomes

The possibility of adequate application of knowledge about elements and materials in the process of designing a functional simple technological solutions landscaping within various architectural and urban programs. |
| 1. Course content

Theory: Defining the basic elements and their materialization. The possibility of an adequate selection and application of elements to achieve diverse forms of landscaping. Functions and functional processes and programs in the space.Practical classes: Through graphics and essays - Mastering the process of selection and use of elements and their materialization in order to achieve the required effect in the given architectural programs and urban areas. |
| 1. Teaching methods

Lectures, Consultations, Field trip, research work  |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 5 | Written and oral part of the exam-tasks and theory | Yes | 50 |
| Exercise attendance | Yes | 35 |  |
| Test, seminar paper | Yes | 10 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Waterman Tim | The Fundamentals of Landscape Architecture | AVA Book, Lausanne | 2009 |
|  | Bell Simon  | Elements of Visual Design in the Landscape | Spon Press, London and New York | 2004 |
|  | Dee Catherine | Form and Fabric in Landscape Architecture | Spon Press, London and New York | 2001 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES Horticulture |
| Table 5.2 Course specification |
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3OHK4P19 – Working practice

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationBACHELOR STUDIES OF HORTICULTURE |
| Table 5.2 Course specification |

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| --- | --- |
| Course: | **Diseases and pests of ornamental plants in horticulture** |
| Course id: 3OHK5O20 |
| Number of ECTS:6 |
| Teacher: | **Jelica S. Balaž; Tatjana B. Kereši** **Mila S. Grahovac; Aleksandra M. Popović** |
| Course status | **Mandatory** |
| Number of active teaching classes (weekly) |
| Lectures:3x15=45 | Practical classes:2x15=30 | Other teaching types:none | Study research work:none | Other classes:none |
| Precondition courses | None |
| 1. Educational goal

Introduction to economically important pathogens and pests in horticulture and the possibility of integrated control.  |
| 1. Educational outcomes

Ability of independent diagnosis of diseases and identification pests of ornamental plants which is the condition for timely control or reduction of pest populations to tolerable level with targeted and more environmentally friendly plant protection measures.  |
| 1. Course content

Plant diseases: The economic importance of plant diseases. Plant pathogens. Symptoms. Basic characteristics of plant pathogenic fungi, bacteria, viruses and phytoplasmas. Pathogenesis. The concept of integrated pest management. Diseases and protection of seedlings in greenhouses and open fields. Diseases and protection of ornamental plants, the most important diseases of vegetable crops, fruits and grapevine. Entomology: Introduction and economic importance of the pest. Morphology and anatomy, reproduction and development, systematics and ecology of insects and other pests. Polyphagous pests. The basic morphological characteristics, distribution, importance, harmfulness, biology and ecology of pests of trees, flowers, shrubs and lawns, vegetables, fruit trees and grapevine and integral measures of control.Practical teaching: Exercise, Other modes of teaching, Study research workPlant diseases: Types of symptoms (inspection of plant material); Based on the identification of plant pathogenic fungi, bacteria and viruses; Diseases of ornamental plants, the most important disease of vegetable crops, fruits and grapevine. identification of pests and damages of flowers, ornamental shrubs and trees, vegetables, fruit trees and vines (in the collections, atlases, images, recognition in the field, etc ). |
| 1. Teaching methods

Teaching is done using modern techniques (video screen, computer) in classrooms. The practical classes are performed with the use of plant material with symptoms of the disease, the equipment for microscopy, conserved material, atlases, pictures and herbaria material with symptoms on plants. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Theoretical part of the exam/**Oral part of the exam/* | Yes | 30 |
|  |  |  | *Written part of the exam-tasks and theory* | Yes | 40 |
| Test | Yes | 20 |  |
| Exercise attendance | Yes | 5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Balaz, F., Balaz, J., Tosic, M., Stojsin, V., Bagi, F.  | Phytopathology-Diseases of field and vegetable crops | Faculty of Agriculture, Novi Sad | 2010 |
|  | Ivanovic,M., Ivanovic, D. | Mycosis and pseudo mycosis of plants | Faculty of Agriculture, Belgrade | 2001 |
|  | Delibasic, G., Babovic,  | General Phytopathology - Practical Guide | Faculty of Agriculture, Belgrade | 2006 |
|  | Mihajlović, Lj. | Forest Entomology | Faculty of Forestry | 2008 |
|  | Kereši, T. | Entomofauna of Field and Vegetable Crops  | Faculty of Agriculture, Novi Sad | 2010 |
|  | Alford, V.D. | A Color Atlas of Pests of Ornamental Trees, Shrubs and Flowers | Timber Press, Portland, Oregon, USA | 2003 |

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| --- | --- |
| Course: | **Seed production of horticultural plants** |
| Course id: 3ОХК5О21 |
| Number of ECTS: 7 |
| Teacher: | Sasa Orlovic, PhD, full professor; Jelena Cukanovic, MsC, assistant professor |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. **Educational goal** of the course is to familiarize students with the seed material of horticultural plants, methods of collecting and storing seed materials and acquire knowledge in the field of production of horticultural plants with modern technology.
 |
| 1. **Educational outcomes**

Student is able to identify different seeds of different varieties, with the methods of storing seed material and the production of horticultural crops to the highest technological standards. |
| 1. **Course content**

*Theory lessons*Introduction to the morphology and biology of seeds of horticultural plants. Forming and seed development. Harvesting and collecting seeds. Storing of seed material. The stratification of seeds. Standard in the seed production of horticultural crops. The use of seed in horticulture. Generative propagation of horticultural plants outdoors. Production of seedlings in pots (pots, containers ...). Nursing of seedlings obtained through the generative. The criteria for quality and standardization.*Practical teaching*: ExercisesIntroducing the seed material of the most important horticultural plants. |
| 1. Teaching methods

Lectures, Practice/ Practical classes |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Written part of the exam-tasks and theory* | Yes | 20 |
| Exercise attendance | Yes | 5 | *Oral part of the exam* | Yes | 25 |
| Colloquium | Yes | 30 |  |
| Seminar paper | Yes | 15 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Stilinović, S. | Semenarstvo ukrasnog drveća i žbunja | Institut za šumarstvo Šumarskog fakulteta u Beogradu | 1985 |
|  | Grbić, M. | Tehnologija proizvodnje ukrasnih sadnica | Univerzitet u Beogradu, Šumarski fakultet | 2010 |
|  | [Hudson T. Hartmann Deceased](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Hudson+T.+Hartmann+Deceased&search-alias=books&text=Hudson+T.+Hartmann+Deceased&sort=relevancerank) [Dale E. Kester Deceased](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Dale+E.+Kester+Deceased&search-alias=books&text=Dale+E.+Kester+Deceased&sort=relevancerank), [Fred T. Davies](http://www.amazon.com/Fred-T.-Davies/e/B003GBJNNK/ref%3Ddp_byline_cont_book_3), Robert L. Geneve | Plant Propagation: Principles and Practices | Hartmann & Kester's Plant Propagation | 2010 |
|  | Gary W. Watson and E. B. Himelick | Practices and Principles of Planting Trees and Shrubs | International Society of Arboriculture Books | 1997 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES *(Horticulture)* |
| Table 5.2 Course specification |

|  |  |
| --- | --- |
| Course: | Fruit species in landscape design |
| Course id:3ОХК5О22 |
| Number of ECTS: 6 |
| Teacher: | Professors: Dr Vladislav M. Ognjanov, full professor Dr Mirjana Ž. Ljubojević, assistant professorAssistant: MSc Dušica, R. Bošnjaković |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 4 | Practical classes: 4 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goals

The aim of the course is acquisition of knowledge about biological and practical basis of fruit growing and application of achieved knowledge in the planning and designs of small green spaces and gardens, using continental and by introduction of subtropical fruit trees in the context of integral and organic production. |
| 1. Educational outcomes

Students will learn about the most important aspects of fruit production in the commercial and decorative context. It includes biology and ecology, agro- and pomo-techniques, varieties and rootstocks of fruit species, as well as their interaction, combining productivity and decorativeness of ornamental fruit tree forms. |
| 1. Course content

Theory lessons:The importance of fruit growing from dendrologic and economic aspects. Adaptability of fruit species, the impact of edaphic and climatic factors, geographical location and fruit districts. Biological basis of propagation and production of fruit planting material. Growth and development of fruit species and the biological basis of their fertility. Classification, design and raise of fruit garden in relation to its purpose. Aagro- and pomo-techniques of fruit trees. Integrated and organic production concept of fruit growing. Harvest, preservation and fruit packaging.Practical classes:Preparation and development of amateur fruit garden project, gradually through practical classes where students are introduced to: pomologic classification of fruit trees; Recognition of fruit species and fruit bearing branches; Recognition of vegetative and generative organs in a function of decorative tree formation; Propagation of fruit trees; Pomologic description of varieties with genetic resistance to parasites and pests; Dwarf and wild fruit species. Raise and care of fruit trees. Determination of harvesting moment and fruit storing. |
| 1. Teaching methods

Lectures, Practical classes, Consultations |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 10 | *Theoretical part of the exam/Oral part of the exam* | Yes | 40 |
| Test | Yes | 20 |  |
| Exercise attendance | Yes | 10 |
| Term paper | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | David Jackson | Temperate and Subtropical Fruit Production | CABI Publishing | 1999 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATED ACADEMIC STUDIES Horticulture |
| Table 5.2 Course specification |

|  |  |
| --- | --- |
| Course: | *Geographic Information System* |
| Course id:3OHK5O23 |
| Number of ECTS: 6 |
| Teacher: | Pavel P. Benka PhD., Atila Bezdan PhD |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:2 | Practical classes:2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

To familiarize students with the theoretical foundations of Geographic Information Systems (GIS) and to enable students to use basic computer application software for geographic information systems. |
| 1. Educational outcomes

Acquired knowledge students will apply in the further process of education as well as in future professional work and solving engineering problem. |
| 1. Course content

Introduction, differences of GIS related systems, applications and history. Types of spatial data, spatial data organization. Sources of spatial data. Working with raster data, working with vector data. Databases in GIS. The analysis of spatial data. Interpolation of spatial data. Creating thematic maps. The distribution of spatial data over the Internet. |
| 1. Teaching methods

Lectures, Practical classes, Consultations |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Written part of the exam-tasks and theory* | Yes | 30 |
| Test 1 | Yes | 10 | *Oral part of the exam* | No | 20 |
| Test 2 | Yes | 10 |  |
| Exercise attendance | Yes | 25 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Longley P, Goodchild M, Maguire D. Rhind D.  | Geographic Information Systems and Science | John Wiley & Sons, LTD | 2002 |
|  | T. Sutton, O. Dassau, M. Sutton | A Gentle Introduction to GIS | Spatial Information Management Unit, Office of the Premier, Eastern Cape,South Africa. | 2009 |
|  | - | QGIS Documentation | http://www.qgis.org/en/docs/index.html |  |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES HORTICULTURE |
| Table 5.2 Course specification |

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| --- | --- |
| Course: | Agricultural machines in horticulture |
| Course id:3OHK6O24 |
| Number of ECTS: 6 |
| Teacher: | Andjelko Bajkin, Bugarin Rajko |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 4 | Practical classes: 3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None/navesti ako ima |
| 1. Educational goal

Theoretical and practical knowledge related to the machines in horticulture in greenhouses and in production in the open field. |
| 1. Educational outcomes

The knowledge obtained in this course should enable the proper selection and use of existing machines in horticulture in the production of certain plant species, with emphasis on the impact of machines on the environment. |
| 1. Course content

The significance of machines in horticulture. Tractors, classification and characteristics. Equipment for the utilization of agricultural tractors. The use of tractors in different conditions. Machines for primary tillage. Machines for tillage. Machines for fertilization. Plant protection bilja.Mašine care of ornamental trees and shrubs .. Machines for landscaping and drainage of land. Facilities and equipment enclosures. Machines for the disinfection of soil and substrate. Machines and apparatus for the production of planting material (seedlings of flowers, herbs, ornamental trees and shrubs). Forming machines parcel area. Machines for soil mulching and drip irrigation. Seeding and planting. Machines for mechanical and chemical care. Harvesting machines. Machinery and equipment for manipulation after harvest. Machines for the establishment and maintenance of the pitch. Safety at work. |
| 1. Teaching methods

Getting to know the purpose of the basic parts, the principle of operation, configuration, maintenance, ongoing operation and protection measures at work machine and oppreme according to the curriculum of lectures.Lectures, Practice/ Practical classes |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes/No | 10 | *Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory* | Yes | 30 |
| Test | Yes/No | 40 |  |
| Exercise attendance | Yes/No | 20 |
| *Ovde se mogu pojaviti i kolokvijumi i seminarski rad (npr. Test, Term paper)* | Yes/No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Бајкин, А, Поњичан, О, Орловић, С, Сомер, Д:,.  | Машине у хортикултури, | Универзитет у Новом Саду, Пољопривредни факултет Нови Сад, | 2005 |
|  | Bošnjaković A | Mašine za zaštitu bilja | Poljoprivredni fakultet Novi Sad | 1994 |
|  | Bugarin, R. Bošnjaković, A.Sedlar, A. | Mašine u voćarstvu i vinogradarstvu | Poljoprivredni fakultet, Novi Sad | 2014 |
|  | Bugarin, R., A.Sedlar, A | Fitomedicina | Univerzitet u Novom Sadu, Poljoprivredni fakultet | 2014 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE STUDIES Horticulture |
| Table 5.2 Course specification |

3OHK6O25 – Olericulture (Povrtarstvo)

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| --- | --- |
| Course: | *Ecotoxicology and Environmental Protection* |
| Course id: | 30HК6026 |
| Number of ECTS: | 5 |
| Teacher: | Sanja D. Lazic, Ivana V. MaksimovićVojislava P. Bursić, Marina I. Putnik- Delić |
| Course status | Mandatory/Elective : Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3x15=45 | Practical classes:15 | Other teaching types  | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

The knowledge about the pollution sources and types of pollutants in ecosystems and the measures to be taken in the process of agriculture production in order to prevent pollution of ecosystems.  |
| 1. Educational outcomes

The acquired-applicable knowledge in the field of ecotoxicology and environmental protection. |
| 1. Course content

Definition of ecotoxicology, circulation of matter and energy in nature, toxicity, toxicity testing, mutagens, cancerogenic, teratogenic, reproduction effects. Human expose to the toxic compounds and risk assessment. Pesticides – organochlorine insecticides, polychlorinated biphenyls, dioxins, polycyclic aromatic hydrocarbons. Concept, causes, types, level of pollution. Goals and assignments of agro-ecosystem protection. Basic characteristics and peculiarities of agro-ecosystem. Pollution and protection of air, water and soil– sources and classifications of pollutant, effects of pollution, possibilities of reducing negative effects in plant production. *Other teaching forms – laboratory exercises*: Determination of organochlorine insecticides, polychlorinated biphenyls and polycyclic aromatic hydrocarbons content in the environment. The determination of SO2, CO2, NH3 excess in air. Determination of inorganic and organic chemical pollution in water. Determination of heavy metals content in water, soil and plants and rebuilding polluted soil. Determination of nitrate content in plant material. |
| 1. Teaching methods: Lectures
 |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes/No | 5 | *Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory* | Yes | 85 |
| Test | Yes/No |  |  |
| Exercise attendance | Yes/No |  |
| *Term paper* | Yes/No | 10 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Kastori, R. | Zaštita agroekosistema | Feljton, Nov Sad | 1996 |
|  | Alloway, B., J. | Heavy metals in soil | Blackie, Glasgow | 1990 |
|  | Walker, C.H., Hopkin, S.P., Siblz, R.M., Peakall, D.B. | Principes of Exotoxicology | Tajlor&Francis, New York | 2006 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationBACHELOR STUDIES OF HORTICULTURE  |
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| --- | --- |
| Course: | Nursery production of ornamental trees and shrubs |
| Course id:3ОПА5И43 |
| Number of ECTS:5 |
| Teacher: | SasaOrlovic, PhD, full professor; JelenaCukanovic, MsC, assistant professor |
| Course status | Elective |
| Number of active teaching classes (weekly) |
| Lectures:2 | Practical classes:2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. **Educational goal**of the course is thatstudents be introducedandto acquire knowledge in the field of production of seedlings of ornamental trees and shrubs, and methods for reproduction of plants in nurseries, seedling production and seedling forming.
 |
| 1. **Educational outcomes**

Student is able to further upgrade through the masterand doctoral studies for scientific work in the field of production of planting material of ornamental trees and shrubs. |
| 1. **Course content**

theory lessonsProduction and manipulation with seeds and fruits of ornamental trees and shrubs. The importance and place of seedlings in the forestry and landscape architecture, general concepts, general information on nursery production in Europe, the choice of habitat for nurseries, general settings and technical conditions in the nursery, vegetative propagation of trees and shrubs in the nursery, generative propagation of trees and shrubs in the nursery, manufacturing plants innursery, Duneman’s seedbeds, in containers, production of rooted cuttings, seedlings forming, forming of seedlings of trees and shrubs in the courts.Practical classesProduction of planting material of most ornamental trees and shrubs: 1.Cl. Gymnospermae (Families: *Ginkoaceae, Pinaceae, Taxodiaceae, Cupressaceae, Araucariaceae, Taxaceae*) 2 Cl. Angiospermae (The Family: *Magnoliaceae, Laureaceae, Ranunculaceae, Berberidaceae, Hammamelidaceae, Platanaceae, Ulmaceae, Moraceae, Fagaceae, Betulaceae, Corylaceae, Juglandaceae, Tamaricaceae, Salicaceae, Ericaceae, Vacciniaceae, Tiliaceae, Maqlvaceae, Buxaceae, Rosaceae, Saxifragaceae, Mimosaceae, Cesalpinaceae, Fabaceae, Eleagnaceae, Anacardiaceae, SimaroubaceaeSapindaceae, Hippocastanaceae, Aceraceae, Cornaceae, Araliaceae, Aquifoliaceae, Celastraceae, Rhamnaceae, Vitaceae, Loganiaceae*). |
| 1. Teaching methods

Lectures, Practice/ Practical classes |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Written part of the exam-tasks and theory* | Yes | 45 |
| Exercise attendance | Yes | 10 | *Oral part of the exam* | Yes | 20 |
| Colloquium | Yes | 10 |  |
| Seminar paper | Yes | 10 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Stilinović, S. | Semenarstvo ukrasnog drveća i žbunja | Institut za šumarstvo Šumarskog fakulteta u Beogradu | 1985 |
|  | Grbić, M. | Tehnologija proizvodnje ukrasnih sadnica | Univerzitet u Beogradu, Šumarski fakultet | 2010 |
|  | [Hudson T. Hartmann Deceased](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Hudson+T.+Hartmann+Deceased&search-alias=books&text=Hudson+T.+Hartmann+Deceased&sort=relevancerank) [Dale E. Kester Deceased](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Dale+E.+Kester+Deceased&search-alias=books&text=Dale+E.+Kester+Deceased&sort=relevancerank), [Fred T. Davies](http://www.amazon.com/Fred-T.-Davies/e/B003GBJNNK/ref%3Ddp_byline_cont_book_3), Robert L. Geneve | Plant Propagation: Principles and Practices | Hartmann & Kester's Plant Propagation | 2010 |
|  | Gary W. Watson and E. B. Himelick | Practices and Principles of Planting Trees and Shrubs | International Society of Arboriculture Books | 1997 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES *(Landscape architecture)* |
| Table 5.2 Course specification |

3OHK7O29 – Vegetable production in protected space

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES *(Horticulture)* |
| Table 5.2 Course specification |

|  |  |
| --- | --- |
| Course: | Agroforestry systems |
| Course id:3OХК7О30 |
| Number of ECTS:7 |
| Teacher: | Sasa Orlovic, PhD, full professor; Lazar Pavlovic, MSc  |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes:4 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. **Educational goal**of the course is to introduce students to acquire knowledge in the field of agroforestry systems in order to successfully design and perform work on establishing windbreaks, ecological networks, for the time being beekeeping and plantation for energy production. In addition to this objective it is important for students to learn how to use the advantage of growing agricultural and forest species in the same place.
 |
| 1. **Educational outcomes**

Student is able to further upgrade through the masterand doctoral studies for scientific work in the field of agroforestry. |
| 1. **Course content**

Theory lessonsThe importance of agroforestry in agriculture and forestry in the lowland part of Serbia. Alley planted forest and agricultural plants. Definition. The choice of species. Design. Spaces and technology foundation planting. Farming forestry. Other forest products. Planning and design. The economic and social importance. The protective forest plantations along the rivers. Planning and design. Functions and importance. Remediation of soil and water. The impact on water and air regime. Forest plantations and pastures. Planning and design. The choice of species. Forest management. The economic benefits. The importance of the environment. Windbreaks. Planning and design. The functioning. The importance of rural development. Windbreaks and diversity. The importance of sustainable development in agriculture. Importance of Animal Husbandry. The impact on microclimate. The impact on crop yield. Plants for a specific purpose. Planning and design. Plant a short cycles to obtain raw materials for the production of energy and raw materials for chemical processing. The choice of species. Appropriate cultivars.Eco network. Eco corridor. Buffer zones. The core of diversity. Surfaces of the restoration. The diversity of forest ecosystems. Options restoration of native woody species. Conservation of forest trees and ex and insitu. The dynamics of the ecosystem floodplain forest and conservation opportunities.Vegetation of the hills, windbreaks, Criteria adequate choice of trees. Payment and technological procedures of establishment, planting and maintenance of greenery. Specifics restoration of landscape greenery and procedures for its implementation. Problems connected to revitalization of landscapes by vegetation. Technologies and procedures for revitalization areas affected by agricultural and industrial activities, re-cultivation.Practical teaching: Development of practical work related design agroforestry windbreaks, Alley plantations, forest plantations and pastures, protective plantations along watercourses, plantations for energy production, project development of local eco corridors. |
| 1. Teaching methods

Lectures, Practice/ Practical classes |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Written part of the exam-tasks and theory* | Yes | 45 |
| Exercise attendance | Yes | 10 | *Oral part of the exam* | Yes | 20 |
| Colloquium | Yes | 10 |  |
| Seminar paper | Yes | 10 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | P.K.Ramachandran | An Introduction to Agroforestry | Kluwer Academic Publishers (in cooperation with ICRAF). 496 p | 1993 |
|  | Edited by H. E. Garrett, W. J. Rietveld, and R.F. Fisher | North American Agroforestry: An IntegratedScience and Practice |  | 2000 |
|  | Edited by Florencia Montagini | Environmental Services of Agroforestry Systems | Food Product Press | 1999 |

3OHK7O31 – Statistics

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| --- | --- |
| Course: | *Irrigation* |
| Course id: 3OХК8О32 |
| Number of ECTS: 4 |
| Teacher:  | professor Borivoj Pejić, Mr. Ksenija Mačkić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

Introducing students to the basic principles (agronomic aspects) of application of irrigation in production of vegetables, lawns, flowers and ornamental plants (without negative consequences on soil properties and environment). |
| 1. Educational outcomes

Forming of academic experts for successful work in vegetable, flower and ornamental plants production in irrigated conditions. |
| 1. Course content

*Theoretical lectures*Introduction, history of irrigation. Problems that follow irrigation. Principles of rational irrigation. Factors that condition irrigation. Crop water requirements. Water balance and irrigation water requirements. Assessing quality of water for irrigation. Soil and water. Water availability for plants, irrigation rate and drought. Agronomic evaluation of irrigation methods. Irrigation scheduling.Irrigation of specific agricultural crops: vegetables, lawns, flowers and ornamental plants. Irrigations in greenhouses. Irrigation in frost protection and cooling watering. Exploitation elements of irrigated fields.*Practical classes*Soil sampling. Methods for soil moisture assessment. Determination of soil water constants. Determination of water and physical properties of the soil. Calculation of the amount of water in soil and irrigation rate. Construction of soil moisture characteristics curve - pF. Calculation of soil water balance and irrigation requirements. Determination the irrigation schedule on the basis of every day calculation of water consumption trough plants evapotranpiration.  |
| 1. Teaching methods

Lectures, practical classes, consultations, research work  |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes |  | Oral part of the exam | Yes | 60 |
| Test | Yes | 10 |  |
| Exercise attendance | Yes |  |
| Practical exam | Yes | 30 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Stewart, B.A. and Nielsen, D.R, Editors | Irrigation of Agricultural Crops | American Society of Agronomy, Crop Science Society of America, Soil Science Society of America Publishers, Madison, Wisconsin USA | 1990 |
|  | Lascano, R.J andSojka, R.E, Co-Editors | Irrigation of Agricultural CropsSecond edition | American Society of Agronomy, Crop Science Society of America, Soil Science Society of America Publishers, Madison, Wisconsin USA | 2007 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES Horticulture |
| Table 5.2 Course specification |

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| --- | --- |
| Course: | *Breeding of horticultural plants* |
| Course id:3ОХК8О33 |
| Number of ECTS: 4 |
| Teacher: | Professors: Dr Vladislav M. Ognjanov, full professor Dr Mirjana Ž. Ljubojević, assistant professorAssistant: Dr Mirjana Ž. Ljubojević, assistant professor |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 4 | Practical classes: 3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goals

The aim of this course is acquisition of knowledge of the basic principles and methods of horticultural plants conventional and non-conventional breeding, as a prerequisite for understanding and usage of genetic variability in the improvement of horticultural production and implementation of modern breeding methods and achievements within molecular biology. |
| 1. Educational outcomes

Students will be qualified for logical thinking and reasoning about the interaction of genotype and environmental conditions, which results in a phenotype and is an important factor in cultivars and rootstocks choice for specific agro - ecological conditions. Applying hybridization, tissue culture methods and selection from natural populations, student will be able to contribute to dissemination of new and better varieties, with new or significantly improved characteristics in terms of resistance, productivity and decorativeness. |
| 1. Course content

Theory:Introduction, history, roles and objectives of horticultural plants breeding. Phyto-geographical differentiation of plant genetic resources and their conservation. Sources of genetic variation - gene recombination and mutations, adaptability, phenotype and components of phenotypic variability. Methods of plant breeding - selection from natural populations, hybridization, parental selection and combining abilities, clonal selection, tissue culture and genetic engineering, molecular markers, in vitro and marker assisted selection, selection of specific traits. Recognition of varieties (cultivars), introduction and comparative experiments. Specific breeding: breeding objectives, breeding methods, heredity and breeding results for the most important woody and shrub species, annual, biennial and perennial flower species.Practical classes:Systematic of starting material in breeding of horticultural plants, number of chromosomes and taxonomy of the most important horticultural species. Floristic regions and centers of origin of cultivated plants. The gene banks. Descriptors and electronic databases. Flowering time, morphological structure of the flower, crossing methods, breeding techniques, raising and nursing of hybrid seedlings. Incompatibility and methods of its overcoming. Practical work on micropropagation of plant genetic resources and embryo culture. |
| 1. Teaching methods

Lectures, Practical classes, Consultations |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 10 | Theoretical part of the exam/Oral part of the exam | Yes | 40 |
| Test | Yes | 20 |  |
| Exercise attendance | Yes | 10 |
| Term paper | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | D. Hayward, N. O. Bosemark and I. Romagosa | Plant Breeding: Principles and Prospects | London, Chapman and Hall | 1993 |
|  | Borojević Slavko | Principles and Methods of Plant Breeding | Springer – Verlag, Neitherlands | 1990 |
|  | Jordan, R. Bryan | The molecular biology and biotechnology of flowering  | CABI Publishing | 2006 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES Horticulture |
| Table 5.2 Course specification |

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| --- | --- |
| Course: | *Establishing and maintaining of urban green areas* |
| Course id: 3OХК8О34 |
| Number of ECTS: 6 |
| Teacher: | Prof. dr Jelena Ninić-Todorović, Aleksandar Kurjakov, MSc., Jelena Čukanović, MSc. |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 4 | Other teaching types: student`s papers (seminar) | Study research work: - | Other classes: - |
| Precondition courses | None |
| 1. Educational goal

To gain knowledge of establishing and maintaining of urban green areas using available literature and working practices in the field |
| 1. Educational outcomes

Education of professionals in establishing and maintaining of urban green areas. |
| 1. Course content

Theory: Historical development of horticultural architectural practice. Ornamental plants - a major element of green areas. Secondary elements of green areas. Functions of green areas. Plants and their environment. Categories of green areas. Urban green space systems. Preliminary work on establishing of green areas. Soil cultivation. Planting and sowing - trees, shrubs and climbers, lawn establishment. Construction of the building elements on a green surface. Tools and accessories for green space maintenance. Cultivating plants. Field tripsPractical classes: Practical work on the maintenance of green areas. Field trip. |
| 1. Teaching methods

Lectures, Practical classes, Consultations, field trip, research work (optional) |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 10 | Written part of the exam-tasks and theory | Yes | 50 |
| Exercise attendance | Yes | 10 |  |
| Test, Term paper | Yes | 30 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Harris Professor Emeritus, Richard W.; Clark, James R.; Matheny, Nelda P. | Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines (4th Edition) | Prentice hall, New Jersey, USA | 2003. |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationUNDERGRADUATE ACADEMIC STUDIES Horticulture |
| Table 5.2 Course specification |