|  |  |  |
| --- | --- | --- |
|  | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 |  |
| Study Programm AccreditationUNDERGRADUATE ACADEMIC STUDIES *AGRICULTURAL ENGINEERING* |

Appendix 5.2 –Book of Course

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course:  | Mathematics 1; Mathematics 1; Mathematics  |
| Course id: 3ОАИ1О01;3ОУВ1О01; 3ОПТ1О01 |
| Number of ECTS: 7; 7; 6 |
| Teacher:  | Снежана Ј. Матић-Кекић, Nebojša M. Dedović |
| 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 |
| Educational goalMastering the skills and knowledge of subject content, which provides the basis for mathematical modeling of agro-economic phenomena and their exploitation in practice. |
| Educational outcomesStudent qualifies for mathematical modeling of agro-economic phenomena and actively pursuing them. |
| Course contentReal functions. Linear, quadratic, exponential, logarithmic, trigonometric functions and degrees. Sequences and limit values. The limit values and the asymptote function. The first copy and performs higher-order functions of one independent variable. Domen, zero growth, decline, extreme values, inflection points, concavity, convexity of real functions of one real variable. The conditional extremes of functions of two independent variables. Economic function: interval of profitability, profits, demand, supply, revenues, costs, flexibility in the point and its interpretation. Integral calculus: defined and indefinite integrals, primitive functions, integral characteristics, the shift method, the method of partial integration and the integration of rational functions. Application of definite integrals. Uncharacteristically integrals. Polynomials. ODE first order: linear, homogeneous, Bernoulli, total differential and separated variables. Homogeneous and non-homogeneous linear ODE second order with constant coefficients . |
| Teaching methods: Lectures |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | No | 5 | Oral part of the exam | Yes | 40 |
| Test | Yes | 40 |  |
| Exercise attendance | No | 5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Konjik S., Dedović N. | Mathematics - a collection of tasks for the students of Faculty of Agriculture (in Serbian) | Faculty of Agriculture, University of Novi Sad | 2011. |
|  | Hadzić O., Takači Đ. | Mathematics for students of natural sciences (in Serbian) | University of Novi Sad, university textbooks - Edition 76 | 1998. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Mechanics |
| Course id: |
| Number of ECTS: 7 |
| Teacher: | Dragi M. Radomirović |
| 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/navesti ako ima |
| Educational goalIntroducing students to the basic concepts and principles of mechanics. |
| Educational outcomesStudent’s ability in solving mechanics problems. |
| Course content* Fundamentals of static
* Coplanar and non-coplanar concurrent force system (equilibrium and resultant)
* System of couples (equilibrium and resultant couple)
* Coplanar non concurrent force system (equilibrium and resultant)
* System of bodies (free body diagrams and equilibrium conditions)
* Structures (plane trusses, methods for solving)
* Beams. Internal forces (shear and axial forces, bending moment)
* Three-dimensional force systems (moments and couples in three dimensions, equilibrium and simpler equivalent systems)
* Dry friction (Coulomb’s law)
* Rolling friction
* Center of gravity
* Kinematics of a particles (trajectory, velocity, acceleration and the radius of curvature of the path) Kinematics of rigid bodies (rotation about a fixed axis, translational motion and general plane motion)
* Kinematics of reative motion
* Newton's second law
* Kinetic energy, linear momentum and angular momentum
* Work, energy and power
* Work-energy principle for a particle
 |
| Teaching methodsLectures, 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 | Yes | 60 |  |
| Exercise attendance | Yes | 5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Radomirović Dragi | Mechanics-part 1 (in Serbian) | Faculty of Agriculture, Novi Sad | 2001 |
|  | Kovačić IvanaZvonko Rakarić | Collection of Problems in Statics I (in Serbian) | Faculty of Technical Sciences, Novi Sad | 2006 |
|  | Kovačić IvanaZvonko Rakarić | Collection of Problems in Statics II (in Serbian) | Faculty of Technical Sciences, Novi Sad | 2006 |
|  | Đukić ĐorđeCvetićanin Livija | Kinematics (in Serbian) | Faculty of Technical Sciences, Novi Sad | 2005 |
|  | Maretić Ratko | Collection of solved Problems in Kinematics (in Serbian) | Faculty of Technical Sciences, Novi Sad | 2007 |
|  | Đukić ĐorđeCvetićanin LivijaZuković Miodrag | Dynamics (in Serbian) | Faculty of Technical Sciences, Novi Sad | 2014 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Engineering communication |
| Course id: |
| Number of ECTS: |
| Teacher: | Mirko Simikić PhD, Assistant professor |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: | Practical classes: | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| Educational goalThe objective of the course is for students to learn how to draw and use technical documentation, and that they develop the ability of graphical representation of ideas and concepts, as well as technical accuracy, propriety and consistency in the application of technical regulations and standards in this area. |
| Educational outcomesUpon passing the course the students will be able to: Draw and use technical structural documentation; Draw and use blueprints; Visualize objects in space based on technical drawings and to use this knowledge when studying other professionally applicable subjects and to learn the basics of drawing 2D and 3D drawings using AutoCAD software.  |
| Course contentTheoretical lessons. Oblique and orthogonal projection of the point and line. Axonometric (3D) and оrthogonal (2D) drawings. Sections in technical drawings. Dimensioning. Drawing mechanical elements. Marking the quality of surface roughness. Tolerances for measurement, form and position. Workshop drawings. Schematic drawings. Graphic symbols for machine parts, for installations, for working operations and safety measures when working with machines. Use of computers for technical drawings. Applying CAD software to produce 2D and 3D drawings.Practical teaching: Exercises, Other methods of teaching, Research work Tasks related to the fields of study analyzed in lectures. Drawing using a computer. Independent production of graphic works and other assignments. Review and editing of graphic works.  |
| Teaching methodsThe method of oral presentations and discussions. The method of drawing, presentations, demonstrations, simulations and illustrations on the board and by using video presentations. Drawing methods with use of computers. Individual consultations during the preparation of presentations and graphic works. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 6 | Written part of the exam-tasks and theory | Yes | 32 |
|  |
| Exercise attendance | Yes | 30 |
| Test | Yes | 32 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Gligorić R, Milojević Z, | Technical drawings – Engineering communication | University of Novi Sad | 2004 |
|  | Gligorić R,  | Descriptive geometry – application | Faculty of agriculture Novi Sad | 2006 |
|  | Dovniković L. | Technical drawings | University of Novi Sad | 1994 |
|  | Instructions for AutoCad software |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | General chemistry  |
| Course id:3OPT1O04 |
| Number of ECTS: 5 |
| Teacher: | Prof. dr Boris Popović, Prof. dr Dubravka Štajner  |
| 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/navesti ako ima |
| Educational goalProviding the basis for the formation of a certain view of the world, getting to know the most important principles, theories and laws of chemistry, providing theoretical basis for acquiring other skills, mastering specific skills related to the application of theoretical knowledge, the development of creative skills and practical skills necessary for the exercise of the profession. |
| Educational outcomesAfter completing the course of chemistry, students will train the application of theoretical and practical knowledge of chemistry both in life and in the acquisition of other knowledge (eg, biochemistry, agrochemistry, microbiology, physiology, etc.). In terms of practical knowledge and skills students will be able to compute in chemistry, handling basic laboratory equipment, perform basic volumetric determinations and basic instrumental measurements. In addition to this, students should be able to continue their studies or to apply their knowledge and understanding of the profession and to convey it to others. |
| Course contentTheoretical classes:Introduction. Basic concepts and laws of chemistry. Chemical formulas and equations. The structure of the atom. The distribution of electrons in the atom. The structure of atoms and the periodic table of elements. The structure of the molecule. Electron theory of chemical bonding. Intermolecular interactions and states. Fundamentals of chemical thermodynamics. Fundamentals of chemical kinetics. Chemical equilibrium. Chemistry of water. The solutions. Electrolytic dissociation and equilibrium in electrolyte solutions. Acids and bases. Hydrolysis and buffers. Solubility and solubility product. Oxidation-reduction processes. Fundamentals of electrochemistry. Corrosion. Colligative properties. Koliodi. The chemical characteristics of natural and waste waters. Water purification. Structure and classification of organic compounds. Hydrocarbons. The chemical composition of the oil. Organic compounds with oxygen and nitrogen. Chemistry fuels and lubricants.Practical teaching: The stoichiometry. Quantifying the composition of the solution. Quantitative analysis. Acid-base titration. Permanganometrija. Electrolytic dissociation and pH. Potentiometric titration. Determination of total hardness of water. Spectrophotometry. Hydrocarbons and for all their reaction. The organic compounds with oxygen (alcohols, carbonyl compounds and acid). The acid number of the fuel. |
| Teaching methodsTheoretical classes and practical exercises. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 3 | Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory | Yes | 55 |
| Test | Yes | 20 |  |
| Exercise attendance | Yes | 2 |
| colloquium | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Gorzynski Smith, J. | General, Organic &Biological Chemistry | Published by McGraw-Hill, New York. | 2010. |
|  | Štajner, D., Kevrešan, S. | Chemistry | Faculty of Agriculture, Novi Sad | 2006. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | PRINCIPLES OF ECONOMICS |
| Course id:3OUV1O05 |
| Number of ECTS:4 |
| Teacher: | Danica Drakulić, PhD, full professor |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:2x15=30 | Practical classes:- | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| Educational goalIntroduce 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. |
| Educational outcomesSelected 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. |
| Course contentLecturesOn 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. |
| Teaching methodsTheoretical 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 | 10 | Oral part of the exam | Yes | 60 |
| Test | Yes | 30 |  |
| Exercise attendance | No |   |
| Essays | No |   |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Pejanović Radovan | Principi ekonomije | Poljoprivredni fakultet, Novi Sad  | 2007 |
|  | Samuelson Pol | Ekonomija | Mate, Zagreb | 2000 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Soil science |
| Course id: 3OPT2O06 |
| 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: 3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 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 |
| Educational outcomes - after passing the exam, students will have increased knowledge about soil science that will enable them to understand the problems related to the soil in agricultural production. |
| 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. |
| Teaching methodsLectures, 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 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| 9090Course: | Strength of Materials |
| Course id: |
| Number of ECTS: 6 |
| Teacher: | Dragi M. Radomirović |
| 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/navesti ako ima |
| Educational goalIntroducing students to the basic concepts and principles of strength of materials. |
| Educational outcomesStudent’s ability in solving strength of material problems . |
| Course content* Stress and strain in tension and compression
* Statically determinate and indeterminate problems in tension and compression
* Linear thermal expansion
* Stresses and strains in pure shear.
* Working stresses in shear
* Geometrical properties of plane figures
* Stress and strain in torsion
* Statically determinate and indeterminate problems in torsion
* Stress and strain in bending
* Statically determinate and indeterminate problems in bending
* Buckling (Euler’s column formula, critical stress)
 |
| Teaching methodsLectures, 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 | Yes | 60 |  |
| Exercise attendance | Yes | 5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Mandić Jovan | Strength of materials (in Serbian) | Scientific book, Belgrade | 1987 |
|  | Mandić JovanTatić Nedeljko | Collection of solved problems in strength of materials (in Serbian) | Scientific book, Belgrade | 1974 |
|  | Maretić Ratko | Collection of solved problems in strength of materials (in Serbian) | Faculty of Technical Sciences, Novi Sad | 2012 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Mechanical and agricultural materials |
| Course id: |
| Number of ECTS:7 |
| Teacher: | Dr.Mirko Babić, Dr Ivan Pavkov, assistant: Milivoj Radojčin, MSc |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 4x15=60 | Practical classes: 3x15=45 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None/navesti ako ima |
| Educational goalIntroducing the theoretical basis, characteristics and practical application of various metallic and non-metallic materials in engineering, especially in mechanical engineering. |
| Educational outcomesTraining students for the evaluation of materials and material selection for installation on agricultural machines and devices. |
| Course contentTheory lessonsThe importance of mechanical materials in terms of exploitation of agricultural techniques. Structure metals and alloys, the crystallization process. The crystal lattice. Deformation. The formation of alloys: mechanical mixtures, solid solutions and chemical compounds. The state diagram multicomponent alloys. Iron and its alloys. The state diagram iron-carbon. The classification of steels. Fundamentals of heat treatment of carbon steel. Classification and properties of cast iron. Non-ferrous and light metals. Non-metallic materials mechanical engineering. Properties and material testing.The importance of knowing the characteristics of agricultural materials. Basic physical properties. The mechanical properties. Rheological properties. The current features. Specifics of friction agricultural materials. Heat, electrical, optical and acoustic properties.Practical teaching: Exercise, Other modes of teachingMechanical Materials: State diagram Fe-Fe3C. Marking metals and alloys by JUS. Crystallographic observation. Introduction to the principles of testing properties of metals and alloys. diagram strain deformations. Introduction to the thermal treatment in practice - visit the factory. Agricultural amterijali: Laboratory exercises test the basic physical properties. Laboratory exercises test the mechanical properties. Laboratory exercise test circuits feature. Laboratory exercises test the friction properties. Demonstration exercise of the optical properties of materials. |
| Teaching methodsLectures: Theoretical teaching is conducted using a computer presentation with oral presentation. Complete authorized lectures are offered to students in the Faculty website. Practical classes: Practical classes are used for clarifying material from lecturess, organized demonstration and laboratory exercises. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam | Yes | 35 |
| Test | Yes | 60 |  |
| Exercise attendance | Yes |  |
|  Test, Term paper | Yes/No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Babić, Mirko | Physical properties of agricultural materials, authorized lectures | Faculty of Agriculture, Novi Sad | 2004 |
|  | Babić, Mirko | Physical properties of agricultural materials, authorized lectures | Faculty of Agriculture, Novi Sad | 2006 |
|  | Vitomir Đorđević | Mechanical materials (some chapters) ) | Faculty of Mechanical Engineering, Belgrade | 1999 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Sociology |
| Course id: 3OPT2O09 |
| 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 |
| Educational goalThe 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. |
| Educational outcomesThis 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. |
| Course contentMeaning 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. |
| 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 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | *Field and Vegetable Crops Production* |
| Course id: 3OPT3O10 |
| Number of ECTS: 6 |
| Teacher: | Ph.D. Dragana Latkovic; Ph.D. Žarko Ilin; contributors: Ph.D. Goran Jaćimović, M.Sc. Boris Adamović |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 4 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None/navesti ako ima |
| 1. Educational goal

The aim of the course is that students learn how to in conditions of Serbia can achieve higher and stable yields of good quality with satisfactory profitability and conservation of agro ecosystems. |
| 1. Educational outcomes

After completion of lectures and exercises student will be qualified and informed with the basic elements of growing technology of field and vegetable crops. After passing the exam, the candidate will be qualified to lead the production of cultivated plants and to be successful in this production; and will be trained to combine the knowledge, ability and skills with the given environmental and edaphic conditions. |
| 1. Course content

*Theoretical teaching*: In the part of field crops will be studied the next plant species: wheat, barley, corn, beans, soybeans, peas, sunflower, canola, hemp, sugar beets, potatoes, tobacco and alfalfa. From vegetable crops will be studied: carrots, parsley, celery, parsnip, beetroot, radish, onion, garlic, leek, shallot, welsh onion, cabbage, kale, cauliflower, broccoli, brussels sprouts, collards, cabbage, Chinese and Peking cabbage, lettuce, spinach, endive, tomatoes, peppers, eggplant, cucumber, melon, watermelon, pumpkin, green peas, green beans, asparagus, artichokes, rhubarb, horseradish. At each crop will be studied the following: 1. General characteristics: economic importance, area and yields in the world and in our country, geographic distribution and origin of the species. 2. Biological characteristics and requirements for growing conditions in the vegetation period and phonological stages. 3. Production Technology: crop rotation, selection of preceding crops and suitability of each crops for the next crop, tillage and seedbed preparation; fertilization (manner, time, relation of N:P:K, quantity of this nutrients and some specificity of crops); sowing (varieties and hybrids, seed quality and seed preparation, sowing time and method of planting, ie, sowing rate and density of crops with emphasis on varietal specificity) and depth of sowing; crop care (fight against weeds, pests and diseases, fertilization with nitrogen – topdressing and specific measures of care); harvest (physiological and technological maturity, moment and way of harvesting, machines for harvest and storage). Through teaching of the production technology will be constantly emphasizes the role and importance of timely and quality of performance of all agro-technical measures and the possibility of rationalization of production processes by using the latest achievements of science and practice.*Practical exercises*: Introduce students to the botanical division, morphological characteristics and developmental stages of the plants specified, using slides, and fresh and dry material from the laboratory. |
| 1. Teaching methods

Lectures, Practice/ Practical classes, Consultations |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Activity during lectures | Yes | 6 (field crops) + 4 (vegetable crops) | *Oral part of the exam* | Yes | 42 (field crops) + 28 (vegetable crops) |
| Colloquium | Yes | 12 (field crops) + 8 (vegetable crops) |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Bharat P. Singh | Industrial Crops and Uses | Fort Valley State University, Fort Valley, Georgia, USA, CAB International  | 2010 |
|  | John H. Martin, Richard P. Waldren, David L. Stamp | Principles of Field Crop Production | Pearson Education Inc., Upper Saddle River, New Jersey, Columbus, Ohio, USA | 2006 |
|  | Robert G. Hoeft, Emerson D. Nafziger, Richard R. Johnson and Samuel R. Aldrich | Modern corn and soybean production | MCSP Publications; 1st edition | 2000 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Тhermotechnics and renewable energy |
| Course id: 3ОAI3О12 |
| Number of ECTS: 6 |
| Teacher: | Todor V. Janić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 3 | Other teaching types: - | Study research work: - | Other classes: 2 |
| Precondition courses | None |
| Educational goalTo familiarize students with the specifics of the theoretical and practical requirements in the field of thermodynamics, thermotechnics and the use of renewable energy sources, and systematization of the same application specific methods. |
| Educational outcomesMastering the professional and scientific methods of solving specific problems in the field of thermodynamics, thermotechnics and the use of renewable energy sources. |
| Course contentIntroduction to Thermodynamics. Thermodynamic state properties, state changes. The equation of state of ideal gases. The equation of state of ideal gas mixtures. External influences. The first law of thermodynamics. The enthalpy. The second law of thermodynamics. Polytropic change of state of ideal gases. Halfideal gases. Real gases and vapors. The water vapor. Converting thermal energy into mechanical work (cyclic processes). Cycles of cooling. Apparatus and equipment for cooling. The two-component mixtures (binary solutions). The absorption cooling machine. Transport of heat. Heat transfer (conduction). Heat transfer (convection). The passage of heat. Radiation heat (radiation). Calculation of heat loss. Power consumption, diagrams consumption and consumer characteristics. Energy efficiency of buildings. Renewable energy sources. Biomass. Biogas. Solar energy. Geothermal energy. Wind energy. The combustion of fuel. Furnaces for combustion of fuel. Burners for liquid and gaseous fuels. Heat exchangers. Thermal plant. Furnaces. Boilers. The choice of type and concept of the energy plant. The criteria to be met by thermal energy plants. The choice of thermal schemes and parameters of thermal power plants, technological systems of thermal power plants in the fuel supply, environmental protection from harmful influences, for taking the ash and slag; for the supply and treatment of water. Energy efficiency of thermal power plants. The pipes and pipe fittings. Heating and air conditioning. Cooling devices. The moist air. Air conditioners. Heat pumps. Energy efficiency HVAC equipment. |
| Teaching methodsTasks of thermodynamics. Laboratory and field exercises in thermal devices and renewable energy sources. Seminar or project works from the aforementioned lessons. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam/Written part of the exam-tasks and theory | Yes |  |
| Test | Yes/No | - | Written part: 40Oral part of the exam: 51 |
| Exercise attendance | Yes | 4 |
|  |  | - |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | M. Brkić  | Termotehnika u poljoprivredi | Poljoprivredni fakultet, Novi Sad | 2004. |
|  | M. Brkić, T. Janić, D. Somer:  | Termotehnika u poljoprivredi – II deo, Procesna tehnika i energetika | Poljoprivredni fakultet, Novi Sad | 2006. |
|  | D. Voronjec | Zbirka zadataka iz tehničke termodinamike | Mašinski fakultet, Beograd | 2001. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Mechinе elements |
| Course id: |
| Number of ECTS:6 |
| Teacher: | Dr.Radojka Gligorić, assistant: Milivoj Radojčin, MSc |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 3 | Other teaching types:2 | Study research work: | Other classes: |
| Precondition courses | None/navesti ako ima |
| Educational goalThe aim of the course is that students learn: the role, function, structural shapes, materials and calculation in order to select or verify the basic machine elements. |
| Educational outcomesStudents will have the necessary knowledge of machine elements and will be able to more accurately, more reliable and more efficient to select, use and maintain machines. After passing the course, students will be able to monitor and study other subjects. |
| Course contentTheory lessonsAnalyzed machine elements: elements for the connection: bolts, springs, pins, fuses and welded forms; Shafts and pins; Gear, chain, belt and gearing forces. Variates; Beds; Couplings (rigid, elastic, expansion, on - off, joint, special and security. For all of these structural elements will analyze the following aspects: Application, roles and division; loads and stresses; standard label; Basic parameters and indicators of work; Calculation of in order to select or check the selected standard types, monitoring and verification work during use; Tests during operation in order to determine the useful life period of replacement, types of damage, maintenance and protection procedures in order to long life and protection measures for the security of use.Practical teaching: Exercise, Other modes of teaching, Study research workCalculation tasks in the area covered by the lectures. Independent production of graphic works. View and defense graphic works. |
| Teaching methodsThe method of oral presentations and discussions. Method of presentations, demonstrations, simulations and illustrations on the board and using the computer. Method simulation work using computers. The method of practical work (computation and computational methods). |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 6 | Oral part of the exam | Yes | 30 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes |  |
|  Test, Term paper, | Yes/No | 34 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Gligorić Radojka | Mašinski elementi, autorizovana skripta | Poljoprivredni fakultet Novi Sad | 2010 |
|  | Kuzmanović S | Mašinski elementi | Univerzitet u Novom Sadu, Fakultet tehničkih nauka | 2005 |
|  | Kuzmanović S., Trbojević R., Rackov M | Zbirka zadataka iz mašinskih elementa | Univerzitet u Novom Sadu, Fakultet tehničkih nauka  | 2005 |
|  | Ognjanović M., Plavšić N., Janković M | Teorija mašinskih elemenata | Mašinski fakultet Beograd | 1991 |
|  | Ercegović Đ | Mašinski elementi | Nauka, Beograd | 1994 |
|  | Ognjanović M., Miltenović V | Mašinski elementi I, II i III | Mašinski fakultet, Beograd | 1996 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Information and Communication Technologies in Agricultural Engineering |
| Course id: ZOPT3O13 |
| Number of ECTS: 6 |
| Teacher: | Branislav A. Karadžić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: | Practical classes: 2 | Other teaching types:2 | Study research work: | Other classes: |
| Precondition courses | Mathematics |
| Educational goalIntroducing students to the principles of functioning of information and communication systems used in agricultural engineering. |
| Educational outcomesStudents will be able to effectively use information and communication technologies applied in agricultural technology. |
| Course contentComputer systems. Technical computer system. Programming a computer system. Computer networks. Internet and Internet services. Web technology. Databases. Sensors, classification, types. Biosensors, classification, application in agriculture. Remote data collection using satellites and aircraft. Standards for data transfer (ISOBUS). Precision agriculture. Information and communication technologies in the management of agricultural machinery and technological processes of production, finishing and processing of agricultural products. Using a web for remote servicing and maintenance of agricultural machinery and equipment. |
| Teaching methodsNa primer: Lectures, Practical classes. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 5 | Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory | Yes | 40 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes | 5 |
| Term paper | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Munack A. | Information Technology (CIGR Handbook of Agricultural Engineering) | ASABE, MI, USA | 2006. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | ***Plant Protection***  |
| Course id: |
| Number of ECTS: |
| Teacher: | Marija F. Zgomba, Full Professor, MrSc.Dušan S. Marinković, Teaching Assistant |
| 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

Introduction to plant diseases, pathogens and weeds in conjunction with the damages and losses caused by bio agences. Meassures and methods of control strategies in plant and environment protection. The pesticides/biocides formulations of the products to be applied. The dose/concentration of the products, safe use and rational approach regarding the tresholds of the pathogens and pests. Needed effectivness of the applied products. Application techniques. Personal protection in relation to toxicity pesticide classes. The equipment used in agriculture and rural/urban environment.  |
| 1. Educational outcomes

Developed skills in distinguishing causatives of losses in plant breeding and obtained knowledge in plant protection disciplines , various degrees of damages caused by different biological agents and possible/contemporary methods to be applied in suppression of pathogens, pests and weeds. Recognition of different products formulations available for the treatments of plants, soil or environment. Use of optimal combination of methods and application techniques in obtaining high degree of effectiveness.  |
| 1. Course content

*Theoretical* Significance of Plant protection. Causes of losses and quality of plants (pathogens, pests, weeds). The most striking symptoms of the most important cultivated plants. Harmful and beneficial insects and other organisms (acarines, rodents, snails). Distribution and abundance of pests. Economic threshold for different damage causatives. Integrated plant protection approach. Equipment for pesticide application. Application techniques and compatibility of the products to be applied simultaneously. *Practical classes*Demonstration of plant material damaged by pathogens, pest insects and stages of the development that are phytophagous . The place and the plant organs that are affected by various diseases/pests. The basic properties of the pesticides, formulations and the treatments that can be carried out either within agriculture or rural/urban area. The criteria for obtaining optimal degree of plant protection in respect to equipment requirements. |
| 1. Teaching methods

 Lectures, Practical classes |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | *Oral*  | Yes |  |
| Test | Yes | 25 |  |
| Exercise attendance | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Čamprag D. | Integralna zaštita ratarskih kult. | Poljoprivredni fakultet, Novi Sad | 2000 |
|  | Šovljanski R, Lazić S. | Osnovi Fitofarmacije  | Poljoprivredni fakultet, Novi Sad | 2000 |
|  | Matthews G.A. | Pesticide Application Methods | Blackwell Science Ltd | 2000 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course:  | Power machines |
| Course id: 3OPT4O15 |
| Number of ECTS: 5 |
| Teacher: | Lazar Đ Savin, Mirko Đ Simikić |
| 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/navesti ako ima |
| Educational goalThe aim of the course is to introduce students with combustion engines which are installed in agricultural tractors, combine harvesters and other mobile and stationary systems. Also, students should learn about with the tasks of individual engine system, structures, functioning, the basic setup, maintenance and storage. |
| Educational outcomesAfter taking the course, students acquire knowledge and skills that enable him in-depth understanding some technical basisIC engine, the design and testing IC engines, proper selection IC engines according to the purpose, structure and seedingTerms of Use, proper handling, maintenance and storage of IC engines and an economical and ecological use of motorinternal combustion. |
| Course contentTheory lessonsPower generating machinery in agriculture, forestry and water management, importance, history, production, situation and needs. Classification, advantages and disadvantages of IC engines and other structures, basic concepts and operation of diesel and spark ignition engine. Structure of the IC engines, immovable and movable elements, valve train and engine balancing. The cooling system and engine lubrication, fueling and air and flue gases. Electronic devices and starting the engine,measuring and control devices. Cycles and cycle indicators, indicator of the effective parameters, mechanical losses,heat balance and budget cycles. The characteristics of the engine, application, engine options. Engine test - standards,methods, equipment, measurement procedure, the formation of the report. Development trends of IC engines and other engine structure. Practical teaching: Exercise, Other modes of teaching, Study research work Introduction to the design of engines and engine Internal combustion and other engines. System design, principles of operation, Setting the basis of the budget. The budget cycle and indicators of operation. Engine test - equipment, methods, Standards and interrogation techniques and the formation of the report. Application of motor tractors, combine harvesters, motor vehicles and stationary plants. |
| Teaching methodsThe method of oral presentations and discussions. Methods of presentations, demonstrations, simulations, drawing and illustration. Consultation and seminar papers. The method of practical work in laboratories and institutes. |
| 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/Written part of the exam-tasks and theory | Yes | 45 |
| Test | Yes | 20 |  |
| Exercise attendance | Yes | 5 |
| Ovde se mogu pojaviti i kolokvijumi i seminarski rad (npr. Test, Term paper) | Yes | 25 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Николић Р | Погонске машине-конструкције и принципи рада | Пољопривредни факултет, Нови Сад | 2004 |
|  | Николић Р | Погонске машине - теорија, уџбеник | Пољопривредни факултет, Нови Сад | 2005 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Repair Equipment and work shop practice |
| Course id:3ОАИ2О08 |
| Number of ECTS:7 |
| Teacher: | Milan D. Tomić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:4 | Practical classes:4 | Other teaching types: | Study research work: | Other classes:2 |
| Precondition courses | None/navesti ako ima |
| Educational goalIntroducing the theoretical basis, characteristics and practical application of various metallic and non-metallic materials in engineering, especially in mechanical engineering. Training and education of students with different materials processing technologies, in order to successfully coping with the problems of theoretical and practical performing maintaining the proper working of technical systems. |
| Educational outcomesEducate the students for the evaluation of materials and material selection for installation on agricultural mašinamam and devices. The ability of the candidate-student to address the problems that arise in the implementation of various workover technologies and the possibility of giving concrete solutions to overcome them. |
| Course contentTheoretical classesCorrosion of metals and metal protection against corrosion (corrosion inhibitors, inorganic protective coatings, organic coatings, types of inorganic coatings and methods of application, errors coatings); Measurement and measuring equipment (rules of measurement, measurement errors, measurement of length, measuring angles, measuring profile, measuring instruments); Metal processing chip removal (cutting theory, elements of machines for metal removing work machines for metal chip removal, lathes, milling machines, planers, sanders, drills); Processing of metal without removing material (metal deformation, minting, cutting, bending, molding); Metal joining techniques (techniques of welding, arc welding, gas welding, resistance welding, welding in a protective atmosphere, mechanical coupling, separable and inseparable connections).Practical teaching: Exercise, Other modes of teaching,Introducing the measuring equipment and work on machine tools and manufacturing of workpieces per drawing. Implementation of the work is performed on a lathe, milling machine, planer and drill ktatkohodnoj; Introducing the devices for arc and gas welding and working with them in the realization of making the set of parts. |
| Teaching methodsLectures with the use of video presentations, demonstration exercises in laboratory and field conditions, assignments, lab and seminar work, testing under laboratory and field conditions and consultation within the lectures and exercises. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam | Yes | 5 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes | 35 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Furman T. | Knowledge workover machine | Faculty of Agriculture, Novi Sad | 1994 . |
|  | Stanković P | Machine Tools | Technical books, Belgrade | 1995. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Electrical engineering and electrical machines |
| Course id: ZOPT4O17 |
| Number of ECTS: 5 |
| Teacher: | Branislav A. Karadžić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | Mathematics |
| Educational goalIntroducing students to the basic concepts of electrical engineering and application of electrical and electronic devices, machines and systems in agriculture. |
| Educational outcomesStudents will be able to understand the working principles and operation of electrical devices and systems used in agricultural production and to be able to exercise choice of appropriate electrical equipment. |
| Course contentElectrostatics. Time constant electric current. Magnetism. Time-varying electric and magnetic field. Time-varying electrical current. Electrical measurements. Fundamentals of electronics. Electrical measurements of non-electrical quantities. Transformers. Types of rotary machines. DC Machines. Asynchronous machines. Synchronous machines. Power electronic devices. Electromotor drives and electric traction in agriculture. Electrical installations, electric lighting and heating in agriculture. Alternative sources of electricity in agriculture. Electrical and electronic devices at agricultural machines. |
| Teaching methodsLectures, 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 | 40 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes | 5 |
| Term paper | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Gustafson J.R, Morgan T.M | Fundamentals of Electricity for Agriculture | ASAE, USA | 2011 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Мechanisms of agricultural machinery |
| Course id:3OPT4O18 |
| Number of ECTS:5 |
| Teacher: | Full professor Radojka Gligorić |
| 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/navesti ako ima |
| Educational goalThe aim of the course is that students learn the basic types of mechanisms of agricultural machinery, their role and function in machines, to done calculation of the structure, kinematic and dynamic parameters of working and balancing. |
| Educational outcomesStudents will get the necessary knowledge of the mechanisms of agricultural machines and will be able to more accurately, reliably and more rationally choose, use, configure and maintain the machines. After passing the course, students will be able to better monitor and study other courses. |
| Course contentTheoretical lessonsAnalysis of different types of mechanisms: the piston mechanism, four-lever mechanism , rocker mechanism, oscilating rocker mechanism, crank mechanism, cam mechanism, gear mechanism, three-point-hitch of the tractor mechanism, cardan mechanism , planetary mechanisms, etc.For all of these mechanisms will analyze the following aspects: structural analysis; the degree of freedom; classification; paths; conditions of functioning, kinematic analysis; dynamic analysis – load forces of mechanism; determining the driving force; dynamic equations of mechanism motion, indicators of working conditions within the machine. The balancing of the mechanism: the conditions of balance; balancing methods; apparatus for balancing. Synthesis of mechanisms: basic concepts; synthesis methods; synthesis optimization.Practical teaching: Exercise, other forms of teaching, study-research workResolving of arithmetic tasks in the area to be covered in the lectures. Individual making of graphic paper. Checking and graphic paper defence. |
| Teaching methodsThe method of oral presentationa, conversation, demonstration, computer simulation and illustration. Na primer: Lectures, Practice/ Practical classes, Consultations, study, research work… (izabrati) |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes/No | 6 | Oral part of the exam/Written part of the exam-tasks and theory | Yes | 30+30 |
| Test | Yes/No | 34 |  |
| Exercise attendance | Yes/No |  |
| Ovde se mogu pojaviti i kolokvijumi i seminarski rad (npr. Test, Term paper) | Yes/No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Gligorić Radojka | Mehanizmi poljoprivrednih mašina | University of Novi Sad | 2005 |
|  | Zlokolica et al. | Mehanika mašina | University of Novi Sad-Faculty of techical science | 2004 |
|  | Zlokolica M, Čavić M, Kostić M. | Mehanika mašina-zbirka rešenih zadataka | University of Novi Sad-Faculty of techical science | 1996 |
|  | Ercegović Đ., Raičević D. | Mehanizmi poljoprivrednih mašina | University of Belgrade-Faculty of agriculture | 2003 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Hydropneumatic engineering |
| Course id: 7OПТ5O21 |
| Number of ECTS: 6 |
| Teacher: | Professor Mirko Babić, PhD, Ivan Pavkov, 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 |
| Educational goalIntroduction to the basics of fluid mechanics and clarification of concepts and phenomena in the statics and fluid flow. The second part of the subject is devoted to the pipelines and hydraulic machines. |
| Educational outcomesTraining students to solve simple hydraulic problems. In addition, the student is trained to recognize and complex problems, and that he may project tasks to specialists in the field of hydraulics. |
| Course contentTheory lessonsBasic physical properties of the fluid. Hydrostatics. The relative balance. Fluid flow. Euler equation. The equation of continuity. Bernoulli's principle. Flow regimes. Energy loss through pipelines. The complex pipelines. Hydraulic machines. Turbomachines. Characteristics of of turbomachines. The work of several hydraulic machines. Volumetric machines. The flow machines. Motor hydraulic machines. Transmission, management and utilization of hydraulic and pneumatic energy. Hydraulic and pneumatic components and devices. Maintenance.Practical teaching: Exercise, Other modes of teaching, Study research workTasks of the basic properties of fluids. Tasks of fluid statics. The tasks of the movement of fluids. Tasks of energy loss of flow. Showing instruments in the laboratory. Tasks of the pipeline. Tasks of turbomachines. The seminar work. Showing hydraulic machines and equipment in the lab. Laboratory exercises - determination of QH characteristic of turbomachine . |
| Teaching methodsLectures of theory, Training of solving tasks. Practical classes in laboratory. Seminar. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 10 | Oral part of the exam | Yes | 35 |
| Test | Yes | 35 |  |
| Laboratory practice | Yes | 5 |
| Seminar | Yes | 15 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Mirko Babić  | Hidropneumatics technics, authorized lectures (in Serbian),  | Faculty of Agriculture, Novi Sad, Serbia | 2012. |
|  | Vuković B, Tašin S. | Introduction to Hydro-pneumatic technique (in Serbian) | Faculty of technical Science, Novi Sad  | 2006. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | AGRICULTURAL TRACTORS |
| Course id: 3ORT5O21 |
| Number of ECTS:7 |
| Teacher: | Lazar Đ Savin, Mirko Đ Simikić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:4 | Practical classes:2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| Educational goalThe aim of the course is to familiarize students with the basic constructions of the tractor, adjusting and economical use and selection mode according to purpose and application conditions. To master the methods and equipment for laboratory and field testing of tractors. Then, to be able to form a tractor systems and machine park according to the structure of production and the conditions and for the development, design, and selection and use of ecological tractor for safe food production. |
| Educational outcomesAfter taking the course the student acquire a knowledge and skills that enable him a thorough understanding of some technical basis of agricultural tractors, the design and testing of agricultural tractors, the proper selection according to purpose, sowing structure and terms of use, form a complete system of the tractor and machine park under the conditions of production, proper handling maintenance and preservation, and economical and ecological use of agricultural tractors. |
| Course contentTheory lessonsTractors and mobile systems in agriculture, water management and forestry, task definition, history, classification and categorization, condition, production, needs and trends of development characteristics of tractors, power, weight, morphological, exploitation, ergonomic and safety at work. Mechanics of movement and determination of dynamic characteristics, tractive balance, power balance, traction characteristics. Using tractors, the impact on the environment and optimization of machine park. Testing of tractors and mobile systems.Practical teaching: Exercise, Other modes of teaching, Study research workIntroduction to the design of the tractor, principles of operation, adjustment, driving techniques, the basis of the budget. Calculation of tractor - static, dynamic, stability, mobility, maneuver, traction and balance balance of power. The formation of mobile systems and optimization of machine park and the impact on the environment. Laboratory and field testing, methods, equipment, procedures, forming reports. |
| 1. Teaching methods

The method of oral presentations and discussions. Methods of presentations, demonstrations, simulations, drawing and illustration. Consultations and seminar papers. The method of practical work in laboratories and institutes. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory | Yes | 45 |
| Test | Yes | 20 |  |
| Exercise attendance | Yes | 5 |
| Term paper | Yes | 25 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Јанковић Д, Тодоровић Ј | Теорија кретања моторних возила | Машински факултет, Београд | 1990 |
|  | Јањићијевић Н, Јанковић Д, Тодоровић Ј | Конструкције моторних возила | Машински факултет, Београд | 1998 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Mechanization in Field Production I |
| Course id:3OPT5O22 |
| Number of ECTS:6 |
| Teacher: | Јан, Ј, Туран |
| Course status | Elective |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None/navesti ako ima |
| Educational goalEnabling students to theoretical and practical mastery of subjects for selection, regulation and management of modern machinery and equipment for crop production |
| Educational outcomesQualification for the selection, planning, management and exploitation of modern mechanization in farming production |
| Course contentTillage machines: machines for primary processing (with razrivačkim working organs - rippers, chisel plow, plows - Raoni, Disc, swivel, swivel, heavy harrows), machines for additional processing harrows, light and medium harrows, rollers, cultivators, generators combined ), machines for processing inter-row crops (crop cultivators with passive and active working bodies). II machinery for soil fertilization: machines for fertilizers (granulated and powdered - mechanical and pneumatic spreaders), machines for organic fertilizer (manure manure, slurry rasiopači). III Seeding of field crops: uskoredne spacing seeding planters uskoredne crops (types of seeding apparatus, investors, etc.), in broadcast sowing machines for root crops (mechanical, pneumatic, adjustment, maintenance), direct drill without tillage. IV Combined till machinery and joint technique. |
| Teaching methodsPractical teaching: Exercise, Other modes of teaching,Practical classes Exercises include practical demonstration and description of machinery for soil tillage, fertilization, seeding and reduced processing. The purpose machines, working organs of the machine, operation, adjustment and maintenance. The theoretical part of the exercise with the applied tasks in these areas. |
| 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/Written part of the exam-tasks and theory | Yes | 60 |
| Test | Yes | 15 |  |
| Exercise attendance | Yes | 5 |
| Test, Term paper | Yes | 15 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Barać, S.: | Mehanizacija biljne proizvodnje | Autor | 2003 |
|  | Veselinov, B., Martinov, M., Bojić, S. | Mašine za biosisteme | Fakultet tehničkih nauka u Novom Sadu | 2009 |
|  | Vojvodić, N., Malinović, N., i dr. | Poljoprivredne mašine  | Nevkoš Novi Sad | 1998 |
|  | Ivančević, S., Mitr ović D. | Sistemi za obradu ritskih zemljišta sa aspekta potrošnje goriva, investicije po hektaru i održivih eko sistema | Institut za ekonomiku poljoprivrede Beograd, Beograd | 2012 |
|  | Mekinda, M. | Traktori i mašine u ratarstvu (I deo) | Poljoprivredni fakultet, Novi Sad | 1969 |
|  | Meši, M. | Poljoprivredne mašine | Poljoprivredni fakultet, Novi Sad | 2012 |
|  | Mićić, J. | Poljoprivredne mašine | Poljoprivredni fakultet, Novi Sad | 1991 |
|  | Poničan, J., Korenko, M. | Stroje pre rastlinnú výrobu | Slovenská pol'nohospodárska univeryita v Nitre | 2008 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Animal Husbandry |
| Course id:3OPT5O23 |
| Number of ECTS:5 |
| Teacher: | Lidija V. Perić |
| 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/navesti ako ima |
| Educational goalIntroducing students to the basics of livestock production and acquisition of basic knowledge in this field. |
| Educational outcomesStudents will gain knowledge about the biological basis of livestock production, as well as on the development and extent of livestock production in our country. |
| Course contentLecturesIntroduction. Breeds and classification of breeds. Fertility and breeding of domestic animals. Growth and development. Methods of breeding of domestic animals. The selection of domestic animals. Nutrition of farm animals. The influence of environment on domestic animals. Cattle production. Pig production. Poultry production. Sheep and goat production.Practical classes: Introduction. Livestock as a science. Definition of domestic animals. Classification of breeds. Fertility and breeding. Growth and development. Constitution and condition of animals. The selection of domestic animals. Methods of breeding. The influence of environment on domestic animals. Basic nutrition of farm animals. Classification of nutrients. Cattle production. Pig production. Poultry production. Sheep and goat production. |
| Teaching methodsLectures, Practice/ Practical classes, Consultations |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes/No | 5 | Oral part of the exam/Written part of the exam | Yes | 1050 |
| Test | Yes/No | 30 |  |
| Exercise attendance | Yes/No | 5 |
| Ovde se mogu pojaviti i kolokvijumi i seminarski rad (npr. Test, Term paper) | Yes/No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Petrović Milica | Stočarstvo | Poljoprivredni fakultet Beograd | 2000. |
|  | Krajinović M., Čobić T., Ćinkulov M. | OPšte stočarstvo | Poljoprivredni fakultet Novi Sad | 2000. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Automatics in Agriculture |
| Course id: ZOPT6O24 |
| Number of ECTS: 6 |
| Teacher:  | Branislav A. Karadžić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: 2 |
| Precondition courses | Mathematics |
| Educational goalIntroducing students to the principles of automatic control of processes in agricultural production. |
| Educational outcomesStudents will be able to understand the working principles and operation of control systems and to independently manage automated processes in agriculture. |
| Course contentBasic concepts and principles of automatic control. Types of control, classification of automatic control systems. The mathematical description of continuous linear and nonlinear systems. Analysis and synthesis of automatic control systems. Selecting and adjustment parameters of PID controller. Software packages for simulation, analysis and synthesis of automatic control systems. Digital control systems. Automation of technological processes in agriculture. Acquisition and control systems. Software packages for data acquisition and supervisory control of processes. The use of robots in agriculture. |
| Teaching methodsLectures, Practical classes: Exercise.Performing computing, computer and laboratory exercises. Introduction to software packages for analysis, synthesis and simulation of control systems. Demonstration of practical adjustment of control systems. |
| 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 | 40 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes | 5 |
| Term paper | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Zhang Q, Pierce F.J. | Agricultural Automation – Fundamentals and Practice | CRC Press, Taylor & Francis Group | 2011 |
|  | Dorf R.C, Bishop R.H. | Modern Control Systems | Prentice Hall, New Jersey, USA | 2001. |
|  | Munack A. | Information Technology (CIGR Handbook of Agricultural Engineering),  | ASABE, MI, USA | 2006. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Mechanization in Field Production II |
| Course id:3OPT6O25 |
| Number of ECTS:5 |
| Teacher: | Associate professor Mihal O. Meši |
| 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/navesti ako ima |
| Educational goalGetting the knowledge for theoretical and practical overcoming of subjects for selection, regulation and management of modern machinery and equipment for crop production. |
| Educational outcomesGetting the skills for selection, planning, management and exploitation of modern mechanization in agricultural field crop production . |
| Course contentUniversal grain harvesters: 1. Headers of combine harvesters, 2. Threshing devices, 3. Separation devices, 4. Conveyors, elevators and bunker 5. Operating and transmosioni systems combine, 6. Hydraulic and electrical installations, 7 cabin with command and control devices. II. Machine harvesting for sugar beet root: 1. Apparatus for removing leaves and sugar beet head, 2. Devices for sugar beet digging, 3rd cleaning sugar beet roots. III. Machine harvesting the corn in the cob (harvesters and pickers). IV. Machinery for primary production of seeds of field crops. V. machines for primary processing seeds of agricultural crops.Practical teaching: Exercise, Other modes of teaching,Practical classes Exercises include practical demonstration and description of machinery and equipment for harvesting and primary processing seeds of agricultural crops. The purpose machines, working organs of the machine, operation, adjustment and maintenance. The theoretical part of the exercise with the applied tasks in these areas |
| Teaching methodsOral presentation with the use of modern equipment for visual presentation and simulation. Practical exercises on machines with a demonstration showing in laboratory and field conditions.Na primer: Lectures, Practice/ Practical classes, Consultations, study, research work… (izabrati) |
| 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 | 60 |
| Test  | Yes/No | 15 |  |
| Exercise attendance | Yes/No | 5 |
| Ovde se mogu pojaviti i kolokvijumi i seminarski rad (npr. Test, Term paper) | Yes/No | 15 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Vojvodić N. | Žetveni kombajni: Poljoprivredne mašine | Nekvoš | 2002 |
|  | Meši M. | Poljoprivredne mašine  | Faculty of agriculture, University of Novi Sad | 2012 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Mechanization of orchard, vineyard and plant protection |
| Course id:3OPT6O26 |
| Number of ECTS:6 |
| Teacher: | 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 |
| Educational goalTheoretical and practical knowledge relating to the use of machines in the orchards and vineyard and plant protection. |
| Educational outcomesThe knowledge obtained within the course are to enable proper selection and use of machines, with emphasis on the impact of mechanization on the environment and food safety. |
| Course contentTractors in orchards and plant protection. Machines for the systematization of land. Machines for mass earthworks. Machines for digging and Maintenance of the channel. Construction machinery and mole drainage pipe. Machines for trenching soil. Machines and equipment for planting. Machines for primary tillage and perennial plants. Machinery Plant Protection: Sprinklers, sprayers with air support, sprayers, sprayers with recirculation, foggers, dusts. Machinery and mechanical appliances care for now. Machinery and equipment for harvesting, transport and packing fruit. Machinery and equipment for harvesting, transporting grapes. |
| Teaching methodsPractice/ Practical classesWithin these groups of machines will be processed working parts, assemblies, working principle of individual machine types and their characteristics. Setting up, use and maintenance of practical demonstration of work. Pulling resistance and strength to drive - traction, assignments for certain types of machinery. Visit labor organizations and the Agricultural Fair in Novi Sad with the presentation of new types of machines.Na primer: Lectures, Practice/ Practical classes, Consultations, study, research work… (izabrati) |
| 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 | 60 |
| Test | Yes/No | 30 |  |
| Exercise attendance | Yes/No | 5 |
| *Ovde se mogu pojaviti i kolokvijumi i seminarski rad (npr. Test, Term paper)* | Yes/No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Bošnjaković A | Mašine za zaštitu bilja | Poljoprivredni fakultet Novi Sad | 1994 |
|  | Brčić J. | Mehanizacija u voćarstvu i vinogradarstvu | Poljoprivredni fakultet Zagreb | 1995 |
|  | Vojvodić M. i saradnici | Poljoprivredne mašine | Poljoprivredni fakultet Novi Sad | 1998 |
|  | Zenamek P, Burg P | Vinohradnicka Mechanizce | ISBN 978-80-87091-14-2 | 2010 |
|  | 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 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Fruit growing and viticulture |
| Course id: 3OPT6O27 |
| Number of ECTS: 5 |
| Teacher: | Sandra M. Bijelić, Mira I. Medić; Borivoje V. Bogdanović, Mira I. Medić |
| 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/navesti ako ima |
|  Educational goalAcquiring basic knowledge in the field of fruit growing and viticulture. Introduction to biology, ecology, methods of propagation and growing of fruit trees and grapevines. Introduction to species and cultivars of fruit trees as well as to grapevine cultivar assortment. Application of previous knowledge to designing orchards and vineyards. |
| Educational outcomesExpertise and knowledge in the field of fruit growing and viticulture, and ability to independently design and raise orchards and vineyards. |
| Course contentTheoretical classes: Significance of fruit growing and viticulture and production of fruits and grapes in the world and at home. Fruit and grapevine growing regions in Serbia. Classification of fruit trees and grapevines. Ecology of fruit trees and grapevines. Biology of fruit trees and grapevines. Propagation of fruit trees and grapevines and production of planting material. Design of orchards and vineyards. Raising and nurturing orchards and vineyards. Training systems of grapevine and support systems. Fruit species and cultivars. Cultivars and rootstocks of grapevines. Fruit and grape processing. Fruit and grape production.Practical classes: Recognition of fruit species. Presentation of fruit tree and grapevine organs. Recognition of fruit seeds and determination of its purity and germination ability. Different methods of propagation of fruit trees and grapevines - demonstration. Designing a project for raising orchards and vineyards. Formation of training systems in vineyards and support systems. Planting fruit trees and grapevines. Nurturing plantations. Pruning. Determining the time of fruit and grape harvest. Storage of fruits and grapes in a cold store. Presentation of fruit and grape species and cultivars. |
| Teaching methodsTheoretical classes with the use of video presentations and practical classes in a laboratory and in the field. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes/No | 10 | Oral part of the exam | Yes | 30 |
| Test | Yes/No | 20 |  |
| Exercise attendance | Yes/No | 20 |
| Term paper | Yes/No | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Veličković, M. | Voćarstvo | Poljoprivredni fakultet, Zemun | 2002 |
|  | Stančević, A. | Praktično voćarstvo | Litopapir, Čačak | 1990 |
|  | Keserović, Z., Korać, N., Magazin, N., Grgurević, V., Gvozdenović, D., Bijelić, S., Vračević, B. | Proizvodnja voća i grožđa na malim površinama | Poljoprivredni fakultet, Novi Sad | 2008 |
|  | Kuljančić I. | Vinogradarstvo | Prometej, Novi Sad | 2008 |
|  | Todić, S., Bešlić, Z. | Proizvodnja loznog sadnog materijala | Monografija, Beograd | 2010 |
|  | Marković, N., Nakalemić, A. | Opšte vinogradarstvo | Poljoprivredni fakultet, Zemun i Zadužbina svetog manastira Hilandara | 2009 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Process technique |
| Course id: 3ОAI5О22 |
| Number of ECTS: 6 |
| Teacher: | Todor V. Janić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Practical classes: 2 | Other teaching types: - | Study research work: - | Other classes: 2 |
| Precondition courses | None |
| Educational goalTo familiarize students with the specifics of the theoretical and practical constraint in the field of process engineering, in agro-industry, the systematization of the same application of concrete methods for solving them. |
| Educational outcomesMastering the professional and scientific methods of choice and use of process equipment, construction and operation of process plants, and resolving specific problems in the field of process engineering in the agro-industry. |
| Course contentMechanical processes and devices. Hydrodynamic processes and devices. Thermal processes and devices. Diffusion processes and devices. Termodiffusive processes and devices. Apparatus for heat and mass transfer. Apparatus and equipment for offal and waste incineration. Apparatus and equipment for the processing of animal feed. Apparatus and equipment for preparing fodder. Apparatus and equipment for detoxification product. Apparatus and equipment for extrusion products. Apparatus and equipment for briquetting and pelleting biomass. Apparatus and equipment for the distillation of essential oils from plants. Apparatus and equipment for cold pressing oil. Apparatus and equipment for the extraction of essential oils. Apparatus and equipment for the production of biodiesel. Apparatus and equipment for the production of biogas from waste materials. Devices and equipment for gas purification. Apparatus and equipment for water purification for technological applications and wastewater. Apparatus and equipment for separating solid from the liquid phase. Apparatus and equipment for internal transportation. Apparatus and equipment for the production of compost and soil. Facilities with a controlled climate (warehouses and refrigerators). Apparatus and equipment for cooling products. Devices and equipment for measuring and packaging products. Apply integrated organizational and technical measures for process systems in the agro-industry in order to preserve the quality of production scopes, increase environmental protection. The selection process plants. Design of process systems for product finishing. Project Technical Documentation and measures of environmental and labor protection. Engineering process systems for product finishing. Costs in the exploitation of the system. Techno-economic feasibility analysis of investment. Conceptual design. Planning documentation. Investment-technical documentation. The construction site. Supervision of construction. The test operation. Scrutineering. The quality of the works and guarantees. Standards, regulations and standards. |
| Teaching methodsThe tasks in process engineering. Laboratory and field exercises in process equipment. Seminar or project works from the aforementioned lessons. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam/Written part of the exam-tasks and theory | Yes |  |
| Test | Yes/No | - | Written part: 40Oral part of the exam: 51 |
| Exercise attendance | Yes | 4 |
|  |  | - |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | D. Tolmač  | Mašine i aparati | Tehnički fakultet "Mihajlo Pupin", Zrenjanin | 2006. |
|  | M. Brkić, T. Janić, D. Somer | Termotehnika u poljoprivredi – II deo, Procesna tehnika i energetika | Poljoprivredni fakultet, Novi Sad | 1998. |
|  | D. Voronjec | Tehnološke operacije | Mašinski fakultet, Beograd | 1983. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | MACHINES IN VEGETABLE PRODUCTION |
| Course id: 3OPT7O30 |
| Number of ECTS: 3OPT7O30 |
| Teacher: | Anđelko M. Bajkin, PhD, Full professorOndrej O. Ponjičan, PhD, 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 |
| Educational goalTheoretical and practical knowledge relating to the use of machines in vegetable production at open field and in greenhouses. |
| Educational outcomesKnowledge acquired in a course in Machines in vegetable production should allow their proper selection and use in the manufacture of certain plant species, with emphasis on the impact of mechanization on the environment. |
| Course contentTheoretical classes: The importance of machines in vegetable production. Machines for forming a bank and beds. Machines for the production of substrates and disinfection of soil and substrate. Machines and apparatus for the production of seedlings in containers, pots and nutrient cubes. Machines for pricking out seedlings. Machines care nursery. Machines for ground covering and design of systems for drip irrigation. Seeding vegetable crops. Machines for planting seedlings, tubers and bulbs. Machines for immediate coverage of plants. Machines to cover the plants with the support structure. Machines for half mechanized and mechanized harvesting. Machinery and equipment for the manipulation of vegetables after harvest. Influence of machines on the environment. Safety at work.Practical teaching: exercise, other modes of teaching,Introduction to the purpose of the basic parts, the principle of operation, configuration, maintenance, ongoing operation and protection measures to work with machines and equipment according to the curriculum of lectures.Creating a project and seminar papers. |
| Teaching methodsTheoretical classes: verbal-textual and illustrative demonstrative methods.Practical classes: management of independent work of students, demonstratively illustrative methods, display machines in operation, computational methods. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5  | Oral part of the exam | Yes | 50 |
| Exercise attendance | Yes | 5 |  |
| Written test | Yes | 20 |
| Oral test | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Bajkin A: | Mechanization in vegetable production (in Serbian: Mehanizacija u povrtarstvu)  | University of Novi Sad,Faculty of Agriculture, Novi Sad, | 1994. |
|  | Bajkin A, Ponjičan O, Orlović S, Somer D:  | Mechanization in horticultural production  (in Serbian: Mašine u hortikulturi) | University of Novi Sad,Faculty of Agriculture, Novi Sad, | 2005. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Livestock machinery |
| Course id:3OPT7O31 |
| Number of ECTS: 6 |
| Teacher: | Miodrag S Zoranović, Mladen S Ivanišević |
| 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 |
| Educational goalAcquisition of theoretical and practical knowledge of machines, devices and equipment for breeding of domestic animals, their technical and exploitation characteristics and choice when equipping the farm. Getting to know the specifics of appropriate technology with the relative processing equipment for processing manure. |
| Educational outcomesQualifications for student selection of machines and equipment as an integral part of livestock farms, with their proper use and preventive maintenance. Increasing the level of energy and environmental efficiency of the production processes in animal husbandry. |
| Course contentTheoretical classes: theoretical foundations of electricity with its subdivisions. Alternative sources of electricity and heat in livestock. Generators and motors. Basics of Automation in livestock. Machinery and equipment for storing hay, forage, silage and haylage. Dehydrator cells. Apparatus for preparing granular and root-tuber feed. Farm supply. Electric fences and other auxiliary devices in livestock. Complex machinery for the production of cattle, pig and poultry farming. Machinery works in sheep and fishing. Systems for air and water purification in livestock. Technical and Technological Management of manure.Practical classes: Demonstrative and budgetary procedures for the above mentioned areas. |
| Teaching methodsOral lectures with active participation of students, with slides originally created animations, films formed by windows movie maker's. Going on farm plots with active monitoring of machinery for preparing roughages. Visiting the farm in order to inform supporting various machinery and equipment supply, nutrition, ventilation, air and water purification, heating, etc. manure. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 10 | Oral part of the exam | Yes | 25 |
| Test | Yes | 30 |  |
| Exercise attendance | Yes | 20 |
| Colloquium | Yes | 15 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  |  | ASHRAE®HANDBOOK | Inch-Pound Edition. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie, N. E., Atlanta, GA 30329 (404) 636-8400 | 2009 |
|  | M. Navaratnasamy and J. J. R. Feddes | Odour Emissions from Poultry Manure/Litter and Barns. Final report submitted to Poultry Industry Council | Alberta Agriculture, Food and Rural Development, J. G. O'Donoghue Building, 7000-113 St., Edmonton, AB, T6H 5T6; Agricultural, Food and Nutritional Science, 4-10 Agriculture/Forestry Centre University of Alberta, Edmonton, AB, T6G 2P5 | 2004 |
|  | C. H. BURTON and C. TURNER | MANURE MENAGEMENT | Treatment Strategies for Sustainable Agriculture 2nd Edition. Silsoe Research Institute | 2003 |
|  | Bill A. Stout | Engineering CIGR Handbook of Agricultural Engineering | Volume III, Plant Production.. Texas A&M University, LCCN USA | 1999 |
|  | El Houssine Bartali andFrederick Wheaton | CIGR Handbook of Agricultural Engineering | Volume II: Animal Production & Agricultural Engineering. Edited by CIGR- The International Commission of Agricultural Engineering. Part I:, Livestock Housing and Environment,. Part II: Aquaculture Engineering. University of Maryland, USA | 1999 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Drying and Storage |
| Course id: 3OPT8O32 |
| Number of ECTS: 3 |
| Teacher: | Ivan Pavkov, PhD Asistant 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/navesti ako ima |
| Educational goalDrying is operation found in almost all industrial sectors, ranging from agriculture to pharmaceuticals. It is the oldest, most diverse and most energy intensive operation. Drying technology is lied down on transport phenomena of thermal energy and moisture in materials. This process in not only the removal of liquid from agricultural materials, but also with the extent to which the dried product meets the necessary quality criteria. Drying of materials is first step to prevent spoilage, next step is storage. The quality and proper storage of materials is important for them long shelf life. Educational goal is the knowledge of drying and storage process for agricultural products and technical equipment which are on disposal. |
| Educational outcomesOn successful completion of this subject, the students should: a) to assemble mastery of the knowledge, techniques, skills and tools related to drying and storing of agricultural materials, grain, fruits, vegetables, hop, medicinal plants and herbs, b) be able to identify, analyze and solve drying and storing facilities problems, c) the knowledge gather in this subject will provoke creativity in design and management of agricultural material handling system. |
| Course contentLectures:History of drying agricultural materials. Moisture content of agricultural products. Drying process of agricultural products. Types of dryers. Grain drying technologies. Agriculture grain storage: Storage technologies, Technical solutions of storage and equipment, Anti fire and anti explosions measures. Drying, processing and storage: corn seed, white seed, sugar beet seed. Drying of forage crops. Drying and storage of fruits and vegetables. Technical and technological solutions for tobacco drying, hop drying, medicinal plants and herbs drying. Drying on small scale farms. Practice:Measuring of agricultural materials physical properties. Drying kinetics of thick grain layer. Calculation exercises: Change of state humid air, classical drying, stepwise drying, drying with recirculation. Material bilans of grain during drying process. Calculations of thermal and material bilans for air during drying processes.  |
| Teaching methodsLectures – oral presentations with power point softer, Practical classes- calculations and practical work in laboratory, Consultations and Term paper |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam | Yes | 20 |
| Tests | Yes | 60 |  |
| Exercise attendance | Yes | 5 |
| Term paper | Yes | 10 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Babić, Ljiljana, Babić Mirko | Drying and Storage | Faculty of Agriculture, Novi Sad, Serbia | 2012 |
|  | Babić, Ljiljana, Babić Mirko | Drying and Storage - Practicum | Faculty of Agriculture, Novi Sad, Serbia | 2000 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Repair and maintenance of technical systems |
| Course id:3ОАИ8О34 |
| Number of ECTS:4 |
| Teacher: | Milan D. Tomić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures:3 | Practical classes:3 | Other teaching types: | Study research work: | Other classes:1 |
| Precondition courses | None/navesti ako ima |
| Educational goalThe aim of the course is to introduce students with problems in the maintenance of proper working. To master the applied technology in the maintenance of working propriety. Finally, to be able to develop technologies maintenance of proper. |
| Educational outcomesThe ability of the candidate-student to perceive the problem of maintenance of proper technical systems and the possibility of giving concrete solutions in order to improve performance anticipated operations. |
| Course contentTheoretical classesBasic concepts of machine repairs, malfunction and reliability. Analysis of technical failures, testing, character effects, causes and consequences. Fundamentals of tribology, lubricants and lubrication. Corrosion. The role and task of system maintenance of proper techniques. The technological processes of repair parts for agricultural machinery, mechanical procedures, welding, plastification and metallization. Technical maintenance and diagnostics, agricultural techniques. Application of documentation and information systems. Inventory management of spare parts.Practical classes: Exercise, Other modes of teaching,The work on the disassembly-assembly activities (use of tools). Defect specific parts of agricultural machinery and analysis of wear (the use of measurement equipment). Practical work on the implementation of the operations of technical maintenance of agricultural machinery. Introducing the diagnostic equipment (brakes for the engines, tightness of piston cylinder assembly, compression, diagnostics high pressure pumps). Getting to know the equipment for the regeneration of machine parts. |
| Teaching methodsLectures with the use of video presentations, demonstration exercises in laboratory and field conditions, assignments, lab and seminar work, testing under laboratory and field conditions and consultation within the lectures and exercises. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam and Written part of the exam-tasks and theory | Yes | 50 |
| Test | No |  |  |
| Exercise attendance | Yes | 25 |
| Graphic work | Yes/No | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Kobbacy, Khairy Ahmed Helmy, Murthy, D. N. Prabhakar (Eds.) | Complex System Maintenance Handbook | Springer | 2008 |
| 2. | Mónica Águila Martínez-Casariego, Kirsty Ormerod, Mark Liddle, Gediminas Vilkevicius, Ellen Schmitz-Felten | Maintenance in Agriculture -A Safety and Health Guide | Luxembourg: Publications Office of the European Union | 2011 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Exploatation of Production Systems |
| Course id:3OPT8O34 |
| Number of ECTS: |
| Teacher: | Јан, Ј, Туран |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 4 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None/navesti ako ima |
| Educational goalThe aim of the course is to familiarize students with the methods and ways of exploiting the production system and recognizing the problems of exploitation in the field. |
| Educational outcomesAfter taking the course, students acquire the knowledge which has enable proper exploitation and utilization of the production system in agricultural production. |
| Course contentClassification and energy performance of business machines and aggregates; Basis for selection of operating speed; Types and characteristics of the machine-tractor assemblies; Calculation methods of composition machine-tractor assemblies; Kinematics of aggregates; Productivity machine aggregates; Labour productivity and efficiency of fuel consumption; Optimization of transport system in agriculture; Optimization reloading-transport systems in agriculture; Optimization of technological and production systems; Basics dealer system in agricultural engineering; The scaling operation with machine aggregates. Exploitation of aggregates of primary and tillage; Exploitation of aggregates for fertilization; Exploitation of aggregates for sowing and planting; Exploitation of aggregates for the care and protection of plants; Exploitation of aggregates for storing hay and silage; Exploitation of aggregates for harvesting and harvesting grain crops; Exploitation of aggregates extraction š.repe and potatoes; Exploitation of aggregates for work in orchards and vineyards; Exploitation of aggregates to work in livestock production; Exploitation of facilities and plants on the farm. |
| Teaching methodsPractical teaching: Exercise, Other modes of teaching, Study Research, Design of papers in the field of processed at the lecture, the application of a method of measuring the exploitation of the generating system. Troubleshooting optimization of the composition and functioning of individual production systems. |
| 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/Written part of the exam-tasks and theory* | Yes | 50 |
| Test | Yes | 15 |  |
| Exercise attendance | Yes | 10 |
| *Test, Term paper* | Yes | 15 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Turan, J. | Eksploatacija proizvodnih sistema | Poljoprivredni fakultet, Novi Sad | 2009 |
|  | Vojvodić, N., Malinović, N., i dr | Poljoprivredne mašine | Nevkoš Novi Sad | 1998 |
|  | Zelenović, D | Projektovanje proizvodnih sistema | Naučna knjiga, Beograd | 1987 |
|  | Kostić, S. | Psihologija rada | Naučna knjiga, Beograd | 1986 |
|  | Lazić, V., Turan, J. | Eksploatacija agregata za osnovnu obradu zemljišta | Poljoprivredni fakultet, Novi Sad | 1997 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course:  | Agricultural transportation means |
| Course id: 3OPT8O35 |
| Number of ECTS: 3 |
| Teacher: | Lazar Đ Savin, Mladen S Ivanisevic |
| 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 |
| Educational goalThe aim of the course is to introduce students with the basic structures of transportation in agriculture, adjustment and economical use, and choice according to purpose and application conditions. Then the trained in the development, design, as well as the choice and use of safe food production. |
| Educational outcomesAfter taking the course, students acquire knowledge and skills that enable him to:- A thorough understanding some technical basis of means of transport in agriculture,- Development and design of transport means in agriculture,- Proper selection according to purpose, the structure of sowing and conditions of use- Proper handling, maintenance and storage of the economical and ecological use of the means of transport in agriculture. |
| Course contentTheory lessonsThe significance and purpose of transportation in agriculture. Definition and structure of the transport process. charged inagricultural transport. Mobile transport unit. Tractor transport unit. Resistance and driving use of traction tractor. Trailers. Braking equipment on trailers, cargo accommodation on trailers, cargo unloading system, control devices on trailers and other equipment trailer. Use trucks in agriculture. Container transport in agriculture, palletizing machines. loading and reloading means of transportation in agriculture. Tractor and self-propelled loaders, conveyors, elevators. The free-reloading means of transportation.Practical teaching: Exercise, Other modes of teaching, Study research workThe structure of the transport process in agriculture. Tractor transport aggregates. The effect of forces on one – and two axles trailer. Systems connecting or trailer. Braking equipment on trailers. loading and reloading means of transportation in agriculture (demonstration and tasks). The calculation of basic parameters conveyors and elevators, productivity and power to drive  |
| Teaching methodsThe method of oral presentations and discussions. Methods of presentations, demonstrations, simulations, drawing and illustration.Consultations and seminars. Displays the equipment in service. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes/No | 5 | Oral part of the exam | Yes | 60 |
| Test | Yes/No |  |  |
| Exercise attendance | Yes/No | 5 |
| Term paper | Yes/No | 30 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Поткоњак В, Савин Л, Зорановић М | Транспортна средства у пољопривреди | Пољопривредни факултет, Нови Сад | 2011 |
|  | Сувајџић С | Механизација претоварно-транспортних радова | Грађевинска књига, Београд | 1973 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course:  | Mathematics 2 |
| Course id: 3OPT2I38; |
| Number of ECTS: 6; 6; 6 |
| Teacher:  | Snežana J. Matić-Kekić, Nebojša M. Dedović |
| Course status | Elective; Mandatory ; Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| Educational goalMastering the skills and knowledge of subject content, which provides the basis for mathematical modeling of agro-economic phenomena and their exploitation in practice. |
| Educational outcomesStudent qualifies for mathematical modeling of agro-economic phenomena and actively pursuing them. |
| Course contentFinancial mathematics: percentage and promil calculus, compounded interest rate, fixed-term and continuous savings, loans payment. Matrix calculus: operations on matrices, determinant of matrices, elementary transformation, regular matrices. Gaussian elimination method, Cramér's theorem, inverse matrix. Formulation and solution of mathematical models. Geometric transformation in space: translation, rotation and scaling. Vectors: inner, vector and mixed product, collinearity, orthogonality, coplanarity. Analytic geometry: algebraic and vector equations of line and plane, mutual relation. |
| Teaching methods: Lectures |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam | Yes | 45 |
| Test | Yes | 45 |  |
| Exercise attendance | Yes | 5 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Konjik S., Dedović N. | Mathematics - a collection of tasks for the students of Faculty of Agriculture (in Serbian) | Faculty of Agriculture, University of Novi Sad | 2011. |
|  | Hadzić O., Takači Đ. | Mathematics for students of natural sciences (in Serbian) | University of Novi Sad, university textbooks - Edition 76 | 1998. |
|  | Matić-Kekić S. | Economic mathematics for students of biological sciences (in Serbian) | Faculty of Agriculture, University of Novi Sad | 2006. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | English Language  |
| Course id: 3OPT2I39 |
| Number of ECTS: 6 |
| Teacher: | Bojana B. Komaromi, Aleksandar M. Jagrović, Igor Đ. Cvijanović |
| Course status | Elective |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Tutorials: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| Educational goalAcquisition, consolidation and enhancement of basic patterns of grammar, pronunciation, spoken and written language in order to educate students for formal and informal communication in General English. Introducing student to basic specialist literature, i.e. basic terms and concepts in agriculture and the relevant study programme. |
| Educational outcomesStudents will be capable of active usage of General English at the elementary, pre-intermediate or intermediate level in both spoken and written medium depending on the course level they attended (A1, A2 or B1 according to the Common European Framework of Reference for Languages). Students will also be able to recognise and actively use basic specialist terms and concepts in agriculture and the relevant study programme.  |
| Course contentTheoretical instructionPhonetics: Correction of students’ pronunciation, accent and intonation according to one of the standard dialects of the English language (British and/or American). Morphology: Nouns – plural, gender, genitive. Pronouns – personal, possessive, question, relative and reflexive. Adjectives – formation and comparison. Adverbs – Formation, place and comparison. Verbs – Forms, auxiliaries, modal verbs, tenses, gerund. Syntax: Word order, clauses, sentences, sentence organisation. Lexical forms – phrasal verbs, idioms, collocations and compounds. Translation – Bilingual translation: from Serbian into English and vice versa. Practical instructionSpoken language practice in practical everyday situations. Development of translation skills and techniques. Grammar activation in communication. Delivering specialist presentations in English.  |
| Teaching methodsLectures, tutorials, consultations. Working in small groups and pairs. Individual work with audio-visual equipment. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes/No | 10 | Written exam |  | 20 |
| Oral Exam |  | 30 |
| Test | Yes/No | 2 x 15 |  |
| Tutorials attendance | Yes/No | 10 |
| Other | Yes/No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Liz and John Soars, Amanda Maris | New Headway Elementary, 4th Ed | Oxford University Press | 2011 |
|  | Liz and John Soars, Amanda Maris | New Headway Pre-Intermediate, 4th Ed. | Oxford University Press | 2011 |
|  | Liz and John Soars, Amanda Maris | New Headway Intermediate, 4th Ed. | Oxford University Press | 2011 |
|  | Whitby N. | Business Benchmark – BEC Preliminary | Cambridge University Press, 6th Printing | 2009 |
|  | Gajić Ranka, | English in Agriculture | Naučna knjiga KMD, Beograd | 2005 |
|  | Murphy R. | Essential English Grammar in Use, 3rd Ed. | Cambridge University Press | 2010 |
|  | Murphy R. | English Grammar in Use, 3rd Ed. | Cambridge University Press | 2010 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Machines in forestry and waterpower engineering |
| Course id: ZОАI5О24 |
| Number of ECTS: 6 |
| Teacher: | Aleksandar D. Sedlar |
| Course status | Mandatory/Elective |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| Educational goalCourse goal is to get theoretical and practical knowledge about machines use in forestry and waterpower engineering. |
| Educational outcomesKnowledge get in this subject will enable correct choose and exploiting of machines wits special accent to energy consumption, efficacy and environmental protection. |
| Course contentLecturesMachines and there importance in forestry. Tractors in forestry. Machines for build of forestry communications. Planting machines in forestry. Equipment and machines for forestry exploitation. Machines and there importance for waterpower engineering. Machines for canals cleaning. Machines for canal digging. Machines for drainage. Equipment for artificial irrigation.Practical classesIntroducing with machines and equipment technical specification. Review and work with machines in forestry and waterpower engineering. Visit to company specialized for work in forestry and waterpower engineering. |
| Teaching methods Lectures, Practical classes |
| 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 | 60 |
| Exercise attendance | Yes | 5 |  |
| Test and term paper | Yes | 30 |
|  |  |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Nikolić S. | Mehanizacija u šumarstvu | Univerzitet u Beogradu,Šumarski fakultet,  | 1990. |
|  | Sedlar A, Đukić N. | Mašine u šumarstvu i vodoprivredi | Univerzitet u Novom Sadu, Poljoprivredni fakultet | U izradi |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Statistical methods |
| Course id: 3ОПТ5И05 |
| Number of ECTS: 4 |
| Teacher: | Dr Beba Mutavdžić |
| Course status | Mandatory/Elective Elective |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Practical classes:2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | Mathematics |
| Educational goalThe program of this course allows students to become familiar with the use of modern statistical methods in solving problems in the field of agricultural and biological sciences. Students should familiarize themselves with descriptive methods and methods of analysis of experimental results. |
| Educational outcomesThrough the teaching process, students should acquire the ability to use statistical methods and their application in agricultural, biological and related fields. Acquired abilities and appropriate use of statistics and its methods allow students to successfully solve problems in the future work and in obtaining an education. |
| Course contentTheoretical lessonsSubject matter and observation units. Population and sample. Classification and presentation of statistical data. Numerical descriptive measures. Theoretical distributions. Discrete and continuous probability distributions. Sampling plan. Simple random sampling. Statistical inference. The sampling distribution. Basic principles of parameter estimation. Determination of sample size. The concept and principles of hypothesis testing. Regression and correlation. Choice of regression function. Simple linear regression. Estimation of regression coefficients. Linear correlation. Statistical inference of regression parameters and correlation coefficient. Coefficient of correlation.Practical classesAnalysis of numerical series. Theoretical distributions. The sampling distribution. The point and the confidence interval estimation of the population mean and proportion. Hypothesis testing. Regression and correlation. Nonparametric statistics.  |
| Teaching methodsLectures, Practice/ 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 | 40 |  |
| Exercise attendance | Yes | 10 |
| Other | No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Hadživuković, S. | Statistical Methods | Agricultural faculty, Novi Sad | 1991. |
|  | Lozanov-Crvenković Z. | Statistics | Faculty of Sciences, Novi Sad | 2012. |
|  | Чобановић К | Examples and exercises in Statistics | Agricultural faculty, Novi Sad | 2003. |
|  | Montgomery, M., Runger, G.C., Huble, N. E. | Engineering Statistics | John Wiley & Sons, Inc. | 2011. |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Оccupational safety in agriculture  |
| Course id: |
| Number of ECTS: |
| Teacher: | Mirko Simikić PhD, Assistant professor |
| Course status | Elective |
| Number of active teaching classes (weekly) |
| Lectures: | Practical classes: | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| Educational goalCourse objective. The objective of the course is to familiarize students with the dangerous places and parts of agricultural facilities, machinery and equipment, as well as safety measures in the workplace in agriculture. |
| Educational outcomesUpon passing the exam, the student acquires knowledge and skills that enable him to recognize dangerous places and parts of agricultural facilities, machinery and equipment and implementation of domestic and international standards and regulations relating to work safety in agriculture. |
| Course OutlineTheoretical lectures. Specifics of agriculture from the standpoint of work safety. Mechanical and thermal injuries while working in agriculture. Common facilities and safety measures in agriculture. Special safety measures in crop production. Special safety measures in livestock production. Safety precautions when agricultural tractors and self-propelled machines participate in traffic on public roads. Special safety measures when using chemical pesticides for the protection of plants, mineral fertilizers and other poisons, easily flammable and explosive substances in agricultural production. Domestic and international standards and regulations relating to occupational health and safety in agriculture.Practical teaching: Exercises, Other methods of teaching, Research workRecognizing dangerous places inside of agricultural production facilities. Recognizing dangerous parts of agricultural tractors, machines and devices. Analysis of dangerous places and parts and defining of measures of prevention. Introduction to protective equipment that is used for protection in agriculture. Obligations of the manufacturer and users of agricultural machinery and equipment. Identifying security labels and warnings on agricultural machines and devices |
| Teaching methodsThe method of oral presentations and discussions. Methods of presentation, demonstration, simulation, drawing and illustration. Consultations and seminar papers. The method of practical work in laboratories and at the Institute. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam | Yes | 60 |
|  |
| Exercise attendance | Yes | 5 |
| Term paper | Yes | 30 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Nikolić R, Savin L,Simikić M. | Tractors - testing | Faculty of agriculture Novi Sad | 2007 |
|  | Nikolić et al | Mechanical and thermal injuries in agriculture | Faculty of agriculture Novi Sad | 2009 |
|  | Tešić et al | Safety in agriculture | NIP „Zaštita rada“, Beograd | 1995 |
|  | Nikolić et al | Development and use of single axle tractors and motor implements | Faculty of agriculture Novi Sad | 2011 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Enterprise Economics |
| Course id: 3OPT5I43 |
| Number of ECTS: 6 |
| Teacher: | Vladislav, N., Zekić  |
| Assistant: | Dragan M. Milić |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Tutorials: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| Educational goalIntroducing students to the concept and classification of costs, and characteristics of cost and income calculations in agricultural production. |
| Educational outcomesUpon completion of the course, students will be capable of independent preparation of calculations in agricultural production, investment and differential calculations.  |
| Course contentTheoretical InstructionThe concept of calculations. Business entities. Costs and classification of costs. Elements of costs. Fixed and variable costs. General and direct costs. Determining the market value of production. Cost of material. Cost of insurance. Cost of interests. Cost of depreciation. Labour cost. Legal and contractual obligations. Measuring and evaluating economical results of business operation. Annual production and financial plan. Differential calculations. Determining economic efficiency of investment. The importance of methods and conditions of financing investments. Evaluation of the means of production.Practical InstructionTutorials. During tutorials students apply the knowledge gained at the lectures to solve practical examples. Calculation of the production value. Calculation of the material costs. Calculation of interest cost. Calculation of salaries cost. Calculation of other cost categories. Making analytical and differential calculations. Making investment calculations. |
| Teaching methodsDuring theoretical instructions students are introduced to the theory. Theory is interpreted through demonstration and practical examples during tutorials.  |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Student’s participation in classroom activities | Yes/No | 15 | Written exam | Yes | 40 |
| Oral part exam |  | 30 |
| Practical work | Yes/No | 15 |  |
| Tests  | Yes/No |  |
| Seminar papers | Yes/No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
| 1. | Marko, J., Jovanović, M., Tica, N. | Kalkulacije u poljoprivredi | Poljoprivredni fakulteta, Novi Sad | 1998 |
| 2. | Andrić, J. | Troškovi i kalkulacije u poljoprivrednoj proizvodnji | Savremena administracija, Beograd | 1998 |
| 3. | Gogić. P. | Teorija troškova sa kalkulacijama | Poljoprivredi fakulteta Beograd – Zemun | 2009 |
| 4. | Jakovčević Klara, Komazec Ljubica, Tomić Slavica  | Ekonomika preduzeća - praktikum | Ekonomski fakultet Subotica | 2011 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | ENGINEERING GRAFICS |
| Course id:  |
| Number of ECTS: 6 |
| Teacher: | Dr. Radojka Gligorić, full professor, Dr. Ivan Pavkov, 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 |
| Educational goalThe aim of the course is to students learn to use a computer for graphic presentation constructional ideas and concepts, as well as for the use and making of the construction technical documentation. |
| Educational outcomesOn successful completion of this subject, the students should: a) to assemble mastery of the knowledge, techniques, skills and tools related to computer engineering grafics design. b) be able to identify, analyze and solve design problems during working on computer grafics of construction and tehnological tehnical documentation, c) the knowledge gather in this subject will provoke creativity in computer grafics design. |
| Course contentLectures:Using AutoCAD software for drawing technical drawings. The basic elements of computer drawing and modifying drawnigs. Drawing 2D drawings. Drawing 3D drawings. Modeling of solids. Dimensioning using computers software. Marking: tolerance measures, shape and position tolerances, surface roughness quality. Preparation of drawings for printing. Preparation of drawings for insert in other softwares, like: Word, Excel, ...Practice:Creating tasks in chapters that are processed at lectures. Independent planning mandatory graphics and term papers using the AutoCAD software. Viewing and defense mandatory graphics and term papers. |
| Teaching methodsThe method of oral presentations and discussions. Method of presentations, demonstrations, simulations and illustrations using computers. The method applied by computer simulation. The method of practical work on the computer. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 6 | Written exeam | Yes | 30 |
| Test | Yes | 34 | Oral part of the exam | Yes | 30 |
| Exercise attendance  | Yes | - |  |
| Term paper | Yes | - |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Gligorić, R., Tomić, M., Simikić, M. | Basics of computer grafics, authorized practicum (in Serbian) | Faculty of Agriculture, Novi Sad, Serbia | 2007 |
|  | Gligorić, R., Milojević, Z. | Technical drawings – engineering comunications (in Serbian) | University of Agriculture, Novi Sad, Serbia | 2004 |
|  | Letić, D. | CAD mechanical elements and constructions (in Serbian) | Computer library, Čačak, Serbia | 2005 |
|  | Group of authors | Instructions - tutorials for using AutoCAD software (in English) |  |  |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Irrigation Technique |
| Course id: 3OPT6I45 |
| Number of ECTS: 6 |
| Teacher: | Bugarin Rajko |
| 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/navesti ako ima |
| Educational goalThe aim of the course is to prepare and introduce students with the requirements and characteristics of the techniques of irrigation and drainage systems in agricultural practice |
| Educational outcomesTraining students for successfully mastering basic reclamation problems that may be encountered in agricultural practices, in order to achieve a stable and high yield crops. |
| Course contentPrinciples of agricultural operations: land consolidation, redistribution of fields, , expropriation. Road network. Application of the principle of protection of the environment. The task and role of land reclamation, classification of objects. The basic principles of the budget, labeling and presentation channels on drainage systems. Channel maintenance mechanical, biological and chemical methods, the importance of maintenance. Traffic facilities. Drainage systems, ponds. Facilities for level and flow. Pumping station on drainage systems. Linings Terms of introducing irrigation. Irrigation techniques. Irrigation equipment, type, equipment selection, application possibilities. |
| Teaching methodsGetting to know the purpose of the basic parts, the principle of operation, configuration, maintenance, ongoing operation and protection measures to work with machines, facilities and oppreme irrigation and drainage 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 | 5 | *Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory* | Yes | 60 |
| Test | Yes/No | 30 |  |
| Exercise attendance | Yes/No | 5 |
| *Ovde se mogu pojaviti i kolokvijumi i seminarski rad (npr. Test, Term paper)* | Yes/No |  |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Belić S, Benka P | Tehnika navodnjavanja i odvodnjavanja | Poljoprivredni fakultet, Novi Sad | 1996 |
|  | Belić S., Škorić M. | Navodnjavanje malog poseda | Poljoprivredni fakultet, Novi Sad | 1991 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Mechanisation of medicament herb |
| Course id:3OPT6I46 |
| Number of ECTS: 6 |
| Teacher: | Turan Jan |
| Course status | Elective |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | Mechanization in Field Production, Field and Vegetable Crops |
| Educational goalEnabling students to theoretical and practical mastery of subjects for selection, regulation and management of modern machinery and equipment for herbs. |
| Educational outcomesQualification for the selection, planning, management and exploitation of modern machinery for herbs. |
| Course contentMachinery for the production of aromatic and medicinal plants (machines that are used in processing, preparation, sowing, fertilizing, mechanical care, etc.). Defining the basic parameters for the process of collection of aromatic and medicinal plants. Technological procedures mechanized harvesting in the function properties and states of aromatic and medicinal plants. Technological procedures of machines for harvesting of aromatic and medicinal plants. Machines for the actions of multiphase harvesting of aromatic and medicinal plants. Machines for single-phase harvesting. The organization of work and budget required capacities harvesting machines. Treatment methods, adjustment and maintenance of seasonal and low season. |
| Teaching methodsExercises include practical demonstration and description of machinery and equipment for harvesting and primary processing seeds of agricultural crops. The purpose machines, working organs of the machine, operation, adjustment and maintenance. The theoretical part of the exercise with the applied tasks in these areas. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes/No |  | *Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory* | Yes | 70 |
| Test | Yes/No | 10 |  |
| Exercise attendance | Yes/No |  |
| *Ovde se mogu pojaviti i kolokvijumi i seminarski rad (npr. Test, Term paper)* | Yes/No | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Barać, S.: | Mehanizacija biljne proizvodnje | Autor | 2003 |
|  | Veselinov, B., Martinov, M., Bojić, S. | Mašine za biosisteme | Fakultet tehničkih nauka u Novom Sadu | 2009 |
|  | Vojvodić, N., Malinović, N., i dr. | Poljoprivredne mašine  | Nevkoš Novi Sad | 1998 |
|  | Ivančević, S., Mitr ović D. | Sistemi za obradu ritskih zemljišta sa aspekta potrošnje goriva, investicije po hektaru i održivih eko sistema | Institut za ekonomiku poljoprivrede Beograd, Beograd | 2012 |
|  | Mekinda, M. | Traktori i mašine u ratarstvu (I deo) | Poljoprivredni fakultet, Novi Sad | 1969 |
|  | Meši, M. | Poljoprivredne mašine | Poljoprivredni fakultet, Novi Sad | 2012 |
|  | Mićić, J. | Poljoprivredne mašine | Poljoprivredni fakultet, Novi Sad | 1991 |
|  | Poničan, J., Korenko, M. | Stroje pre rastlinnú výrobu | Slovenská pol'nohospodárska univeryita v Nitre | 2008 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Mechanization of seed production  |
| Course id:3OPT7I47 |
| Number of ECTS: 6 |
| Teacher: | Јан, Ј, Туран |
| 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/navesti ako ima |
| Educational goalEnabling students to theoretical and practical mastery of subjects for selection, regulation and management of modern machinery and equipment for seed production in crop production.The outcome of cases |
| Educational outcomesQualification for the selection, planning, management and exploitation of modern machinery in seed crop production. |
| Course contentTechnological processes in seed production (from harvesting to processing). Characteristics of the seed and the need for treatment, care and breeding of seeds of field crops. Standards and regulations in the production of seeds. Methods of treatment, care and breeding of seeds of field crops. Machines for mechanical cleaning, calibration and sorting seeds by physical and mechanical properties of seeds. Machines for the protection and breeding of seeds of field crops. Design of technological lines and finishing the required capacity of machine semana field crops. |
| Teaching methodsExercise, Other modes of teaching,Exercises include practical demonstration and description of machinery and equipment in the process semanske production and primary processing of seeds of field crops. The purpose machines, working organs of the machine, operation, adjustment and maintenance. The theoretical part of the exercise with the applied tasks in these areas.Na primer: Lectures, Practice/ Practical classes, Consultations, study, research work… (izabrati) |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes |  | *Theoretical part of the exam/Oral part of the exam/Written part of the exam-tasks and theory* | Yes | 70 |
| Test | Yes | 10 |  |
| Exercise attendance | Yes |  |
| *Test, Term paper* | Yes | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Barać, S.: | Mehanizacija biljne proizvodnje | Autor | 2003 |
|  | Veselinov, B., Martinov, M., Bojić, S. | Mašine za biosisteme | Fakultet tehničkih nauka u Novom Sadu | 2009 |
|  | Vojvodić, N., Malinović, N., i dr. | Poljoprivredne mašine  | Nevkoš Novi Sad | 1998 |
|  | Ivančević, S., Mitr ović D. | Sistemi za obradu ritskih zemljišta sa aspekta potrošnje goriva, investicije po hektaru i održivih eko sistema | Institut za ekonomiku poljoprivrede Beograd, Beograd | 2012 |
|  | Mekinda, M. | Traktori i mašine u ratarstvu (I deo) | Poljoprivredni fakultet, Novi Sad | 1969 |
|  | Meši, M. | Poljoprivredne mašine | Poljoprivredni fakultet, Novi Sad | 2012 |
|  | Mićić, J. | Poljoprivredne mašine | Poljoprivredni fakultet, Novi Sad | 1991 |
|  | Poničan, J., Korenko, M. | Stroje pre rastlinnú výrobu | Slovenská pol'nohospodárska univeryita v Nitre | 2008 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | GREENHOUSE DESSING, ENGINEERING AND EXPLOITATION |
| Course id: 3ОАИ6И44 |
| Number of ECTS: 6 |
| Teacher: | Ondrej O, Ponjičan PhD, 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 |
| Educational goalIntroduction to students with the phases of design, construction and equipping of greenhouses and applied technique and technology of production. |
| Educational outcomesMastery the scientific and practical methods for solving specific problems in the field of design, construction and equipping of greenhouses and applied techniques and production technology. |
| Course contentTheoretical classes: Technical characteristics of greenhouses. Climate as a factor of production. Materials used in the construction of greenhouses. Terms growth of plants. Technology of production in greenhouses. Sustainable production. Organic production. The ecological aspect in the production of the greenhouse. Access control microclimatic conditions in greenhouses (heating, ventilation, air-conditioning, shading, etc.). Machinery and equipment for the preparation of your substrate. Apparatus and equipment for disinfection land. Machines and apparatus for the production of seedlings in nutrient cubes, containers and pots. Specifics of machinery for production in greenhouses. Machines for performing basic, supplementary and row crop tillage. Seeding and planting. Machines for soil mulching plastic film and film in the greenhouse. Systems and equipment for watering and feeding plants. Systems and equipment for plant protection. Measurement, regulation microclimate conditions in the greenhouse. Process automation. Machinery, appliances and equipment for harvesting and processing the harvested material. Finishing systems for harvested material. Facilities with controlled microclimate. Design of machinery and equipment for production in greenhouses.Costs in the exploitation of the system. Designing of greenhouses and technical systems for the regulation of microclimate parameters. Project technical documentation. Measures to protect life and working environment. Design parameters. Bioclimatic design. Selection and sizing of the protected area. Techno-economic feasibility analysis of investment. Conceptual design. Tender. The Terms of Reference. Planning regulations and other approvals. Investment-technical documentation. An audit of the project. Bids and works. The construction site. Supervision of construction. The test operation. The quality of the works and guarantees. Standards, regulations and standards in the construction, equipping and technical exploitation of the protected area.Practical teaching: exercise, other modes of teaching,Tasks, laboratory and field exercises in the aforementioned lessons |
| Teaching methodsLectures, Practical classes, Consultations, study,  |
| 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 |
| Exercise attendance | Yes | 5 |  |
| Term paper | Yes | 40 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Bajkin A: | Mechanization in vegetable production (in Serbian: Mehanizacija u povrtarstvu)  | University of Novi Sad,Faculty of Agriculture, Novi Sad, | 1994. |
|  | Bajkin A, Ponjičan O, Orlović S, Somer D:  | Mechanization in horticultural production  (in Serbian: Mašine u hortikulturi) | University of Novi Sad,Faculty of Agriculture, Novi Sad, | 2005. |
|  | Reknagel i sar. | Heating and air conditioning (in Serbian Grejanje i klimatizacija) | Interklima, Paraćin | 2002 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Process and thermic equipment in drying and storaging centers |
| Course id: 3OPT7I49 |
| Number of ECTS: 6 |
| Teacher: | Todor V. Janić  |
| Course status | Elective |
| Number of active teaching classes (weekly) |
| Lectures: 2 | Practical classes: 2 | Other teaching types: | Study research work: | Other classes: 2 |
| Precondition courses | None |
| Educational goalTo familiarize students with the specifics of the theoretical and practical constraint in the field of process and thermally equipment in the centers for drying and storage, systematization and application of that concrete methods for solving them. |
| Educational outcomesMastering the professional and scientific methods of solving specific problems in the field of processing and thermally equipment in the centers for drying and storage |
| Theory lessonsTechnological requirements in centers for drying and storage. Facilities at the centers for drying and storage. Refrigerators. Mechanical processing devices. Hydrodynamic processing devices. Heat processing devices. Diffusion Process devices. Thermodiffusion processing devices. HVAC equipment. Admission product. Technique and technology of transporting products. Product finishing facilities. Systems aspiration of dust in the plant. Separating solids from the vapor phase. Scales and packaging machine for products. Analysis of thermal energy consumers. The available energy sources. Analysis of technical and environmental infrastructure. Explosion and fire equipment. Bases for design of plants for process and thermal systems in the centers for drying, cooling, storage and processing. Law on Planning and Construction. Defining project task. Preparation of conceptual design. Technical aspects of the tender for construction. Making investment and technical documentation. The main projects. Operational projects. Infrastructure devices and equipment. Analysis of the economic, environmental, and energy aspects of the investment. Technical control of the project. Location permit. Approval for construction. Implementing and monitoring performance. Test drive, proving the capacity and technical acceptance. Legal regulations and standards in the investment and technical construction.Practical teaching: Exercise, Other modes of teaching, Study research workMethods of presentations, demonstrations, simulations and illustrations. Laboratory-experimental methods |
| Teaching methodsLectures, Practical classes, Consultations, study,  |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 5  | Oral part of the exam | Yes | 51 |
| Exercise attendance | Yes | 4 |  |
| Term paper | Yes | 40 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Brkić, M, Janić, T, Somer, D | Termotehnika u poljoprivredi – II deo, Procesna tehnika i energetika, | Poljoprivredni fakultet, Novi Sad | 2006. |
|  |  | Proceedings and magazines |  |  |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | PLANT DESIGN |
| Course id: 3OPT7I50 |
| Number of ECTS: 6 |
| Teacher: | Dr. Mirko Babić, full professor, Dr. Ivan Pavkov, 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 |
| Educational goalIntroduction students with structures and order of design. Introduction students with technical activities during investment construction. |
| Educational outcomesOn successful completion of this subject, the students should: a) to assemble mastery of the knowledge, techniques, skills and tools related to plant design. b) be able to identify, analyze and solve design problems during construction of plants, c) the knowledge gather in this subject will provoke creativity in plant design. |
| Course contentLectures:Technical terms and definition in plant construction. The order investmentes activites. Preparation and analysis of conceptual design. Defining project task. Technical aspects of the tender for construction. The structure and sequence of investment-technical documentation. Technological scheme. The layout of equipment and facilities. Details of the project. Tender for the design and construction. The main projects. Special projects. Infrastructure. Analysis of environmental and energy aspects of the investment. Internal and external control of the project. Approval for construction. Building and construction supervision. The test operation and Practice:Technical terms and definitions in the construction. Analysis of the sequence of examples of investment activities. The Terms of Reference. Preparation and analysis of conceptual design. Creating a business plan ("business" plan). Making the technical part of the tender. Creation of the main mechanical and technological project. Simulation activities before the construction of the examples. Simulations of obtaining building permits. Simulations construction activities in the examples. Examples of environmental and energy analysis. Simulation of technical acceptance. Essay that encompasses all aspects of the preliminary design of the business plan. |
| Teaching methodsLectures – oral presentations with power point softer, Practical classes- calculations and practical work in laboratory, Consultations and Term paper |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam | Yes | 30 |
| Test | Yes | 20 |  |
| Exercise attendance  | Yes | 5 |
| Term paper | Yes | 40 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Babić Mirko | Design processing plants, authorized lectures (in Serbian) | Faculty of Agriculture, Novi Sad, Serbia | 2011 |
|  | Babić, Ljiljana, Babić Mirko | Draying ans Storage (in Serbian) | Faculty of Agriculture, Novi Sad, Serbia | 2012 |
|  | Bogner, M; Petrović, A. | Assessment services in investment construction (in Serbian) | The Association of Mechanical and Electrical Engineers and Technicians of Serbia, Belgrade | 1994 |
|  | Babić, Ljiljana, Babić Mirko, Pavkov, I; Radojčin, M | Processing and storage agricultural products, authorized lectures (in Serbian) | Faculty of Agriculture, Novi Sad, Serbia | 2012 |

Table 5.2 Course specification

|  |  |
| --- | --- |
| Course: | Design of livestock buildings |
| Course id: 3OPT7I51 |
| Number of ECTS: 6 |
| Teacher: | Miodrag S ZoranoviĆ, Mladen S Ivanišević |
| 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 |
| Educational goalGetting theoretical and practical knowledge about the development of technical and technological projects of cattle, swine and poultry farms. |
| Educational outcomesQualifications student for making technical and technological projects of livestock farms. |
| Course contentTheoretical teaching Basis of design. Influential zootechnical and external factors on the construction of livestockObjects by type and category of livestock. Position livestock farms in relation to inhabited areas. Factors environmental pollutionenvironment and the impact of livestock buildings on them (air, groundwater, etc.). Design: technical and technological linesnutrition, water supply, milking systems, evaporative cooling, ventilation with air purification, purificationwater heating systems interacting with a heat pump and system for purifying air and water systemsmanure and manure storage, manure processing and so on.Practical classes: Creating project tasks on individual chapters. Development of mathematical models in MathcadU terrain exercises and presentation of individual solutions. Analysis of individual solutions from practice  |
| Teaching methodsOral lectures with active involvement of students, slides and movies via video link, display equipment in service. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam  | Mandatory | Points |
| Lecture attendance | Yes/No | 10 | Oral part of the exam | Yes | 20 |
| Test | Yes/No | 15 |  |
| Exercise attendance | Yes/No | 15 |
| Colloquium | Yes/No | 40 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  |  | ASHRAE®HANDBOOK | Inch-Pound Edition. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie, N. E, Atlanta | 2009 |
|  | C. H. BURTON and C. TURNER | MANURE MENAGEMENT | Treatment Strategies for Sustainable Agriculture 2nd Edition. Silsoe Research Institute | 2003 |
|  | M. Navaratnasamy and J. J. R. Feddes | Odour Emissions from Poultry Manure/Litter and Barns. Final report submitted to Poultry Industry Council | Alberta Agriculture, Food and Rural Development, J. G. O'Donoghue Building, 7000-113 St., Edmonton, AB, T6H 5T6; Agricultural, Food and Nutritional Science, 4-10 Agriculture/Forestry Centre University of Alberta, Edmonton, AB, T6G 2P5 | 2004 |
|  | El Houssine Bartali andFrederick Wheaton | CIGR Handbook of Agricultural Engineering | Volume II: Animal Production & Agricultural Engineering. Edited by CIGR- The International Commission of Agricultural Engineering. Part I:, Livestock Housing and Environment,. Part II: Aquaculture Engineering. University of Maryland, USA | 1999 |
|  | Pedersen, S. and Sällvik, K | Climatization of Animal Houses | 4th Report of Working Group on Heat and moisture production at animal and house levels | 2002 |

Table 5.2 Course specification

|  |  |
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| Course: | Projection of systems and capacities for technical exploatation |
| Course id: 3OPT7I52 |
| Number of ECTS:6 |
| Teacher: | Milan D. Tomić |
| Course status | Elective |
| Number of active teaching classes (weekly) |
| Lectures:2 | Practical classes:2 | Other teaching types: | Study research work: | Other classes:1 |
| Precondition courses | None/navesti ako ima |
| Educational goalTraining students for successful overcoming the problem of designing mechanical parks and yards. |
| Educational outcomesThe ability of the candidate-student to look at the problem of designing mechanical parks and the possibility of providing concrete solutions. |
| Course contentTheoretical classesDefining influencing factors for the optimization of machine parks and economic yard (soil and climate conditions, the structure of sowing). The choice of production technology. The choice of the composition of the tractor fleet.Optimization of tractor-trailers machine. Optimization of machine park. Determining the burden of machinery works. Determining the required capacity for the implementation of works on technical maintenance and repairs of agricultural machinery. Designing systems, resources and facilities for the maintenance of proper techniques. Site Selection and Design yards.Practical classes: Exercise, Other modes of teaching,Calculation of the necessary machinery for different sowing structure and production conditions. Selection of the optimum composition of the machine pool. Calculation of required capacity for the maintenance of proper techniques for different production conditions and selected compositions machine park. Calculation of the optimal location and composition of economic yard |
| Teaching methodsLectures with the use of video presentations, demonstration exercises in laboratory and field conditions, assignments, lab and seminar work, testing under laboratory and field conditions and consultation within the lectures and exercises. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | Yes | 5 | Oral part of the exam and Written part of the exam-tasks and theory | Yes | 50 |
| Test | No |  |  |
| Exercise attendance | Yes | 25 |
| Graphic work | Yes/No | 20 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Furman T., Tot A, Oparnica S. | Repair and maintenance of agricultural engineering | Faculty of Agriculture, Novi Sad | 1993. |
|  | Savin L. | Optimization of machine park | Faculty of Agriculture, Novi Sad | 2011 |
|  | Tomić M.  | Optimization of the repair capacity of agricultural techniques tailored to the needs of family farms | Faculty of Agriculture, Novi Sad |  |