UNIVERSITY OF BELGRADE

FACULTY OF VETERINARY MEDICINE

Bulevar oslobođenja 18, 11000 Belgrade

SYLLABUS

INTEGRATED ACADEMIC STUDIES IN VETERINARY MEDICINE

Belgrade, 2026

Study programme: Integrated academic studies in veterinary medicine

Course title: Anatomy 1

Lecturer/lecturers: Milena Đorđević, Associate Professor; Miloš Blagojević, Associate Professor; Ivana Nešić, Associate Professor; Dejana Ćupić Miladinović, Assistant Professor; Nikola Cukić, Teaching Assistant

Course status: Obligatory

ECTS credits: 7.0

Prerequisites: Enrolled semester in which the course is taken

Course objective

The aim of the course Anatomy 1 is to familiarize with the theoretical and practical aspects of the anatomy of domestic animals and to master the necessary skills for recognizing importante morphological structures for clinical practice.

Course outcome

Upon completion of this course, the student:
will master the Latin terminology of organs and organ systems implied by the program,
will be able to recognize the normal macroscopic structure of organs and organ systems,
will be able to study them comparatively, in different domestic mammals.

Course content

Lectures

Introduction to anatomy, anatomical terms; bones in general, limb bones, trunk bones, head bones and teeth; introduction to myology; girdle or extrinsic musculature of the thoracic limb, muscles of the thoracic limb, muscles of the hind limb, muscles of the head, muscles of the trunk: back and groin, muscles of the chest, muscles of the abdominal wall and the tail; nervous system in general; spinal cord, brain: rhombencephalon, brain: mesencephalon, brain: telencephalon, cerebral nerves, spinal nerves, autonomic nervous system; senses of sight, hearing and balance, taste and smell; endocrine glands; skin and skin derivatives.

Practicals

Anatomical terms, bones in general, bones of the extremities, bones of the trunk, bones of the head and teeth, girdle or extrinsic musculature of the thoracic limb, muscles of the thoracic limb, muscles of the hind limb, muscles of the head, muscles of the trunk: back and groin, muscles of the chest, muscles of the abdomen and tail, nervous system in general, spinal cord, brain: rhombencephalon, brain: mesencephalon, brain: telencephalon, cerebral nerves, spinal nerves, vegetative nervous system, the organ of the sense of sight, the organs of the sense of hearing and balance, the sense of taste and smell, endocrine glands, skin and skin derivatives.

Recommended literature

1. Janković Ž, Popović S: Osteology and myology of domestic animals, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 1995.
2. Drekić D, Lozanče O: Anatomy of the nervous system, endocrine glands, sense organs and skin of domestic animals, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2010.
3. Konig HE, Liebich HG: Anatomy of domestic mammals, Schattauer, Stuttgart, 2009.

Hours	**Lectures:** 4	**Practicals:** 5

Student workload in hours, per semester

Total 210	During active teaching 135	Time for self studies including examination preparation 75

Teaching methods

Theoretical classes with interactive learning, with use of audio-visual methods (PowerPoint presentations, video animations, movies). Practical classes involve individual student work on fresh samples and formalin samples. Identification and description of individual organs of different organ systems and various species of domestic mammals.

Evaluation and grading (maximum number of points 100)

Exam prerequisites	**Points**	**Final exam**	**Points**
Active participation in lectures	4	Practical	20
Practical classes	6	Final exam	50
Colloquia	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Medicinal chemistry

Lecturer/lecturers: Iris Đorđević, Full Professor; Milena Krstić, Associate Professor

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring knowledge and understanding of structures and properties of simple and complex molecules, getting to know chemical reactions of organic and inorganic compounds that are crucial for the processes in cells of the organism, as well as the chemical laws and mechanisms that underlie these processes. Laboratory exercises provide basic laboratory techniques as well as the ability to use laboratory procedures.

Course outcomes

After completing this course, the student should:
- recognizes and understands the structure of basic and complex molecules, as well as chemical laws that are crucial for the chemical and biochemical reactions in the body
- acquires the ability to integrate theoretical knowledge and practical skills in laboratory practice
- compare and connect the structures and properties of organic compounds and biomolecules
- possesses practical skills of independent and team work in theoretical presentation as well as in laboratory analyzes
- masters and independently uses methods of analytical chemistry, qualitative and quantitative analysis
- gains safety in laboratory work
- solves chemistry tasks independently by calculation

Course content

Lectures

Atomic structure. Intra- and intermolecular bonds. Covalent and non-covalent interactions in biomacromolecules. Basic classes of inorganic compounds. Thermodynamic changes of chemical reactions in living systems. Chemical kinetics. Solutions, solubility, structure of biomolecules as a consequence of interaction with water. Acids, bases and salts. pH value. Mechanism of action and buffer capacity. Oxidation-reduction reactions and processes in living systems. Structure of organic molecules. Hydroxyl and thiol derivatives of hydrocarbons important in veterinary medicine. Carbonyl derivatives of hydrocarbons. Carboxylic acids and biologically important substituted acids. Carboxylic acid derivatives. Amines and their importance. Chemistry of carbohydrates and lipids. Steroids. Structure and properties of amino acids, peptides and proteins. Heterocyclic compounds in veterinary medicine.

Practicals

Qualitative chemical analysis of individual anions and cations. Solutions, calculations and preparation. Quantitative chemical analysis - volumetric methods. Analysis of individual classes of organic molecules. Qualitative analysis of carbohydrates.

Recommended literature

1. Borozan S: Odabrana poglavlja iz Medicinske hemije, Naučna KMD, Beograd, 2012.
2. Borozan S, Krstić M, Đorđević I: Praktikum iz Medicinske hemije sa radnom sveskom i zbirkom zadataka za studente I godine, Fakulteta veterinarske medicine Univerziteta u Beogradu, Naučna KMD, Beograd, 2010.

Hours	**Lectures:** 2	**Practicals:** 1

Student workload in hours, per semester

Total 120	During active teaching 45	Time for self studies including examination preparation 75

Teaching methods

Theoretical teaching with interactive learning, with the application of audio-visual methods (PowerPoint presentation). Practical exercises are performed individually in the experimental laboratory.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	5	Written exam	45
Participation in practicals	10	Oral exam	/
Colloquium	40		

Study programme: Integrated academic studies in veterinary medicine

Course title: Zoology

Lecturer/lecturers: Zoran Stanimirović, Full Professor; Jevrosima Stevanović, Full Professor; Ninoslav Đelić, Full Professor; Uroš Glavinić, Associate Professor; Marko Ristanić, Assistant Professor

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is to prepare students for attendance of scientific-professional and professional-applicative subjects at the Faculty of Veterinary Medicine through introduction to comparative morphology, philogenia and systematics of animals.

Course outcomes

After the successful completion of this course, students should be able to:

- determine the phylum, classis and ordo of the particular animal;
- correctly write and use Latin names of species (binominal nomenclature) and other systematic categories;
- determine taxonomical status of species important for veterinary medicine;
- understand philetic and functional interconectivity of living systems from organelles to the biosphere based on the knowledge of comparative ontogeny;
- know how to make native microscopic slides, use the school optical microscope and digital interconnected microscopic system for observation of microobjects;
- recognize morphologic and ecologic adaptations of domesticated and wild animal species;
- determine ecological and trophic niche of a given animal in food chains and adequately estimate risk from the phenomenon of environment pollutant biomagnification;
- critically access the selection of animals based on the knowledge of evolutionary relationships in the processes of speciation.

Course content

Lectures

The diversity of life. Basic principles of systematics and taxonomy of living beings. Classifications of living beings. Acellular and cellular living systems. Prokaryota and Eukaryota - the differences between them. Five kingdoms of living organisms. Kingdom Protista. Kingdom Animalia. Parazoa and Metazoa - their origin. Acoelomata. Plathyhelminthes and Nemertina. Pseudocoelomata. Nematoda. Coelomata. Mollusca, Annelida. Arthropoda and Echinodermata. Chordata. Chondrichtyes, Osteichthyes. Amphibia and Reptilia. Aves and Mammalia. Basic principles of ecology. Ecological valence. Ecological niche. Ecological factors. Food chains and biomagnification. Ecosystem metabolism and biogeochemical cycles. Acid rains and eutrophication. Theories of evolution. Natural selection. The origin of species, theories of speciation. Extinction of species.

Practicals

Microscop and microscopy. Preparation and analysis of native microscopic slides; Comparative microscopic analysis of structure of characteristic micro objects of various phylogenetic status - observation of micropreparations of budding yeast, blood smears and spermatozoa; Types of reproduction of molecules, cells and organisms. Observation of stages of mitotic division at permanent micropreparations of onion root and embrion of trout; Observation of Protozoa from phyla important for veterinary medicine and learning their morphology: native microscopic preparations from rumen of cattle and infusum, as well as permanent microobjects: *Trypanosoma* sp., *Coccidia* sp., *Plasmodium* sp. and *Nosema* sp.; Taxonomical keys for identification of Cnidaria and Platyhelminthes and introduction to their morphology by observation of permanent microobjects of *Actinia* sp., *Dicrocoelium* sp., *Fasciola* sp., *Schistosoma* sp., *Taenia* sp. и *Echinococcus* sp.; Taxonomical keys for identification of Nematoda and learning their morphology by observation of permanent micropreparations of *Ascaris* sp. and *Trichinella* sp.; Taxonomical keys for identification of Mollusca and Annelida and introduction to their morphology by observation of permanent preparations of *Helix* sp., *Anodonta*sp., *Lumbricus* sp. and *Placobdella* sp.; Taxonomical keys for identification of Arthropoda (Chelicerata, Crustacea and Uniramia) and introduction to their morphology by observation of permanent preparations of *Varroa* sp. and *Astacus* sp. and numerous insect species (from orders of Anoplura, Mallophaga, Aphaniptera, Diptera, Hymenoptera and Lepidoptera) important for veterinary medicine; Philogenia and taxonomical keys for identification of Chondrichtyes, Osteichthyes and Amphibia and introduction to their morphology on live specimens in tropicarium; Philogenia and taxonomical keys for identification of Reptilia and introduction to their morphology on live specimens in the ZOO. Ecological adaptations of Reptilia; Philogenia and taxonomical keys for identification of Aves and introduction to their morphology on live specimens in the ZOO. Ecological adaptations of Aves. Natural and artificial selection of birds; Philogenia and taxonomic keys for identification of Mammalia, part 1: orders of Primates, Rodentia, Lagomorpha and Carnivora and introduction to their morphology on live specimens in the ZOO. Ecological adaptations and adaptive radiation; Philogenia and taxonomic keys for identification of Mammalia, part 2: orders of Pinnipedia, Proboscidea,

Artiodactyla and Perissodactyla and introduction to their morphology on live specimens in the ZOO. Ecological adaptations and adaptive radiation. Natural and artificial selection of mammals.

Recommended literature

1. Stevanovic J, Stanimirovic Z, Djelic N: Zoology, Faculty of Veterinary Medicine, University of Belgrade, CID, Belgrade, 2013.
2. Stanimirovic Z, Glavinic U, Djelic N, Stevanovic J: Manual in zoology, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2015.
3. Stanimirovic Z, Soldatovic B, Vucinic M: Bee Biology. The Honeybee, Faculty of Veterinary Medicine, University of Belgrade, Medicinska knjiga-Medicinske komunikacije, Belgrade, 2000.

Hours	**Lectures:** 1	**Practicals:** 2

Student workload in hours, per semester

Total 120	During active teaching 45	Time for self studies including examination preparation 75

Teaching methods

Apart from theoretical lectures, interactive learning with application of audio-visual methods (PowerPoint presentations, video animations, films). Individual microscopy work with application of iPad device interconnected with microscopes in the classroom for digital microscopy at the Department of Biology (preparation, observation, exploration and drawing of native, permanent micropreparations, permanent composite preparations and prepared invertebrates). Practical instruction in the ZOO and tropicarium: observation of animals from all phyla and direct contact with some animals according to protocols of animal welfare and safety and safety of visitors.

Evaluation and grading (max 100 points)

Pre-exam activities	Points	**Final exam**	Points
Lecture attendance	4	Practical exam	20
Participation in practicals	10	Final exam	50
Colloquium	16		

Study programme: Integrated academic studies in veterinary medicine

Course title: Biophysics

Lecturer/lecturers: Jelena Ajtić, Full Professor; Darko Sarvan, Assistant Professor

Course status: Obligatory

ECTS credits: 3.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The objective of this course is: 1) to introduce students to the specific knowledge on physical processes in living systems and effect of physical factors on the environment, as well as to the fundamentals of some diagnostic and therapeutic methods, and 2) to increase their laboratory skills, and thus prepare them for assimilation of theoretical knowledge in the field of veterinary medicine and commencement of clinical work.

Course outcomes

On successful completion of the course, students should be able to:
– describe physical processes in living systems,
– list physical fundamentals in the functioning of living systems,
– recognise physics fundamentals in modern veterinary medicine instruments,
– demonstrate ability to conduct an experiment, analyse and present experimental results.

Course content

Lectures

Systems in physics and biology. Biomechanics. Biohydrodynamics: basics of haemodynamics and rheology of biological materials. Oscillations and waves. Bioacoustics and ultrasound in veterinary medicine. Thermodynamics and thermoregulation. Bioelectromagnetism. Transport phenomena. Optics and optical instruments. Lasers and application in biomedicine. Roentgen radiation and basics of roentgen diagnostics. Radiation biophysics. Ionising radiation, radiotherapy and basics of nuclear medicine.

Practicals

Systems of units, analysis and presentation of measurement results, characteristics of measurement instruments. Length measurements. Mass measurements. Volume measurements. Determining density of solid body. Determining density of liquid. Determining viscosity. Determining surface tension. Determining specific heat capacity. Electric measurements. Determining of the half-thickness of a gamma radiation absorber.

Recommended literature

1. Ajtić J, Popović D: Biofizika, Fakultet veterinarske medicine, Univerziteta u Beogradu, CID, Beograd, 2014.
2. Ajtić J, Popović D, Sarvan D: Praktikum iz Biofizike, Fakultet veterinarske medicine, Univerziteta u Beogradu, CID, Beograd, 2024.
3. Sarvan D, Ajtić J, Popović D: Radna sveska za vežbe iz Biofizike, Fakultet veterinarske medicine, Univerziteta u Beogradu, CID, Beograd, 2024.
4. Ajtić J, Popović D: Zbirka zadataka iz biofizike, Veterinarska komora Srbije, Beograd, 2010.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 90	During active teaching 30	Time for self studies including examination preparation 60

Teaching methods

Lectures use audio-visual presentations. Students conduct practicals under teaching assistant's supervision.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	6	Written exam	40
Participation in practicals	24		
Colloquium	30		

Study programme: Integrated academic studies in veterinary medicine

Course title: Biostatistics with informatics

Lecturer/lecturers: Milorad Mirilović, Full Professor; Spomenka Đurić, Assistant Professor; Branislav Vejnović, Assistant Professor; Jelena Janjić, Assistant Professor

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is to enable students, future doctors of veterinary medicine, to acquire the necessary knowledge about methods of data collection, organization and processing, as well as to enable them to work on a personal computer that will help them in their daily work and record keeping. Business results, searching databases on the Internet.

Course outcomes

Upon successful completion of this course, students should be able to:

- use basic methods of statistical analysis;
- computer processing of statistical data;
- interprets, concludes and presents the obtained results in the field of biomedicine;
- use software packages for text processing, databases and Internet use.

Course content

Lectures

Introduction to statistical analysis, tables and graphs; Descriptive statistical analysis; Central tendency measures; Measures of variation; Central moments; Asymmetry and flatness; Probability and theoretical frequency distributions; Sample and sample-based estimates; Time series analysis; Regression and correlation analysis; Testing statistical hypotheses; Parametric statistical tests; Nonparametric statistical tests; Introduction to Informatics; Hardware and Software; Operating system (Windows); Word Processor (Word); Statistical packages and Excel; Basics of the Internet, E-mail.

Practicals

Introduction and frequency distribution; Mean values; Measures of variation; Normal frequency distribution and center moments; Trend analysis; Correlation and regression analysis; Data analysis in Excel; Internet.

Recommended literature

1. Mirilović M: Biostatistika, Naučna KMD, Beograd, 2018.
2. Mirilović M: Biostatistika sa informatikom, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2013.
3. Pejin I, Mirilović M: Zbirka zadataka iz biostatistike, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2007.
4. Janošević S, Dotlić R, Erić-Marinković J: Medicinska statistika, Medicinski fakultet, Beograd, 1998.
5. Lovrić M, Komić J, Stević S: Statistička analiza, metodi i primena, Ekonomski fakultet Banja Luka, 2006.
6. Joyce J, Moon M: Microsoft Office System 2003, CET, 2004.
7. Aviva P, Watson P: Statistics for veterinary and animal science, 3rd Edition, John Wiley & Sons, 2013.

Hours	**Lectures:** 2	**Practicals:** 1

Student workload in hours, per semester

Total 120	During active teaching 45	Time for self studies including examination preparation 75

Teaching methods

Theoretical classes with interactive learning, with the application of audiovisual methods (PowerPoint presentations, video animations, movies). Exercises in the computer lab with individual work of students on the computer.

Evaluation and grading(maximum number of points 100)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	10	Practical exam	20
Participation in practicals	20	Final exam	30
Colloquium	10		
Seminar	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Animal behaviour, welfare and protection

Lecturer/lecturers: Katarina Nenadović, Associate Professor; Miloš Vučićević, Associate Professor; Vladimir Nešić, Full Professor; Nikola Čobanović, Associate Professor; Milena Đorđević, Associate Professor; Ljubomir Jovanović, Associate Professor; Bogomir Bolka Prokić, Associate Professor

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Enrolled semester in which the course is taken

Course aims: Acquiring the necessary knowledge and skills to understand the role of behavior in animal welfare, recognizing the circumstances for the disturbance of welfare and knowledge of the mechanisms for improving animal welfare.

Course outcomes: The student should understand the adaptive role of animal behavior and the role of behavior as a direct indicator of animal welfare, to know how to distinguish physiological from pathological forms and disorders of animal behavior, to recognize their cause; to know direct and indirect indicators of animal welfare, to be able to assess animal welfare, to understand how animal welfare is disturbed, to be able to remove factors that disrupt welfare and to apply mechanisms that improve animal welfare.

Course content

Lectures

Animal behavior as an adaptive function of the organism. Forms and strategies of behavior. Anatomical bases of animal behavior. Physiological bases of animal behavior. Motivational systems in animals and the development of disorders and pathological forms of animal behavior. Animal welfare. Ethical bases of animal welfare. Mechanisms for ensuring animal welfare. Basic principles of animal welfare assessment. Farm animal welfare. Welfare of traditional pets. Welfare of non-traditional pets. Slaughter animal welfare. Welfare of sport, working animals, animals in science, education and testing. Welfare of wildlife animals in captivity and in natural habitats. Animal welfare in transport.

Practicals

Recognition of behavioral forms, behavioral strategies, causes and reasons for animal behavior; recognizing the type and nature of the stimulus. Application of anatomical and physiological bases of animal behavior in practice - stunning, euthanasia, use of pheromones, physiological assessment of emotional status of animals. Assessment of the welfare of different use categories of animals. Resolving ethical concerns in animal welfare with examples.

Recommended literature

1. Vucinic M, Radisavljevic K, Radenkovic B, Jankovic Lj: A methodological approach to assessing animal welfare, Veterinary Journal of the Republic of Srpska XIV, 2, 181-193, 2014.
2. Vucinic M: Animal welfare, Faculty of Veterinary medicine, University of Belgrade, Belgrade, 2016.
3. Vucinic M, Nenadovic K, Kovac D, Jankovic Lj: Why veterinarians need to know the behavior of animals, Veterinary Journal of the Republic of Srpska XVIII, 1, 225-240, 2018.
4. Broom DB, Fraser AV: Domestic Animal Behavior and Welfare, 5th Edition, CABI, 2015.
5. Houpt KA: Domestic Animal Behavior for Veterinarians and Animal Scientists, 6th Edition, Wiley-Blackwell, 2018.
6. Goymann W, Küblbeck M: The second warning to humanity - Why ethology matters? Ethology 126, 1–9, 2019.

Hours	**Lectures:** 2	**Practicals:** 1

Student workload in hours, per semester

Total 120	During active teaching 45	Time for self studies including examination preparation 75

Teaching methods: Theoretical and practical classes with the organization of thematic workshops and discussions.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	15	Written exam	
Participation in practicals	15	Oral exam	70
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Anatomy 2

Lecturer/lecturers: Milena Đorđević, Associate Professor; Miloš Blagojević, Associate Professor; Ivana Nešić, Associate Professor; Dejana Ćupić Miladinović, Assistant Professor; Nikola Cukić, Teaching Assistant

Course status: Obligatory

ECTScredits: 6.0

Prerequisites: Anatomy 1 resolved

Course aims:
The aim of the course Anatomy 2 is to familiarize with the theoretical and practical aspects of the anatomy of domestic animals and to master the necessary skills for recognizing importante morphological structures for clinical practice.

Course outcomes:
Upon completion of this course, the student:
will master the Latin terminology of organs and organ systems implaied by the program,
will be able to recognize the normal macroscopic structure of organs and organ systems,
will be able to study them comparatively, in different domestic mammals.

Course content
Lectures
Body cavities and serosas, digestive system of domestic animals, respiratory system of domestic animals, urinary system of domestic animals, male and female sexual organs of domestic animals, cardiovascular system of domestic animals, poultry: bones, muscles and poultry organs.
Practicals
Body cavities and serosas, digestive system of domestic animals, respiratory system of domestic animals, urinary system of domestic animals, male and female sexual organs of domestic animals, cardiovascular system of domestic animals, poultry: bones, muscles and organs of poultry.

Recommended literature
1. Simić V, Janković Z: Anatomy of domestic mammals - splanchnology, Veterinary faculty, University of Belgrade, Belgrade, 1986.
2. Janković Z, Stanojević D, Miladinović Z: Anatomy of domestic mammals - angiology, Veterinary faculty, University of Belgrade, Belgrade, 1996.
3. Simić V: Basics of domestic poultry, Veterinary faculty, University of Belgrade, Belgrade, 1990.
4. Konig HE, Liebich HG: Anatomy of Domestic Mammals, Schattauer, Stuttgart, 2010.

Hours	**Lectures:** 3	**Practical sesion:** 3

Student workload in hours, per semester

Total 180	During active teaching 90	Time for self studies including examination preparation 90

Teaching methods
Theoretical classes with interactive learning, with use of audio-visual methods (PowerPoint presentations, video animations, movies). Practical classes involve individual student work on fresh samples and formalin samples. Identification and description of individual organs of different organ systemes and various species of domestic mammals.

Evaluation and grading (maximum number of points 100)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Active participation in lectures	4	Written exam	20
Practical classes	6	Oral exam	50
Colloquia	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Topographic anatomy

Lecturer/lecturers: Milena Đorđević, Associate Professor; Miloš Blagojević, Associate Professor; Ivana Nešić, Associate Professor; Dejana Ćupić Miladinović, Assistant Professor; Nikola Cukić, Teaching Assistant

Course status: Obligatory

ECTScredits: 3.0

Prerequisites: Anatomy 1 and Anatomy 2 resolved

Course aims

The aim of the course Topographic anatomy is to familiarize with the theoretical and practical aspects of the anatomy of domestic animals and to master the necessary skills for recognizing important morphological structures for clinical practice.

Course outcomes

Upon completion of this course, the student:
will master the theoretical and practical aspects of the topographic anatomy of domestic animals,
will know the position of organs and organ systems covered by the program,
as well as their mutual interaction, comparatively, in domestic animals.

Course content

Lectures

Regions, topography of the thoracic cavity of horses, large and small ruminants, pigs and dogs, topography of the abdominal cavity of horses, large and small ruminants, pigs and dogs, topography of the pelvic cavity of horses, large and small ruminants, pigs and dogs, topography of the forelimbs of horses, large and small ruminants, pigs and dogs, topography of the hind limbs of horses, large and small ruminants, pigs and dogs, topography of the head and neck of horses, large and small ruminant, pig and dog.

Practicals

Regions, topography of the thoracic cavity of the horse, large and small ruminants, pigs and dogs, topography of the abdominal cavity of the horse, large and small ruminants, pigs and dogs, topography of the pelvic cavity of horses, large and small ruminants, pigs and dogs, topography of the forelimbs of horses, large and small ruminants, pigs and dogs, topography of the hind limbs of horses, large and small ruminants, pigs and dogs, topography of the head and neck of horses, large and small ruminants, pigs and dogs.

Recommended literature

1. Simić V, Janković Z: Anatomy of domestic mammals - splanchnologia, Veterinary faculty, University of Belgrade, Belgrade, 1986.
2. Janković Z, Stanojević D, Miladinović Z: Anatomy of domestic mammals - angiology, Veterinary faculty, University of Belgrade, Belgrade, 1986.
3. Konig HE, Liebich HG: Anatomy of Domestic Mammals, 2010.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 90	During active teaching 30	Time for self studies including examination preparation 60

Teaching methods

Evaluation and grading (maximum number of points 100)

Points	**Points**	**Final exam**	**Points**
Active participation in lectures	10	Written exam	20
Practical classes	10	Oral exam	30
Colloquia	30		

Study programme: Integrated academic studies in veterinary medicine

Course title: Biochemistry

Lecturer/lecturers: Ivan B. Jovanović, Full Professor; Svetlana Milanović, Full Professor; Olivera Valčić, Full Professor

Course status: Obligatory

ECTS credits: 7.0

Prerequisites: Medicinal chemistry resolved

Course aims are that students should develop the knowledge and understanding of:

- structure and biological roles of the molecules that constitute an organism;
- biological role and action mechanisms of enzymes;
- structure and rules of biological membranes;
- metabolic pathways and their importance in the distribution of the matter and energy in the organism;
- interconnection, organization and specific aspects of metabolism;
- laboratory methods and procedures in the context of their possible use in clinical practice.

Course outcomes. By the end of the course students should be able to:

- know the structures and roles of the most important classes of molecules in an organism;
- understand biological role and modes of actions of enzymes and their clinical importance;
- understand the structure of cellular membranes and biological processes they carry out;
- understand the reactions, roles and modes of regulation of the principal metabolic pathways;
- understand connections and interdependency of metabolic pathways;
- recognize specific aspects of metabolism in different tissues and metabolic states.

Course content

Lectures

Biological molecules. Water and minerals. Carbohydrates. Lipids: fatty acids, triglycerides, glycerophosphates, sphingozydes, cholesterol, eicosanoides. Free radicals and antioxidative protection. Nucleic acids: nucleosides, structure of dna and rna. Proteins: amino acids, weak interactions, protein structure, the relationship between the structure and function of proteins: collagen, myoglobin, hemoglobin, immunoglobulin g.

Enzymology. Bio-energetics and kinetics of the enzyme reaction; structure, catalytic site, mechanism of action; isozymes and multienzyme complexes; mechanisms of inhibition and regulation; vitamins as coenzymes; iubmb enzyme classification.

Biological membranes. Membrane structure; transport across membranes; bioelectric properties, transduction of hormones signals.

Metabolism. Overview. Digestion, resorption and transport of food molecules: carbohydrates, lipids, proteins, nucleic acids; plasma lipoproteins.

Oxidative phosphorylation. Citric acid cycle (CAC) and its regulation, amphibolic role of CAC, metabolic modifications of CAC. Carbohydrates metabolism: glycogen, glycolysis, gluconeogenesis. Lipids metabolism: triglycerides and glycerophosphatides, ketone bodies, fatty acids, cholesterol and its derivatives. Nitric compounds metabolism: amino acids and their derivatives, urea cycle, fate of the C skeleton of amino acids; heme metabolism; nucleosides metabolism.

Interconnection and specificity of metabolic processes. Metabolic network, central role of CAC; strategic regulation of metabolism; prominent metabolic hormones. Interconversion of monosaccharides; pentose phosphate pathway. Overview of metabolic specificities in different tissues. Metabolic effects of feeding and fasting; metabolic adaptations during exercise, pregnancy and lactation. Metabolic adaptations in ruminants.

Practicals

Laboratory practicals

- Solutions: types of solutions, concentration calculation.
- Diffusion, dialysis, osmosis.
- Electrometric and colorimetric determination of pH. Buffers.
- Determination of protein concentration: acidimetric titration (Kjeldahl); colorimetric method and calibration curve.
- Fractional sedimentation of proteins. Centrifugation.
- Chromatography, electrophoresis; immunochemical methods.
- Effects of physicochemical factors on protein structure.
- Determination of activity of clinically relevant enzymes 1. (static methods).
- Determination of activity of clinically relevant enzymes 2. (dynamic methods).
- Determination of glycaemia.
- Fatty acid numbers (iodine, saponification, peroxidation).
- Determination of plasma cholesterol concentration.

DON (additional forms of teaching)

Two thematic seminars (new topics are determined each year).			
Recommended literature 1. Mihailović MB, Jovanović IB: Biohemija, 5th Edition, Naučna, Beograd, 2008. 2. Jovanović IB, Valčić O, Milanović S: Praktikum iz biohemije, 3rd Edition, Fakultet veterinarske medicine, Univerzitet u Beogradu, CID, Beograd, 2015. 3. Berg JM, Stryer L, Tymoczko JL, Gatto G: Biochemistry, 9th Edition, WH Freeman, New York, USA, 2019.			
Hours		**Lectures:** 4	**Practicals:** 3
Student workload in hours, per semester			
Total 210	During active teaching 105	Time for self studies including examination preparation 105	
Teaching methods Lectures through multimedia presentation; laboratory practical work; interactive learning through discussion; writing and defense of the seminary dissertation under mentor supervision.			
Evaluation and grading (maximum 100 points) <51 = fail, 51-60 = 6, 61-70 = 7, 71-80 = 8, 81-90 = 9, 91-100 = 10			

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	10	Practicals	10
Colloquium(s)	10	Oral exam	60
Seminars	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Veterinary genetics

Lecturer/lecturers: Zoran Stanimirović, Full Professor; Vladimir Dimitrijević, Full Professor; Ninoslav Đelić, Full Professor; Jevrosima Stevanović, Full Professor; Uroš Glavinić, Associate Professor; Marko Ristanić, Assistant Professor; Elmin Tarić, Assistant Professor; Nina Dominiković, Teaching Assistant

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Enrolled semester in which the course is taken

Course aims: To provide students theoretical and practical knowledge of basic genetics, immuno-, pharmaco-, clinical (hereditary diseases) and population genetics, use of genetic and molecular-genetic methods in veterinary medicine. To inform students with the importance and application of genomics, preservation of genetic resources, estimation of breeding value, selection, improvement of breeding performances using the latest findings in this area, and to prepare students for the attendance of scientific-professional and professional-applicative courses at the Faculty of Veterinary Medicine.

Course outcomes

Student should know basic principles of genetics, clinical, population, immuno-, pharmaco- and molecular genetics, genomics as well as applied molecular-genetic diagnostic procedures. Student should understand: elementary mechanisms of heredity, segregation and interaction of genes during the reproduction of animals, basic mechanisms of sex determination, basic mechanisms of reparation and recombination of heredity material in prokaryots and eukaryots, mechanisms of health control and means of distribution of hereditary diseases and molecular-genetic techniques for disease diagnostics and detection of animal pathogens. Students should be able to apply acquired knowledge in every day veterinary practice.

Course content

Lectures

The application of genetics in veterinary medicine. Mendel's laws. Gene, genotype and phenotype. Mechanisms of heredity. Gene interactions. Interallelic interatcions. Intergenic (non-allelic) interactions. Family (genealogic) trees. Genetics of sex determination. Levels of organisation and expression of the genome. Biological sense of DNA and RNA origin. Structure of nucleic acids. Central dogma of molecular biology. DNA replication in prokaryots and eukaryots. Replication of single strand DNA viruses. Gene expression. DNA transcription and RNA splicing. The Genetic code. Protein biosynthesis (translation). Regulation of gene activity. Linkage and recombination. Chromosomes: chromatin, structure of metaphase chromosomes. Genetic basis of cell division: mitosis, meiosis. Gametogenesis in animals. Chromosome aberrations: numeric aberrations, structure aberrations. Gene mutations. Genotoxicity and mutagenesis. DNA repair mechanisms. Developmental genetics. Genetics of aging. Genetics of cancer. Genomics. Basic principles of molecular-genetic methods in the detection of pathogens and diagnostics of hereditary diseases in veterinary medicine.

Population genetics, directing the genetic drift, effects of rearing methods on genofond, Race: formation, effects of selective breeding on genetic structure of population: acceleration of drift, consanguinity, programs of genetic resource conservation, Variability: types of variability, genes in population, Multifactorially controlled characteristics (diseases and production), heritability, threshold of expression, selection, Application of genetic variability analysis in animal breeding and forensic veterinary medicine, Elements of pharmacogenetics: biological variability and drug metabolism, basis of resistance, hypersensitivity, immunogenetics: control of synthesis of antibodies and histocompatibility antigens, MHC, split genes, Genetic basis of parasite-host interaction: basics of resistance in the host, resistance of pathogens and parasites, general resistance to infections.

Practicals

Mendelian genetics. Types of inheritance: monohybrid and dihybrid crosses. Phenotype and genotype. Interallelic interactions: dominant - recessive interaction, intermediacy, codominance, lethal genes. Sex- linked inheritance. Influence of sex on the inheritance and sex limited inheritance. Intergenic (non-allelic) interactions: dominant coepisatasis and types of gene epistasis. Molecular genetics. Family (genealogic) trees. Kariotype, kariogram, and idiogram. Genetic basis of cell division. Gametogenesis: spermatogenesis and oogenesis. Chromosome aberrations: numerical and structural aberrations. The application of molecular-genetic methods (nucleic acids extraction, PCR amplification, visualisation of products) in diagnostics of hereditary diseases and analysis of animal genomes. Laboratory work. The application of molecular-genetic methods (nucleic acids extraction, PCR amplification, visualisation of products) in the analysis of nucleic acids of animal pathogens (PCR detection and real-time PCR quantification). Laboratory work.

Genes in population: equilibrium, drift, acceleration of drift, effects of planned selection: inbreeding and outbreeding, polygenic traits, heritability, QTL and GWT. Heritopathology: diagnostics: anamnesis, familiar analysis diagnostic protocols. Epizootiology of hereditary diseases. Examples of monogenic inheritance: metabolic deficiency, diseases accompanied by intracellular accumulation (storage). Multifactorial disturbances of health: ambient control and threshold of expression, examples of polygenic diseases. Veterinary forensics: identification and parentage control.

MAS (colour of the skin, wool, fertility, muscle hypertrophy in cattle, sheep and dogs, dwarf poultry). Gene variability and side effects of drugs: idiosyncrasy of species and breeds of domestic animals. Resistance of host and microorganisms. GMO: application in veterinary medicine: pharmacologic preparations, vaccines, gene therapy.

Recommended literature

1. Djelic N, Stanimirovic Z: Principles of Genetics, Faculty of Veterinary Medicine, University of Belgrade, Data Status, Belgrade, 2019.
2. Kulic M, Stanimirovic Z, Djelic N, Novakovic M: Human genetics, Faculty of Medicine Foca, University of East Sarajevo, Foca, 2010.
3. Stevanovic J, Stanimirovic Z, Glavinic U: Molecular-genetic methods in veterinary medicine, Faculty of Veterinary Medicine, University of Belgrade, Authorized script, 2020.
4. Stanimirovic Z, Glavinic U, Djelic N, Stevanovic J: Manual in zoology, Faculty of Veterinary Medicine, University of Belgrade, 2015.
5. Dimitrijevic V, Savic M, Trailovic R, Beckei Z: Animal husbandry-farm and social animals, Faculty of Veterinary Medicine, University of Belgrade, 2020.
6. Oldenbroek K, van der Waaij L: Textbook animal breeding Animal breeding and genetics for BSc students, Centre for Genetic Resources and Animal Breeding and Genomics Group, Wageningen University and Research Centre, the Netherlands, 2014.
7. Charls D, Kishor K: Trends and Advances in Veterinary Genetics, Westbury Publishing Ltd, 2020.
8. Khatib H: Molecular and Quantitative Animal Genetics, John Wiley & Sons, Oxford, 2015.
9. Nicholas FW: Intruduction to Veterinary Genetics, 3rd Edition, John Wiley & Sons, Oxford, 2009.
10. Abbas N: DNA FORENSICS: Use in Animals, VDM Verlag Dr. Müller, 2010.

Hours	**Lectures:** 2	**Practicals:** 2

Student workload in hours, per semester

Total 120	During active teaching 60	Time for self studies including examination preparation 60

Teaching methods

Apart from theoretical lectures, practical instruction will be performed in small groups of students, allowing active practical work. System of rotation of smaller groups in the Laboratory for genetics of domestic animals, wildlife and honey bees at the Faculty of Veterinary Medicine on the existing equipment that fully supports the curriculum and allows that each student is capable for independent work after the completing the course.

Evaluation and grading (max 100 points)

Pre-exam activities	Points	**Final exam**	Points
Lecture attendance	4	Exam	70
Participation in practicals	10		
Colloquium	16		

Study programme: Integrated academic studies in veterinary medicine

Course title: Botany

Lecturer/lecturers: Svetlana Grdović, Full Professor; Dejan Perić, Assistant Professor

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring basic knowledge about plants that are: 1. basic feed for animals (fodder plants), 2. source of medicinal substances (medicinal and spice plants) and 3. source of substances that lead to animal poisoning (poisonous plants).

Course outcomes

Students should learn to make a diference between fodder, medicinal, spice and poisonous plants. They need to learn the most important organic compounds present in plants that are indicators of the feed quality. Students should master the types of medicinal substances and their healing effect, which they will later apply in animal therapy. They also need to learn the symptoms of poisoning in animals that have consumed poisonous plants. A special chapter refers to spice plants that are most often used in the meat and meat products industry.

Course content

Lectures

Introduction - the importance of studying plants in veterinary medicine; flora and its significance for animals; the importance of the chemical composition of plants for determining the quality of animal feed: water, macro and microelements, carbohydrates, proteins, fats, vitamins. Morphology and ecology of plants, vegetative plant organs, reproductive plant organs, fodder plant production and its conditionality by ecological factors. Fodder plants and nutrients of plant origin: general ecological and morphological properties of grasses and butterflies with description and significance in animal nutrition, as well as root, tuber and other fodder plants; division and general characteristics of nutrients and methods of production (natural and sowing meadows and pastures as a source of food and methods of their use, extensive and persecution grazing). Importance of bacteria, fungi and algae for veterinary practice. Aromatic plants (medicinal, spice and honey) and poisonous plants, as well as their substances (essential oils, alkaloids, glycosides, saponins), which are significantly present and have a medicinal or poisonous effect and are widespread in our meadows and pastures.

Practicals

In the exercises students learn about basic morphological structure of plants on the basis of herbarium specimens: I, II, III class of meadow-pasture grasses and cereals. Clover, alfalfa and other genus from the legumes family. Medicinal plants. Poisonous plants. Spicy plants.

Recommended literature

1. Grdović S: Botanika, udžbenik za studente, Fakultet veterinarske medicine, Univerzitet u Beogradu, CID, Beograd, 2019.
2. Grdović S: Praktikum iz botanike za studente, Fakultet veterinarske medicine, Univerzitet u Beogradu, CID, Beograd, 2014.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical classes are conducted using audio-visual methods (PowerPoint presentations, overhead projectors), and practical classes are conducted using herbarium plants and going to the field where students get to know plants in nature.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	5	Written exam	70
Participation in practicals	13	Oral exam	
Colloquium	12		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Histology with embryology 1

Lecturer/lecturers: Ivan Milošević, Associate Professor; Tijana Lužajić Božinovski, Associate Professor; Anja Nikolić, Teaching Assistant; Emilija Nićković, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Introducing the students to cell and tissue structure and function on a molecular level, so that they could understand their functional connection in various tissues and organs; introducing the basic regularities of fertilization and early embryonic development in domestic animals.

Course outcomes

After successfully completing the course, students should be able to: describe morphofunctional characteristics of cells; recognize and describe the structure and function of various tissues; understand the basic principles processes of development as well as the process of morphogenesis; describe tissue sampling and preparing of histological slides; develop microscope skills.

Course content

Lectures

Molecular organization of eukaryotic cells; structure and function of organelles; molecules of cell adhesion and communication between cells; cell cycle and cell death; cells and extracellular matrix; embryological origin and basic morphofunctional characteristics of epithelial, connective, muscle (including components of the musculoskeletal system), nerve tissue (including basic histological characteristics of organs of the central and peripheral nervous system), as well as histological characteristics of circulatory system; maturation and structure of gametes; fertilization and sex determination; basic processes of development (growth, differentiation, induction, determination); morphogenetic processes; *in vitro* technologies (cloning, transgenic animals, chimeras) pre-embryonic period of development (blastomerisation, blastulation, gastrulation, neurulation, celomation).

Practicals

Presenting basic phases in preparing slides for light and electron microscopy; proper microscope use and microscope techniques; analysis of electromicrophotograpghs, studying microscopic structure of cells, tissues and organs; presentation and analysis of various morphogenetic processes on slides of tissues and organs in different phases of development.

Recommended literature

1. Gledić D: Veterinarska histologija, Fakultet veterinarske medicine, Univerzitet u Beogradu, Veterinarska komora Srbije, Beograd, 2012.
2. Milošević I, Lužajić Božinovski T, Radovanović A, Marković D, Nikolić A: Praktikum iz Histologije sa embriologijom 1, Fakultet veterinarske medicine, Univerzitet u Beogradu, 2024.
3. Anđelković Z, Danilović V, Smiljanić Milutinović S, Kapić D, Šahinović M: Opšta i oralna histologija i embriologija, Galaksijaniš, Niš, 2022.
4. McGeady TA, Quinn PJ, FitzPatrick ES, Ryan MT: Veterinarska embriologija, Naklada Slap, Zagreb, 2014.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 75	Time for self studies including examination preparation 75

Teaching methods

Formal lectures with interactive studying, implementation of audio-visual methods (PowerPoint presentations and video presentations). Practicals: introductory lecture (PowerPoint presentations); individual student work on a microscope; (studying and drawing of chosen cell, tissue and organ slides); teamwork on microscopes with integrated camera, where live reproduction is possible on cell phones, tablets or laptops.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	2	Practical exam	30
Participation in practicals	8	Oral exam	20
Colloquium	40		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Veterinary profession and society

Lecturer/lecturers: Jakov Nišavić, Full Professor; Milorad Mirilović, Full Professor; Natalija Fratrić, Full Professor; Milan Maletić, Associate Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

To provide students with basic knowledge about the veterinary profession, ie all activities that a doctor of veterinary medicine is engaged in today and can do, both in our country and in the world in order to protect animal and human health, ways to achieve it, as well as the importance of professions for society.

Course outcomes

The student should know all the most important characteristics of his future profession, all areas of veterinary activity, as well as to understand the place and role of the doctor of veterinary medicine, ie the veterinary profession in society as a whole.

Course content

Lectures

I- The role and importance of veterinary activity in modern society (history of veterinary medicine and animal treatment, the influence of society and social factors on the performance of veterinary activities, problems of the veterinary profession in developed countries with special reference to our country in transition). II- Place and role of veterinary doctors in various fields of veterinary activity (animal health, control of food hygiene, production, control and supervision of drug trade, organization of livestock production, scientific research and education, state administration, management and marketing in veterinary activities). III- Modern concept of education in veterinary medicine (modern concept of veterinary medicine studies and Bologna process, ECTS - European credit transfer system, student exchange with other universities, postgraduate and specialist studies, continuing education). IV- Legislation in veterinary medicine.

Practicals

Not provided

Recommended literature

1. Jovanović VP: Istorija veterinarske medicine i zdravstvene kulture na tlu današnje Vojvodine, Matica Srpska, Novi Sad, 2004.
2. Vučevac-Bajt V: Povijest veterinarstva, Veterinarski fakultet, Sveučilište u Zagrebu, Zagreb, 2012.
3. Ćupić V: Istorija veterinarske medicine, Hiron, 2 (2): 4-5, 2014.
4. Cincović MR, Vidović BR: Istorijski razvoj veterinarske medicine, Naši salaši, 2:28-29, 2008.
5. Korenčić Kampl K: Veterinarska medicina i njezina etika u bioetičkom kontekstu, Soc. Ekol. Zagreb, 10 (3): 143-155, 2001.
6. Slavica A, Radin L: Nove vještine i znanja u veterinarskoj profesiji, Zbornik radova, Veterinarski dani, Opatija, 2018.

Hours	**Lectures:** 2	**Practicals:** 0

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical teaching is performed by interactive learning, with the application of audio-visual methods (PowerPoint presentation).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	60
Participation in practicals		Oral exam	
Colloquium	10		
Seminars	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Medical terminology - English

Lecturer/lecturers: Danijela Đorđević, Associate Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

- To reinforce grammatical forms and structures that allow for better comprehension and production of both spoken and written discourse within the register of veterinary medicine;
- To provide instruction in using reference literature (dictionaries and e-dictionaries);
- To acquaint students with specific professional terminology of veterinary medicine in English;
- To practise integration of receptive and productive skills (listening & reading, speaking & writing), with specific focus on reading comprehension and summary writing.

Course outcomes

Upon successful completion of the course, the students will be able to:

- Read and comprehend professional texts of lower to medium complexity (level B1 according to CEFR);*
- Independently use reference literature and tools (dictionaries, e-dictionaries, Internet sources);
- Independently take notes while listening to lectures and develop summaries based on note-taking;
- Produce an independent shorter (up to 3 minutes) presentation on chosen topics from the veterinary medicine domain (level B1 according to CEFR).

CEFR* - Common European Framework of Reference for Languages

Course content

Lectures

Basic grammar structures necessary for better comprehension and production of both spoken and written discourse within the register of veterinary medicine (Present Simple, Past Simple and Present Perfect; modal verbs MUST, MAY/MIGHT, CAN/COULD, SHALL/SHOULD, WILL/WOULD; singular/plural of nouns; irregular plurals; collective nouns; noun gender - specific nouns denoting animals).

Practical activities

Following activities will be carried out: vocabulary building exercises, listening comprehension exercisess, reading comprehension exercises, Summary writing (up to 200 w.) Basic public speaking skills (oral presentation structure), speaking on chosen topics.

Recommended literature

1. Bjelica N: English for Students of Veterinary Medicine, Faculty of Veterinary Medicine, Belgrade, 1996.
2. Boden E, Andrews A: Black's Veterinary Dictionary, 22nd Edition, Bloomsbury, London, 2015.
3. Hine RS, Martin E: Dictionary of Biology, Constable and Robinson Ltd, London, 2005.
4. Bjelica N: Veterinary Dictionary, Nauka, Belgrade, 2002.

Hours	**Lectures:** 2	**Practicals: -**

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Interactive communicative approach.

Evaluation and grading (max. 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	30	Written exam	70
Participation in practicals	/	Oral exam	/
Colloquia	/		
Seminars	/		

Study programme: Integrated academic studies in veterinary medicine

Course title: Psychosocial aspects of animal husbandry

Lecturer/lecturers: Katarina Nenadović, Associate Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims: Introducing students to the relationship between humans and animals, the way animals are used, human attitudes towards animals, the benefits that humans have from animals, the harms that animals cause to humans and the harms that humans cause to animals and, the leading importance of veterinarians in maintaining the human-animal relationship.

Course outcomes: The student should know in which ways man uses animals and what are the mutual benefits and harms of the human-animal relationship and what is the role of veterinarians in preserving and strengthening this relationship.

Course content

Practicals

Workshop 1. Evolution of the human-animal relationship. Workshop 2. Factors from society that affect the human-animal relationship. 3. The role of the individual in the relationship between man and animals. Workshop 3. Ways of using animals. Workshop 4. Benefits for animals from the human-animal relationship. Workshop 5. Damage to animals from the human-animal relationship. Workshop 6. Benefits for humans from the human-animal relationship. Workshop 7. Damage to humans from the human-animal relationship. Workshop 8. The role of veterinarians in the human-animal relationship. Workshop 9. Ways of studying the relationship between humans and animals. Workshop 10. Ways of collecting data (interviews, surveys, questionnaires) on the relationship between humans and animals.

Recommended literature

1. Menna LF, Santaniello A, Todisco M, et al.: The human-animal relationship as the focus of animal-assisted interventions: A one health approach, Int J Environ Res Public Health, 16 (19), 3660, 2019.
2. Wells DL: The state of research on human–animal relations: implications for human health, Anthrozoös, 32 (2), 169-181, 2019.
3. Friedmann E, Galik E, Thomas SA, Hall S et al.: Relationship of behavioral interactions during an animal-assisted intervention in assisted living to health-related outcomes, Anthrozoös, 32 (2), 221-238, 2019.
4. Griffin JA, Hurley K, McCune S: Human-animal interaction research: progress and possibilities, Front. Psychol. 10, 2803, 2019.
5. Mueller MK, Gee NR, Bures RM: Human-animal interaction as a social determinant of health: descriptive findings from the health and retirement study, BMC Public Health 18, Article number: 305, 2018.
6. Echeverri A, Karp DS, Naidoo R, Zhao J, Chan KM: Approaching human-animal relationships from multiple angles: A synthetic perspective, Biological Conservation, 224, 50-62, 2018.
7. Beck AM: The biology of the human–animal bond, Animal Frontiers, 4 (3), 32-36, 2014.
8. Hosey G, Melfi V: Human-animal interactions, relationships and bonds: A review and analysis of the literature, International Journal of Comparative Psychology, 27 (1), 117-142, 2014.
9. Rabinowitz P, Conti L: Links among human health, animal health, and ecosystem health, Annual Review of Public Health, 34 (1), 189-204, 2013.
10. Fraser D, MacRae AM: Four types of activities that affect animals: Implications for animal welfare science and animal ethics philosophy, Animal Welfare, 20, 4, 581-590, 2011.

Hours	**Lectures:** 0	**Practicals:** 2

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Practical classes through workshops.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Written exam	
Participation in practicals	50	Oral exam	50
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Experimental chemistry

Lecturer/lecturers: Iris Đorđević, Full Professor; Milena Krstić, Associate Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Study of basic practical principles of chemistry, chemical reactivity of inorganic and small organic molecules through virtual experiments and experiments in a real laboratory. Through simulated experiments in a virtual laboratory, the student has the opportunity to explore the reactivity of various substances, monitor, observe and "on line" record changes. Working in a virtual laboratory does not require any specific prior knowledge in chemistry and allows the student to plan an experiment in a real laboratory that follows through an interactive quiz. Experiments performed in the laboratory are related to research work in veterinary medicine.

Course outcomes

Upon completion of this course the student should
- more easily connects theoretical concepts, creativity and practice
- master laboratory techniques and principles of teamwork
- plans the experiment, implements and draws conclusions
- learn to apply the first postulates of scientific research

Course content

Practicals

Introduction to work in a virtual laboratory. Virtual experiments with inorganic agents. Chemical properties, significance and role of some inorganic ions in the organism. Synthesis and structure of complex compounds and their application in veterinary medicine. Isolation and analysis of natural products with protective effect. Analysis of the obtained results. Determination of the activity of individual enzymes and small molecules, biomarkers in pathological processes. Seminar papers if they are planned for certain areas.

Recommended literature

1. Internet pretraživači PubChem, Entrez
2. Sajtovi: http://www.chem.ox.ac.uk/vrchemistry/, http://www.lenntech.com/periodic/periodic-chart.htm, http://www.ptable.com/, http://www.3dchem.com/atoz.asp
3. Stevanović J, Borozan S: Značaj slobodnih radikala u veterinarskoj medicini, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2012.

Hours	**Lectures:** 0	**Practicals:** 2

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Introductory notes for work in the virtual laboratory, discussion of the results obtained in the virtual laboratory and performance of a real experiment using existing animations and an interactive quiz. Application of laboratory methods in biomarker detection (extraction, centrifugation, thin layer chromatography, electrophoresis, Western blot technique).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Written exam	50
Participation in practicals	40	Oral exam	
Colloquium			
Seminars	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Physics fundamentals of diagnostic and therapeutic methods

Lecturer/lecturers: Jelena Ajtić, Full Professor; Darko Sarvan, Assistant Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The objective of this course is to introduce students to basic theoretical knowledge on physics fundamentals and principles of measurements, and functioning of biomedical instrumentation.

Course outcomes

On successful completion of the course, students should be able to:
– name physical phenomena that are the basis of instruments widely used in veterinary medicine,
– differentiate diagnostic from therapeutic application of a given physical phenomenon,
– calculate doses of ionizing radiation,
– recognise situations wherein protection from laser and ionizing radiation is necessary.

Course content

Practicals

Environmental monitoring. Ultrasound - diagnostics and therapy. Roentgen diagnostics. Optics - diagnostics and therapy. Laser diagnostics and therapy. Electrodes and microelectrodes in biomedical techniques. Electrical current in diagnostics and therapy. Ionising radiation in biomedicine. Non-ionising radiation. Thermography and thermotherapy. Visits to the Faculty clinics and laboratories where students are introduced to the modern instruments used in diagnostics and therapy.

Recommended literature

1. Ajtić J, Popović D: Fizičke osnove dijagnostičkih i terapijskih metoda, Veterinarska komora Srbije, Beograd, 2013.
2. Ajtić J, Popović D: Biofizika, Centar za izdavačku delatnost, Fakultet veterinarske medicine, Beograd, 2014.
3. Ajtić J, Popović D: Zbirka zadataka iz biofizike, Veterinarska komora Srbije, Beograd, 2010.

Hours	**Lectures:** 0	**Practicals:** 2

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Audio-visual presentations, problem-solving classes, demonstrations.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	30	Written exam	70

Study programme: Integrated academic studies in veterinary medicine

Course title: Introduction to veterinary clinical practice

Lecturer/lecturers: Vanja Krstić, Full Professor; Ivan Vujanac, Full Professor; Milan Maletić, Associate Professor; Bogomir Bolka Prokić, Associate Professor; Sreten Nedić, Assistant Professor; Anja Ilić-Božović, Assistant Professor; Miloš Đurić, Assistant Professor

Course status: Elective

ECTS credits: 3.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring real information about the metacognition of studying and the differences in relation to previous schooling. Achieving a proper, functional pre-study relationship. Appropriate consumption of pedagogical, andragogical and heutagogical techniques of learning and education. Acquiring real information about the origin and historical changes in the veterinary profession. Obtaining information on the current state of primary veterinary activity in the Republic of Serbia. Obtaining information on the current state of the profession in countries with developed veterinary practice. Understanding the real picture of the perspective of clinical practice currently and in the near future in the Republic of Serbia.

Course outcomes

The idea is for the student to get acquainted with real forms of veterinary-clinical practice with most of their specifics and extravagances they carry, so that during his studies, in the following years, he masters the necessary hard and soft skills that would make him a quality and efficient veterinarian.

The outcome is assessed on the basis of a summative assessment of the knowledge of the specific student absorbed and applicable to the concept of modern veterinary practice. Continuous assessment, resulting from the processing of forwarded seminars after work at home, where all available literature will be available to him, will be incorporated into the final grade of each student.

As veterinarians-practitioners realize their skills and knowledge in direct, personal communication with the client, the owner of a specific patient, the test is an absolutely inadequate way to check the mastery of knowledge and skills to which students are instructed during classes.

Course content

Lectures

Studying as a complex activity, significantly narrower than education. Proper consumption of andragogical, pedagogical and heutagogical methods in the process of mastering clinical skills. Proper use of the Internet in the process of learning and educating veterinarians. The concept of integrated basic master studies, specialist academic studies, doctoral studies and continuous education of veterinary doctors. Definition and historical process of adapting veterinary activity to current production concepts. The current state of the veterinary profession in the conditions of the development of extensive livestock breeding and the expansion of small practice. A necessary set of skills that a veterinarian needs to be sovereign in order to survive in the current market of services. Level of development of veterinary clinical activity in countries with advanced veterinary activity. Levels of organization of veterinary services, ambulances, veterinary stations, veterinary clinics, scientific veterinary institutes, veterinary specialist institutes. Veterinary Chamber of Serbia, veterinary license, Veterinary Directorate at the Ministry of Agriculture, Forestry and Water Management. Documents regulating the primary veterinary activity. Lectures by veterinarians employed in specific activities and providing information on the scope and nature of the services they provide.

Practicals

Stay in FVM outpatient clinics and outpatient clinics outside FVM, in order to see the position of veterinary clinical practice as realistically as possible. Which should be a good basis for orienting students in which direction they want to lead their professional career.

Recommended literature

1. Material presented in lectures during the course.
2. Veterinary Law, valid documents of Serbian veterinary chamber that regulate primary veterinary activity in the Republic of Serbia.
3. Material is available online. Explicit citation of sources could lead students to reach for the same sources and thus only consume the material offered in lectures. With this procedure, they are forced to find "their" sources and to critically incorporate them into their attitudes and answers on the exam.

Hours	**Lectures:** 1	**Practicals:** 2

Student workload in hours, per semester

Total 90	During active teaching 45	Time for self studies including examination preparation 45

Teaching methods

Theoretical teaching with special emphasis on interactive teaching. Group analysis of the obtained materials, by the

students, in response to the questions asked, before or after the processed teaching unit. Practical classes with interpretation of absorbed experiences of staying in FVM clinics or extramural units.			
Evaluation and grading (maximum 100 points)			
Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Written exam	
Participation in practicals		Oral exam	70
Colloquium		Homework	30
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Introduction to veterinary laboratory practice

Lecturer/lecturers: Milica Stojković, Associate Professor; Ljubomir Jovanović, Associate Professor; Dušan Bošnjaković, Teaching Assistant; Svetlana Milanović, Full Professor; Jelena Francuski Andrić, Associate Professor; Milena Đorđević, Associate Professor; Ivan Milošević, Associate Professor; Tijana Lužajić-Božinovski, Associate Professor; Ivana Vučićević, Associate Professor; Milan Aničić, Assistant Professor; Dejan Krnjaić, Full Professor; Jakov Nišavić, Full Professor; Andrea Radalj, Associate Professor; Danica Bogunović, Associate Professor; Slobodanka Vakanjac, Full Professor; Ljubodrag Stanišić, Assistant Professor; Snežana Bulajić, Full Professor; Tijana Ledina, Associate Professor; Sonja Radojičić, Full Professor; Nataša Stević, Associate Professor

Course status: Elective

ECTS credits: 3.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The subject target is to provide a student basic knowledge about the importance of various laboratory diagnostic tests in veterinary medicine. The aim of the subject is to prepare students for laboratory work and teach them how to follow basic biosecurity measures in the scope of different diagnostic laboratory during studies. The aim of the subject is to meet students with development of laboratory protocol and the principle of performed diagnostic procedures in laboratory practice.

Course outcomes

After completing the course the student should learn and understand the basics of good laboratory practice in veterinary medicine as well as the importance of proper sampling and safe handling of biological samples of animal origin. The student is supposed to acquire the skill of proper reception and processing of samples for proper laboratory examination. The student is supposed to learn to make a laboratory protocol for appropriate analysis and to prepare a solution of certain concentration. The student should learn the basic techniques of blood smear examination and how to recognize the cell. The student should explain how to sample tissues and get histological specimens. The student should state the basic principles of work and diagnostic procedures in the parasitological and microbiological laboratory as well as to present and interpret the laboratory protocol of completed checks. The student should explain the importance of the laboratory for the analysis of food of animal origin in the protection of public human health and learn to make a protocol for the analysis of the assessment of the quality and safety of meat and milk. The student should state the steps of proper sampling, reception and processing of potentially infectious material and respect the basics of biosafety measures in working with infectious material. The student should develop the awareness of the existence zoonoses and the importance of following the protocols of laboratory procedures in their diagnosis.

Course content

Lectures

Standards of good laboratory practice; Basic principles of the preanalytical phase in laboratory testing- possible sampling, transportation and sample keeping errors; Principles and application of basic methods in clinical pathology; Introduction to the basics of clinical hematology; Basic principles of bone preparation and skeletal fabrication; Histological methods of tissue and cell studies; Reception and preparation of tissue samples for pathohistological examination, principles of histochemical and immunochemical methods; Principles of operation in a parasitic laboratory; Conventional laboratory diagnosis of parasitic infections; Basic principles of microbiological diagnostics in veterinary practice; Conventional laboratory diagnosis of bacterial, fungal and viral infections; Basic principles of analyses of samples of genital tract and mammary gland of domestic animals; Basic principles of food analysis of animal origin; Basic principles of work in the laboratory for the diagnosis of infectious diseases.

Practicals

Preparation of analysis protocols, preparation of test solution, preparation of stock solution; Introduction to the work and application of biochemical and hematological blood analyzers; Microscopic examination of blood smears - morphology of blood cells; Bone preparation and processing - skeletal fabrication; Practical principles of tissue and cell study histological methods; Processing, cutting and staining tissue for histopathological and immunohistochemical examinations; Sampling and sending material for parasitological analysis; Preparation and microscopic examination of direct preparations; Sampling and sending materials for microbiological analysis; Methods of detection, isolation and identification of microorganisms; Reception, taking and processing of samples of genital tract and mammary gland of domestic animals; Practical work in laboratory for the analysis of food of animal origin - development of protocols, taking and processing of samples; Proper collection and processing of infectious material for examination; Laboratory methods for the diagnosis of zoonoses.

Recommended literature

1. Ašanin R, Krnjaić D, Milić N: Handbook with practical exercises in microbiology with immunology, Scientific KMD, Belgrade, 2014.
2. Nešić S, Vučićević I: Practicum in pathohistology for students of the Faculty of Veterinary Medicine, Scientific

KMD, Belgrade, 2018.

3. Katić V: Practicum in milk hygiene, Faculty of Veterinary Medicine, University of Belgrade, Serbian Veterinary Chamber, Belgrade, 2007.
4. Teodorović V, Bunčić O, Karabasil N, Dimitrijević M, Vasilev D: Hygiene and meat technology, Practicum, Belgrade, 2012.
5. Willard MD, Tvedten H: Small animal clinical diagnosis by laboratory methods, Elsevier, 2012.

Hours	**Formal lecture:** 1	**Practicals:** 2

Student workload in hours, per semester

Total 90	During active teaching 45	Time for self studies including examination preparation 45

Teaching methods

Theoretical classes with interactive learning with the use of audio-visual methods (PowerPoint presentation, films), demonstration, discussion workshops and practical classes in the laboratory of the Faculty. The writing and analysis of laboratory protocols in student groups (5 students).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	60
Participation in practicals	30	Oral exam	
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Breeding and care of wild and exotic animals

Lecturer/lecturers: Ninoslav Đelić, Full Professor; Jevrosima Stevanović, Full Professor; Zoran Stanimirović, Full Professor; Uroš Glavinić, Associate Professor; Marko Ristanić, Assistant Professor

Course status: Elective

ECTS credits: 3.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is: to provide students knowledge of breeding and care of wild and exotic animals, importance of means of conservation of endangered animal species; to explain the importance of breeding and care of hunting game and existence of hunting facilities; to introduce planned management of hunting ground, topics about survival of hunting game in contemporary era and specificity of hunting game diversity; to allow students practical knowledge about accommodation, rearing, welfare and care of animals, as well as safety of visitors, employees and animals in ZOOs.

Course outcomes

Student will learn principles of breeding and care of hunting game, understand ecological specificities of reared and free-ranging species of hunting game, to apply acquired knowledge in planning of management with hunting ground in order to contribute to elevation of conscience of hunters about the protection and welfare of hunting game, as well as protection of biodiversity and the environment. Student should know basic rules of breeding and care of hunting game and exotic animals in captivity and importance of the existence of ZOOs. Student should understand ways of providing the life conditions for wild and exotic animals in accordance with their biological needs. Student should accurately act with wild and exotic animals, thought-out the enclosure and provide diet, elevate the conscience of visitors and employees in ZOOs about the necessity of health protection of wild and exotic animals. One of the outcomes of the course is that Hunting association of Serbia will recognize passed hunting exam to each student who successfully completes this course.

Course content

Lectures

Definition and types of hunting grounds. Hunting ground quality and its assessment. Economical and biological capacity of hunting ground. Hunting management plan. Types, characteristics and importance of our hunting grounds - relationship between hunters and game. Importance and types of hunting dogs. Biological specificities, morphology and taxonomy of some important hunting game species. Areal of wild species and ecological relationships within areal. Species of wild animals making damage in agriculture, forestry and traffic. Biological vectors of contagious diseases of wild animals and their role as vectors of human and animal contagious diseases. Modern trends of management of open and fenced hunting grounds. Conservation genetics of game. Possibility of experimental breeding and reintroduction of hunting game. Ethical and economic issues in relations between humans and hunting game. Importance of hunting for biodiversity throughout history until today. Use of forensic analysis in discovery of illegal hunting and poaching. First aid after injuries during hunting. Importance of ZOOs: conservation of endangered species of animals, research, education, rehabilitation. Rearing, welfare and care of animals. Safety of visitors, employees and animals in ZOOs. Providing accommodation and food for animals in ZOOs in accordance with their biological needs and natural habitat. Providing the conditions for normal behavior in ZOOs - behavioral enrichment of enclosures. Introducing the possibilities and means of reproduction of animals in ZOO, importance of cooperation with other ZOOs in animal exchange, issues of breeding and care of rejected newborns. Proper handling, restraining and transferring live animals. Role of veterinarians and health protection of animals in ZOOs. Level of endangerment of species in „Red list“ - IUCN, current status and level of protection - CITES position of species.

Practicals

Areal and interactions of hunting game species. Phenotypic characteristics and communication among hunting game. Marking the animals and phenomenon of migration. Breeding of pheasants. Learning through practice in pheasantry. Introducing the organisation and infrastructure of hunting ground. Learning through practice in hunting grounds, planning and organisation of hunting ground management. Hunting ground quality and capacity of hunting ground. Evaluation of hunting trophies - horns, skulls, tusks and furs of hunting game, according to protocols of CIC, comparison and analysis - work in the classroom at the Department of Biology. Importance of introduction of hunting game into hunting grounds. Techniques of monitoring, observation and counting of hunting game - traces of game species. Ways of capturing and safe manipulation of hunting game. Hunting logistics, safe handling of weapons, and various ways of game harvesting. The adequate procedures of breeding and care of exotic mammals in captivity. The adequate procedures of breeding and care of exotic birds in captivity. The procedures of correct breeding and care of exotic reptiles in captivity. Good and bad examples of accommodation and care of ZOO animals. Practical examples of importance of various ways of enrichment of enclosure. Ways of capturing and safe manipulation of animals in ZOOs. Safety in ZOOs. Estimation and means of providing safety and security for animals, employees and visitors in ZOOs. Marking/identification of animals, data bases and list of animals in ZOOs with specification of IUCN and CITES status.

Recommended literature

1. Stevanovic J, Stanimirovic Z, Djelic N: Zoology, Faculty of Veterinary Medicine, University of Belgrade, CID, Belgrade, 2013.
2. Stevanovic J, Stanimirovic Z: Breeding and care of ZOO animals, Authorised manuscipt, 2020.
3. Hosey G, Melfi V, Pankhurts S: Zoo Animals: Behaviour, Management, and Welfare, Oxford University Press Inc., New York, 2010.
4. Ristic Z: Zoology of hunting game and hunting taxonomy, part 1, IK "Ljubostinja" Trstenik, 2013.
5. Ristic Z: Wild life management, Aston, Kragujevac, 2008.
6. Popovic N, Ilic N: Biological characteristics and diseases of hunting game, rabbits and furred animals, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2007.

Hours	**Lectures:** 1	**Practicals:** 2

Student workload in hours, per semester

Total 90	During active teaching 45	Time for self studies including examination preparation 45

Teaching methods

Theoretical classes and interactive learning, audio-visual presentations (PowerPoint presentations and films).
Learning through practical classes and duties in enclosures, pheasantries and hunting grounds. Visiting the hunting museum and hunting trophy exhibition. Evaluation of hunting trophies (classroom). Practical classes in ZOOs of Serbia (Belgrade ZOO, Palic ZOO), block lectures, practice and duties in ZOOs and in form of creative workshops. Introducing to wild life veterinary practice.

Evaluation and grading (max 100 points)

Pre-exam activities	Points	**Final exam**	Points
Lecture attendance	5	Exam	60
Practical instruction	10		
Colloquium	25		

Study programme: Integrated academic studies in veterinary medicine

Course title: Breeding and care of honey bees

Lecturer/lecturers: Zoran Stanimirović, Full Professor; Jevrosima Stevanović, Full Professor; Uroš Glavinić, Associate Professor; Marko Ristanić, Assistant Professor

Course status: Elective

ECTS credits: 3.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Mastering proper breeding and care of bee colonies aimed at maintaining healthy and productive colonies. Teaching students to solve the most often problems in apiculture and to gain knowledge on bee products. The course is to lay foundation for attendance at the Bee diseases course and successful learning its content.

Course outcomes

Students should know the social organisation and development of bee colonies, the morphology and communication between the colony members and the characteristics of the bee pasture and bee products. Students should understand the basic principles of breeding and care of bee colonies in accordance with their seasonal needs, the development of the colonies, basic principles of queen selection and management in apiculture. They can apply the learnt skills for the establishment and management of apiaries on their own, professional inspection of apiaries, collection of adequate samples for laboratory analyses and communication with beekeepers.

Course content

Lectures

The origin, distribution, taxonomy and the breeds of the honey bee. Structure and the social organisation of the bee colony and biology of its members. The queen: biology and pheromones, recognition of the queen. Drones: the importance and the role of drones in the colony. Worker bees: in-hive bees - age structure, roles, inter-relationships and age-related labour division - temporal polyethism. Worker bees: foragers - pollen forager, nectar forager, water forager and their inter-relationship. Orientation of the bees in the field. Communication between the members of the colony - pheromones and waggle dance. Bee pasture: melliferous flora and the dynamics of nectar production in Serbia. Additional spring pastures (hazel, fruit trees, dandelion and). The main bee pastures: oil-seed rape, acacia and false indigo-bush, lime tree, sunflower. Meadow pasture. Additional autumn pastures. Classification of bee pasture plants according to their productivity and deciding on the number of bee colonies in accordance with the capacity of bee pastures. Bee nutrition: nectar, pollen, honey and bee bread, and their reserves for bee colonies. Genetics of the honey bee. Queen rearing and selection. Honey bee behaviour. Beekeeping management: economic status of beekeeping today. The world market of bee products. Economic foundation of contemporary beekeeping. Management in beekeeping. Ecological beekeeping for the future and higher profit. Development of a beekeeper’s image.

Practicals

Bee products: honey - types and characteristics, honey extraction, storage, crystallisation, significance, biological and nutritive value. Pollen - characteristics, collection, storage, significance, biological and nutritive value. Bee products. Royal jelly - characteristics, harvesting, storage, significance, biological and nutritive values. Propolis and beeswax - characteristics, collection, storage. Bee venom - characteristics, collection, storage, biological value and significance. Tasting honey and other bee products. Morphology of the honeybee. Microscopy of permanent slides: the front, middle and the hind pair of legs, wings, bee sting and mouth apparatus, wax mirrors. Reproduction of the honeybee (female and male reproductive organs). Development of the honeybee: embryonic and post-embryonic development, molecular aspects of honeybee development. Dissection of honeybees - individual work. Type of hives: hives with fixed combs (log hive, skep hives) and movable-frame hives: long hive, leaf hive and multi-chamber hives. Beekeeping equipment and tools: tools used for colony inspection (a tool box, a bee smoker, a hive tool, protective clothing, and a beekeeping hat and veil). Tools used for bee feeding (feeders, vessels for preparing syrup, water device for bees). Apiary house. Choosing the place for an apiary. Position of the apiary, micro-ecological conditions for the location of apiaries, hygienic principles of establishing and maintaining apiaries. The development and structure of bee nests. Hive preparation. Frame construction and wiring - individual work. The insertion of wax foundations - individual work. Establishing and maintaning of bee colonies. Dynamics of colony development and factors which influence the development. Expanding bee colonies. Seasonal work on the apiary. Proper inspection of bee colonies. The addition of wax foundations and the preparation of bee colonies for honeyharvest. Swarming instinct and swarming of bee colonies. Factors which influence swarming. Colony splitting and establishment of new colonies. Amateur methods of queen rearing. Professional methods of queen rearing. Assessment of queen cups and queens. Visit to a beekeeping equipment factory. Visits to bee product processing plants and factories for bee protection products. Visits to a queen rearing facility. Professional beekeepers' experience in beekeeping with LR and DB hives. Melliferous plant diversity in various regions of Serbia. Visits to the apiaries owned by the beekeepers who cooperate with the Dpt. of Biology.

Recommended literature

1. Stanimirovic Z, Soldatovic B, Vucinic M: Bee biology. The honey bee, Medicinska knjiga, Medicinske

komunikacije, Beograd, 2000.

2. Cirkovic D, Stanimirovic Z: Beekeeping Manual, Naucna KMD, Beograd, 2018.
3. Stanimirovic Z, Stevanovic J, Glavinic U, Ristanic M: Authorized e-textbook available at the website of the Department of Biology (http://biologija.vet.bg.ac.rs/uzgoj-i-nega-pcela/), 2020.

Hours	**Lectures:** 1	**Practicals:** 2

Student workload in hours, per semester

Total 90	During active teaching 45	Time for self studies including examination preparation 45

Teaching methods

Theoretical classes and interactive learning, audio-visual presentations (PowerPoint presentations and films). Instructions and practical work. Students work in small groups in an appropriately equipped beekeeping workshop and on the apiary owned by the Department of Biology. Visit to beekeeping equipment factories and apiaries (stationary, migratory apiaries and those for queen rearing), owned by the beekeepers who cooperate with the Department.

Evaluation and grading (maximum 100 points)

Pre-exam obligations	Points	**Final exam**	Points
Lecture attendance	5	Exam	60
Participation in practicals	10		
Colloquium	25		

Study programme: Integrated academic studies in veterinary medicine

Course title: Histology with embryology 2

Lecturer/lecturers: Ivan Milošević, Associate Professor; Tijana Lužajić Božinovski, Associate Professor; Anja Nikolić, Teaching Assistant; Emilija Nićković, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Completed Histology with embryology 1

Course aims

Provide students with knowledge about the basics of development and microscopic structure of organs in domestic animals; introduce them to the specifics of extraembryonic membranes formation and different types of placenta in domestic animals.

Course outcomes

Students should be able to: describe normal organ structure; understand basic regularities of organ development during embryogenesis in domestic animals; based on the acquired knowledge and skills and by using a microscope should recognize various organs and analyze their structure; understand the principles of placentation and explain the basic morphofunctional characteristics of placentae in various species of domestic mammals.

Course content

Lectures

Basic characteristics of development and microscopic structure of organs of various organ systems: lymphatic system, respiratory system, digestive system, urinary system, skin and epidermis derivatives, sensory organs, endocrine system, reproductive system of males, reproductive system of females, estrous cycle; maternal pregnancy recognition; implantation and decidua, extraembryonic membranes and placentae.

Practicals

Presentation, microscopic analysis and drawing of chosen organs of various organ systems: lymphatic system, respiratory system, digestive system, urinary system, skin and epidermis derivatives, sensory organs, endocrine system, reproductive system of males, reproductive system of females, types of placentae and presentation of development of various organs.

Recommended literature

1. Gledić D: Veterinarska histologija, Fakultet veterinarske medicine, Univerzitet u Beogradu, Veterinarska komora Srbije, Beograd, 2012.
2. Marković D, Radovanović A, Milošević I, Lužajić T, Milošević S: Praktikum iz Histologije sa embriologijom 2, Fakultet veterinarske medicine, Univerzitet u Beogradu, CID, Beograd, 2016.
3. Eurell JA, Frappier BL: Dellman's Textbook of Veterinary Histology, Blackwell Publishing, Oxford, 2006.
4. Anđelković Z, Danilović V, Smiljanić Milutinović S, Kapić D, Šahinović M: Opšta i oralna histologija i embriologija, Galaksijaniš, Niš, 2022.
5. McGeady TA, Quinn PJ, FitzPatrick ES, Ryan MT: Veterinarska embriologija, Naklada Slap, Zagreb, 2014.

Hours	**Lectures:** 3	**Practicals:** 3

Student workload in hours, per semester

Total 180	During active teaching 90	Time for self studies including examination preparation 90

Teaching methods

Formal lectures with interactive studying, implementation of audio-visual methods (PowerPoint presentations and video presentations). Practicals: introductory lecture (PowerPoint presentations); individual student work on a microscope; (studying and drawing of chosen cell, tissue and organ slides); teamwork on microscopes with integrated camera, where live reproduction is possible on cell phones, tablets or laptops.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	2	Practical exam	30
Participation in practicals	8	Oral exam	20
Colloquium	40		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Physiology 1

Lecturer/lecturers: Danijela Kirovski, Full Professor; Natalija Fratrić, Full Professor; Milica Stojković, Associate Professor; Ljubomir Jovanović, Associate Professor; Dušan Bošnjaković, Teaching Assistant; Slavica Dražić, Teaching Assistant

Course status: Obligatory

ECTS credits: 7.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is to enable students to understand complex mechanisms of homeostasis and control of physiological processes by the nervous and endocrine systems in domestic animals. The aim of the course is to acquaint the student with the similarities and differences in the function of the skeletal, smooth and cardiac muscles, as well as with its metabolic characteristics. The aim of the course is to acquaint students with the composition, properties and roles of the blood and the immune system in physiological processes. The aim of the course is to acquaint the student with the physiological base of practical techniques used in the clinical examination of the nervous and endocrine systems and blood. The aim of the course is to provide a basic knowledge for understanding changes in nervous, endocrine, muscular system functions and blood functions under different pathological conditions in domestic animals.

Course outcomes

After completing the course, the student must know to itemize parameters of homeostasis, understand coherency of the parameters and mechanisms of homeostatic control. Students must understand mechanisms of the control and connections between nervous and endocrine systems. Students must understand the concept of reflexes and perform particular reflexes (corneal, pupillary, and myotatic). Students must understand reflex control of blood pressure. Students must know to itemize endocrine glands of domestic animals and their hormones, to understand function of endocrine glands and mechanisms of hormone secretion control as well as basis of hormone secretion changes. Students must understand hormonal control of the estrous cycle of domestic animals as base for interpretation of clinical pregnancy diagnosis, estrus and delivery. Students must know similarities and differences in the functions of skeletal, smooth, and cardiac muscles. Students must define mechanisms of muscle contraction control and explain the influence of intensity of stimulation and load to muscle contraction. The student must define composition, properties and roles of blood in domestic animals. Students must understand basis of blood sampling and also to define basic techniques for blood parameters estimation (blood cell count, hematocrit value, hemoglobin concentration, sedimentation rate, leukocyte formula). Students must understand classical techniques used to examine blood parameters, but also to understand and use modern laboratory equipment (hematologic analyzer, biochemical analyzer, spectrophotometer, blood gas and ion analyzer). Students must define basic roles of the immune system of domestic animals and describe mechanisms for control of immune system functions. The student should understand the blood groups concept in humans and domestic animals as a base for clinical blood groups determination in blood transfusion.

Course content

Lectures

Introduction, homeostasis and homeostatic mechanisms, ion channels; Physiology of the central nervous system; Physiology of the autonomic nervous system; Physiology of the senses; Physiology of the endocrine glands; Physiology of skeletal muscles; Physiology of smooth muscles; Physiology of the blood; Physiology of immune system; Physiology of the spleen, lymph and lymph flow.

Practicals

Characteristics of the spinal reflexes (spatial and time summation, inhibition and irradiation), performance of the corneal, pupillary and patellar reflex, examination of the eye fundus; Observation of internal organs *in situ*, direct method of blood pressure registration - interpretation of respiratory, pulse and vasomotor oscillations of the blood pressure, baroreceptor reflex, influence of norepinephrine, adrenaline and acetylcholine on the blood pressure; Determination of the estrous cycle phase in bitches, glycemia - mechanisms of regulation; Determination of the stimulus threshold (effect of subthreshold, threshold and suprathreshold stimuli on skeletal muscle contraction), influence of different weight load on the intensity of skeletal muscle contraction; Determination of blood properties, blood sampling, blood centrifugation, determination of hematocrit value, obtaining blood plasma and blood serum; Red blood cell count; Determination of hemoglobin concentration by Sahli and Drabkin methods, calculation of hematological indices, detection of hemin crystals; Determination of red blood cells sedimentation rate, examination of red blood cells osmotic resistance, hemolysis, detection of hemoglobin derivatives; White blood cellcount, white blood cells formula; Examination of the Ca^{++}ion influence on blood coagulation, measuring coagulation time and bleeding time, examination of blood buffer capacity; Determination of blood parameters on hematologic analyzer, precipitation of blood plasma and serum proteins, observation of the frog's peripheral blood flow; Blood groups, blood compatibility testing between donor and recipient, transfusion reactions.

Recommended literature

1. Stojić V, Lazarević M, Vapa M, Gledić D, Fratrić N, Kirovski D: Veterinary physiology, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2010.
2. Stevanović J: Physiology of digestive organs of domestic animals, Author's edition, Belgrade, 2004.
3. Stevanović J: Physiology of nervous system, Author's edition, Belgrade, 2004.
4. Stojić V, Kirovski D, Fratrić N: Physiology-practicum, Naučna KMD, Belgrade, 2008.
5. Sjastaad OV, Hove K, Sand O: Physiology of domestic Animals, Scandinavian Veterinary Press, Oslo, Norway, 2003.
6. Erickson HH, Goff JP, Uemura EE: Dukes' physiology of domestic animals, John Wiley & Sons, Iowa, USA, 2015.
7. Cunningham JG, Klein BG: Veterinary physiology, Saunders Elsevier, Philadelphia, 2007.

Hours	**Lectures:** 4	**Practicals:** 3

Student workload in hours, per semester

Total 210	During active teaching 105	Time for self studies including examination preparation 105

Teaching methods

Theoretical classes with the use of audio-visual methods (Power Point and Prezi presentations, video material). Practical exercises, discussion workshops.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	6	Practical exam	10
Participation in practicals	8	Oral exam	60
Colloquium	16		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Microbiology and immunology 1

Lecturer/lecturers: Dejan Krnjaić, Full Professor; Jakov Nišavić, Full Professor; Andrea Radalj, Associate Professor; Isidora Prošić, Teaching Assistant; Aleksandar Nikšić, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring knowledge about the shape, structure, physiological and antigenic characteristics of pathogenic and non-pathogenic microorganisms, their ecology, antibiotic resistance, infection, immune reactions and microbiological and immunological diagnostic methods.

Course outcomes

The student should acquire knowledge about the basic biological characteristics of pathogenic and non-pathogenic microorganisms, about infection and immune reactions to antigens. Furthermore, the student should be able to perform material sampling for microbiological diagnostics, determine the shape and structure of microorganisms as well as to identify bacteria and fungi in native and colored preparations. The student should know how to perform sterilization, isolate bacteria in pure culture, perform their identification and to examine antibiotic susceptibility. The student should be able to perform serological reactions and interpret the obtained results, to set up tissue culture, perform virus inoculation and recognize the appearance of cytopathic effect, to inoculate embryonated chicken eggs with viruses, rickettsiaand chlamydia, to stain preparations from allantochorionic and vitellus membranes, to prepare and stain brain tissue preparations to detect Negri bodies.

Course content

Lectures

Introduction to microbiology. Shape and structure of microorganisms. Ecology of microorganisms. Physiology of microorganisms. Microorganisms in nature. Microorganisms as means of biological warfare. Genetics of microorganisms. Immunity and immune reactions. Infection and resistance to infection.

Practicals

Use of microscope in microbiology. Basic forms of bacteria. Basic forms of fungi. Instruments and labware, washing and preparation for work. Sterilization in microbiology. Bacteriological growth media. Preparation of microscopic slides. Staining procedures. Gram and Giemsa staining. Spore and capsule staining. Colony identification and obtaining pure cultures of bacteria. Cultural characteristics of microorganisms. Physiological characteristics of microorganisms. Antibiotic susceptibility testing of isolated bacteria, serological reactions.

Recommended literature

1. Milić N, Krnjaić D, Mišić D, Nišavić J, Radojičić M: Mikrobiologija sa imunologijom, Naučna KMD, Beograd, 2017.
2. Krnjaić D, Milić N, Nišavić J, Radojičić M, Radalj A: Priručnik sa praktičnim vežbama iz mikrobiologije sa imunologijom 1 i mikrobiologije sa imunologijom 2, Naučna KMD, Beograd, 2023.

Hours	**Lectures:** 3	**Practicals:** 3

Student workload in hours, per semester

Total 180	During active teaching 90	Time for self studies including examination preparation 90

Teaching methods

Formal lecture, practical laboratory work.

Evaluation and grading (maximum 100 points)

Grading: 6 = 51-60 points, 7 = 61-70 points, 8 = 71-80 points, 9 = 81-90 points, 10 = 91-100 points.

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	4	Written exam	10
Participation in practicals		Oral exam	50
Colloquium	36		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Animal nutrition 1

Lecturer/lecturers: Dragan Šefer, Full Professor; Jelena Nedeljković-Trailović, Full Professor; Radmila Marković, Full Professor; Branko Petrujkić, Full Professor; Stamen Radulović, Associate Professor; Dejan Perić, Assistant Professor

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring knowledge about the basic nutrients present in feed, as well as their role in animal nutrition. Understanding the factors that determine the quality of food, its nutritional value and provide an opportunity for classification. Acquiring knowledge about the methods of production, processing and conservation of feed and the factors that affect its spoilage. Educating students about key points in safety control and animal feed production. Introduction to the methods of industrial production of animal feed. Understanding the current legislation in the field of production of quality and safe feed. Acquiring knowledge about the use of specific feed additives in aim to produce quality and healthy feed and stimulate the growth of animals. Understanding the ways of using nutrients in animals organism for the requirements of maintenance, lactation, reproduction, pregnancy, growth, fattening and work.

Course outcomes

After attending classes, the student will be able to understand the biochemical and physiological basis of animal nutrition, be able to distinguish nutrients based on their basic characteristics, as well as the importance they have in the diet of certain species and categories of animals, all in order to learn nutritional requirements during different production phases, while fulfilling respecting the quality conditions prescribed by the relevant Regulations. The student will be able to identify the conditions under which animal feed failure may occur, indicate the consequences of their use and to apply an adequate method of feed processing and / or to use of appropriate feed additives in order to solve the problem.

Course content

Lectures

The subject of nutrition science. Comparative composition of animal body and animal feed. Essential nutrients: proteins, carbohydrates, lipids, vitamins (fat-soluble vitamins and water-soluble vitamins) and minerals (macro and micro elements). The importance of water in animal nutrition. Evaluation of nutritional value of feed according to chemical composition and digestibility. Balance of matter and energy. Productive and biological value of feed. Nutritional units of feed. Animal feed: definition, classification, quality factors. Roughages and methods of their conservation. Concentrated feed and by-products of the feed industry. Feed of animal origin, yeasts, mineral nutrients and feed additives. Industrial production of animal feed. Feed spoilage factors and adverse effects on animal health. Requirements for maintenance, lactation, reproduction, pregnancy, growth, fattening and work.

Practicals

Sampling, packing and sending samples of animal feed. Methods of testing animal feed: classical and modern methods. Determination of nutritional value of animal feed: chemical analysis (Weende procedure). Nutritional units of feed: theoretical and practical segment. Knowledge and hygienic assessment of nutrients: Roughages, concentrated feed, by-products of the feed industry, animal feed, minerals, additives, complete feed mixtures.

Recommended literature

1. Šefer D, Sinovec Z: Opšta ishrana, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2008.
2. Marković R, Petrujkić B, Šefer D: Bezbednost hrane za životinje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2018.
3. Sinovec Z, Resanović R, Sinovec S: Mikotoksini, pojava, efekti i prevencija, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2006.
4. Nedeljković Trailović J, Stefanović S: Ohratoksin A u hrani za životinje, štetni efekti, detekcija i mogućnost zaštite, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2017.
5. Ševković N, Pribićević S, Rajić I: Ishrana domaćih životinja, Naučna knjiga, Beograd, 1986.
6. Đorđević N, Grubić G, Makević M, Jokić Ž: Ishrana domaćih i gajenih životinja, Poljoprivredni fakultet, Univerzitet u Beogradu, Zemun, 2009.
7. Sinovec Z, Ševković N: Praktikum iz ishrane, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 1995.

Hours	**Lectures:** 3	**Practicals:** 3

Student workload in hours, per semester

Total 150	During active teaching 90	Time for self studies including examination preparation 60

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations,

films), practical exercises in the laboratory of the Department Animal of Nutrition and Botany.			
Evaluation and grading (maximum 100 points)			
Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	18	Written exam Task: 10 points Knowledge of nutrients: 8 points	18
Participation in practicals	12	Oral exam	32
Colloquium	20		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Animal breeding 1

Lecturer/lecturers: Vladimir Dimitrijević, Full Professor; Bečkei Žolt, Associate Professor; Elmin Tarić, Assistant Professor; Nina Dominiković, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Zoology, Veterinary genetics, Anatomy 1 and Anatomy 2 attended classes

Course aims

Introduction to the basics of animal production, assessment of animal production value, breeding systems and procedures, as well as methods and effects of animal selection.

Course outcomes

The student should know procedures with animals.

The student should be able to assess animal constitution and condition, as well as it's production value.

The student should understand effects of planned selection and breeding on the population and organisms of domestic animals.

Course content

Lectures

Economic importance of domestic animals. Domestication process. Domestic animal breeding systems. The concept of breed. General breed characteristics. Basic reproduction characteristics of species. Selection methods. Breeding methods. Application of new biotechnology in animal breeding.

Practicals

Animal handling. Exterior assessment of domestic animals. Growth and development of domestic animals. Body measurements. Assessment of the constitution. Conditions assessment. Exterior production types.

Recommended literature

1. Savić M, Dimitrijević V, Trailović R, Bečkei Ž: Stočarstvo praktikum, Faculty of veterinary medicine, University of Belgrade, CID, Belgrade, 2014.
2. Kor Oldenbroek, Liesbeth van der Waaij: Textbook animal breeding: Animal breeding and genetics for BSc students, Centre for Genetic Resources and Animal Breeding and Genomics Group, Wageningen University and Research Centre, the Netherlands, 2014.
3. Nikolić D, Simović B: Opšte stočarstvo, Naučna knjiga, Beograd, 1989.

Hours	**Lectures:** 2	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 60	Time for self studies including examination preparation 90

Teaching methods

Theoretical teaching:

Lectures with interactive use of audio-visual materials.

Practical teaching:

Lectures and practical sessions at the clinic of the Faculty of Veterinary Medicine.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	5	Written exam	30
Participation in practicals	10	Oral exam	40
Colloquium	15		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Physiology 2

Lecturer/lecturers: Danijela Kirovski, Full Professor; Natalija Fratrić, Full Professor; Milica Stojković, Associate Professor; Ljubomir Jovanović, Associate Professor; Dušan Bošnjaković, Teaching Assistant; Slavica Dražić, Teaching Assistant

Course status: Obligatory

ECTS credits: 8.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is to acquaint students with the structure, mechanism of contraction and regulation of cardiac muscle and enable student to understand the physiological basis of important procedures in the diagnosis of cardiac disorders (ECG registration, heart sounds auscultation). The aim of the course is to acquaint students with the structure of blood vessels, biophysics of blood circulation in arteries and veins, transport through the capillary wall and to provide basis for practical procedures used in the clinical examination of the circulatory system (measurement of the arterial blood pressure). The aim of the course is to acquaint the student with the basics of respiratory system functioning and regulation of respiration processes in domestic animals, including birds. The aim of the course is to provide knowledge of the basic procedures used in order to examine functions of the respiratory system (determination of lung volumes and capacity and assessment of respiration). The aim of the course is to provide students an insight into the comparative physiology of the digestive system of domestic animals, including birds, through theoretical classes and practical exercises by demonstrating digestive enzymes activity, determining acidity of gastric juice and proving presence of bile salts and cholesterol. The aim of the course is to provide a complex understanding of the roles of the digestive system and to connect roles of the digestive tract with the metabolism of macro and microelements, water metabolism, energy turnover and nutritional balance. The aim of the course is to acquaint students with the function of the urinary tract and the mechanisms of control of the production and excretion of urine. The aim of the course is to enable students through practical classes to understand the physiological basis of the procedures used to examine functions of the urinary system. The aim of the course is to acquaint students with the physiological roles of mammary gland and skin and mechanisms of milk production and excretion regulation in domestic animals.

Course outcomes

After completing the course, students should be able to define the structure and mechanism of cardiac muscle contraction as well as mechanisms of the heart function regulation. The student should know how to perform ECG and to understand the mechanism of ECG recording, draw and mark waves that appear on the physiological ECG record. The student should understand the mechanism of heart sounds formation and to perform heart sounds auscultation in humans and domestic animals. The student should know the structure of blood vessels and define biophysical processes associated with circulation as well as the mechanisms of circulation control and metabolism at the capillary level. Students should be able to itemize methods of registration and to measure blood pressure in humans and domestic animals by the indirect method with a Rivarochi sphingomanometer. The student should define the structure and functions of the respiratory system in domestic animals and mechanisms of respiratory control. The student should be able to enlist lung volumes and capacities and to define methods for their registration in humans and domestic animals. The student should understand physiological basis of the methods used in the assessment of respiration in domestic animals. Students should define similarities and differences in the structure of the digestive tract, the processes of digestion and absorption of nutrients in different domestic animals species. The student should evaluate the significance of differences in the process of digestion in different types of domestic animals as a basis for understanding disorders that can occur in clinical practice. The student should perform reactions to prove the action of important enzymes of the digestive tract (ptyalin, pepsin, trypsin and pancreatic amylase) and to measure acidity of gastric juice. The student should look at the complexity of liver function in domestic animals and to evaluate role of the liver in metabolic processes. The student should pay special attention in defining specifities in the structure and function of the digestive tract of ruminants and to evaluate significance of differences in practical clinical work. The student should understand homeostasis of the body fluid volume, macronutrient and micronutrient metabolism, energy turnover, nutrition balance and connect them with the functions of various organic systems (endocrine, digestive and urinary). The student should define the mechanism of urine production and excretion and understand the mechanisms of regulation. The student should define physiological composition of urine. The student should also define the most common disorders that can change the physiological composition of urine as well as the ingredients that may be present in the urine during these disorders (erythrocytes, ketone bodies, hemoglobin, bile acids). The student should understand the importance of classical techniques used for clinical examination of urine, but also to know and apply work with tests for rapid examination of urine (urine test strip) and modern laboratory devices (urine analyzer).

The student should list important vitamins, explain their role in the body and define the changes that occur in hypo and hypervitaminosis. The student should explain the structure and role of the skin and mammary gland of domestic animals, especially in economically important animal species (cows and goats), and know the mechanisms of milk secretion control.

Course content

Lectures

Physiology of the heart; Physiology of blood vessels; Physiology of respiratory system; Physiology of digestive system; Physiology of the liver; Water metabolism; Body fluid volume homeostasis; Macronutrient metabolism; Microelement metabolism; Basic energy traffic; Nutrition balance; Physiology of the kidney; Physiology of vitamins; Body temperature and thermoregulation; Physiology of the skin; Physiology of the mammary gland.

Practicals

Influence of Stanius ligatures on the frog heart function, influence of temperature on frog heart function; Extrasystole, Starling's law, influence of *n. vagus* stimulation to heart rate, Goltz's phenomenon; ECG recording and interpretation; Measurement of arterial blood pressure, auscultation of heart sounds; Examination of the ptyalin action, determination of the acidity of gastric juice; Examination of conditions for activation and action of trypsin, examination of conditions for activation and action of pepsin, examination of conditions for activation and action of pancreatic amylase; Demonstration of the presence of bile dyes and bile acids, reactions to prove the presence of cholesterol; Determination of respiratory volumes and capacities, assessment of respiration in dogs; Clinical examination of urine Part I - (preparation of the urine for examination, physical and physico-chemical properties of the urine, detection of proteins in urine); Clinical examination of the urine - Part II (detection of glucose, ketone bodies, hemoglobin, bile acids, bile pigments, urobilin and urobilinogen in the urine); Demonstration of the free and bound urine sulfates, qualitative and quantitative determination of the urine chloride (Moor's technique); Clinical examination of the urine with urine analyzer.

Recommended literature

1. Stojić V, Lazarević M, Vapa M, Gledić D, Fratrić N, Kirovski D: Veterinary physiology, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2010.
2. Stevanović J: Physiology of digestive organs of domestic animals, Author's edition, Belgrade, 2004.
3. Stevanović J: Physiology of nervous system, Author's edition, Belgrade, 2004.
4. Stojić V, Kirovski D, Fratrić N: Physilogy-practicum, Naučna KMD, Belgrade, 2008.
5. Sjastaad OV, Hove K, Sand O: Physiology of domestic Animals, Scandinavian Veterinary Press, Oslo, Norway, 2003.
6. Erickson HH, Goff JP, Uemura EE: Dukes' physiology of domestic animals, John Wiley & Sons, Iowa, USA, 2015.
7. Cunningham JG, Klein BG: Veterinary physiology, Saunders Elsevier, Philadelphia, 2007.

Hours	**Lectures:** 4	**Practicals:** 3

Student workload in hours, per semester

Total 240	During active teaching 105	Time for self studies including examination preparation 135

Teaching methods

Theoretical classes with the use of audio-visual methods (PowerPoint and Prezi presentations, video material). Practical exercises, discussion workshops.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	6	Practical exam	10
Participation in practicals	8	Oral exam	60
Colloquium	16		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Microbiology and immunology 2

Lecturer/lecturers: Dejan Krnjaić, Full Professor; Jakov Nišavić, Full Professor; Andrea Radalj, Associate Professor; Isidora Prošić, Teaching Assistant; Aleksandar Nikšić, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Microbiology and immunology 1 resolved

Course aims

Acquiring knowledge about the shape, structure, physiological and antigenic characteristics of pathogenic and non-pathogenic microorganisms, their ecology, antibiotic resistance, infection, immune reactions and microbiological and immunological diagnostic methods.

Course outcomes

The student should acquire knowledge about the basic biological characteristics of pathogenic and non-pathogenic microorganisms, about infection and immune reactions to antigens. Furthermore, the student should be able to perform material sampling for microbiological diagnostics, determine the shape and structure of microorganisms as well as to identify bacteria and fungi in native and colored preparations. The student should know how to perform sterilization, isolate bacteria in pure culture, perform their identification and to examine antibiotic susceptibility. The student should be able to perform serological reactions and interpret the obtained results, to set up tissue culture, perform virus inoculation and recognize the appearance of cytopathic effect, to inoculate embryonated chicken eggs with viruses, rickettsia and chlamydia, to stain preparations from allantochorionic and vitellus membranes, to prepare and stain brain tissue preparations to detect Negri bodies.

Course content

Lectures

Special bacteriology. Rickettsia. Chlamydia. Mycology. General virology. Special virology.

Practicals

Staphylococcus spp., *Streptococcus* spp., *Erysipelothrix, Listeria, Corynebacterium* spp., *Mycobacterium* spp., *Bacillus anthracis, Clostridium* spp., *Enterobacteriaceae*, *Pasteurell*a spp., *Brucella* spp., *Campylobacter* spp. Fungi. Chlamydia and Rickettsia. The use of embryonated chicken eggs in virological diagnostics. Viral hemagglutination and heminhibition. Tissue cultures and cytopathic effect. Herpesviruses and rhabdoviruses.

Recommended literature

1. Milić N, Krnjaić D, Mišić D, Nišavić J, Radojičić M: Mikrobiologija sa imunologijom, Naučna KMD, Beograd, 2017.
2. Krnjaić D, Milić N, Nišavić J, Radojičić M, Radalj A: Priručnik sa praktičnim vežbama iz mikrobiologije sa imunologijom 1 i mikrobiologije sa imunologijom 2, Naučna KMD, Beograd, 2023.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 180	During active teaching 75	Time for self studies including examination preparation 105

Teaching methods

Formal lecture, practical laboratory work.

Evaluation and grading (maximum 100 points)

Grading: 6 = 51-60 points, 7 = 61-70 points, 8 = 71-80 points, 9 = 81-90 points, 10 = 91-100 points.

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	4	Written exam	10
Participation in practicals		Oral exam	50
Colloquium	36		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Animal nutrition 2

Lecturer/lecturers: Dragan Šefer, Full Professor; Jelena Nedeljković-Trailović, Full Professor; Radmila Marković, Full Professor; Branko Petrujkić, Full Professor; Stamen Radulović, Associate Professor; Dejan Perić, Assistant Professor

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: The prerequisite for passing the course Nutrition 2 is the successful completion of the exam in the course Nutrition 1

Course aims

Acquiring knowledge about feed utilization, choice of nutrients, as well as specifics in the nutrition of different species and production categories of animals (cattle, sheep and goats, horses, pigs, poultry, dogs, cats, carp and trout). Understanding the specifics of the relationship between biochemical and physiological principles of nutrition and animal diseases within clinical nutrition. Enabling students to independently optimize meals according to the type and production category of animals in accordance with specific conditions of production.

Course outcomes

Upon completion of this course, the student will be able to understand feed utilization and the specifics of the diet of different species and production categories of animals (cattle, sheep and goats, horses, pigs, poultry, dogs, cats, carp and trout). The student will be able to independently formulate, analyze and correct meals, as well as complete mixtures for the listed species and production categories of animals according to applicable nutrition recommendation, all in order to preserve health, achieve optimal production and quality of food of animal origin. The student will be able to apply the acquired knowledge about the relationship between nutrition and animal diseases through the implementation of specific dietary measures adapted to the nature of the disease and disorders of various organ systems (urinary, cardiovascular, respiratory, digestive, reproductive).

Course content

Lectures

Nutrition of cattle (nutrition of dairy cows and pregnant cows, nutrition of calves and cattle, nutrition of fattening categories). Nutrition of sheep and goats (nutrition of pregnant and lactating sheep, nutrition of young and fattening categories). Horse nutrition (nutrition of foals and suckling mares, nutrition of foals, fattening and working horses). Nutrition of pigs (nutrition of piglets, nutrition of pregnant and lactating sows, nutrition of fattening pigs). Poultry nutrition (broiler and laying hen nutrition, turkey, duck and goose nutrition). Diet of dogs and cats (diet of bitches during pregnancy and lactation, nutrition of puppies, specifics of cat diet). Carp and trout diet. Clinical nutrition (relationship between diet and disease, dietary measures, special clinical nutrition).

Practicals

Introduction to meal composition. Formulation of meals for dairy cows. Formulation of meals for other categories of cattle. Meal analysis and correction for sheep. Assembling meals for horses. Calculative analysis of complete mixtures for cattle, sheep and horse nutrition. Meal preparation and calculation analysis of complete mixtures for pig nutrition. Meal preparation and calculation analysis of complete feed mixtures for poultry nutrition. Meal analysis and correction for pig and poultry nutrition. Computational analysis and correction of complete feed mixtures. Assembling meals for rabbits. Computational analysis of complete feed mixtures for laboratory animal nutrition.

Recommended literature

1. Šefer D, Sinovec Z: Opšta ishrana, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2008.
2. Sinovec Z: Stimulatori rasta u ishrani nepreživara, Hemijska industrija „Župa“ Kruševac, Beograd, 2000.
3. Marković R, Baltić M: Ishranom životinja do funkcionalne hrane, Naučna knjiga, Beograd, 2018.
4. Đorđević N, Grubić G, Makević M, Jokić Ž: Ishrana domaćih i gajenih životinja, Poljoprivredni fakultet, Zemun, 2009.
5. Sinovec Z, Ševković N: Praktikum iz ishrane, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 1995.

Hours	**Lectures:** 2	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 60	Time for self studies including examination preparation 90

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations, films), practical exercises in the laboratory of the Department Animal of Nutrition and Botany.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points

Lecture attendance	20	Written exam Test 10 points Task 10 points	20
Participation in practicals	28	Oral exam	32
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Animal breeding 2

Lecturer/lecturers: Vladimir Dimitrijević, Full Professor; Bečkei Žolt, Associate Professor; Elmin Tarić, Assistant Professor; Nina Dominiković, Teaching Assistant

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Animal breeding 1 attended classes

Course aims

Students should get acquainted with the technology of domestic animals production, understand livestock procedures and master the skills necessary for animal breeding and health care.

Course outcomes

Students should be able to recognize breeds.
Students should be able to apply the procedures of animal identification and record keeping.
Students should be able to identify the available selection tools for different animal species.
Students should be able of application of knowledge from subjects related to all areas of animal breeding and selection.

Course content

Lectures

Economic importance of cattle breeding. Cattle breeds. Milk and meat production. Selection methods. Reproduction and calf rearing. Economic importance of sheep breeding, Main types of sheep breeding. Sheep breeds. Milk and meat production. Selection methods. Sheep reproduction and rearing of lambs. Main types of goat breeding. Goat breeds, milk production. Selection methods. Reproduction. Economic significance of pig farming. Breeds. Meat production. Reproduction and rearing piglets. Selection methods. Production types and breeds of poultry. Egg and meat production. Reproduction. Selection, hybrids. Rabbit breeds and reproduction. Economic and social importance of horse breeding, origin of equidae. Horse breeds. Horse reproduction and foal breeding. Selection methods. Dog and cat breeds, selection. Reproduction, rearing puppies and kittens.

Practicals

Wool and fur quality assessment. Estimation of the age of domestic animals. Identification of animals. Methods of identification and marking of animals. Animal record keeping. Visit to the livestock exhibition. Practical sessions on farms. Visit to the hippodrome. Visit to the AI center. Visit to dog and cat shows.

Recommended literature

1. Dimitrijević V, Savić M, Trailović R, Bečkei Z: Animal breeding: farm and social animals, Faculty of veterinary medicine, University of Belgrade, CID, Belgrade, 2020.

Hours	**Lectures:** 2	**Practicals:** 2

Student workload in hours, per semester

Total 120	During active teaching 60	Time for self studies including examination preparation 60

Teaching methods

Theoretical teaching:
Lectures with interactive use of audio-visual materials.
Practical teaching:
Lectures and practical sessions on farms.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	5	Written exam	30
Participation in practicals	10	Oral exam	40
Colloquium	15		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Parasitology 1

Lecturer/lecturers: Danica Bogunović, Associate Professor; Milan Rajković, Teaching Assistant PhD; Ana Milosavljević, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Introducing the students to taxonomy, morphological and morphometric characteristics of parasites in the field of protozoology, helminthology and arachnoentomology, biological cycle of parasites, different levels of host-parasite interactions, as well as methods for sampling, isolation and identification of parasites and/or their developmental stages.

Course outcomes

Upon completing the course, the student should be able to:

use parasitological terminology in a correct way; explain the complex relationships between parasites, hosts and the external environment; select an adequate sample for parasitological analysis based on the knowledge related to the parasite life cycle; independently collect and processes material for laboratory analyzes; select and apply the most suitable method of laboratory diagnostics; recognize and identify developmental form of the parasite based on its morphological and morphometric characteristics.

Course content

Lectures

Parasitism and its forms; morphological, morphometric, biological and immunological characteristics of parasites; nomenclature and taxonomy; life cycle, transmission routes and modes of parasite reproduction; parasite nutrition and metabolic products; relationship among parasites, hosts and the external environment; host reaction to the presence of parasites; the importance of parasites in epizootiology and epidemiology of animals and humans as well as in ecology; parasite species important for veterinary medicine in the field of protozoology, helminthology and arachnoentomology; zoonotic potential of parasites; the role and importance of intermediate hosts in parasite transmission.

Practicals

General and specific morphological characteristics of parasites from different taxonomic groups (protozoa, helminths, arthropods); recognition and identification of parasites and their developmental forms in macroscopic and microscopic preparations; basic methods of parasitological diagnostics and their application.

Recommended literature

1. Bogunović D, Rajković M: Parasitology 1 - Practicum, Author's Edition, Belgrade, 2024.
2. Kulišić Z: Helmithology, Faculty of Veterinary Medicine, University of Belgrade, Serbian Veterinary Chamber, Belgrade, 2001.
3. Kulišić Z, Aleksić-Bakrač N: Dictionary of basic terms in parasitology, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 1999.
4. Teodorović V, Bunčić O, Kulišić Z, Radenković-Damnjanović B, Teodorović R, Đorđević M, Mirilović M: Trichinella-trichinellosis, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2007.
5. Bowman DD: Georgis' Parasitology for Veterinarians, 10th Edition, Elsevier Health Sciences, 2014.
6. Jacobs D, Fox M, Gibbons L, Hermosilla C: Principles of veterinary parasitology, Wiley-Blackwell, 2015.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 75	Time for self studies including examination preparation 75

Teaching methods Oral presentation, video presentation, interactive discussion, laboratory work.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	5	Lab exam	20
Participation in practicals	10	Oral exam	50
Colloquium	15		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Medicinal and poisonous plants of the Balkans

Lecturer/lecturers: Svetlana Grdović, Full Professor

Course status: Elective

ECTS credits: 1.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring basic knowledge about the most important medicinal and poisonous plants that are widely distributed in the Balkan Peninsula.

Course outcomes

Students should learn and get to know the most important medicinal plants that are widespread in the Balkans, as well as their medicinal ingredients that they would later use in animal therapy. Also, students should get to know our most important plants that are poisonous to animals, to learn the chemical compounds that cause toxic effects and symptoms that occur in animals due to plant poisoning.

Course content

Lectures

Introductory lecture on medicinal plants; history of the study and use of medicinal plants; processing of essential oils and the most important substances of medicinal plants, as well as their effect on humans and animals. The most important medicinal plant species of meadow, pasture and forest vegetation and their effect on animals. The following species will be treated: *Aesculus hyppocastanum, Apium graveolens, Arctostaphylos uva - ursi, Calendula officinalis, Cornus mas, Melissa officinalis, Ocimum basilicum, Origanum vulgare, Primula veris, Rosa canina, Sambucus nigra, Taraxacumum serus, Taraxacumum serinale, Thymus vulgaris, Tilia cordata, Tilia platyphyllos* and *Valeriana officinalis*.

Prevalence of poisonous plants in the Balkans; alkaloid, glycosidic, saponin and other poisonous plant species that are widespread in meadows and pastures and can pose a great danger to grazing animals. The following species will be treated: *Aconitum divergens, Actaea spicata, Anemone nemorosa, Arum maculatum, Asarum europaeum, Bryonia alba, Caltha palustris, Chelidonium majus, Clematis vitalba, Convallaria majalis, Colutea arborescens, Corydenthis, Corydalis tinis, Lonicera xylosteum, Paris quadrifolia* and *Solanum dulcamara.* For each poisonous plant, the effects on animals will be exposed if they use them in their diet.

Practicals

Does not have

Recommended literature

1. Kovačević N, Jančić R: Stotinu lekovitih biljaka kroz tradiciju i savremeni život srpskog naroda, Srpska školska knjiga, Beograd, 2003.
2. Kojić M, Janjić V: Otrovne biljke, Naučna knjiga, Beograd, 1991.
3. Blaženčić Ž, Grdović S: Krmno bilje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Veterinarska komora, Beograd, 2003.

Hours	**Lectures:** 1	**Practicals:** 0

Student workload in hours, per semester

Total 30	During active teaching 15	Time for self studies including examination preparation 15

Teaching methods

Theoretical classes are conducted using audio-visual methods (PowerPoint presentations, overhead projectors), and practical classes are conducted using herbarium plants and going to the field where students get to know plants in nature.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	20	Written exam	40
Participation in practicals		Oral exam	
Colloquium			
Seminars	40		

Study programme: Integrated academic studies in veterinary medicine

Course title: Aquaristics

Lecturer/lecturers: Maja Marković, Full Professor; Ksenija Aksentijević, Associate Professor

Course status: Elective

ECTS credits: 1.0

Prerequisites: Enrolled in semester in which the course is taken

Course aims

To provide veterinary medicine students with basic understanding of aquarium (ornamental) fishes biology, husbandry, aquarium technology, and health in order to support disease prevention and control approaches.

Course outcomes

After completion of the Aquaristics course, a student should be able to independently set-up basic level ornamental fish aquarium, is familiar with common aquarium fishes, and is aware of common problems in technology, biology and nutrition of aquarium fishes. Further, a student will have knowledge of etiology, and pathogenesis of major ornamental fish diseases, and be able to prescribe/apply adequate treatments and biosecurity measures.

Course content

Lectures

Types of aquariums; Physical and chemical characteristics of aquarium water; Aquarium equipment; Common ornamental fish species bred in our country; Purchasing and transport of ornamental fishes; Welfare of ornamental fishes; Breeding of ornamental fishes; Nutrition of ornamental fishes; Overview and significance of the most common aquarium plants and algae; Aquarium snales; Marine aquaristics; Diseases of aquarium fishes; Measures for disease prevention and control; Medical treatments of ornamental fishes.

Recommended literature

1. Marković M, Aleksić N, Radojičić M: Akvaristika, Beograd, 2017.
2. Roberts H: Fundamental of ornamental fish health, Wiley-Blackwell, 2010.
3. Goodvin D: The Practical Aquarium Fish Handbook, Alnari - Otvorena knjiga, Belgrade, 2008.

Hours	**Lectures:** 1	**Practicals:** 0

Student workload in hours, per semester

Total 30	During active teaching 15	Time for self studies including examination preparation 15

Teaching methods

Theoretical classes and interactive learning, with audio-visual methods (Power Point presentations, videos).

Evaluation and grading (maximum 100 points)

Grading: 6 = 51-60 points, 7 = 61-70 points, 8 = 71-80 points, 9 = 81-90 points, 10 = 91-100 points.

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	50	Oral exam	30
Seminars	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Breeding and care of caged birds

Lecturer/lecturers: Radmila Resanović, Full Professor; Miloš Vučićević, Associate Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring knowledge about proper keeping, breeding, care and behaviorism of pigeons and cage birds and the importance of veterinarians in the field of aviculture.

Course outcomes

Student should be able to apply the basic principles of breeding, care, nutrition, quarantine, to detect stressors and consequent behavioral disorders in pigeons and cage birds.

Course content

Lectures

The most important breeds of pigeons and species of cage birds. Comparative morphological and histological characteristics of organ systems, types of flight, types of cages, types of nests, hand rearing, preventive veterinary and sanitary measures. Problems of cage bird socialization. Legal provisions on keeping caged birds. Behavioral disorders and treatment.

Practicals

Introduction to the cage bird species. Breeding and care of cage birds. Accommodation of birds and conditions in kennels and bird shops. Conditions for transport of birds. Implementation of quarantine.

Recommended literature

1. Palić T, Resanović R, Rašić Z, Ilić V: Golubarstvo i bolesti golubova, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2011.
2. Resanović R, Palić T, Nikolić Z, Rašić Z, Simonović Lj: Bolesti kaveznih ptica, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2009.
3. Duerr RS, Gage LJ: Hand-Rearing Birds, John Wiley & Sons, 2020.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical classes with interactive learning with the use of audio-visual methods (Power point presentations, films), clinical vignettes, practical exercises at the Department of Diseases of Equine, Small Animal, Poultry and Wild Animal Diseases and visits to bird kennels.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	20	Written exam	60
Participation in practicals	20	Oral exam	
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Aquaculture and fisheries

Lecturer/lecturers: Maja Marković, Full Professor; Ksenija Aksentijević, Associate Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

To provide veterinary medicine students with basic understanding of aquaculture and capture fisheries biology, technology and management, in order to support disease prevention and control approaches and health protection of fish in different aspects of fisheries and aquaculture.

Course outcomes

A student should be aware of different types of fish ponds, economically significant types of fish, equipment and tools used in fishery, basic health protection of fish, errors in fish farming which cause diseases and should be familiar with fish marketing and trade for human consumption.

Course content

Lectures

Aquaculture and fisheries in our country and abroad; Hydrobiology; Systematics of fishes; Genetics and fish selection; Aquaculture: Warm water fish / pond aquaculture; Cold water fish aquaculture; Cage aquaculture; Open water fishery; Fish nutrition; Aquatic environment pollution issues; Fish marketing and trade.

Practicals

Analysis of physical and chemical characteristics of water (water quality); Growth and growth rate of fishes; Collection and preservation of fish pituitary glands; Breeding of important fish species; Stocking of fishponds; Inspection fishing; Fishing equipment and tools; Fishpond record keeping; Stocking of open waters; Fish transportation; Recreational fishing; Fish health protection and welfare; Visit to a carp or trout farm.

Recommended literature

1. Ćirković M, Jovanović B, Maletin S: Fisheries, Faculty of Agriculture, University of Novi Sad, Novi Sad, 2002.
2. Marković Z, Mitrović-Tutundžić V: Fish breeding, Zadužbina Andrejević, Belgrade, 2003.
3. Marković Z, Poleksić V: Aquaculture and Fishery in Serbia, Belgrade, 2011.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical classes and interactive learning, with audio-visual methods (PowerPoint presentations, videos).

Evaluation and grading (maximum 100 points)

Grading: 6 = 51-60 points, 7 = 61-70 points, 8 = 71-80 points, 9 = 81-90 points, 10 = 91-100 points.

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	25	Oral exam	30
Participation in practicals	25		
Seminars	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Molecular-genetic methods in veterinary medicine

Lecturer/lecturers: Jevrosima Stevanović, Full Professor; Zoran Stanimirović, Full Professor; Uroš Glavinić, Associate Professor; Marko Ristanić, Assistant Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is to explain students the importance and ways of applying molecular-genetic methods in veterinary medicine; to inform students about the working rules in the laboratory for molecular genetics and to train students to apply DNA analysis in veterinary diagnostics.

Course outcomes

Upon successful completion of this course, students should be able to:

- work in the laboratory for molecular genetics respecting the rules of conduct and safety measures regulated by current regulations,
- perform all steps that present integral part of the process of molecular-genetic analysis: sampling of biological material, DNA/RNA extraction, *in vitro* amplification of target DNA regions (PCR), visualization of end-point PCR results, reverse transcription and nucleic acid quantification (qPCR),
- interpret the results, write a professional opinion and give a recommendation,
- apply the results of molecular-genetic analyses in veterinary practice.

Course content

Lectures

Necessary conditions for work and rules of work in laboratory for molecular genetics. Significance and advantages of molecular-genetic diagnostic methods in veterinary medicine. Preparation procedures for performing molecular-genetic analyses. Extraction of DNA and RNA. Amplification of target DNA regions *in vitro* (Polymerase Chain Reaction-PCR). Conventional (end-point) PCR. Visualisation of end-point PCR products (electrophoresis, sequencing). Reverse transcription technique, RT-PCR. Absolute and relative quantification of nucleic acids, real-time PCR (qPCR). Use of molecular-genetic methods in: diagnosis of hereditary diseases, determination of sex of birds and mammalian embryos, genotype differentiation, detection and determination of pathogens in animals, parentage determination and pedigree analysis, assessment of pathogen and drug effects, veterinary forensic and food control. Nutrigenetics and nutrigenomics, evaluation of the effects of dietary supplements (qPCR). Molecular-genetic analyses in Biosafety Level 3 (BSL-3) laboratory. Single cell DNA electrophoresis (comet assay) as a sensitive method for detection of DNA damage and early diagnosis of malignant diseases. Analysis of oxidative stress parameters in biomolecular damage assessment. Genetic engineering, transgenesis, cloning and gene therapy.

Practicals

Organisation of a laboratory for molecular genetics. Rules of conduct and safety measures in laboratory. Proper sampling and sending of samples, sample manipulation: laboratory reception and storage of samples for further analysis. Pipetting practice. DNA extraction procedure using standardized chemical kits. RNA extraction procedure using standardized chemical kits. Performing a conventional PCR procedure (preparation of a PCR mixture and addition of extracted DNA), optimisation of PCR protocol. Visualisation of end-point PCR products by gel electrophoresis and interpretation of the results. Sequencing and results interpretation. Reverse transcription technique, RT-PCR. Nucleic acid quantification, qPCR. Practical application of PCR analysis: determination of sex of birds and mammalian embryos, forensic identification of the species origin of meat of the poached animal. PCR detection and determination of viruses (parvovirus, morbillivirus, bee viruses, PBFDv), bacteria *(Lawsonia intracellularis, Brachyspira* sp., *Paenibacillus larvae*, *Melissococcus pluton*), protozoans *(Babesia* sp., *Prototheca* sp., *Nosema* sp., *Lotmaria passim),* fungi (*Ascosphaera apis)* and metazoanparasites *(Dirofilaria* sp., *Thelazia* sp.). Quantitative (qPCR) assessments of the effect of dietary supplements on expression of genes important for resistance, production and reproduction properties and health of animals.

Recommended literature

1. Djelic N, Stanimirovic Z: Principles of Genetics, Faculty of Veterinary Medicine, University of Belgrade, Data Status, Belgrade, 2019.
2. Kulic M, Stanimirovic Z, Djelic N, Novakovic M: Human genetics, Faculty of Medicine Foca, University of East Sarajevo, Foca, 2010.
3. Cunha MV, Inácio J: Veterinary infection biology: Molecular diagnostics and high-throughput strategies, Humana Press, 2015.
4. van Pelt-Verkuil E, van Leeuwen WB, te Witt R: Molecular Diagnostics, Part 2: Clinical, Veterinary, Agrobotanical and Food Safety Applications, Springer, Singapore, 2017.
5. Stevanovic J, Stanimirovic Z, Glavinic U: Molecular-genetic methods in veterinary medicine, Faculty of Veterinary

<table>
<tr><td colspan="5">Medicine, University of Belgrade, Authorized script, 2020.
6. Merck M: Veterinary Forensics: Animal Cruelty Investigations, 2nd Edition, Wiley-Blackwell, 2012.</td></tr>
<tr><td colspan="2">Hours</td><td colspan="2">Lectures: 1</td><td>Practicals: 1</td></tr>
<tr><td colspan="5">Student workload in hours, per semester</td></tr>
<tr><td>Total 60</td><td>During active teaching 30</td><td colspan="3">Time for self studies including examination preparation 30</td></tr>
<tr><td colspan="5">Teaching methods
Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations, video animations). Individual work of students in the Laboratory for Genetics of Domestic Animals, Wildlife and Bees of the Department of Biology on the existing equipment that fully supports the planned curriculum.</td></tr>
<tr><td colspan="5">Evaluation and grading (maximum 100 points)</td></tr>
<tr><td colspan="2">Pre-exam obligations</td><td>Points</td><td>Final exam</td><td>Points</td></tr>
<tr><td colspan="2">Lecture attendance</td><td>5</td><td>Exam</td><td>60</td></tr>
<tr><td colspan="2">Participation in practicals</td><td>10</td><td></td><td></td></tr>
<tr><td colspan="2">Colloquium</td><td>25</td><td></td><td></td></tr>
</table>

Study programme: Integrated academic studies in veterinary medicine

Course title: Parasitology 2

Lecturer/lecturers: Nevenka Aleksić, Full Professor; Tamara Ilić, Full Professor; Nemanja Jovanović, Assistant Professor

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Students are tought parasitic infections and diseases of domestic animals: etiology, epizootiology/epidemiology, pathogenesis and pathology, clinical symptoms, diagnostic procedures, differential diagnosis, therapeutic approaches and contemporary means of prophylaxis.

Course outcomes

On successfully completing the course, students

- Are capable of completing the diagnostics of the most important animal endo and ectoparasitic diseases using direct parasitic methods
- Have learnt the epizootiology/epidemiology of parasitic infections
- Know to choose adequate therapy in accordance with the degree of parasitic infection and its prevalence
- Can plan the prophylactic measures in accordance with the given conditions

Course content

Lectures

Main characteristics of infections caused by protozoa, helminths and arthropods. Babesiosis, theileriosis and other haemoprotozoan infections of domestic animals. Bovine and avian tritrichomonas infection. Histomonosis. Coccidiosis of mammals: equine, cattle, small ruminants, pig, rabbit and carnivores. Coccidiosis of the chicken and other birds. Cryptosporidiosis. Neosporosis. Sarcocystosis. Toxoplasmosis. Balantidiosis. Trematode infections of ruminants (fasciolosis, dicrocoeliosis and paramphistomosis). Equine and bovine tapeworm infections. Tapeworm infections of carnivores. Metacestodoses. Ascarididosis of the pig, horse, cattle, carnivores and birds. Larva migrans syndrome. Strongyloidosis. Hookworm infections. Whipworm infections. Oesophagostomosis. Onchocercosis. Dirofilariosis. Thelasiosis. Trichinellosis. Parasitic gastroenteritis of ruminants. Equine roundworm infections: oxyurosis, strongylidosis, parafilariosis. Porcine verminous gastritis. Heterakidosis. Amidostomosis. Lungworm infections of ruminants, the horse and pig. Ectoparasitic infections of domestic animals: demodicosis and mange. Significance of ticks, fleas, chewing and biting lice, mosquitoes, blackflies, biting midges and sandflies to animals and humans. External myasis. Internal myiases (Hypoderma, Gasterophilus and Oestrus infections).

Practicals

Introduction to the diagnostics of parasitic diseases. Qualitative methods of coprodiagnostics. McMaster method. Diagnosis of babesiosis and coccidiosis. Diagnosis of main helminth infections of ruminants. Diagnostics of main helminth infections of equids, the pig, carnivores, poultry and the rabbit. Diagnosis of mange and demodicosis.

Recommended literature

1. Dimitrijević S, Ilić T: Clinical parasitology, Published by the author and Interprint, Belgrade, 2011.
2. Aleksić N: Parasitic diseases, Published by the author, Belgrade, 2020.
3. Aleksić N: Clinical parasitology manual, Published by the author, Belgrade, 2020.
4. Taylor AM, Coop LR, Wall LR: Veterinary Parasitology, 4th Edition, Wiley Blackwell, 2016.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Lectures: interactive teaching aided by audio-visual methods (Power Point presentations and video clips). Practical excercises in the laboratory.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	10	Written exam	20
Participation in practicals	20	Oral exam	40
Seminary paper - essay	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: General pathology

Lecturer/lecturers: Sanja Aleksić Kovačević, Full Professor; Darko Marinković, Full Professor; Vladimir Kukolj, Full Professor; Slađan Nešić, Associate Professor; Ivana Vučićević, Associate Professor; Milan Aničić, Assistant Professor; Stefan Jelisić, Teaching Assistant

Course status: Obligatory

ECTS credits: 8.0

Prerequisites: Histology with embryology 1, Histology with embryology 2, Physiology 1, Physiology 2, Microbiology with immunology 1 and Microbiology with immunology 2 resolved

Course aims

Obtaining knowledge and skills about mechanisms of development of diseases, important for understanding of pathogenesis and clinical manifestations of disease.

Course outcomes

Student should learn and understand basic and molecular mechanisms of pathologic processes and diseases.

Course content

Lectures

History of pathology; Introduction to pathology; Methods in pathology; Etiology, Intrinsic etiological factors - disposition, body constitution, genetic defects, immunological defects, aging; Extrinsic etiological factors - physical factors (mechanical factors, thermal factors, electricity, radiation, pressure), chemical factors, biological factors, nutritional factors, stress; Pathogenesis; Cellular injury, Adaptations, Factors of cellular injury, Mechanisms of cellular injury; Cell death - Necrosis, Apoptosis; Intracellular accumulations - lipids, glycogen, proteins, Defects in keratin production; Extracellular - hyaline, amyloid, fibrinoid degeneration, collagenosis, Lipid infiltration; Uricosis; Calcification; Concrements and pseudoconcrements; Defects in pigmentation - endogenous pigments (hemoglobinogenic and anhemoglobinogenic pigments), exogenous pigments; Circulatory disorders - hyperemia, plethora, edema, hemorrhage, hemostasis, thrombosis, disseminated intravascular coagulopathy (DIC), emboli, ischemia, infarction, shock, metastasis; Healing - growth, growth factors, tissue proliferation activity, Regeneration and Reparation, Wound healing; Inflammation - Acute inflammation, forms of acute inflammation; Chronic inflammation - nodular and diffuse granuloma; Tuberculosis, Actinobacillosis and Actinomycosis, Glanders, Botryomycosis, Brucellosis, Mycotic granuloma (aspergillosis, cryptococcosis, histoplasmosis, coccidiomycosis, blastomycosis), foreign body granuloma; Neoplasms - nomenclature, differences between benign and malignant tumors, tumor differentiation, metastatic potential of tumors, tumor growth, tumor types - epithelial, mesenchymal, melanocytic/pigment, undifferentiated tumors, tumors of nervous tissue, mixed tumors, tumor-like lesions; Tumor development; Carcinogenesis - intrinsic and extrinsic factors; Metastasis; Immunologic response to tumors; Teratology - causes of malformations; Exogenous teratogens - mechanical, physical, chemical, nutritional, hormonal, infectious; Endogenous teratogens - genopathies, chromosomopathies, malformation caused by assisted reproductive techniques; Mechanism of teratogenesis, Malformation classification, Malformation of tissues, organs and organ systems.

Practicals

Necropsy: Necropsy general facts, Postmortal changes, Demonstration of necropsy procedure, Tissue sampling and modeling, Writing of necropsy protocol, Necropsy and postmortal diagnostics of different animal species.

Histopathology: Tissue sampling (during necropsy, biopsy, fixatives), Tissue processing and staining; Degenerations, Necrosis and Apoptosis, Circulatory disorders, Forms of acute inflammation - slide seminar, Chronic inflammation, Tumors.

Recommended literature

1. Marinković D, Aleksić-Kovačević S: Opšta patologija, Beograd, 2021.
2. Marinković D, Nešić V: Tehnika obdukcije životinja sa osnovama tanatologije, Fakultet veterinarske medicine, Univerzitet u Beogradu, 2013.
3. Zachary J: Pathologic Basis of Veterinary Disease, 6th Edition, Elsevier, 2016.
4. Nešić S, Vučićević I: Praktikum iz patohistologije za studente Fakulteta veterinarske medicine, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, 2018.

Hours	**Lectures:** 4	**Practicals:** 3

Student workload in hours, per semester

Total 240	During active teaching 105	Time for self studies including examination preparation 135

Teaching methods

Formal - theoretical lectures in form of interactive teaching with use of audio-visual methods (Power Point presentations, educational movies).

Practical lessons - necropsy technique and macroscopic examination of animal carcasses, microscopy, recognition and description of histopathological changes characteristic for degenerative processes, necrosis, circulatory disturbances,

inflammation and tumors.			
Evaluation and grading (maximum 100 points)			
Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	
Participation in practicals	10	Oral exam	70
Colloquium	10		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Pathophysiology

Lecturer/lecturers: Dragan M. Gvozdić, Full Professor; Milica Kovačević Filipović, Full Professor; Jelena Francuski Andrić, Associate Professor

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Physiology 1 and Physiology 2 resolved

Course aims

The aim of the course is to acquire knowledge about the mechanisms of diseases, which is the basis for understanding and monitoring teaching process in clinical subjects, in order to achieve the correct diagnosis of disease and choosing the right therapy.

The aim of the course is also to acquire skills in performing laboratory diagnostic procedures and to acquire knowledge for the correct interpretation of laboratory findings for the purpose of making a correct disease diagnosis.

Course outcomes

After successfully mastering the course material, the student will be able to:

1. Describe and explain the mechanisms of disease development based on disorders of the cells, tissues, organs and organ systems;
2. Link the consequences of dysfunction with clinical signs of the disease;
3. Select and perform appropriate procedures/analyzes by which they can assess the disorders in patients.

Course content:

Lectures

Disease (general); Hematologic disorders; Acid-base imbalances; Disorders of water and sodium metabolism; Acute inflammation; Hemostasis disorders; Stress reaction, pain, death; Host response to infection; Respiratory tract disorders; Digestive tract disorders; Renal dysfunction; Hypersensitivity reactions; Disorders of the cardiovascular system; Endocrine dysfunction; Nervous system disorders; Disorder of carbohydrate and fat metabolism.

Practicals

Influence of chronic hypoxic hypoxia on red blood count (basic erhithrocytes parameters), Cardiovascular and respiratory system; Influence of iron deficiency on red blood count and parameters of serum iron status (hematological indices); Changes in blood and urine in hemolytic anemia (blood smear, reticulocytes); Effect of stress on white blood cell count (changes in the number and morphology of leukocytes); White blood count, plasma proteins and erythrocyte sedimentation during the acute phase reaction; Disorder of blood plasma protein concentration (biuret reaction, electrophoresis); Disorder of primary blood clot formation (platelet count, bleeding time); Coagulation disorders (coagulation time); Examination of urine sediment; Examination of glomerular dysfunction - proteinuria; Examination of glomerular dysfunction - glomerular filtration rate (GFR); Examination of tubular dysfunction (quantity and specific gravity of urine); Diabetes and ketosis (chemical composition of urine); Influence of liver dysfunction on the concentration of bile acids and bilirubin in serum and urine. Determination of enzymes that indicate hepatocyte damage; Arrhythmia analysis (using electrocardiography).

Recommended literature

1. Božić T: Pathophysiology of domestic animals, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2012.
2. Kovačević Filipović M: Practicum in pathophysiology of domestic animals, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2016.
3. Gamulin S: Pathophysiology, Medicinska naklada, Zagreb, 2011.
4. Stockham S, Scott M: Fundamentals of Veterinary Clinical Pathology, 2nd Edition, Wiley-Blackwell, 2008.

Hours	**Lectures:** 3	**Practicals:** 3

Student workload in hours, per semester

Total 180	During active teaching 90	Time for self studies including examination preparation 90

Teaching methods:

Theoretical classes with interactive learning; practical teaching in the laboratory; written colloquia.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Written exam	10
Participation in practical		Oral exam	50
Colloquium	30	Practical exam	10
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Pharmacology and toxicology 1

Lecturer/lecturers: Saša Trailović, Full Professor; Mirjana Milovanović, Full Professor; Saša Ivanović, Full Professor; Đorđe Marjanović, Assistant Professor; Dragana Medić, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Physiology 1 and Physiology 2 completed exams

Course aims

To provide students with basic knowledge about the physico-chemical properties of drugs, pharmaceutical forms of drugs, how to prepare and prescribe drugs, dosage regimen, the fate of the drug in the body, place and mode of action of drugs, therapeutic and adverse drug reactions, as well as the use of drugs in the treatment of animal diseases in clinical practice.

Course outcomes

The student should know the origin of drugs, types and forms of drugs, rules for prescribing drugs, methods of dosing and application of drugs, can dose drugs, define and understand the pharmacokinetics and pharmacodynamics of drugs, can recognize side effects, know synergistic and antagonistic interactions between drugs.

Course content

Lectures

Introduction, definitions and classification of drugs, preclinical and clinical trials of drugs. Dosages and dosage of drugs. Drug transport across body barriers, pharmacokinetics. Pharmacodynamics of drugs. Drug interactions, drug side effects. Pharmacology of organic systems, blood and rehydration agents, nutritional pharmacology, etc.

Practicals

Instruction parts, principles, rules and examples of prescribing solid, soft and liquid main and official drugs, finished drugs, incompatibility, biological variations, etc.

Recommended literature

1. Ćupić V, Muminović M, Kobal S, Velev R: Pharmacology for students of veterinary medicine, 3rd Edition, Belgrade, Sarajevo, Ljubljana, Skopje, Naučna KMD, 2019.
2. Ćupić V: The most common poisonings in veterinary medicine, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2015.
3. Trailović S, Milovanović M, Jeftić Z: Veterinary recipe, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2012.
4. Adams RH: Veterinary Pharmaology and Therapeutics, 8th Edition, Iowa State University Press/Ames, Iowa, 2001.
5. Gupta RC: Veterinary Toxicology. Basic and Clinical Priciples, 3rd Edition, Elsevier, Academic Press, 2018.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 75	Time for self studies including examination preparation 75

Teaching methods

Theoretical classes (PowerPoint presentations, films), practical exercises (practice of prescribing drugs, immobilization of animals, computer simulation).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	6	Written exam - practical	6
Participation in practicals	6	Exam (written/oral)	50
Colloquium	32		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: General clinical diagnostics and propedeutics

Lecturer/lecturers: Predrag Stepanović, Associate Professor; Ivan Vujanac, Full Professor; Nenad Andrić, Full Professor; Stefan Đoković, Associate Professor; Radiša Prodanović, Associate Professor; Darko Davitkov, Associate Professor; Sreten Nedić, Assistant Professor; Anja Ilić Božović, Assistant Professor; Sveta Arsić, Assistant Professor; Natalija Milčić Matić, Assistant Professor; Miloš Đurić, Assistant Professor; Predrag Simeunović, Teaching Assistant PhD; Lazar Marković, Teaching Assistant; Aleksandra Mitrović, Teaching Assistant; Lazar Karić, Teaching Assistant; Ana Pešić, Teaching Assistant

Course status: Obligatory

ECTS credits: 7.0

Prerequisites: Physiology 1, Physiology 2 completed exams and Pathophysiology attended classes

Course aims

Students meet animals live for the first time and should learn how to approach them, how and what to observe and make comparisons in relation to healthy individuals and how to make differences in relation to other diseased conditions. Students are trained to notice the existence of a pathological condition in the shortest possible time by applying general, special and specialist diagnostic methods, to record all changes in the patient's card and to get acquainted with the process of making a diagnosis. Students are expected to be trained on dogs, cats, horses, cattle and other ungulates.

Course outcomes

In addition to keeping documentation on the examination, students should know how to apply all the above methods of clinical examination. To get used to thinking in a medical way and thus gain the conditions to apply previously acquired knowledge, in the end, after listening to the remaining subjects from the diseases of these animals, connect their acquired skills and knowledge and become veterinarians - clinicians.

Course content

Lectures

Introductory lecture; History, national, habitus and triassic; Examination of the skin, mucous membranes and lymph nodes; Examination of the respiratory tract; Examination of the cardiovascular system; Examination of the digestive tract; Examination of the urinary tract; Examination of the nervous system; Laboratory diagnostics.

Practicals

Introductory lecture; History, national, habitus and triassic; Examination of the skin, mucous membranes and lymph nodes; Examination of the respiratory tract; Examination of the cardiovascular system; Examination of the digestive tract; Examination of the digestive organs: mouth, pharynx, esophagus, rumen and contents of the rumen; Examination of the reticulum, omazum, abomazum, stomach and intestines; Examination of the liver, spleen and pancreas of the ungulate; Examination of the urinary tract; Examination of the urinary system and ungulate urine; Examination of the nervous system; Review of the nervous system of ungulates; Laboratory diagnostics of ungulates; Analysis of hematological and biochemical parameters in the diagnosis of diseases in ungulates; Immunological diagnostics in ungulates.

*DON (*additional *forms of teaching)* lectures, video beam presentations, films and work on live animals.

SRW (study research work) Measurement of horse pulse on mandible, digital arteries and tail, measurement of pulse in dog on femoral artery, induction of cough by laryngeal irritation, determination of caudal border of lungs on animals, determination of absolute and relative heart mucus, inspection and palpation of pharynx, examination of the abdomen of carnivores, exercise of different ways of taking urine, description of physical properties of urine, determination of chemical properties of urine, microscopic examination of urine sediment, etc.

Recommendedliterature

1. Radojičić B: Opšta klinička dijagnostika kod domaćih papkara, Naučna KMD, Beograd, 2008.
2. Radostits OM, Mayhew J, Houston DM WB: Veterinary clinical examination and diagnosis, Saunders, Philadelphia, 2000.
3. Stepanović P, Vujanac I, Andrić N, Jovanović M, Dimitrijević B: Praktikum iz opšte kliničke dijagnostike, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2013.

Hours	**Lectures:** 2	**Practicals:** 4

Student workload in hours, per semester

Total 210	During active teaching 90	Time for self studies including examination preparation 120

Teaching methods:

Lectures are held in the lecture hall at the Department of equine, small animal, poultry and wild animal diseases. Exercises are held in the exercise halls at the Department of equine, small animal, poultry and wild animal diseases and at the Department of ruminants and swine diseases.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	12	Practical exam	35
Participation in practicals	30	Oral exam	20
Colloquium	3		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Bee diseases

Lecturer/lecturers: Sonja Radojičić, Full Professor; Sonja Obrenović, Full Professor; Dragan Bacić, Associate Professor; Nataša Stević, Associate Professor; Tamara Radovanović, Teaching Assistant

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Microbiology with immunology 1 and Microbiology with immunology 2 resolved

Course aims

To acquire knowledge of etiology, pathogenesis, diagnostic work, therapy and prevention of the most important diseases of bees, caused by viruses, bacteria, fungi, parasite and other pests.

Course outcomes

To acquire knowledge of bee hive and bee inspection and to recognize symptoms of diseases, to recognize apiary pest occurrence, to act in appropriate manner in case of disease suspicion, collect samples for laboratory diagnostic work and to react in the appropriate way in order to prevent infectious bee disease occurrence and transmission.

Course content

Lectures

Adult bee diseases: May disease, aspergilosis, nosemosis, amoeba disease, acarosis, senoteniasis, bee septicemia, paratiphus, dysentery, bee paralysis, varrosis, braulosis, Tropilelaps clarae, viral bee diseases (wing deformity, cloudy wing disease, Kashmir virus disease, apis iridescent virus), bee diseases therapy, general prevention of the bee diseases. Brood diseases: American pest, European pest, Ascospherosis, Aspergilosis, Sac brood, etinosis, other fungal bee diseases, colony collapse disease, therapy and prevention of bee disease. Queen diseases: melanosis, unfertilized eggs, genitals obstruction, catalepsy, oviduct obstruction, inherited anomalies. Basic principles of bee immunity, role of haemolymph, apidecines. Apiary veterinary sanitary and preventive measures.

Practicals

Sampling, examination and methods of determination of ecto and endoparasites. Virological methods in the diagnosis of bee diseases: tissue cultures and virus isolation. Application of serological tests and biological test in the diagnosis of bee diseases. Diagnosis, differential diagnosis and treatment of diseases. Methods of drug application and general prophylaxis measures. American pest, European pest, Ascospherosis, Aspergilosis, sac brood. OIE recommendations for control, suppression and eradication of brood as well as adult bee diseases, the procedure for sampling, packaging and sample transportation for laboratory diagnosis, microbiological laboratory diagnostic work, sample preparation (nosemosis, acarosis, varoosis, braulosis, May disease, infestations with Tropilaelaps spp.).

Recommended literature

1. Bacić D, Obrenović S: Bolesti pčela, Fakultet veterinarske medicine, Univerzitet u Beogradu, CID, Beograd, 2021.
2. Bacić D, Obrenović S: Praktikum iz bolesti pčela, Fakultet veterinarske medicine, Univerzitet u Beogradu, CID, Beograd, 2016.
3. Lolin M: Bolesti pčela, Veterinarski fakultet, Univerzitet u Beogradu, Beograd, 1986.
4. Dobrić Đ: Bolesti pčela, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2000.
5. Evans JD, Saegerman C, Mullin C, Haubruge E, Nguyen BK, Frazier M, Tarpy DR: Colony collapse disorder: adescriptive study, PloS One, 4(8), e6481, 2009.
6. Watson K, Stallins JA: Honey bees and colony collapse disorder: A pluralistic reframing, Geography Compass, 10(5), 222-236, 2016.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Lectures, power point presentation, films, laboratory practical work, field ambulatory work.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	5	Practical exam	30
Participation in practicals	5	Oral exam	60
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Special pathology

Lecturer/lecturers: Sanja Aleksić-Kovačević, Full Professor; Darko Marinković, Full Professor; Vladimir Kukolj, Full Professor; Slađan Nešić, Associate Professor; Ivana Vučićević, Associate Professor; Milan Aničić, Assistant Professor; Stefan Jelisić, Teaching Assistant

Course status: Obligatory

ECTS credits: 7.0

Prerequisites: General pathology, Microbiology with immunology 1, Microbiology with immunology 2, Histology with embryology 1, Histology with embryology 2 resolved

Course aims

Study of morphological manifestations of the disease, in organs and different systems of organs, as well as pathological processes of a certain etiology, course and evolution.

Course outcomes

The student is able to:

- distinguish macroscopic and microscopic changes in organ systems related to certain pathological conditions of defined etiology and course,
- recognize and describe macroscopic changes and is able to make a pathoanatomical diagnosis,
- use elements of descriptive pathology in the process of writing pathomorphological and differential diagnosis.

Course content

Lectures

Pathology of the GIT, liver, biliary system and exocrine pancreas. Pathology of the respiratory system. Pathology of the cardiovascular system. Pathology of the hematopoietic system. Pathology of the urinary system. Pathology of the endocrine system. Pathology of the CNS. Pathology of the muscles, bones, joints and reproductive organs, eye and ear. Skin pathology.

Practicals

Autopsy. Postmortem diagnostics, autopsy of different animal species. Autopsy protocol writing. Macroscopic preparations. Slide seminars - Histopathology: gastrointestinal system, liver, biliary system and exocrine pancreas, respiratory system, cardiovascular system, urinary system, CNS, muscles, skin, female reproductive system, male reproductive system.

Recommended literature

1. Jovanović M, Aleksić-Kovačević S, Knežević M: Special Veterinary Pathology, Naučna KMD, Belgrade, 2019.
2. Marinković D, Nešić V: Animal autopsy technique with basics of thanatology, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2013.
3. Zachary J: Pathologic Basis of Veterinary Disease, 6th Edition, Elsevier, 2016.
4. Nešić S, Vučićević I: Practicum in pathohistology for students of the Faculty of Veterinary Medicine, Naučna KMD, 2018.
5. Maxie G: Jubb Kennedy and Palmer's Pathology of Domestic Animals, 3-Vol. Set, 6th Edition, Elsevier, 2015.

Hours	**Lectures:** 4	**Practicals:** 3

Student workload in hours, per semester

Total 210	During active teaching 105	Time for self studies including examination preparation 105

Teaching methods

Theoretical classes with interactive learning, supported by audio-visual methods (PowerPoint presentations, films), practical exercises - autopsy and macroscopic examination of animal carcasses, microscopy, recognition and description of histopathological changes in certain organ systems.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	
Participation in practicals	10	Oral exam	70
Colloquium	10		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Pharmacology and toxicology 2

Lecturer/lecturers: Saša Trailović, Full Professor; Mirjana Milovanović, Full Professor; Saša Ivanović, Full Professor; Đorđe Marjanović, Assistant Professor; Dragana Medić, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Physiology 1, Physiology 2 and Pharmacology and toxicology 1 resolved

Course aims

To provide students with basic knowledge about the physico-chemical properties of drugs, pharmaceutical forms of drugs, how to prepare and prescribe drugs, dosage regimen, the fate of the drug in the body, place and mode of action of drugs, therapeutic and adverse drug reactions, as well as the use of drugs in the treatment of animal diseases in clinical practice.

Course outcomes

The student should know the origin of drugs, types and forms of drugs, rules for prescribing drugs, methods of dosing and application of drugs, be able to dose drugs, pharmacokinetics and pharmacodynamics, be able to knows the side effects of drugs, knows the synergistic and antagonistic interactions between drugs, knows the origin and types of poisons and poisonings, toxicokinetics and toxicodynamics of poisons, as well as the method of treatment of poisoned animals.

Course content

Lectures

Introduction, classification, antibacterial, antiviral and antifungal drugs, antiseptics and disinfectants. Cytostatics and immunomodulators, antiparasitic drugs. Introduction and significance of toxicology in veterinary medicine, classification of poisons and poisonings. Toxicokinetics, toxicodynamics. Poisoning of animals with pesticides, heavy metals, animal and plant and other poisons, and the method of treatment of poisoned animals.

Practicals

Drug interactions. Local and general anesthesia. Adrenergic and cholinergic drugs. CNS excitants and anticonvulsant drugs. Sampling and sampling procedures for chemical-toxicological analysis, Legislation in the production and trade of toxic substances, Antidotes and antagonists in the therapy of animal poisoning.

Recommended literature

1. Ćupić V, Muminović M, Kobal S, Velev R: Pharmacology for students of veterinary medicine, 3rd Edition, Belgrade, Sarajevo, Ljubljana, Skopje, Naučna KMD, 2019.
2. Ćupić V: The most common poisonings in veterinary medicine, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2015.
3. Trailović S, Milovanović M, Jeftić Z: Veterinary recipe, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2012.
4. Adams RH: Veterinary Pharmaology and Therapeutics, 8th Edition, Iowa State University Press/Ames, Iowa, 2001.
5. Gupta RC: Veterinary Toxicology. Basic and Clinical Priciples, 3rd Edition, Elsevier, Academic Press, 2018.

Hours	**Lectures:** 4	**Practicals:** 2

Student workload in hours, per semester

Total 180	During active teaching 90	Time for self studies including examination preparation 90

Teaching methods

Theoretical classes (PowerPoint presentations, films), practical exercises (practice of prescribing drugs, immobilization of animals, computer simulation, case studies of poisoned animals).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	6	Written exam - practical	6
Participation in practicals	6	Written/oral exam	50
Colloquium	32		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Animal hygiene and herd health

Lecturer/lecturers: Radislava Teodorović, Full Professor; Milutin Đorđević, Full Professor; Vladimir Drašković, Assistant Professor; Radovan Marčetić, Teaching Assistant

Course status: Obligatory

ECTS credits: 8.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is for students to understand: 1) the impact of climatic and microclimatic factors on the health and production results of animals, 2) water quality and water needs of animals, 3) general principles in the construction of animal housing, 4) the role of biosecurity measures (disinfection, disinsection and pest control) in preventing the occurrence and spread of infectious diseases, 5) hygiene of housing and keeping farm animals, fish, game and pets, 6) hygiene of animal transport, 7) hygienic and technological-technical aspect of fertilization of livestock facilities and wastewater treatment from plant for processing food of animal origin, 8) harmless removal of animal corpses and slaughterhouse wastes and the importance of quarantine.

Course outcomes

Upon completion of the course, students should be able to apply knowledge related to the needs of animals in the construction of facilities - stables and appropriate microclimatic conditions in the facilities; to know what are the biosecurity measures that must be implemented on farms and to be able to implement them properly; to understand the importance of proper housing hygiene, production and keeping of farm animals, game and fish, as well as housing hygiene and keeping of pets; to know how to organize appropriate modes of transport and to carry out quarantine for different species of animals; as well as appropriate ways of disposing of and removing slaughterhouse wastes and animal corpses.

Course content

Lectures

The concept, subject of study and practical activity of animal hygiene. Air hygiene. Soil as a hygienic factor. Animal hygiene requirements and animal needs for water. Fundamentals of bioclimatology. Basics of hygienic construction of animal accommodation facilities. Disinfection. Disinsection. Pest control. Hygiene of cattle production and housing. Hygiene of production and accommodation of horses. Hygiene of pig production and housing. Hygiene of production, accommodation and keeping of sheep and goats. Hygiene of production, accommodation and keeping of poultry. Hygiene of accommodation and farming methods of game. Hygiene of accommodation and ways of keeping pets. Hygiene of accommodation and farming methods of fish. Hygiene of animal transport and specifics of transport for certain species of animals. Removal and processing of animal corpses and slaughterhouse wastes. Quarantine. Hygienic and technological-technical aspect of fertilization of livestock facilities and wastewater treatment.

Practicals

Testing and hygienic assessment of air. Testing and hygienic assessment of soil. Testing and hygienic assessment of water. Visit to the drinking water treatment plant. Calculation of required ventilation openings and lighting. Disinfection - preparation of solution, preparation of apparatus, disinfection, disinfection control. Disinsection - biological characteristics of certain species of arthropods, preparation of a plan for performance of disinsection, preparation of insecticide solution and apparatus and performing disinsection. Pest control - biological characteristics of rodents, preparation of a plan for performance of pest control, preparation of baits and performing of pest control. Visit to a cattle farm - analysis of animal hygienic norms. Visit to a horse stable - analysis of animal hygienic norms. Visit to a pig farm - analysis of animal hygienic norms. Visit to a sheep farm - analysis of animal hygienic norms. Visit to a fishpond - analysis of animal hygienic norms. Visit to a poultry farm - analysis of animal hygienic norms. Visit to a hunting ground - analysis of animal hygienic norms. Test - knowledge test at the end of the semester.

Recommended literature

1. Radenković-Damnjanović B, Janković Lj, Đorđević M, Teodorović R: Zoohigijena 1, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2016.
2. Radenković-Damnjanović B: Praktikum iz zoohigijene, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2010.
3. Vučinić M, Radenković-Damnjanović B, Teodorović R, Janković Lj: Bioklimatologija i biometeorologija, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2006.
4. Ristić M, Radenković B, Đorđević M: Neškodljivo uklanjanje leševa i sporednih proizvoda zaklanih životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2000.
5. Ćirković M, Jovanović B, Maletin S: Ribarstvo (biologija-tehnologija-ekologija-ekonomija), Poljoprivredni fakultet, Univerzitet u Novom Sadu, Novi Sad, 2002.
6. Asaj A: Higijena na farmi i u okolišu, Medicinska naklada, Zagreb, 2003.

Hours	**Lectures:** 4	**Practicals:** 4

Student workload in hours, per semester		
Total 240	During active teaching 120	Time for self studies including examination preparation 120

Teaching methods

Theoretical teaching with interactive learning, with the application of audio-visual methods (PowerPoint presentation). Practical classes are held in the laboratory of the Department of Animal Hygiene at the Faculty of Veterinary Medicine, at the plant for drinking water treatment "Makiš", farms of the Institute of Animal Husbandry "Soko Salaš" and the company Al Dahra, fishpond Ovča and hunting grounds Rit and Crni Lug.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	15	Practical exam	20
Participation in practicals	15	Oral exam	40
Colloquium	10		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Fish diseases

Lecturer/lecturers: Maja Marković, Full Professor; Ksenija Aksentijević, Associate Professor

Course status: Obligatory

ECTS credits: 3.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Students will gain knowledge of freshwater and marine fish farming technology, most common fish diseases, and their spread, health and economic significance, clinical signs of infection, diagnostic methods, prevention and therapy, and master the techniques of examination and diagnostic methods through practical classes.

Course outcomes

The student should acquire knowledge about etiology and pathogenesis of common fish diseases, and will be prepared to diagnose and prescribe adequate disease treatment. Student will know how to act and proceed in a case of potential infectious disease outbreak, and be able to independently perform a clinical exam and apply medical treatment to and individual or population of fish.

Course content

Lectures

Fish diseases and their characteristics; Bacterial fish diseases; Viral fish diseases; Fungal fish diseases; Parasitic fish diseases; Diseases of unknown etiology; Nutritional diseases; Diseases due to poor environmental conditions; Principles of aquatic veterinary biosecurity; Principles of aquatic animal welfare.

Practicals

Aquaculture facilities. Carp aquaculture (ponds). Trout aquaculture (raceways). Fish Anatomy and Physiology: Topographic anatomy of Osteichthyes. The muscular system, respiratory system, cardio-vascular system, digestive system (Cyprinidae and Salmonidae), excretory system, reproductive system, byoancy organs. Fish species of economic importance. Pathological examination and dissection of sick fish. Pathological-anatomical changes. Collecting, fixing material and diagnostic sample submission. Blood collection and smear preparation. Giemsa staining. Microscopical evaluation of blood smear. Collection and shipping of diagnostic samples for laboratory analysis. Diagnostic procedure. Fish medication. Fish welfare. Field trip to a carp or trout aquaculture facility.

Recommended literature

1. Patrick TKW: Fish diseases and disorders, 3 Volume Set, CABI, 2011.

2. Roberts RJ: Fish Pathology, 4th Edition, Wiley-Blackwell, 2012.

3. Marković M, Aksentijević K: Bolesti riba - praktikum, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2017.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 90	During active teaching 30	Time for self studies including examination preparation 60

Teaching methods

Theoretical classes and interactive learning, with audio-visual methods (PowerPoint presentations, films), practical exercises (blood sampling of fish, making a blood smear and microscopic analysis, dissection of fish, collecting samples for laboratory analysis, laboratory diagnostics) at the practice room of the Department of Microbiology and at fishponds (collecting anamnestic data, sampling, keeping records).

Evaluation and grading (maximum 100 points)

Grading: 6 = 51-60 points, 7 = 61-70 points, 8 = 71-80 points, 9 = 81-90 points, 10 = 91-100 points.

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Practical exam	10
Participation in practicals	10	Oral exam	40
Colloquium	30		

Study programme: Integrated academic studies in veterinary medicine

Course title: Anesthesiology

Lecturer/lecturers: Maja Vasiljević, Assistant Professor; Bogomir Bolka Prokić, Associate Professor; Emilija Vujić, Teaching Assistant; Mirjana Milovanović, Full Professor; Miloš Vučićević, Associate Professor; Milena Đorđević, Associate Professor

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Pharmacology and toxicology 1 completed exam, enrollment in Pharmacology and toxicology 2

Course aims

Acquiring knowledge of the basic principles of sedation, local, general injection and general inhalation anesthesia in certain species of animals. Introduction to the basic principles of pain therapy before, during and after surgical procedures in certain types of animals. Mastering the monitoring, inhalation apparatus, anesthesia protocol writing technique and interpretation of all vital parameters during anesthesia, as well as the basic principles of nerve and plexus blockade in certain species of animals. Mastering the reanimation protocol.

Course outcomes

Student should be able to evaluate the patient's health condition before induction of sedation, general injection or general inhalation anesthesia. Also, he should know how to adequately prepare the patient, depending on the specifics of the problem and the intervention, as well as to assess the degree of risk of the anesthesia itself. Student must know the pharmacodynamics and pharmacokinetics of available sedatives, anesthetics and analgesics and be able to apply them appropriately (method of application, time required for their action, synergism and antagonism between sedatives, anesthetics and analgesics). In addition, student should know the techniques of endotracheal intubation, interpretation of monitoring of vital parameters during anesthesia, as well as the use of the inhalation apparatus itself. It is necessary to master the writing and monitoring of the anesthesia protocol, recognize the complications that can occur during and after sedation and anesthesia, as well as take the necessary measures in case of complications. Every student must know the resuscitation protocol.

Course content

Lectures

1. Introduction to anesthesia; 2. Medications in anesthesiology; 3. Preparation of the patient for anesthesia, anesthesiological protocol, monitoring during anesthesia; General injection anesthesia, characteristics of pediatric and geriatric patients; 4. General inhalation anesthesia, characteristics of pediatric and geriatric patients; 5. Local anesthesia and analgesia, pain therapy; 6. Techniques of local anesthesia and analgesia (nerve and plexus blockade); 7. Anesthesia and analgesia of equidae and ruminants; 8. Anesthesia and analgesia of exotic and experimental animals; 9. Anesthesia and analgesia of dogs and cats; 10. Anesthesia and analgesia in patients with specific diseases; 11. Reanimation.

Practicals

1. Medicines - distribution and dosage, preparation of the patient for anesthesia, characteristics of pediatric patients, characteristics of geriatric patients. Examples of anesthesiology protocol, filling in anesthesiology protocol. 2. Characteristics of the anesthesia machine, parts and additional equipment, checking the correctness of the anesthesia machine, filling out the anesthesia protocol. 3. Endotracheal intubation, patient monitoring during anesthesia, familiarization with the characteristics, advantages and disadvantages of each individual monitoring. 4. Techniques of local and regional anesthesia and analgesia. 5. Techniques for maintaining general inhalation and injection anesthesia. 6. Anesthesia and analgesia in emergency patients, resuscitation.

Recommended literature

1. Vučović D, Prokić B, Raptopulos D: Veterinarska anesteziologija, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2009.
2. Krstić V, Popović N, Andrić N, Stepanović P, Ilić V, Jovanović M: Autorizovana predavanja, Bolesti pasa i mačaka, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2014.
3. Jezdimirović BM: Veterinarska farmakologija, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2010.
4. Božić T: Patološka fiziologija domaćih životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2007.
5. Tranquilli WJ, Thurmon JC, Grimm KA: Veterinary anesthesia and analgesia, Blackwell Publishing, 2007.
6. Silverstein CD, Hopper K: Small animal critical care medicine, Saunders Elsevier, 2009.
7. Murtaugh K: Veterinary emergency and critical care medicine, Mosby Year Book, 1992.
8. Meddison JE, Page CB, Church DB: Small animal clinical pharmacology, Saunders Elsevier, 2008.
9. Matičić D, Vnuk D: Veterinarska kirurgija i anesteziologija, Medicinska naklada, Zagreb, 2010.
10. Maksimović A, Lutvikadić I, Filipović S, Hadžijunuzović-Alagić Dž: Analgetici, sedativi i anestetici u veterinarskoj medicini, Veterinarski fakultet Sarajevo, 2018.
11. Trojačanec P, Toholj B, Trojačanec S, Ilievska K: Osnove veterinarske anesteziologije, Univerzitet u Novom Sadu,

Poljoprivredni fakultet, 2018.			
Hours		**Lectures:** 1	**Practicals:** 1
Student workload in hours, per semester			
Total 60	During active teaching 30	Time for self studies including examination preparation 30	
Teaching methods Theoretical classes with interactive learning with audio-visual methods (PowerPoint presentations, films), practical exercises on healthy and sick animals, as well as on cadavres and practical work at the Clinic of Surgery, veterinary clinics and teaching bases of the Faculty.			
Evaluation and grading (maximum 100 points)			
Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Practical exam	10
Participation in practicals	40	Final test	40
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Cynology and felinology

Lecturer/lecturers: Vladimir Dimitrijević, Full Professor; Žolt Bečkei, Associate Professor; Elmin Tarić, Assistant Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Overview of the basics of cynology and felinology, their biological characteristics, principles of rearing and nursing, principles of breeding and selection with the goal of improving their health and working performances in dogs.
Special focus is given to better understanding of heritability and distribution of inherited diseases of dogs and cats.

Course outcomes

After the finished course, students should be trained and able to:

- understand the principles of dog and cat breeding,
- recognize dog and cat breeds,
- assess the exterior, constitution (failures in physiological, exterior and psychological constitution), body condition and temper of dogs and cats,
- advise and recommend dog and cat keepers and owners regarding inherited diseases, with the goal to ensure better health and welfare of their animals.

Course content

Lectures

Origin and domestication of dogs and cats. FCI classification of dog breeds. FIFe classification of cat breeds. Canine reproduction and rearing puppies. Feline reproduction and rearing kittens. Selection by using exterior traits, working performances, ancestry and progeny. Breed specific predisposition of dog and cat breeds to some hereditary diseases. Genetic control of some health issues. Methods of breeding in cynology and felinology.

Recommended literature

1. Dimitrijević V, Savić M, Trailović R, Bečkei Ž: Stočarstvo-farmske i socijalne životinje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2020.
2. Statutes of the FCI, Brussels, 2018.
3. International Breeding Rules of the FCI, 1979, 1990, 2019.
4. The Complete Dog Breed Book, New Edition, DK, 2020.
5. FIFe statutes, 2020.
6. FIFe Breed Council Rules, 2020.
7. FIFe Breeding and Registrationes Rules, 2020.

Hours	**Lectures:** 2	**Practicals:** 0

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical interactive lectures with participation, inclusion of students and sharing experience with dog and cat owners, seminars on predefined topics, application of audio-visual methods of teaching (Power Point Presentation, video materials).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	30	Seminar	70
Participation in practicals			
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Breeding and welfare of sport horses

Lecturer/lecturers: Vladimir Dimitrijević, Full Professor; Katarina Nenadović, Associate Professor; Stefan Đoković, Associate Professor; Branko Petrujkić, Full Professor; Elmin Tarić, Assistant Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

To enable students to acquire knowledge in specific breeding procedures, care and training of different sport and racing horses in accord to the traits: gallop race, trot, sport horses and horses for recreation.

To enable students to acquire knowledge in veterinary procedures and documentation that is applied in equine sport and breeding of race and sport horses.

Course outcomes

Student should acquire knowledge and skills in:

- Specific procedures in breeding, care and training of sport horses;
- Principles of feeding and supplementation in accord to needs upon physical work;
- Training procedures in accord to principles of welfare and specific requirements of different disciplines.

Course content

Lectures

Horse breeds and types used in different equine sports and races. Equine behavior: a basic for appropriate handling, feeding and training. Basic principles of equine nutrition and welfare of horses in training. Introduction to equine reproduction: reproductive cycle, mounting, pregnant mare care, foaling and care of newborn foal. Studbooks, the role of veterinarian in pedigree book keeping upon standard of the breed, report of foal. Handling, training, nutrition and drinking water - special demands upon equestrian discipline or horserace type. Assessments of welfare in sport horses. Hoof, skin and hair hygiene and care. Equine handling, training stable organization and veterinary support. Veterinary supervision in events and races: identification, sport supervision, antidoping control.

Recommended literature

1. Dimitrijević V, Savić M, Trailović R, Bečkei Ž: Stočarstvo-farmske i socijalne životinje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2020.
2. Trailović D: Sportska medicina za studente veterinarske medicine, Fakultet veterinarske medicine, Univerzitet u Beogradu, VetKer, Beograd, 2019.
3. Trailović D, Vučinić M, Lazić J: Ponašanje i dobrobit konja, Fakultet veterinarske medicine, Univerzitet u Beogradu, VetKer, Beograd, 2012.

Hours	**Lectures:** 2	**Practicals:** 0

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Interactive lectures with audiovisual presentations; debating, on field lectures.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	30	Seminar	70
Participation in practicals			
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Breeding and care of farm animals

Lecturer/lecturers: Radislava Teodorović, Full Professor; Milutin Đorđević, Full Professor; Vladimir Drašković, Assistant Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is for students to understand the specifics of breeding, care and transport of different species and categories of farm animals.

Course outcomes

Upon completion of the course, students should be able to apply knowledge related to the basic principles of breeding, caring for cattle, sheep, goats, pigs, poultry, dogs and cats in kennels; to know the specifics of the technology of breeding different categories of farm animals; to understand the impact of housing and care of the health and production results of farm animals.

Course content

Lectures

Breeding and care of lactating cows. Breeding and care of calves. Breeding and care of fattening beef cattle. Hygiene and care of cattle and sheep hooves. Breeding and care of pregnant sows. Breeding and care of piglets. Breeding and care of fattening pigs. Breeding and care of sheep and goats before and after parturition. Breeding and care of lambs and goatlings. Breeding and care of mares before and after parturition. Breeding and care of foals. Breeding and care of broilers. Breeding and care of laying hens. Hygiene of farm animal transport.

Recommended literature

1. Radenković-Damnjanović B, Janković Lj, Đorđević M, Teodorović R: Zoohigijena 1, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2016.
2. Vučemilo M: Higijena i bioekologija u peradarstvu, Intergrafika, Zagreb, 2008.
3. Radenković-Damnjanović B: Praktikum iz zoohigijene, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2010.
4. Vučinić M, Radenković-Damnjanović B, Teodorović R, Janković Lj: Bioklimatologija i biometeorologija, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2006.
5. Asaj A: Higijena na farmi i u okolišu, Medicinska naklada, Zagreb, 2003.

Hours	**Lectures:** 2	**Practicals:** 0

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical teaching with interactive learning, with the application of audio-visual methods (PowerPoint presentation).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	20	Practical exam	
Participation in practicals		Written exam	60
Colloquium	20		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Protection and rescue of animals in emergency situations

Lecturer/lecturers: Darko Marinković, Full Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The goal of course: Acquisition of necessary knowledge required for organization and solution of problems with regard to protection and rescue of animals in emergency situations; in cases of danger and threats cause by various harmful impacts of natural and anthropogenic origins.

Course outcomes

Students are expected to posses the necessary knowledge and skills in order to be able to solve problems in case of emergency situations, how to help endangered people and animals (animal production). They should be able to understand the origin of those emergency situations, to assess the possible threats for animals, to make plans for protection and rescue of endangered animals, and to know on whom to rely in civil protection.

Course content

Lectures

Importance and rescue of animals, principles of organization and protagonists of protection and rescue of animals in Serbia; Term and causes of emergency situations and their influence on animals in animal production; Endangered animals in emergency situations (natural catastrophes and natural disasters - floods, landslides, earthquakes, droughts, fires, bad weather, frost, avalanches and snowdrifts), wars, epidemics, chemical and nuclear accidents, etc.; Organization of animal rescue in emergency situations; Endangered animal production in emergency situations - RCB agents and their effect in lowland, hilly and mountainous regions; Organization of rescue and providing for animals in emergency situations - preventive measures, decontamination, new accommodation/housing; Endangered production of food of animal origin in emergency situations and during RCB accidents; Organization of rescue and storage of animal food in emergency situations and during RCB accidents; Organization of rescue and storage of food of animal origin in emergency and RCB events; Regulations for protection and rescue of animal production in Serbia - Constitutional obligation to provide for public goods.

Recommended literature

1. Marić P, Tomić D: Upravljanje vanrednim situacijama, Balkanski institut Modriani, Beograd, 2010.
2. Kuzmanović M: Zaštita i spasavanje životinja, namirnica životinjskog porekla, stočne hrane i vode za pojenje životinja u miru i ratu u okviru civilne zaštite, VINC, Beograd, 1988.
3. Zakon o smanjenju rizika od katastrofa i upravljanju vanrednim situacijama, Službeni Glasnik, Beograd, 2019.

Hours	**Lectures:** 2	**Practicals: /**

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical i.e. interactive teaching accompanied with modern audio-visual material (films, CD, DVD), visits to relevant centers and institutions dealing with the problems of protection and rescue, i.e. civil protection.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	60	Written exam	30
Participation in practicals		Oral exam	
Colloquium			
Seminars	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Sport medicine of horses

Lecturer/lecturers: Stefan Đoković, Associate Professor; Olivera Valčić, Full Professor; Ljubomir Jovanović, Associate Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Introduction to the specifics of physiology and pathology of sport horses in different disciplines of equestrian sport.

Course outcomes

Upon completion of the course, the student should determine, recognize and apply the basic methods of appropriate training of horses, explain the most important disorders caused by physical exertion and perform a clinical examination, necessary functional tests including stress test to assess the degree of training, diagnose the most important disorders caused by training and load and took appropriate preventive and therapeutic measures in order to prevent major damage and improve the sporting performance of the sport horse.

Course content

Lectures

Influence of physical load on the organism and adaptation of the organism to the training and load of sport horses. Evaluation of sports performance before introduction to training. Psychological basis of sport horse training. Basics of sport horse training and specifics of horse training for certain equestrian sports disciplines. Assessment of the degree of training of horses. Diseases of the cardiovascular and respiratory system caused by physical exertion, neuro-endocrine and metabolic disorders caused by exercise, diseases of the musculoskeletal system caused by exercise, sports injuries, doping and anti-doping control. Diseases that lead to a decrease in sports performance.

Practicals

Assessment of sports performance, functional tests to assess the degree of training of horses, stress test, diagnosis and therapy of sports diseases and injuries, sampling for doping control. Clinical exercises in the outpatient clinic for horse diseases and at the Belgrade Hippodrome.

Recommended literature

1. Trailović D, Trailović R, Lazić J: Konjarstvo i konjički sport, Fakultet veterinarske medicine, Univerzitet u Beogradu,VetKer, Beograd, 2009.
2. Trailović D: Dijagnostika i terapija oboljenja konja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2009.
3. Marlin D, Nankervis K: Equine Exercise Physiology, Blacкwell, Oxford, 2003.
4. Hodgson DR, Rose RJ: The Athletic Horse, Saunders, Philadelphia, 2013.
5. Hinchcliff K, Geor R, Kaneps A: Equine exercise physiology, Saunders, Philadelphia, 2008.

Hours	**Lectures:** 2	**Practicals:** 0

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations, films), practical work at the Clinic for Horse Diseases and Hippodrome.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	30	Written exam	70
Participation in practicals			
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Rearing and nursing of dogs and cats

Lecturer/lecturers: Vladimir Dimitrijević, Full Professor; Katarina Nenadović, Associate Professor; Vladimir Magaš, Full Professor; Stamen Radulović, Associate Professor; Žolt Bečkei, Associate Professor; Elmin Tarić, Assistant Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Studying the characteristics of rearing, keeping, nursing, nutrition, reproduction and behaviour of dogs and cats.

Course outcomes

After the finished course, students should be trained and able to:

- understand the principles of rearing, keeping and nursing of dogs and cats,
- catch and handle dogs and cats ensuring their welfare,
- ensure the optimal composition of feed and the overall nutrition for dogs and cats, recognize pathological changes of young and adult dogs and cats caused by malnutrition,
- understand the basics of reproduction of dogs and cats,
- apply the propriate measures of care for healthy and sick dogs and cats,
- understand the basic models of behaviour of dogs and cats,
- understand the regulative legislation of rearing, transportation and healthcare of dogs and cats.

Course content

Lectures

Introduction to cynology: biological characteristics of dogs, breeds and selection of purebred dogs. Basics of dog reproduction: sexual cycle, mating, care of pregnant bitch, whelping and care of puppies. Inherited models of dog behaviour and pathological behaviour. Basic principles of rearing and nutrition of dogs. Care of healthy and sick dogs. Introduction to felinology: biological characteristics of cats, breeds and selection of purebred cats. Basics of cat reproduction: sexual cycle, mating, care of pregnant cat, parturition and care of kittens. Inherited models of feline behaviour and pathological behaviour. Basic principles of rearing and nutrition of cats. Care of healthy and sick cats. Regulatory legislation of rearing and transportation of dogs and cats, management of rearing and healthcare of dogs and cats.

Recommended literature

1. Dimitrijević V, Savić M, Trailović R, Bečkei Ž: Stočarstvo-farmske i socijalne životinje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2020.
2. Savić M, Dimitrijević V, Trailović R, Bečkei Z: Stočarstvo praktikum, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2014.
3. Vučinić V: Dobrobit životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2016.
4. Overall K: Manual of Clinical Behavioral Medicine for Dogs and Cats, Mosby, Elsevier Inc., 2013.
5. Šefer D, Sinovec Z: Opšta ishrana, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2008.
6. England G, von Heimendahl A: BSAVA Manual of Canine and Feline Reproduction and Neonatology, 2nd Edition, John Wiley & Sons, Oxford, 2011.

Hours	**Lectures:** 2	**Practicals:** 0

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical interactive lectures with participation, inclusion of students and sharing experience with dog and cat owners, seminars on predefined topics, application of audio-visual methods of teaching (PowerPoint presentation, video materials).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	30	Seminar	70
Participation in practicals			
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Diagnostic imaging

Lecturer/lecturers: Nikola Krstić, Full Professor; Mirjana Lazarević-Macanović, Full Professor; Marko Jumake Mitrović, Associate Professor

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Anatomy 1, Anatomy 2, Pathophysiology, General pathology and Special pathology resolved

Course aims

During the teaching process students are trained to analyze and interpret images obtained by different diagnostic imaging methods (radiography/fluoroscopy, computed tomography /CT/ and ultrasonography) in order to detect pathological changes and make an accurate diagnosis of the disease.

Course outcomes

Upon completion of this course, students should:

- Understand how the X-rays are generated, understand the interaction between X-rays and matter, as well as the harmful effects caused by X-rays;
- Understand the differences in image formation during conventional radiography and computed tomography;
- Recognize organs in the radiological image and understand the basic principles of radiological anatomy and physiology;
- Recognize, analyze and interpret pathological changes in the radiological image;
- Understand the way of ultrasonic waves formation as well as the ways of their interaction with matter;
- Understand the method of ultrasound image formation;
- Recognize organs in the ultrasound image;
- Recognize, analyze and interpret pathological changes in the ultrasound image.

Course content

Lectures

The X-ray room. Parts of X-rays devices. Types of X-ray devices (mobile, stationary). The nature and the production of X-rays. Factors which affect the intensity and quality of X-rays. Interaction of X-rays and matter. Biological effects of X-rays. Fluoroscopy. Radiography (analog and digital). Grids and collimators. X-ray image (formation, influence of voltage and current on X-ray image quality, geometry and perspective of X-ray image). Radiographic opacity. Radiographic projection. Plainradiography (radiological anatomy and pathology). Contrast radiography (radiological anatomy, physiology and pathology). Basic principles of computed tomography (CT).

Methodology of plain *radiography* of the abdomen, *radiographic anatomy* of abdominal organs, the role of plain *radiography* in diagnostics of abdominal organs diseases. Methodology of contrast radiography of gastrointestinal system diseases, radiographic physiology of the gastrointestinal system and the role of contrast radiography in diagnostics of the gastrointestinal system diseases. Computed tomography of the abdomen.

Methodology of radiological examination and radiographc anatomy of the thoracic organs. Radiolgical diagnostics of the respiratory system diseases, heart and major blood vessels diseases. Radiological diagnostics of pathological changes on the thoracic boundaries, pleural and mediastinal space. Computed tomography of thoracic organs.

Methodology of radiological examination and radiographc anatomy of urogenital organs. Radiological diagnostics of pregnancy and the urogenital system diseases.

Methodology of radiological examination of bones and joints. Manifestations of basic bone structure changes on radiograms. Radiological diagnostics of bone diseases in juvenile and adult animals. Radiological diagnostics of bone fractures. Manifestations of joint diseases on radiograms. Methodology of radiological examination of spinal diseases. Radiological diagnostics of pathological changes on intervertebral discs. Computed tomography of the spine. Methodology of radiological examination of the shoulder and elbow joint. Radiological diagnostics of shoulder and elbow joint diseases. Methodology of radiological examination of the hip and stifle joint. Radiological diagnostics of hip and stifle joint diseases. Computed tomography of joints. Methodology of radiological examination and radiological anatomy of the skull, nasal cavities, vestibular system, sinuses and teeth. Radiological diagnostics of pathological changes on the bones of the skull and diseases of the nasal cavities, vestibular system, sinuses and teeth. Computed tomography of the endocranium.

Methodology of radiological examination and radiological anatomy of the equine acropodium. Radiological diagnostics of equine acropodium diseases. Methodology of radiological exminationof birds and exotic animals. Radiological diagnostics of birds and exotic animals diseases.

Physical characteristics of ultrasound (frequency, wavelength, speed of propagation, intensity of ultrasonic waves). Attenuation (absorption, dispersion) and reflection. Ultrasound devices and operating mode: A-mode, B-mode, M-mode. The terms "gray scale" and "real time". Types of ultrasonic probes. Ultrasound image (quality of ultrasound image /artifacts/, interpretation of ultrasound image).

Ultrasound anatomy and echographic characteristics of abdominal organs. Ultrasound diagnostics of the abdominal

organs diseases.

Practicals

The X-ray room and the X-ray device. Fluoroscopy. Radiography. Radiographic opacity. Radiographic projection. Computed tomography. Plain radiography of the abdominal organ diseases. Contrast radiography of gastrointestinal system diseases. Radiological diagnostics of respiratory system diseases, heart and major blood vessels diseases. Radiological diagnostics of pathological changes on the thoracic boundaries, pleural and mediastinal space. Radiological diagnostics of pregnancy and the urogenital system diseases. Radiological diagnostics of basic bone structure changes. Radiological diagnostics of bone diseases in juvenile and adult animals. Radiological diagnostics of spine, shoulder, elbow, hip and stifle diseases. Radiological diagnostics of pathological changes on the bones of the skull and diseases of the nasal cavities, vestibular system, sinuses and teeth. Computed tomography of the endocranium. Radiological diagnostics of equine acropodium diseases. Methodology of radiological examination of birds and exotic animals. Radiological diagnostics of birds and exotic animals diseases. Ultrasound diagnostics of the liver, gallbladder, bile ducts, pancreas and spleen diseases. Ultrasound diagnostics of kidney and bladder diseases.

Recommended literature

1. Krstić N, Lazarević Macanović M: Praktikum iz rendgenologije za studente veterinarske medicine, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2002.
2. Krstić N, Lazarević Macanović M, Milošević H: Fizički principi radiološke i ultrazvučne dijagnostike, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2014.
3. Krstić N, Krstić V: Rendgenološka i endoskopska dijagnostika oboljenja digestivnog i respiratornog sistema pasa i mačaka, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2007.
4. Šehić M: Klinička rendgenologija u veterinarskoj medicini, Veterinarski fakultet, Sveučilište u Zagrebu, Zagreb, 2002.
5. Šehić M: Osteoartropatije u domaćih životinja, Veterinarski fakultet, Sveučilište u Zagrebu, Zagreb, 2012.
6. Šehić M, Matko M: Kompjuterizirana tomografija i dijagnostika patologije lubanje mozga i kralježnice psa, Veterinarski fakultet, Sveučilište u Zagrebu, Zagreb, 2012.
7. Šehić M, Stanin D, Butković V: Ultrasonografija abdomena i toraksa psa i mačke, Veterinarski fakultet, Sveučilište u Zagrebu, Zagreb, 2006.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 180	During active teaching 75	Time for self studies including examination preparation 105

Teaching methods:

PowerPoint presentations, analysis of radiograms, ultrasonograms and CT images from the archives of the Department of Radiology and Radiation Hygiene, Faculty of Veterinary Medicine, University of Belgrade and writing descriptions of pathological changes.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Written exam	
Participation in practicals		Oral exam	40
Colloquium	30 (3x 10)	Practical exam	30
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: General surgery

Lecturer/lecturers: Milan Hadži Milić, Assistant Professor; Bogomir Bolka Prokić, Associate Professor; Maja Vasiljević, Assistant Professor; Risto Dučić, Teaching Assistant; Emilija Vujić, Teaching Assistant; Stefan Veličković, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Completed exams in General clinical diagnostics and propedeutics and Anesthesiology

Course aims

Acquiring knowledge of general principles of surgery, asepsis, antisepsis, examination and preparation of animals for surgery, animal fixation, hemostasis, shock, solving surgical infections, treatment of open and closed injuries, as well as solving diverticulum dilatations and hernias. In addition, the student must acquire skills in the diagnosis of lameness as well as ophthalmic diagnostics.

Course outcomes

Student should be able to use basic surgical instruments, apply asepsis and antisepsis correctly, resolve hemostasis, treat a fresh or old wound, apply an appropriate type of bandage, master basic sewing and suturing techniques, as well as basic ophthalmological examination and implement the principles of lameness diagnosis.

Course content

Lectures

Surgical diagnostics and methods. Monitoring of surgical patients. Bleeding and hemostasis. Shock-anti-shock therapy. Infections in surgery. Injuries - open and closed and wound healing. Change of position and lumen of the organ - hernia, events, diverticula. Hypertrophy, atrophy, edema. Diseases of the muscles of the joints, tendons and bursa. Principles of oncological surgery. Diagnosis of lameness. Ophthalmic diagnosis.

Practicals

Methods of fixing and restraining the animal. Asepsis, antisepsis, surgical instruments. Basic surgical techniques - cutting, dissection, drainage and bandaging. Types, shapes and application of bandages - specific bandages - according to Andreyev, hoof and plaster bandages. Types of materials and instruments for sewing - application of seams. Treatment of fresh and old wounds, abscesses, hematomas, cysts, preparation of wounds - defects for transplantation. Diagnosis of lameness and nerve blockade techniques. Ophthalmological diagnostics. Principles of tumor surgery.

Recommended literature

1. Vasić J: Opšta hirurgija, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2018.
2. Bojrab MJ: Disease Mechanisms in Small Animal Surgery, Lea y Febiger, Philadelphia, 1993.
3. Hendrickson DA, Baird AN: Turner and Mcllwraiths Techniques in Large Animal Surgery, Wiley Blackwell, 1st Edition, 2013.
4. Andersen DK, Billiar RT, Dunn LD, Hunter JG, Matthews BJ, Pollock RE: Schwartzs Principles of Surgery, Absite and Board Review, McGraw-Hill, 10th Edition, 2015.
5. Fossum T: Small Animal Surgery, Elsevier, 5th Edition, 2018.
6. Tobias KM, Johnston SA: Veterinary surgery: small animal, Elsevier, 2012.

Hours	**Lectures:** 2	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 60	Time for self studies including examination preparation 90

Teaching methods

Theoretical classes with audio-visual methods (PowerPoint presentation). Practical exercises on healthy or sick animals and practical work in the Clinic of surgery.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Practical exam	10
Participation in practicals	30	Oral exam	50
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Obstetrics and reproduction 1

Lecturer/lecturers: Slobodanka Vakanjac, Full Professor; Vladimir Magaš, Full Professor; Milan Maletić, Associate Professor; Miloje Đurić, Associate Professor; Ljubodrag Stanišić, Assistant Professor; Jovan Blagojević, Teaching Assistant

Course status: Obligatory

ECTS credits: 7.0

Prerequisites: Pathophysiology, General pathology, Special pathology, Pharmacology and toxicology 1 and Pharmacology and toxicology 2 resolved

Course aims

The aim of the course is for students to learn the basic physiological conditions of the reproductive system and mammary glands of domestic animals, diseases of newborns, the basics of artificial insemination and embryo transfer.

Course outcomes

Students will acquire the following knowledge: physiology of the estrus cycle of domestic animals, physiology and diagnostics of pregnancy, physiology of parturition and puerperium, physiology of the mammary gland, sperm collection methods, sperm examination and artificial insemination, neonatal diseases and embryo transfer basics.

Course content

Lectures

Fundamentals of neuroendocrine regulation of reproduction. Breeding season and sexual cycle, mating. Early embryonic development, placental classifications and specifics for each domestic animal species, physiology of pregnancy, diagnosis of pregnancy, physiological parturition and puerperium. Artificial insemination, examination, evaluation and conservation of sperm. Insemination of cows, sheep and goats, mares, dogs, pigs, poultry, fish and queen bees. Neonatal diseases in domestic animals, Embryo transfer. Ultrasound diagnosis of the reproductive tract and mammary glands.

Practicals

Clinical examination of genitals, diagnosis of estrus and pregnancy, diagnostic rinsing of the bull's preputium. Delivery, rectal examination and catheterization of the cervix. Semen preparation for artificial insemination, semen inspection and quality assessment. Artificial insemination of domestic animals, udder examination and milk sampling.

Recommended literature

1. Pavlović V: Porodiljstvo, sterilitet i veštačko osemenjavanje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2018.
2. Pavlović V, Pavlović M, Vakanjac S: Dijagnostika graviditeta domaćih životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2010.
3. Petrujkić T: Reprodukcija svinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2011.
4. Vuković D, Miljković V: Klinička primena hormona u reprodukciji ženki domaćih životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2008.

Hours	**Lectures:** 3	**Practicals:** 4

Student workload in hours, per semester

Total 210	During active teaching 105	Time for self studies including examination preparation 105

Teaching methods

Theoretical classes with interactive learning with the application of audio-visual methods (PowerPoint presentations, films), practical work at the Faculty Clinic, stables and farms of cows, sheep and pigs.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	30
Participation in practicals	10	Oral exam	30
Colloquium	20		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Diseases of ruminants 1

Lecturer/lecturers: Ivan Vujanac, Full Professor; Radiša Prodanović, Associate Professor; Sreten Nedić, Assistant Professor; Sveta Arsić, Assistant Professor; Predrag Simeunović, Teaching Assistant PhD; Aleksandra Mitrović, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Pathophysiology, General clinical diagnostics and propedeutics, General pathology completed exams, Special pathology, Pharmacology and toxicology 1 and Pharmacology and toxicology 2 attended classes

Course aims

The aim of the course is that students acquire knowledge about the etiology, pathogenesis, clinical picture, diagnosis and differential diagnosis, basic clinical skills important for the treatment and prevention of diseases of cattle, sheep and goats, non-infectious and infectious etiology.

Course outcomes

After completing theoretical and practical training the student is able to: use the professional literature, properly use diagnostic procedures and diagnose the disease, adequately apply the measures of prophylaxis and therapy of diseases of particular categories of domestic ruminants.

Course content

Lectures

Disorders of digestive system: Diseases of the mouth, tongue, salivary glands, pharynx, teeth and esophagus, Indigestion (simple, alcaline, acute, subacute and chronic rumen acidosis), Putrefaction of rumen content, Ruminitis and parakeratosis, Traumatic indigestion, Indigestion due to damage of n. vagus - Vagus Indigestion, Ruminal bloat, acute and chronic bloat, frothy bloat, diaphragmatic hernia, Omasum paresis, Diseases of abomasum, Intestinal inflammation, Ileus, Dilatation and torsion of the caecum, Diarrhea of newborn calves, Alimentary diarrhea of calves, Winter dysentery, Enterotoxaemia andperitonitis. **Disorders of liver and pancreas. Respiratory diseases:** Inflammation of the nasal mucosa, Inflammation of the sinuses, Inflammation of the mucous membrane of the larynx, Infectious bovine rhinotracheitis, Pneumonia (bronchopneumonia, gangrenous, purulent, embolic and mycotic pneumonia) in calves and cattle. Enzootic pneumonia in calves and cattle, Pulmonary adenomatosis and pulmonary silicosis, **Cardiovascular diseases**: Pericarditis, Miocarditis, Endocarditis, Traumatic pericarditis, Heart failure, Diseases of the blood vessels. **Blood and hematopoietic diseases**: Anemia, Polycythemia, Porphyria, Hemoglobinemia and hemoglobinuria, Bovine and ovine leukemia, Hemorrhagic diathesis, Disorders of spleen. **Diseases of the urinary system**: Nephrosis, Renal amyloidosis, Acute, chronic and purulent glomerulonephritis, Pyelonephritis, Cystitis, Enzootic hematuria, Urolithiasis. **Metabolic disorders**: Depraved and perverted appetite, Ketosis, Rickets, Osteomalacia, Puerperal paresis, Atypical puerperal paresis, Tetany (grazing, stable and transport).

Practicals

Checking the health status of cows in pregnancy and lactation and calves in suckling period. Assessment of physical condition - BCS. Examination of the fore stomach and abomasum (stomach tubing, examination of the rumen content, auscultation and percussion of displaced abomasum, omentopexy and abomasopexy). Examination of the liver (palpation, percussion, biochemical diagnostics). Examination of the cardiovascular and respiratory system. Examination of the urinary system and urine (catheterization, biochemical examination). Apply practical procedures in the field of diagnosis and therapy of certain diseases of cattle, sheep and goats with the processing of clinical cases in teaching bases with which the Faculty has signed a cooperation agreement.

Recommended literature

1. Radojičić B, Bojkovski J, Jonjić B, Ćutuk R: Bolesti preživara, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2017.
2. Šamanc AH: Bolesti respiratornog i kardiovaskularnog sistema goveda, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2010.
3. Šamanc AH: Bolesti organa za varenje kod goveda, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2011.

Recommended reading

4. Šamanc AH, Vujanac MI: Bolesti sirišta goveda, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2013.
5. Stamatović S, Jovanović MM: Bolesti goveda, Fakultet veterinarske medicine, Univerzitet u Beogradu, Veterinarska komora, Beograd, 1994.
6. Divers TJ, Simon FP, William CR: Rebhun's Diseases of Dairy Cattle, St. Louis: Saunders Elsevier, 2008.
7. Pugh DG, Baird AN: Sheep & goat-medicine, St. Louis: Saunders Elsevier, 2002.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester		
Total 150	During active teaching 75	Time for self studies including examination preparation 75

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations, films), practical exercises on healthy and sick animals in teaching bases with which the Faculty has signed acooperation agreement.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Practical exam	20
Participation in practicals	30	Oral exam	30
Colloquium	10		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: One health

Lecturer/lecturers: Neđeljko Karabasil, Full Professor; Snežana Bulajić, Full Professor; Mirjana Dimitrijević, Full Professor; Sonja Radojičić, Full Professor; Dejan Krnjaić, Full Professor; Danijela Kirovski, Full Professor; Miloš Vučićević, Associate Professor; Katarina Nenadović, Associate Professor; Ljubomir Jovanović, Associate Professor; Nataša Stević, Associate Professor

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Understand the One health concept through the interconnection between people, animals and their shared environment.

Course outcomes

The student will be able to recognize the role and responsibility of the veterinary profession in the One Health concept; to apply multidisciplinary approach in promotion the well being in all aspects of people, animals and environment health.

Course content

One health - concept, definition, principles. The role and responsibility of the veterinary profession in the application of the One Health concept. Ecosystem and the impact of intensive livestock farming, agro-industry, bioclimatology and socio-economic factors on ecosystem health. Biology, ecology and epidemiology of "emerging" diseases. Zoonoses, vector-borne diseases and antimicrobial drug resistance. The importance of comparative medicine and the links between veterinary and human medicine. Sustainable food production, food and water safety and public health. Foodborne diseases.

Recommended literature

1. Jedno zdravlje, udžbenik, grupa autora, Fakultet veterinarske medicine, Univerzitet u Beogradu, Štampa Galeb, Niš, 2024.

Hours	**Lectures:** 1	**Practicals: /**

Student workload in hours, per semester

Total 60	During active teaching 15	Time for self studies including examination preparation 45

Teaching methods

Interactive theoretical classes with the use of presentations, cases, tasks related to One Health.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	30	Written exam	70
Participation in practicals		Oral exam	
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Basic principles of food hygiene

Lecturer/lecturers: Snežana Bulajić, Full Professor; Mirjana Dimitrijević, Full Professor; Neđeljko Karabasil, Full Professor; Dragan Vasilev, Full Professor; Radoslava Savić Radovanović, Full Professor; Tijana Ledina, Associate Professor; Nevena Grković, Associate Professor; Branko Suvajdžić, Assistant Professor; Jasna Lončina, Assistant Professor

Course status: Obligatory

ECTS credits: 3.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

- Defining the conditions and applying the measures necessary for the safe food production,
- Understanding the interaction between microorganisms, food matrix and food-processing factors from the aspect of food quality and safety.

Course outcomes

Upon successful completion of the course, students should be able to:

- analyze veterinary-sanitary conditions in food production facilities and apply elements of good hygienic and good manufacturing practice,
- explain the role and activity of microorganisms present in food,
- identify sources and routes of food contamination,
- identify biological, physical and chemical hazards in food,
- discuss the rationale for the use of standard methods and procedures for the microbiological analysis of food,
- explain the basic principles of food microbiological testing,
- adopt and correctly use terminology specific to this area - terms food hygiene, food safety and quality, hazard, risk analysis, microbiological criteria.

Course content

Lectures

Food of animal origin: definition, classification and categorization, food quality *vs* food safety. The role of Veterinary Services in Food Safety Systems. Prerequisite hygiene requirements: veterinary-sanitary conditions in food production facilities. Prerequisite hygiene requirements: good hygienic and good manufacturing practice. Food safety - hazard and risk analysis. Food safety - laws and regulations. Sources and routes of food contamination. Food microbiota. "*Emerging*" foodborne diseases. Microbial ecology - basic concepts. Microbial ecology - interaction of microorganisms. Factors influencing the growth and survival of food-borne microorganisms. Principles of food microbiology laboratory. Methods in food microbiology. Sampling plan and microbiological criteria for food.

Recommended literature

1. Bulajić S, Dimitrijević M, Savić-Radovanović R, Ledina T, Grković N, Lončina J, Suvajdžić B: Osnove higijene hrane životinjskog porekla, Univerzitet u Beogradu, Fakultet veterinarske medicine, CID, 2024.

Hours	**Lectures:** 2	**Practicals: -**

Student workload in hours, per semester

Total 90	During active teaching 30	Time for self studies including examination preparation 60

Teaching methods

Lecture, group discussion with a case study.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	30	Written exam	50
Participation in practicals		Oral exam	20
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Specialised surgery

Lecturer/lecturers: Milan Hadži Milić, Assistant Professor; Bogomir Bolka Prokić, Associate Professor; Maja Vasiljević, Assistant Professor; Risto Dučić, Teaching Assistant; Emilija Vujić, Teaching Assistant; Stefan Veličković, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Fulfilled pre-exam obligations in General surgery. General clinical diagnostics and propedeutics and Anesthesiology resolved

Course aims

Enabling the student to independently solve the most common surgical procedures on different types of domestic animals in certain body regions - head, neck, thorax, extremities and abdomen.

Course outcomes

Student must be familiar with surgical methods and techniques to be used on various tissues and organs, to prepare the patient for surgery, to assist as part of a team or to perform simpler surgical procedures, such as wound treatment and suturing, castration, ovariectomy and laparatomy. In addition, the student should master the basic principles of caring for injuries of the musculoskeletal system.

Course content

Lectures

Ophthalmology (vision test, tonometry, biomicroscopy, colors in eye diagnostics, direct and indirect ophthalmoscopy). Ophthalmology (suturing of eyelid and conjunctival wounds, correction of protrusion of the third eyelid and ectropium-entropy, ulcer healing). Soft tissue surgery - skin, subcutaneous tissue and fascia. Surgery of the upper respiratory tract - bleeding, empyema of the sinuses and air sacs, trepanation of the sinuses, dorsal dislocation of the soft palate, hemiplegia of the larynx, tracheotomy. Ear, lip and tooth surgery. Surgery of the esophagus, stomach, intestines and hernias - diverticulum and dilatation of the esophagus, gastric torsion, intestinal coprostasis, change in the position of the intestine, foreign bodies in the digestive tract. Diseases of the cardiovascular, nervous and endocrinesystem. Surgery of female and male genitals and urinary tract - uterine prolapse, ovariectomy, ovariohysterectomy, Kaslik's operation, penile prolapse, castration of cryptorchids, rehabilitation of inguinal and scrotal hernia, urethrotomy and urethrostomy. Surgery of the musculoskeletal system of small animals - chondropathy, rupture of ligaments, fissures and fractures, dislocations and sprains. Surgery of the musculoskeletal system of large animals - diagnosis of lameness, basic principles of treatment of arthritis, tendinitis and bursitis. Onychology - hoof structure, normal, posture adjusted and deformed hooves, corneal rupture, treads, laminitis, frog rot, sesamoid lameness and basic principles of shoeing. Diseases of the acropodium of cattle - ulcer of the hoof, digital and intradigital dermatitis, tilom. Basic principles of tumor surgery. Reconstructive surgery.

Practicals

Surgery of hematomas and abscesses, decornuation, tonsillectomy and tracheotomy and surgical procedures on teeth (filing and extraction). Laparotomy, rumenotomy, gastrotomy, bowel resection, prolapse and rectal amputation. Ovariectomy, hysterectomy and urethrotomy. Osteofixation - techniques, materials, wedges, plates, fixators. Castration and complications of castration (bleeding, prolapse, fistulas, granulomas...). Hooves and cloven hooves operations - tread on the crown and sole, incisions on the horn, compressed hoof, ulcer of the hoof and rotten frog. Technique of skin graft harvesting.

Recommended literature

1. Milosavljević P: Specijalna veterinarska hirurgija velikih životinja u terenskim uslovima, Fakultet veterinarske medicine, Univerzitet u Beogradu, Ljubostinja, Trstenik, 2017.
2. Dougles H Slatter: Textbook of small animal surgery, Saunders, Philadelphia, 2003.
3. Tadić M, Milosavljević P: Onychologia equi, klinika, patologija i terapija oboljenja kopita konja, Čikoš holding, Subotica, 1995.
4. Tadić M, Milosavljević P: Acropodium bovis, klinika, patologija i terapija, Dečije novine, Gornji Milanovac, 1991.
5. Fossum T: Small Animal Surgery, 5th Edition, Elsevier, 2018.
6. Slatter DH: Textbook of Small Animal Surgery, 3rd Edition, Saunders, 2003.
7. Brinker, Piermattei and Flo's: Handbook of Small Animal Orthopedics and Fracture Repair, 4th Edition, Saunders, 2015.
8. Muir P: Advances in the Canine Cranial Cruciate Ligament, 2nd Edition, 2018.
9. Tobias K, Spencer J: Veterinary Surgery: Small Animal, 1st Edition, Elsevier, 2011.

Hours	**Lectures:** 3	**Practicals:** 3

Student workload in hours, per semester

Total 180	During active teaching 90	Time for self studies including examination preparation 90

Teaching methods Theoretical classes with interactive learning with audio-visual methods (PowerPoint presentations, films), practical exercises on healthy and sick animals, as well as on cadavers and practical work at the Clinic of Surgery, veterinary clinics and teaching bases of the Faculty.			
Evaluation and grading (maximum 100 points)			
Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Practical exam	10
Participation in practicals	30	Oral exam	50
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Obstetrics and reproduction 2

Lecturer/lecturers: Slobodanka Vakanjac, Full Professor; Vladimir Magaš, Full Professor; Milan Maletić, Associate Professor; Miloje Đurić, Associate Professor; Ljubodrag Stanišić, Assistant Professor; Jovan Blagojević, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Obstetrics and reproduction 1 completed exam

Course aims

The aim of the course is for students to learn to recognize, diagnose and treat pathological conditions in the reproductive system, to diagnose and treat diseases of the mammary gland as well as the diseases of newborns of domestic animals.

Course outcomes

Students will acquire the following knowledge: to know the etiology, pathogenesis and therapy of diseases of the reproductive system, pathological changes in the duration of the each phase of estrus cycle of domestic animals, pathology of pregnancy, pathology of parturition and puerperium, methods of completion of parturition, diagnosis and treatment of mammary gland diseases and the diseases of newborns.

Course content

Lectures

Disorders of fertilization, early embryonic mortality, pathological fertilization. Male infertility. Diagnosis and therapy of pathologies in pregnancy, parturition and puerperium. Diagnosis and therapy of mammary gland diseases. Sterility and causes of sterility. Therapy of sterility. Congenital and nonheritable diseases of the female genital organs. Congenital and nonheritable diseases of the male genital organs. Application of hormones in biotechnology. Infectious sterility of cattle, sheep, goats, mares, pigs, dogs and cats. Metabolic disorders and reproduction.

Practicals

Vaginotomy, insertion of flesso fastener and suturing of the vulva, epidural anesthesia, pathological parturition, correction of irregular situs and position, correction of incorrect habitus of the head and extremities, fetotomy and cesarean section. Diagnosis of mammary gland disease. Diagnosis of neonatal diseases. Reproductive protocols, ultrasound diagnosis of pathological conditions of the reproductive tract and mammary gland.

Recommended literature

1. Pavlović V: Porodiljstvo, sterilitet i veštačko osemenjavanje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2018.
2. Pavlović V, Pavlović M, Vakanjac S: Dijagnostika graviditeta domaćih životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2010.
3. Petrujkić T: Reprodukcija svinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2011.
4. Vuković D, Miljković V: Klinička primena hormona u reprodukciji ženki domaćih životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2008.

Hours	**Lectures:** 3	**Practicals:** 3

Student workload in hours, per semester

Total 180	During active teaching 90	Time for self studies including examination preparation 90

Teaching methods

Theoretical classes with interactive learning with the application of audio-visual methods (PowerPoint presentations, films), practical work at the Faculty Clinic, stables and farms of cows, sheep and pigs.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	30
Participation in practicals	10	Oral exam	30
Colloquium	20		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Diseases of ruminants 2

Lecturer/lecturers: Ivan Vujanac, Full Professor; Radiša Prodanović, Associate Professor; Sreten Nedić, Assistant Professor; Sveta Arsić, Assistant Professor; Predrag Simeunović, Teaching Assistant PhD; Aleksandra Mitrović, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Completed exams in Diseases of ruminants 1, Special pathology, Pharmacology and toxicology 1 and Pharmacology and toxicology 2

Course aims

The aim of the course is that students acquire knowledge about the etiology, pathogenesis, clinical picture, diagnosis and differential diagnosis, basic clinical skills important for the treatment and prevention of diseases of cattle, sheep and goats, non-infectious and infectious etiology.

Course outcomes

After completing theoretical and practical training the student is able to: use the professional literature, properly use diagnostic procedures and diagnose the disease, adequately apply the measures of prophylaxis and therapy of diseases of particular categories of domestic ruminants.

Course content

Lectures

Water, electrolyte and acid-base balance disorders: hyperhydration, dehydration, metabolic acidosis, respiratory acidosis, metabolic and respiratory alkalosis. **Deficiency of vitamins and microelements**: hypovitaminosis and avitaminosis, lack of copper, manganese, cobalt, selenium, zinc, iron and iodine. **Musculoskeletal disorders***:* multiple inflammation of the bone marrow, paramioclonia, spastic paresis, incomplete and complete paresis of the hind legs, rheumatism of the muscles, inflammation of the joints (non-purulent and purulent), aseptic pododermatitis, foot rot - interdigital phlegmon. **Skin diseases**: hair diseases, wool deficiency and loss, papillomatosis, dermatophytosis. **Infectious diseases**: tuberculosis, paratuberculosis and pseudotuberculosis, malignant catarrhal fever, actinomycosis, actinobacillosis, infectious ceratoconjunctivitis, tetanus, diplococosis, bovina viral diarrhea (BVDV). Diseases of the central nervous system: sunburn, heat stroke, concussion, contusion, compression of the brain and spinal cord, paresis and paralysis of the caudae equinae, inflammation of the brain and spinal cord, polioencephalomalacia and necrosis of the brain, scrapie and bovine spongiform encephalopathy. **Poisonings:** organophosphate and carbamate poisoning, heavy metal poisoning, mycotoxin poisoning, plant poisoning.

Practicals

Application of drugs and rehydration agents. Examination of the locomotor system and skin. Examination of the nervous system by basic diagnostic methods. Sampling of biological material for diagnostic tests. Apply practical procedures in the field of diagnosis and therapy of certain diseases of cattle, sheep and goats with the processing of clinical cases in teaching bases with which the Faculty has signed a cooperation agreement.

Recommended literature

1. Radojičić B, Bojkovski J, Jonjić B, Ćutuk R: Bolesti preživara, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2017.
2. Šamanc AH: Bolesti respiratornog i kardiovaskularnog sistema goveda, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2010.
3. Šamanc AH: Bolesti organa za varenje kod goveda, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2011.

Recommended reading

4. Šamanc AH, Vujanac MI: Bolesti sirišta goveda, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2013.
5. Divers TJ, Simon FP, William CR: Rebhun's Diseases of Dairy Cattle, St. Louis: Saunders Elsevier, 2008.
6. Pugh DG, Baird AN: Sheep & goat-medicine, St. Louis: Saunders Elsevier, 2002.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 180	During active teaching 75	Time for self studies including examination preparation 105

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations, films), practical exercises on healthy and sick animals in teaching bases with which the Faculty has signed a cooperation agreement.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Practical exam	20
Participation in practicals	30	Oral exam	30
Colloquium	10		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Wild animal diseases

Lecturer/lecturers: Miloš Vučićević, Associate Professor; Ana Pešić, Teaching Assistant

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Microbiology with immunology 1, Microbiology with immunology 2, Pathophysiology, Pharmacology and toxicology 1, Pharmacology and toxicology 2, General pathology and Special pathology resolved

Course aims

The aim of the course is for the student to understand the place of veterinarians in the hunting economy, basic biological characteristics of hunting game, hunting technology and specifics in pathology and diagnostic and therapeutic procedures in certain species of wild animals.

The aim of the course is to enable the student to recognize the symptoms of the most common diseases of exotic pets, sample tissues, make a diagnosis and apply appropriate therapeutic protocols.

Course outcomes

The student is able to apply basic measures for prevention and control of infectious and parasitic diseases of wild animals. Also, the student is able to independently recognize the symptoms of exotic pets, sample tissues for testing, apply adequate diagnostic procedures, make differential diagnoses and use appropriate therapeutic protocols.

Course content

Lectures

Diseases of feathered game. Diseases of wild animals from the orders Artiodactyla, Carnivora, Lagomorha, Rodentia. Specifics of diagnosing and treating animal diseases in the wild. Zoonoses. Diseases of furriers and rabbits. Diseases of wild animals pets.

Practicals

Clinical exercises at the Clinic for Equine, small animal, poultry and wild animal diseases - a basic clinical examination of the exotic pets, manipulation of animals during examination, tissue sampling for testing, application of specialist examination methods, specifics of therapeutic protocols.

Field exercises in the hunting ground.

Recommended literature

1. Popović N, Ilić V: Biološke karakteristike i bolesti divljači, kunića i krznašica, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2007.
2. Quesenberry K, Mans C, Orcutt C, Carpenter JW: Ferrets, Rabbits and Rodents: Clinical Medicine and Surgery, 4th Edition, Elsevier Health Sciences, 2020.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical classes with interactive learning with the use of audio-visual methods (Power Point presentations, films), clinical vignettes, practical exercises at the Department of Diseases of Equine, Small Animal, Poultry and Wild Animal Diseases and on hunting grounds.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	
Participation in practicals	30	Oral exam	60
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Economics and management in veterinary medicine

Lecturer/lecturers: Drago N. Nedić, Full Professor; Milorad Mirilović, Full Professor; Spomenka Đurić, Associate Professor; Branislav Vejnović, Assistant Professor; Jelena Janjić, Assistant Professor

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Students should acquire: - wider knowledge of the application of economics in veterinary medicine as well as on farms in animal husbandry, nutrition and production of products of animal origin; production and service planning skills; skills of epidemiological and economic methods of design and analysis of animal health and public health; risk assessment and harm assessment skills due to animal diseases; - wider knowledge in the field of management in order to be able to establish and manage veterinary practice, to develop a good organization and strategic plan, to manage human and material resources, to make work plans, to establish good clientele and marketing for stable work and progress large, mixed or small practices.

Course outcomes

Students should: be trained to be capable managers and leaders of veterinary practice; can develop an economic analysis and business plan of veterinary practice; to develop an economic analysis and production plan on the farm; to recognize market opportunities in the country and the EU through a common agricultural policy; can make epidemiological and economic analyzes of animal health and assessments of damage due to animal diseases; to be able to analyze the market and become more competitive; to collect data, analyze them and make reports; to enable an increase in farm production and the overall development of rural areas through their approach; to increase the quality of animal relations and animal welfare; to establish a higher level of trust of users of veterinary services and thus lead to better application of veterinary and sanitary measures in all segments of veterinary activities.

Course content

Lectures

Theoretical basis of economics, management, communication, analysis-thinking, personal scientific and professional training; specifics of agro and veterinary economics; the role and place of veterinary medicine in the state agricultural policy and in the Common Agricultural Policy of the EU; the importance of economics in controlling animal health and herd productivity; production optimization; definition, classification and method of determining costs in veterinary medicine; basic and advanced methods of economic analysis of animal health; determining the income statement and balance sheet; assessment, classification and determination of economic damages in livestock production, food production, in the implementation of sanitary measures; business and financial risk in veterinary medicine; business decision making; market - type and division; specifics of supply and demand of veterinary services; international trade and animal health; risk analysis in the production and trade of animals and products; information management and marketing in veterinary medicine; determining the competitive position of veterinary practice in conditions of full competition; management theory - basic terms and definition; basic functions of management and veterinary epidemiology - planning, organization, management and control; strategic and operational management; defining goals and applying appropriate methods; development cycle of veterinary practice; clienting in veterinary medicine, herd management; veterinary organization and lifelong learning.

Practicals

Economic calculations in veterinary medicine; economic analysis and farm management; supply and demand analysis of veterinary services; preparation of economic analysis of animal health and application of certain veterinary measures; data collection and analysis and reporting; assessment of damage due to animal diseases and public health problems: analysis of the state agricultural policy and the EU Common Agricultural Policy; analysis of factors of production and services; making plans to improve production on the farm; development of appropriate tasks for certain methodological units such as: establishment of veterinary practice; development of a plan and organizational scheme; market analysis; increasing the number and level of veterinary services; designing systemic animal health protection; risk analysis in veterinary medicine; statistical methods in the analysis of animal health and production and products; development of a long-term professional development plan.

Recommended literature

1. Tešić M, Nedić D: Veterinary Economics, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2015.
2. Rushton J: Animal Health Economics: An Introduction, CABI Publishing, 2016.
3. Tešić M, Nedić D: Veterinary Practice Management, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2011.
4. Tešić M, Nedić D, Tajdić N: Veterinary Economics - practicum, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2013.
5. Fejzić N, Šerić S: Animal Health Economics, Faculty of Veterinary Medicine, University of Sarajevo, Sarajevo,

2004.
6. Đuričin D, Kaličanin Đ, Lončar D, Vuksanović Herceg I: Management and Strategy, Faculty of Economics, University of Belgrade, Belgrade, 2018.
7. Shilcock M, Stutchfield G: Veterinary Practice Management, 2nd Edition, A Practical Guide, Saunders Ltd, 2008.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 120	During active teaching 75	Time for self studies including examination preparation 45

Teaching methods

Theoretical classes with interactive learning, with the application of audiovisual techniques (PowerPoint, Keynote, Zoom, Teams), practical classes through teamwork to solve set thematic tasks and DON visits to specific subjects in the field.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	15	Written exam	25
Participation in practicals	15	Oral exam	30
Colloquium and Seminars	15		

Study programme: Integrated academic studies in veterinary medicine

Course title: Milk hygiene and technology

Lecturer/lecturers: Snežana Bulajić, Full Professor; Radoslava Savić Radovanović, Full Professor; Tijana Ledina, Associate Professor; Jasna Lončina, Assistant Professor

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Basic principles of food hygiene resolved

Course aims

- To develop knowledge, understanding and skills related to the management of milk and dairy products quality and safety,
- To independently evaluate the hygienic and technological requirements necessary for adequate milk production and dairy processing environment.

Course outcomes

Upon successful completion of the course, students should be able to:

- independently evaluate the quality and safety of milk and dairy products,
- analyze the hygienic conditions related to milk production and processing environment,
- recognize the basic technological requirements in dairy processing industry,
- adopt and correctly interpret legal regulations (national, EU, Codex Alimentarius) in relation to quality and safety of milk and dairy products.

Course content

Lectures

The economic importance of dairying. Milk and dairy products in human nutrition. The mammary gland: morphology and lactation physiology. Milk: definition, composition and variation. Non-bovine milk. Somatic cell in milk - physiological aspects and relationship to amount and composition of milk. Sensory attributes and defects of milk. Bovine mastitis. Understanding the milk microbiota: saprophytic, spoilage and pathogenic microorganisms. Milk borne diseases - epidemiology and control. Chemical contaminants in milk and public health concerns. Milking, milk production hygiene and udder health. Primary milk processing on farm (milk preprocessing): technology and sanitary requirement. Sanitary measures in dairy industry. Veterinary sanitary control over dairy industry plant. HACCP in the dairy industry. Heat treatment of milk. Milk fermentation process. Technological processes related to an increase in dry matter and fat in dairy products. Technological processes that partially or completely removed water from milk. Adverse reaction to milk and dairy products.

Practicals

Quality tests for milk and dairy products (fermented milk, milk powder, cheese, butter): Compositional Analysis. pH and titrable acidity. Alkaline phosphatase testing for milk pasteurization. Bovine subclinical mastitis diagnostics. Microbiological analysis of milk - total viable plate count, total coliform count, detection of *Mycobacterum* spp. and *Brucella* spp. Microbiologial testing of milk and dairy products based upon microbiological criteria. Detection of antibiotic/drug residues in milk.

Recommended literature

1. A plethora of books on the subject related to dairy production and processing, food safety, veterinary public health, understanding the dairy cow – available at vetbooks.ir
2. Katic V, Bulajic S: Milk hygiene and technology, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, CID, 2018.
3. Katic V: Practicum - Hygiene of milk, Serbian Veterinary Chamber, Belgrade, 2007.

Hours	**Lectures:** 4	**Practicals:** 2

Student workload in hours, per semester

Total 180	During active teaching 90	Time for self studies including examination preparation 90

Teaching methods

Lecture, group discussion, laboratory practical work.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	20	Practical exam	20
Participation in practicals		Oral exam	30
Colloquium	30		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Pharmacognosy

Lecturer/lecturers: Saša Ivanović, Full Professor

Course status: Elective

ECTS credits: 2.0

Prerequisites: Pharmacology and toxicology 1 and Pharmacology and toxicology 2 attended classes

Course aims

To provide students with basic knowledge about medicinal drugs, their preparation and testing, acquaintance with the method of preparation of phytopreparations, as well as all important pharmacologically active principles originating from plants and their effects.

Course outcomes

The student should know the basic characteristics of plants, as sources of medicinal substances, the technology of obtaining drugs and their ingredients, the basic characteristics of the most important active substances which are obtained from plants, and their pharmacological activity and application in medicine.

Course content

Lectures

Introduction, drugs, drug production and drug testing, phytopreparations, plant secondary metabolites, biological function and classification. General characteristics and definition of alkaloids (pyrrolidine alkaloids, piperidine alkaloids, pyridine alkaloids, indole alkaloids, steroid alkaloids, turpentine alkaloids, purine alkaloids), heteroiside - glycosides (phenolic heterosides, coumarin heterosides, flaroterosides and bitter heterosides, cardiotonic heterosides), saponosides, terpenoids, essential oils, lipids, carbohydrates, amino acids and peptides.

Practicals

Watching films about medicinal plants, the way they are picked, crushed and dried, and the extraction of active principles, i.e. pharmacologically active substances, and visits to plants for the production of drugs and teas.

Recommended literature

1. Kovačević N: Osnovi farmakognozije, Farmaceutski fakultet, Univerzitet u Beogradu, Srpska školska knjiga, 2002.
2. Gorunović M, Lukić P: Farmakognozija, Naša Knjiga, Beograd, 2001.
3. Kuštrak D: Farmakognozija, fitofarmacija, izdanje 1, Golden Marketing, Tehnička knjiga, Zagreb, 2005.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical classes are conducted through interactive learning, with the use of audio-visual methods (PowerPoint presentations), practical classes include (in addition to watching movies) and discussion of pharmacologically active substances derived from plants, and the possibilities of their application in veterinary medicine.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	60
Participation in practicals	10		
Colloquium			
Seminars	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Tropical diseases

Lecturer/lecturers: Sonja Radojičić, Full Professor; Sonja Obrenović, Full Professor; Dragan Bacić, Associate Professor; Nataša Stević, Associate Professor; Nevenka Aleksić, Full Professor; Danica Bogunović, Associate Professor; Milan Rajković, Teaching Assistant PhD; Tamara Radovanović, Teaching Assistant

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring knowledge of morphology and biology of pathogens related to tropical and subtropical areas; epizootiology, pathogenesis, clinical picture, diagnosis, treatment and control of diseases, in order to prevent the introduction of the causes of tropical diseases in our country and train veterinarians to independently solve problems related to the occurrence of tropical diseases.

Course outcomes

The student should know the epizootiology of the disease, pathogenesis, etiological characteristics and conditions for the development of pathogens, clinical and pathomorphological characteristics of the disease important for recognition, be able to apply the appropriate method for sampling, isolation and identification of pathogens, understand the complexity of factors contributing, maintenance and spread tropical infections as well as the pathogenic action of the causative agent on the host; is able to diagnose and apply adequate methods in the fight against tropical diseases.

Contents

Lectures

Analysis of the risk of occurrence and spread, control and eradication measures, impact on the economic and socio-economic position of the country. Epizootiology of diseases caused by arboviruses, epizootiological factors of the sub-saharan region, effective contacts between wildlife and domestic animal species in Africa. Vectors of tropical and exotic animal diseases (ticks, Muscide, Tabanide, Culicoides, mosquitoes). Infections of domestic and wild animal species in the sub-saharan region and the Far East caused by viruses, bacteria, piroplasmas and systemic mycoses. Tropical helminthiasis and parasitosis. Models of active district supervision, prophylaxis measures and education of the population.

Practicals

Introduction to laboratory techniques and clinical procedures in the diagnosis of tropical diseases, as well as measures for treatment and control of diseases.

Recommended literature

1. Radojičić S, Valčić M, Đuričić B: Infektivne bolesti životinja - specijalni deo, Naučna KMD, Beograd, 2011.
2. Jukić B: Tropske zarazne bolesti životinja, Veterinarski fakultet Sveučilišta u Zagrebu, 2003.
3. Aleksić N: Parazitske bolesti (specijalni deo), autorsko izdanje, Beograd, 2004.
4. Dimitrijević S: Dijagnostika parazitskih bolesti, FVM, Beograd, 1999.

Hours	**Lectures:** 1	**Exercises:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint, movies), practical work in the laboratory and practice of methods for diagnosing tropical diseases.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Activites during lectures	10	Oral exam	70
Practical lessons	10		
Colloquia	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Physical therapy

Lecturer/lecturers: Nikola Krstić, Full Professor; Mirjana Lazarević-Macanović, Full Professor; Marko Jumake Mitrović, Associate Professor

Course status: Elective

ECTS credits: 2.0

Prerequisite: Enrolled semester in which the course is taken

Course aims

Students should expand their knowledge about the nature and essence of physical therapy; they should also be enabled to apply its laws in practice correctly. By studying the mechanisms of therapeutic effects, a student will deepen her understanding of the physiology of pain, the physiology of receptors and synapses, the physiology of skeletal muscles and nerves, as well as of pathological processes and ways to neutralize them.

Course outcome

Upon successful completion of this course, students should be able to:

- know the general principles and laws of physical therapy, to make the differences of its stimulating effect, as well as to independently use and choose among different methods of physical treatment;
- master the ways of functioning of various devices in physical therapy and application techniques;
- perform an initial evaluation of the patient's physiological status;
- establish an individual therapy plan, form a treatment protocol and present it to the animal owner in an appropriate way;
- make a comparative analysis of the findings obtained on the basis of medical history, clinical and orthopedic examinations, as well as the results of physical therapy examinations obtained through specific tests;
- make a physical therapy diagnosis, give a prognosis of the disease and perform physical therapy treatment.

Course content

Lectures

1. Laws of physical therapy. Theoretical basis of physiotherapy. Mechanism of therapeutic effect. Specifics of stimulating effects of physical methods. 2. Electrotherapy: Medical division of currents. Galvanotherapy and ionotherapy. Faradization and application of diadynamic-modulated currents. High frequency currents (principle and biological effect). Application of ultrashort waves and microwaves in therapy. Indications for use. 3. Phototherapy: Application of infrared and ultraviolet rays in therapy and prophylaxis. Therapeutic and harmful effects. Indications for use. Application of laser beams in diagnostics and therapy. 4. Hydrotherapy: General and local hydrotherapy procedures. Physico-chemical properties of water, physiological action, biophysical action, dosimetry, application technique. 5. Massotherapy: active (kinesitherapy) and passive massage (hydro and mechanotherapy). 6. Thermotherapy and thermography: wet and dry thermotherapy procedures. Physical properties, application methodology, application technique.

Practicals

1. Application of direct current, alternating current of low frequency, medium-frequency and high-frequency current. 2. Lucotherapy, infrared diagnostics, heliotherapy, chromotherapy, actinotherapy, lasers, linearly polarized light in therapy and diagnostics. 3. Thermotherapy. 4. Paraffin therapy. 5. Parafango, clay, peloidotherapy, mineral water. 6. Thalassotherapy (sonotherapy). 7. Hydrotherapy and balneotherapy. 8. Kinesitherapy and massotherapy.

Recommended literature

1. Bockstahler B, Levine D, Millis D: Essential Facts of Physiotherapy in Dogs and Cats - Rehabilitation and Pain Management, Babenhausen: BE VetVerlag, 2004.
2. Mc Gowan C, Goff L, Stubbs N: Animal Physiotherapy (Assessment, Treatment and Rehabilitation of Animals), Blackwell Publishing, New Jersey, 2007.
3. Millis LD, Taylor AP: Canine Rehabilitation and Physical Therapy, WB Saunders, Philadelphia, 2004.
4. Stevanović J: Physiology of Nervous System, Faculty of Veterinary Medicine, Belgrade, 2004.
5. Stojić V: Veterinary Physiology, Faculty of Veterinary Medicine, Belgrade, Naučna knjiga, 2004.
6. Šehić M: Fizikalna terapija i rehabilitacija psa, Veterinarski fakultet Zagreb, 2014.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods

Power Point presentations for each lecture as well as work with physical therapy devices.

Evaluation and grading(maximum number of points 100)

Pre-exam requirements	**Points**	**Final exam**	**Points**

Lecture attendance		Written exam	60
Practical teaching	40	Oral exam	
Colloquium (colloquia)			
Seminar(s)			

Study programme: Integrated academic studies in veterinary medicine

Course title: Radioecology

Lecturer/lecturers: Branislava Mitrović, Full Professor; Jelena Matković, Teaching Assistant

Course status: Elective

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is to introduce the students with the basic principles of the impact of natural and artificial radionuclides on living organisms and the environment and protection against ionizing radiation.

Course outcomes

Upon completion of the course the student should:

- acquire knowledge about radiation sources, radioactivity measurements and the impact of radiation on living organisms and the environment;
- understand the transfer of radionuclides through the environment (air, water, soil, plants and animals);
- assess the risk to humans and non-human biota due to the presence of radioactive elements in the environment.

Course content

Lectures

Basic principles of radioecology. Radioactivity and ionizing radiation. Dosimetry and radiation detection. Radioactive environmental contamination. Nuclear accidents. Biologically significant radionuclides. Distribution and transfer of radionuclides to ecosystems. Effects of radiation on living organisms. Dose assessment and assessment of the consequences of ionizing radiation on living organisms. Reference animals and plants for assessing the effects of radioactive contamination of the environment. Radioactivity monitoring. Review and interpretation of monitoring results on the territory of the Republic of Serbia. Legislation in the field of protection against ionizing radiation.

Practicals

Basic principles of work in the laboratory for gamma spectrometry. Sampling and preparation of samples for analysis. Gamma spectrometric analysis. Visit to the Vinča Institute. Visit to the "Food Testing Center".

Recommended literature

1. Mitrović B, Andrić V, Šefer D: Praktikum iz radiobiologije i radijacione higijene, Beograd, 2016.
2. Meyers RA: Encyclopedia of sustainability science and technology, Springer, 2012 (selected chapters).
3. Smith JT, Beresford NA: Chernobyl - catastrophe and consequences, Springer, 2005.

Hours	**Lectures:** 1	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 30	Time for self studies including examination preparation 30

Teaching methods: Lectures, movies.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	20	Written exam	
Participation in practicals	30	Oral exam	
Colloquium		Seminar	50
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Diseases of equides

Lecturer/lecturers: Stefan Đoković, Associate Professor; Vanja Krstić, Full Professor; Predrag Stepanović, Associate Professor; Nenad Andrić, Full Professor; Tamara Ilić, Full Professor; Lazar Marković, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Microbiology with immunology 1, Microbiology with immunology 2, Pathophysiology, General pathology, Special pathology, Pharmacology and toxicology 1, Pharmacology and toxicology 2 and General clinical diagnostics and propedeutics resolved

Course aims

To enable students to apply theoretical and practical aspects of pathology and therapy of equine diseases and acquire skills important for direct involvement in clinical practice and independent solving of the most common problems within the usual clinical practice in equidae.

Course outcomes

The student should recognize the etiology and pathogenesis of diseases of horses included in the program, explain the mechanisms of disease, use general and specialist clinical examination and establish diagnosis and determine appropriate therapy, apply the principles of access and fixation of horses, use the drug appropriately, choose the appropriate examination method as which are rectal examination and probing of the stomach, catheterization of the bladder and choose how to act in case of suspicion of infectious diseases.

Course content

Lectures

Systemic disorders and pathology of horses. Diseases of the cardiovascular system: congenital anomalies, diseases of the heart and blood vessels, heart failure and shock. Respiratory system diseases: congenital anomalies, diseases of the upper respiratory tract, lungs and pleura. Diseases of the digestive system: diseases of the oral cavity, pharynx and salivary glands; diseases of the esophagus, stomach and intestines; colic. Liver and pancreatic diseases, peritonitis. Diseases of the hemolymphatic and immune systems. Diseases of the musculoskeletal system: myopathies, arthropathies, laminitis. Diseases of the urogenital system, skin, nervous system, endocrine system and senses. Dietary errors and metabolic disorders. Diseases of the newborn. Sports injuries and diseases. Poisoning. Current equine diseases caused by viruses, bacteria, fungi and parasites.

Practicals

Program exercises that include the application of drugs in horses and practice of basic clinical procedures in the diagnosis and treatment of diseases of individual organs and organ systems, interactive learning on examples of various diseases with complete processing of clinical cases in all areas of clinical pathology and therapy of horses, diagnostic procedure, application of appropriate testing methods, therapy and care of sick animals, exercises in a clinical laboratory, then clinical exercises in an outpatient clinic for equine diseases.

Recommended literature

1. Trailović D: Equine diseases, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2011.
2. Trailović D: Equine diseases - Practicum, Faculty of Veterinary Medicine, University of Belgrade, Naučna KMD, Belgrade, 2010.
3. Selon DC, Long MT: Equine infectious diseases, Saunders/Elsevier, St. Lous, 2007.
4. Orsini JA, Divers TJ: Equine emergencies, Treatment and procedures, 3rd Edition, Saunders/Elsevier, St. Louis, 2008.
5. Reed SM, Bayly WM, Selon DC: Equine internal medicine, 3rd Edition, Saunders/Elsevier, St. Louis, 2010.

Hours	**Lectures:** 4	**Practicals:** 3

Student workload in hours, per semester

Total 180	During active teaching 105	Time for self studies including examination preparation 75

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations, films), practical work at the Clinic for Horse Diseases and Hippodrome.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	15	Written exam	10
Participation in practicals	15	Oral exam	20
Colloquium	20	Practical exam	10

Seminars	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Diseases of dogs and cats 1

Lecturer/lecturers: Vanja Krstić, Full Professor; Nenad Andrić, Full Professor; Predrag Stepanović, Associate Professor; Darko Davitkov, Associate Professor; Anja Ilić Božović, Assistant Professor; Miloš Đurić, Assistant Professor; Lazar Karić, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Microbiology with immunology 1, Microbiology with immunology 2, Pathophysiology, General pathology, Special pathology, Pharmacology and toxicology 1, Pharmacology and toxicology 2 and General clinical diagnostics and propedeutics resolved

Course aims

Introduction to theoretical and practical aspects of pathology, diagnosis and therapy of small animal diseases and mastering the necessary skills important for direct involvement in clinical practice.

Course outcomes

Upon successful completion of this course, students should be able to recognize the symptoms of individual diseases, make a detailed clinical examination, use all available information and knowledge in compiling a comprehensive and as wide as possible list of differential diagnoses, perform all necessary clinical procedures to establish a definite etiological diagnoses, to show the ability to interpret tests and results, to compile an appropriate treatment plan in all cases of non-infectious and infectious diseases that are part of everyday clinical practice and to adequately implement therapy and prevention.

Course content

Lectures

Introduction to clinical pathology and therapy of small animals. Diseases of the cardiovascular system. Diseases of the respiratory system. Diseases of the oral cavity and pharynx. Diseases of the esophagus, stomach and intestines. Liver and pancreas diseases. Diseases of the urinary system. Endocrine diseases and metabolic disorders.

Practicals

Program exercises - application of drugs, basic principles of fluid and electrolyte replacement, clinical procedures in the diagnosis and treatment of diseases of the cardiovascular, respiratory, digestive and urogenital systems. Clinical exercises - practice of clinical procedures: clinical examination, application of drugs, intensive care, processing of clinical cases.

Recommended literature

1. Nelson R, Couto G: Small animal internal medicine, 6th Edition, Elsevier Science, 2019.
2. Ettinger S, Feldman E, Cote E: Textbook of veterinary internal medicine expert consult, 8th Edition, Elsevier Science, 2017.
3. Trailović D: Gastroenterology of dogs and cats, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2011.

Hours	**Lectures:** 2	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 60	Time for self studies including examination preparation 90

Teaching methods

Theoretical classes, PowerPoint presentations, seminars, public presentation and discussion, practical exercises on Clinics.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	10
Participation in practicals	10	Practical exam	10
Colloquium	20	Oral exam	30
Seminars	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Infectious diseases of animals with epizootiology 1

Lecturer/lecturers: Sonja Radojičić, Full Professor; Sonja Obrenović, Full Professor; Dragan Bacić, Associate Professor; Nataša Stević, Associate Professor; Tamara Radovanović, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Microbiology with immunology 1, Microbiology with immunology 2, Pharmacology and toxicology 1, Pharmacology and toxicology 2, Pathophysiology, General pathology, Special pathology resolved

Course objectives

To acquire knowledge of basic principles of the general and specific infectology and epizootiology, as well as with specific characteristics of infectious diseases of animals. Students acquire knowledge of the infectious elements characteristics and skills in order to independently work with infected animals and with infectious materials in the field as well as in the laboratory.

Course outcomes

Student should be aware of basic epizootiological principles and determinants, infectious diseases mode of transmission, risk analysis, and measures for disease control and eradication. As for specific disease, student should acquire knowledge on the etiology, epizootiology, pathogenesis, clinical signs, post mortem analysis of the diseases covered by course syllabus, to know how to take samples for laboratory diagnosis, to define suspect case of infectious disease in general and infectious disease or zoonosis, that pose danger for the country and the region in particular. Student should be aware of the administrative work and procedures in order to officially report infectious disease, to know differential diagnosis, therapy, prophylaxis, prevention and other measures in order to control infectious diseases covered with the course program.

Course content

Lectures

General infectology, basics of epizootiology, infectious disease control measures, epizootics protective measures, formation of epizootiology models and health schemes, risk analysis, bioterrorism. Diseases of bacterial etiology: diseases caused by *Clostridia spp*, *Salmonella spp*, *Brucella spp*, *Mycoplasma spp*, anthrax, glanders, melioidosis and ulcerative lymphangitis, African glanders, pasteurellosis, dourine, leptospirosis, borreliosis, psittacosis, tularemia, listeriosis, Q fever, erysipelas, infectious mare metritis.

Practicals

Sampling, packing and sending materials for laboratory testing, accompanying document, statistical aspects of sampling, ways of applying materials to laboratory animals, methods of diagnosing infectious diseases, epizootiological investigation, epizootiological diary, anthrax, erysipelas, pasteurellosis, glanders, dourine, brucellosis, salmonellosis, poultry salmonellosis, leptospirosis, borreliosis.

Recommended literature

1. Radojičić S, Valčić M, Đuričić B: Infectious diseases of animals - special part, Naučna KMD, Belgrade, 2011.
2. Valčić M: Special epizootiology, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2004.
3. Thrusfield M, Christley R: Veterinary epidemiology, 4th Edition, Wiley-Blackwell, 2018.
4. Coetzer JAW, Tustin RC: Infectious Diseases of Livestock, 2nd Edition, Oxford University Press Southern Africa, 2005.
5. Tizard I: Veterinary immunology, 10th Edition, Philadelphia, Saunders, 2017.
6. Panjević Đ: Zarazne bolesti - opšti deo, Veterinarski fakultet, Beograd, 1986.
7. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, online-access https://www.woah.org

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 75	Time for self studies including examination preparation 75

Teaching methods

Lectures, PowerPoint presentation, films, laboratory practical work, field ambulatory work.

Evaluation/grading (maximum 100 points)

Pre-exam requirements	points	**Final exam**	Points
Participation in formal lectures	5	Practical exam	30
Participation in practicals	5	Oral exam	60
Colloquium			

Study programme: Integrated academic studies in veterinary medicine

Course title: Poultry diseases

Lecturer/lecturers: Radmila Resanović, Full Professor; Miloš Vučićević, Associate Professor

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Microbiology with immunology 1, Microbiology with immunology 2, Pathophysiology, General pathology, Special pathology, Pharmacology and toxicology 1and Pharmacology and toxicology 2 resolved

Course aims

To enable the student to cope the theoretical and practical aspects of clinical pathology and therapy of poultry diseases and the necessary skills important for direct involvement in clinical practice and independent problem solving within the usual clinical practice.

Course outcomes

The student is able to recognize the most common diseases of poultry of infectious and non-infectious etiology, correctly sample relevant material for testing, select the appropriate diagnostic method and apply an adequate therapeutic protocol. Also, the student is able to perform an autopsy, sample blood, apply a vaccine and medicine, and perform tuberculin testing. After completing the course, the student is able to act in case of suspicion of infectious diseases.

Course content

Lectures

Bacterial diseases of poultry: campylobacteriosis, colibacillosis, clostridial infections, salmonellosis, streptococcus, staphylococcus, mycoplasmosis and CRD, tuberculosis, pasteurellosis, enterococcosis. Viral diseases: epidemic tremor, APV infections, Gumboro, avian influenza, NewCastle disease, infectious laryngotracheitis, infectious bronchitis, pregnancy loss syndrome, adenoviral infections, infectious poultry anemia. Fungal diseases of poultry: aspergillosis, favus, soor. Poultry intoxications and mycotoxicosis. Neoplastic diseases of poultry: Marek's disease, leukemia, osteopetrosis, reticuloendotheliosis. Metabolic diseases of poultry. Diseases as a result of nutritional deficiencies: diseases caused by water and food imbalance, diseases caused by changes in the composition of food - carbohydrates, proteins and amino acids, fats and essential fatty acids, diseases caused by vitamin deficiency.

Practicals

Introduction to poultry technology: breeding and exploitation, incubator stations. Methods of vaccine administration. Autopsy in poultry. Diagnostics in poultry production. Methods of application of drugs in poultry production.

Recommended literature

1. Fadly AM, Glisson JR, McDougald LR, Nolan LK, Swayne DE: Diseases of Poultry, John Wiley & Sons, 2011.
2. Kromm M, Prajitno TY, Rubinoff I, Zavala G: Diseases of Poultry, 14th Edition, John Wiley & Sons, 2019.
3. Vučićević M, Marinković D, Resanović R: Poultry diseases - Practicum, Faculty of Veterinary Medicine, University of Belgrade, CID, Belgrade, 2016.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 180	During active teaching 75	Time for self studies including examination preparation 105

Teaching methods

Theoretical classes with interactive learning with the use of audio-visual methods (PowerPoint presentations, films), clinical vignettes, practical exercises at the Department of Equine, Small Animal, Poultry and Wild Animal Diseases and on poultry farms.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	4	Written exam	
Participation in practicals	6	Oral exam	50
Colloquium	40		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Meat hygiene and technology 1

Lecturer/lecturers: Neđeljko Karabasil, Full Professor; Mirjana Dimitrijević, Full Professor; Dragan Vasilev, Full Professor; Nikola Čobanović, Associate Professor; Nevena Grković, Associate Professor; Branko Suvajdžić, Assistant Professor; Ivan Vićić, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Understand the principles of meat hygiene and technology; the impact hygiene, and technological procedures on meat safety and quality.

Course outcomes

Upon completion of the program, the student is expected to be able to:

- Conduct *ante-* and *post-mortem* examination of meat; evaluate meat for public consumption; apply appropriate process hygiene requirements and assess meat safety and quality.

Course content

Lectures

Meat hygiene and technology - concept and significance. Slaughterhouses - structure and organization. Animals for slaughter (cattle, ungulates, pigs, sheep and goats, poultry, game, fish). Transport and handling of animals before slaughter. Animal welfare in the meat production chain and importance for meat quality. Animal slaughter operations. Animal by products and treatment of inedible slaughter products. Veterinary inspection before and after slaughter of animals. Categories of meat usability and for public consumption. Categorization and classification of meat in carcasses. Good production practice and good hygiene practice and integrated control systems in the meat industry.

Practicals

Ante-mortem inspection. *Post-mortem* meat inspection: cattle, pig, equine, sheep/goat meat inspection. Inspection of poultry, game and fish meat. Examination of meat for the presence of Trichinella larvae. Meat testing methods. Evidence of antimicrobial drug residues.

Recommended literature

1. Teodorović V, Dimitrijević M, Karabasil N, Vasilev D: Higijena i tehnologija mesa (udžbenik), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2015.
2. Teodorović V, Bunčić O, Karabasil N, Dimitrijević M, Vasilev D: Higijena i tehnologija mesa (praktikum), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2012.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 75	Time for self studies including examination preparation 75

Teaching methods

Interactive theoretical classes with the use of presentations and audio video materials. Practical classes in the form of individual work or group work in the laboratory and in the slaughterhouse.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	10	Practical exam	10
Participation in practicals	20	Oral exam	50
Colloquium	10		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Ethics and communication in veterinary medicine

Lecturer/lecturers: Vladimir Nešić, Full Professor

Course status: Obligatory

ECTS credits: 3.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquiring the necessary knowledge that enables students to conscientiously and ethically fulfill moral principles in performing their professional activities, as well as acquiring knowledge from the theory of communication and improving all types of communication techniques in veterinary medicine; to understand and apply high standards of professional veterinary ethics in everyday work, as well as to take a leading role in society regarding the use and care of animals.

Course outcomes

After completing the course, students are able to, within their professional activities, both independently and in cooperation with other colleagues, successfully overcome modern ethical and communication challenges, and are introduced to the most common ethical and communication problems in modern veterinary medicine. After completing the course, the students will have knowledge of veterinary ethics and deontology, which relate to the rights, obligations and responsibilities of veterinary experts towards animals, owners, the profession and society as a whole. The students will be able to apply the principles of effective communication with colleagues, institutions, animal owners and the public.

Course content

Lectures

Basic ethical categories and concepts; Main directions of opinion on ethics; The importance of veterinary ethics; Veterinary Ethics and Law; Ethical aspects of animal euthanasia; The role of veterinarians from an ethical point of view in preventing animal abuse; Ethics and farm animals; Ethics and doping; Ethics and laboratory animals; Definition of communication; Ways of transmitting information and communication channels; Characteristics of communication components; Active listening; Nonverbal communication; The place of communication skills in everyday practice (RVKP); Definition of marketing; Veterinary Marketing Practice; Sale of non-veterinary goods; Marketing strategies; Specific marketing problems and solutions.

Recommended literature

1. Mullan S, Fawcett A: Veterinary Ethics: Navigating Tough Cases, 1st Edition, 5m Publishing, UK, 2017.
2. Rollin BE: An Introduction to Veterinary Medical Ethics: Theory and Cases, 2nd Edition, Wiley-Blackwell, USA, 2006.
3. Đukić B: Veterinary Medical Ethics, Vukans, Belgrade, 1996.
4. Turza K: Medicine and Society - Introduction to Medical Ethics, "Libri medicorum", Faculty of Medicine, University of Belgrade, Belgrade, 2007.

Hours	**Lectures:** 1	**Practicals:** 0

Student workload in hours, per semester

Total 90	During active teaching 15	Time for self studies including examination preparation 75

Teaching methods

Lectures; work in the autopsy room; practical classes in the form of expertise; mentoring; essay.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	20	Written exam	
Participation in practicals		Oral exam	60
Colloquium			
Seminars	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Diseases of dogs and cats 2

Lecturer/lecturers: Vanja Krstić, Full Professor; Nenad Andrić, Full Professor; Predrag Stepanović, Associate Professor; Darko Davitkov, Associate Professor; Anja Ilić Božović, Assistant Professor; Miloš Đurić, Assistant Professor; Lazar Karić, Teaching Assistant

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Microbiology with immunology 1, Microbiology with immunology 2, Pathophysiology, General pathology, Special pathology, Pharmacology and toxicology 1, Pharmacology and toxicology 2, General clinical diagnostics and propedeutics and Diseases of dogs and cats 1 resolved

Course aims

Introduction to theoretical and practical aspects of pathology, diagnosis and therapy of small animal diseases and mastering the necessary skills important for direct involvement in clinical practice.

Course outcomes

Upon successful completion of this course, students should be able to recognize the symptoms of individual diseases, make a detailed clinical examination, use all available information and knowledge in compiling a comprehensive and as wide as possible list of differential diagnoses, perform all necessary clinical procedures to establish a definite etiological diagnoses, to show the ability to interpret tests and results, to compile an appropriate treatment plan in all cases of non-infectious and infectious diseases that are part of everyday clinical practice and to adequately implement therapy and prevention.

Course content

Lectures

Diseases of the nervous system. Diseases of the musculoskeletal system. Diseases of the hemolymphatic system. Autoimmune and immune-mediated diseases. Diseases of the skin and external ear canal. Clinical toxicology. Clinical oncology.

Practicals

Program exercises - clinical procedures in the diagnosis and treatment of diseases of the hemolymphatic, nervous and musculoskeletal system, skin and ear. Clinical exercises - practice of clinical procedures: clinical examination, application of drugs, intensive care, processing of clinical cases.

Recommended literature

1. Nelson R, Couto G: Small animal internal medicine, 6th Edition, Elsevier Science, 2019.
2. Ettinger S, Feldman E, Cote E: Textbook of veterinary internal medicine expert consult, 8th Edition, Elsevier Science, 2017.

Hours	**Lectures:** 2	**Practicals:** 2

Student workload in hours, per semester

Total 120	During active teaching 60	Time for self studies including examination preparation 60

Teaching methods

Theoretical classes, PowerPoint presentations, seminars, public presentation and discussion, practical exercises on Clinics.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	Points
Lecture attendance	10	Written exam	10
Participation in practicals	10	Practical exam	10
Colloquium	20	Oral exam	30
Seminars	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Infectious diseases of animals with epizootiology 2

Lecturer/lecturers: Sonja Radojičić, Full Professor; Sonja Obrenović, Full Professor; Dragan Bacić, Associate Professor; Nataša Stević, Associate Professor; Tamara Radovanović, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Infectious diseases of animals with epizootiology 1 resolved

Course aims

Introduction to the specific characteristics of certain infectious diseases of animals. Getting to know the characteristics of infectious factors and skills necessary for independent and safe work with infectious agents in the field and laboratory.

Course outcomes

The student should know the etiology, epizootiology, pathogenesis, clinical picture, pathomorphological changes of diseases covered by the program, to know and be able to sample material necessary for diagnosis, to be able to make an objective suspicion of an infectious disease, especially those infectious diseases that threaten the whole country or are from the group of zoonoses. The student should also understand the procedure for reporting infections, know the differential diagnosis, therapy, prophylaxis as well as measures to control certain infectious diseases.

Course content

Lectures

Characteristics of viral infections, epizootiology and diagnosis of viral diseases, diseases of viral etiology caused by viruses from the families: *Poxviridae, Picornaviridae, Reoviridae, Herpesviridae, Flaviviridae, Bunyaviridae, Retroviridae, Paramyxoviridae, Rhabdoviridae, Arteriviridae, Coronaviridae, Ortomyxoviridae, Asfarviridae, Caliciviridae, Parvoviridae*, diseases caused by prions - transmissible spongiform encephalopathies (TSEs).

Practicals

Introduction to epizootic and laboratory diagnostics of viral diseases, diagnostics: rabies, fluorescent antibody technique, Morbus Aujeszky, Classical swine fever, African swine fever, influenza, Newcastle diseases, poxviruses infections, foot and mouth disease, complement titration, RVK, enzyme immunoassays, assessment results of diagnostic tests, simulation of procedures in the event of the occurrence of particularly dangerous infectious diseases.

Recommended literature

1. Radojičić S, Valčić M, Đuričić B: Infectious diseases of animals - special part, Naučna KMD, Belgrade, 2011.
2. Valčić M: Special epizootiology, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2004.
3. Thrusfield M, Christley R: Veterinary epidemiology, 4th Edition, Wiley-Blackwell, 2018.
4. Coetzer JAW, Tustin RC: Infectious Diseases of Livestock, 2nd Edition, Oxford University Press Southern Africa, 2005.
5. Tizard I: Veterinary immunology, 10th Edition, Philadelphia, Saunders, 2017.
6. Panjević Đ: Zarazne bolesti - opšti deo, Veterinarski fakultet, Beograd, 1986.
7. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, online-access https://www.woah.org

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 75	Time for self studies including examination preparation 75

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint, movies), practical work in the laboratory and practice of methods for diagnosing infectious diseases.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	5	Practical exam	30
Participation in practicals	5	Oral exam	60
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Swine disease

Lecturer/lecturers: Ivan Vujanac, Full Professor; Radiša Prodanović, Associate Professor; Sreten Nedić, Assistant Professor; Sveta Arsić, Assistant Professor; Predrag Simeunović, Teaching Assistant PhD; Aleksandra Mitrović, Teaching Assistant

Course status: Obligatory

ECTS credits: 5.0

Prerequisites: Pathophysiology, General clinical diagnostics and propedeutics, General pathology, Special pathology, Pharmacology and toxicology 1 and Pharmacology and toxicology 2 resolved

Course aims

The aim of the course is for students to acquire knowledge about the etiology, pathogenesis, clinical picture, diagnosis and differential diagnosis, basic clinical skills important for the therapy and prevention of the organ systems diseases of pigs.

Course outcomes

After completing the theoretical and practical classes, the student is trained to: to use professional literature, correctly use diagnostic procedures and diagnose diseases, adequately apply measures for prophylaxis and therapy of swine diseases on commercial farms.

Course content

Lectures

Disorders of digestive system: diseases of the mouth, tongue, salivary glands, teeth and esophagus, esophagogastric ulcer, colibacillosis, dysentery, intestinal adenomatosis, enteritis necroticans, transmissible gastroenteritis, enzootic viral diarrhea, vomiting syndrome and retardation in the growth of piglets, change in bowel position, prolapsed of the rectum and anus, ascites and peritonitis. Liver and pancreas diseases. **Respiratory diseases**: rhinitis, atrophic rhinitis, mycoplasma pneumonia, pleuropneumonia, pleuritis, PRRS. **Cardiovascular diseases**: pericarditis, myocarditis and endocarditis, heartworm, heart attack, heart failure, peripheral blood flow weakness and blood vessel disorders. **Blood and hematopoietic diseases**: anemia, leukemia, hemolytic disease of newborn piglets, prolonged umbilical cord bleeding, thrombocytopenic purpura, spleen diseases. **Urinary tract diseases**: nephropathy, bacterial pyelonephritis, cystitis, urolithiasis and enterorenal syndrome. **Diseases of the nervous system and senses**: sunburn and heat stroke, inflammation of the brain and meanings, paresis and paralysis of the legs, sow eclampsia, congenital tremor of piglets, ear diseases. **Metabolic disorders**: rahitis, ostomalatia, sow ketosis and piglet hypoglycemia. **Diseases of the locomotory organs**: pododermatitis, epiphysiolysis of the humerus, epiphysiolysis of the femur, stiffness of the joints, stress syndrome. **Skin diseases**: erythema, urticaria, photodermatosis, moist eczema, parakeratosis and *pityriasis rose*. **Disease of mamar gland:** hypo and agalactia. **Infectious diseases of pigs**: tuberculosis, pseudotuberculosis, actinomycosis, actinobacillus, poliserositis, tetanus, diplo-streptococcal infections, circovirus infections. **Poisonings**: organophosphate and carbamate poisoning, heavy metal poisoning, mycotoxin poisoning, plant poisoning.

Practicals

Biosecurity on pig farms, Health control of sows in pregnancy, Health control of suckling piglets, Health control of piglets in rearing, Health control of fattening pigs, Drug application, Sampling of biological material for diagnostic tests.

Recommended literature

1. Šamanc AH: Bolesti svinja, Naučna KMD, Beograd, 2009.
2. Simeunović P, Prodanović P, Vujanac I, Štukelj M, Bojkovski J: Bolesti svinja - praktikum, Naučna KMD, Beograd, 2016.

Hours	**Lectures:** 3	**Practicals:** 2

Student workload in hours, per semester

Total 150	During active teaching 75	Time for self studies including examination preparation 75

Teaching methods

Theoretical classes with interactive learning, with the application of audiovisual methods (PowerPoint presentations), practical exercises on pig farms of commercial type, with which the Faculty has a contract.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	10	Practical exam	20
Participation in practicals	20	Oral exam	30
Colloquium	10		
Seminars	10		

Study programme: Integrated academic studies in veterinary medicine

Course title: Meat hygiene and technology 2

Lecturer/lecturers: Neđeljko Karabasil, Full Professor; Mirjana Dimitrijević, Full Professor; Dragan Vasilev, Full Professor; Nikola Čobanović, Associate Professor; Silvana Stajković, Associate Professor; Nevena Grković, Associate Professor; Branko Suvajdžić, Assistant Professor; Ivan Vićić, Teaching Assistant

Course status: Obligatory

ECTS credits: 6.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Understand the principles of meat/meat products hygiene and technology; the impacthygiene and technological procedures on meat/meat products safety and quality.

Course outcomes

Upon completion of the program, the student is expected to be able to apply appropriate process of production, process hygiene requirements and assess the safety and quality of meat and meat products.

Course content

Lectures

Composition and properties of meat. Meat spoilage. Methods of meat preservation: cooling and freezing, salting and curing of meat, smoking of meat, drying of meat, packaging of meat and meat products, heat treatment. Additives in meat products. Meat products: boiled sausages, cooked sausages, fermented sausages, cured meat products, smoked products, canned meat. Hygiene and fat technology. Hygiene and technology of eggs and egg products. Hygiene and technology of honey. Biological, chemical and physical hazards in the meat and meat product production chain. Good manufacturing practice and good hygiene practice in meat processing plants and integrated control systems.

Practicals

Meat properties, post-mortem processes. Meat and fat spoilage. Microbiological examination of meat and meat products. Control of technological processes of meat processing. Examination of meat products. Examination of eggs and honey.

Recommended literature

1. Teodorović V, Dimitrijević M, Karabasil N, Vasilev D: Higijena i tehnologija mesa (udžbenik), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2015.
2. Teodorović V, Bunčić O, Karabasil N, Dimitrijević M, Vasilev D: Higijena i tehnologija mesa (praktikum), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2012.

Hours	**Lectures:** 4	**Practicals:** 3

Student workload in hours, per semester

Total 180	During active teaching 105	Time for self studies including examination preparation 75

Teaching methods

Interactive theoretical classes with the use of presentations and audio video materials. Practical classes in the form of individual work or group work in the laboratory and in the meat processing plant.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Practical exam	10
Participation in practicals	20	Oral exam	50
Colloquium	10		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Radiobiology with radiation hygiene

Lecturer/lecturers: Branislava Mitrović, Full Professor; Jelena Matković, Teaching Assistant

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

to acquaint students theoretically and practically with modern methods of applying ionizing radiation in veterinary medicine, measuring radioactivity and to be able to implement countermeasures to protect the animals in emergency situations.

Course outcomes

Upon completion of the course the student should:

- acquires knowledge about the origin of ionizing radiation and radioactivity in the environment and the possibilities of their application in veterinary medicine;
- knows what is radiation risk, radiological reaction and recognizes radiation diseases in domestic animals;
- to understand the movement of biologically important radionuclides through the links of the food chain and to be able to recommend appropriate animal countermeasures in case of radioactive contamination of the environment;
- to be able to apply legal regulations in the field of radiation protection.

Course content

Lectures

The place and role of radiobiology and radiation hygiene in veterinary medicine. Radioactivity, radioactive decay. Dosimetry and radiation detection. Natural and manufactured radiation sources. Radioactive contamination of the biosphere. Biologically significant radionuclides. Fundamentals of radiobiology. Mechanisms of action of ionizing radiation. The effect of ionizing radiation on the cell. Mechanisms of reparation of radiation injury. Radiation injury in tissues and organs. Acute radiation syndrome. Chronic radiation syndrome, beta burns, radiological poisoning, and associated radiation injuries. Protection of animals and livestock production in an emergency situation. Protection against radiation and radioactive contamination. Legislation in the field of protection against ionizing radiation. Radiation monitoring of the environment.

Practicals

Detection and dosimetry of ionizing radiation. ATOMTEX radioactive radiation monitor. KOMO-TM radiation monitor. Nuclear tests and accidents. Determination of mass volume and mass surface radioactive contamination of SVIT-10. Gamma spectrometry. Organization of domestic animal nutrition in accidental conditions. Work in food technology in emergency conditions.

Recommended literature

1. Mitrović B, Andrić V, Šefer D: Praktikum iz radiobiologije i radijacione higijene, Belgrade, 2016.
2. Gupta R: Veterinary toxicology. Basic and clinical principles, Elsevier, 2007 (selected chapters).
3. Pöschl M, Nollet LML: Radionuclide Concentrations in Food and the Environment, Taylor & Francis Group, 2006.

Hours	**Lectures:** 1	**Practicals:** 2

Student workload in hours, per semester

Total 60	During active teaching 45	Time for self studies including examination preparation 15

Teaching methods: lectures, films, practical work with radiation monitors.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Oral /written exam	50
Participation in practicals	10		
Colloquium	30		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Veterinary laws and regulations

Lecturer/lecturers: Vladimir Nešić, Full Professor; Jelena Aleksić Radojković, Associate Professor; Dajana Davitkov, Assistant Professor

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is to provide student with basic knowledge of national and EU laws and regulations in the field of veterinary medicine, with special emphasis on the control of infectious animal diseases and zoonoses, animal welfare, domestic and international trade in animals and products, and hygiene of food, products and animal by-products origin. The goal is for the student to know how to find and apply valid regulations in the field of veterinary medicine in specific situations.

Course outcomes

After completing the theoretical part and practical classes, the student will have the knowledge to understand the organization of the veterinary service, legal terms and regulations in the field of public veterinary health, will be able to independently distinguish between binding and non-binding EU acts, and apply knowledge for good during the control of transport and traffic of animals, as well as the facilities in which they are kept. It is expected that the student will be able to recognize and systematically present the advantages of harmonizing national with EU regulations. Students will be able to correctly interpret, apply and implement laws and bylaws in the field of veterinary activities.

Course content

Lectures

Introduction to legislation, the importance of veterinary regulations, the historical development of veterinary legislation and veterinary services in Serbia. The concept and types of normative acts, the procedure for passing laws, the state and economic organization of the RS. Organization of the veterinary service. Law on Public Administration. Law on Public Services. Organization and work of the administrative body for veterinary affairs. Administrative procedure: concept, importance of knowledge, principles. Veterinary Act. Regulations. Sources of EU legislation. International Veterinary Organizations (OIE, WVA, WSAVA). Monitoring and control of infectious animal diseases and zoonoses. Animal welfare regulations. Domestic and international traffic and protection of animals during transport. Legislation related to the protection of wild animal species.

Practicals

Interpretation of international and national regulations in the field of veterinary medicine; Practical work with the veterinary inspector during the inspection in the field of control of food and products of animal origin; control of the operations of veterinary dispensaries, stations, pharmacies, clinics, shelters for abandoned animals, kennels, boarding houses, etc.

Recommended literature

1. Veterinary Law; Animal Welfare Act; Food Safety Act; Law on Medicines and Medical Devices; By-laws in the field of veterinary medicine
2. Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law')
3. Directive 2010/63/EU on the protection of animals used for scientific purposes
4. Directive 2003/99/EC on the monitoring of animal diseases and infections
5. Council Regulation (EC) No 1/2005 on the protection of animals during transport and related operations
6. Directive 92/118/EEC - animal health and public health requirements for trade in and imports into the EU of certain products
7. Regulation (EU) 798/2008 - List of non-EU countries, territories or zones from which poultry and poultry products may be imported into and transit through the Community and the veterinary certification requirements

Hours	**Lectures:** 2	**Practicals:** 1

Student workload in hours, per semester

Total 60	During active teaching 45	Time for self studies including examination preparation 15

Teaching methods

Lectures; practical application of regulations in the field of veterinary medicine (filling in forms, working with a veterinary inspector in the field).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	20	Written exam	

Participation in practicals	10	Oral exam	50
Colloquium	20		
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Forensic veterinary medicine

Lecturer/lecturers: Vladimir Nešić, Full Professor; Jelena Aleksić Radojković, Associate Professor; Dajana Davitkov, Assistant Professor

Course status: Obligatory

ECTS credits: 4.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

To enable students to understand general pathological changes and consequent mechanisms of cellular reaction to established changes, to evaluate different types of injuries and mechanisms of their occurrence, to distinguish between lifelong and postmortem changes, to exclude confirmed violent death, abuse and neglect of animals and to determine the duration of a pathological process. The aim of the course is to acquaint students with legal obligations and responsibilities in performing daily veterinary work, writing an autopsy report after a forensic autopsy, training to perform expertise in veterinary medicine through findings and opinions, as well as introduction to the criminal liability of veterinarians.

Course outcomes

After completing the course and practical classes, the student will be able to independently perform forensic autopsies, to assess lifelong and postmortem changes that distinguish intentional from accidental injuries. The student will be able to classify various types of injuries and assess the means that are suitable to seriously injure the body, tools and weapons with which the injuries were inflicted, as well as to adequately sample material for molecular, toxicological and other analyzes in veterinary forensics.

Course content

Lectures

Law on Civil Procedure. Regulations in the field of criminal offenses and their significance for the veterinary profession. Law on Obligations and its application in the veterinary profession. Methods of expertise. Forensic assessment of general pathomorphological changes: cell damage and death, circulatory disorders, inflammation, growth disorders; forensic assessment of postmortem changes. Forensic assessment of viral and bacterial diseases common to several animal species. Forensic assessment of joint parasitosis. Forensic assessment of diseases and defects of horses. Forensic assessment of cattle diseases and defects. Forensic assessment of diseases and defects of pigs. Forensic assessment of diseases and defects of sheep and goats. Forensic assessment of diseases and defects of dogs. Forensic assessment of rabbit disease. Forensic assessment of bee diseases. Animal injuries - forensic assessment. Veterinary responsibility. Professional errors during work or in connection with work in the fields of veterinary activity.

Practicals

Forensic autopsies. Expertise based on court records.

Recommended literature

1. Aleksić J, Aleksić Z: Forensic Veterinary Medicine - General Part, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2019.
2. Đukić B, Aleksić Z: Forensic Veterinary Medicine - Special Part, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2001.
3. Marinković D, Nešić V: Animal autopsy technique with the basics of thanatology, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, 2013.
4. Merck M: Veterinary forensics: Animal cruelty investigations, 2nd Edition, Wiley-Blackwell, Iowa, USA, 2012.
5. Brooks J: Veterinary forensic pathology, volume 1-2, Springer Nature, Pennsylvania, USA, 2018.

Hours	**Lectures:** 1	**Practicals:** 2

Student workload in hours, per semester

Total 120	During active teaching 45	Time for self studies including examination preparation 75

Teaching methods

Lectures; case reports; work in the autopsy room; preparation of findings and expert opinions.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	20	Written exam	
Participation in practicals	10	Oral exam	50

Colloquium	20		
Seminars			

CLINICAL ROTATION

Clinical pathology of pets

Clinical pathology of farm animals

Clinical pathology of equidae

Urgent and mobile clinic

Food hygiene and technology of animal origin

Administrative veterinary medicine

Laboratory practice

Study programme: Integrated academic studies in veterinary medicine

Course title: Clinical pathology of pets

Lecturer/lecturers: Natalija Milčić Matić, Assistant Professor; Vanja Krstić, Full Professor; Radmila Resanović, Full Professor; Nenad Andrić, Full Professor; Predrag Stepanović, Associate Professor; Nikola Krstić, Full Professor; Vladimir Magaš, Full Professor; Miloš Vučićević, Associate Professor; Stefan Đoković, Associate Professor; Darko Davitkov, Associate Professor; Anja Ilić Božović, Assistant Professor; Maja Vasiljević, Assistant Professor; Miloš Đurić, Assistant Professor; Lazar Marković, Teaching Assistant; Lazar Karić, Teaching Assistant; Ana Pešić, Teaching Assistant

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The student should understand the role and responsibilities of veterinarians in clinical work with pets and acquire skills important for direct involvement in practice and independent problem solving.

Course outcomes

Upon successful completion of the clinical rotation, the student will be able, under the supervision of a teacher, to safely handle companion animals, obtain a relevant medical history, and perform a systematic clinical examination; formulate a problem list and justify differential diagnoses; select and perform basic diagnostic procedures, collect and prepare samples for laboratory testing, and critically interpret the findings obtained; propose a treatment plan, administer the prescribed therapy, and monitor the patient's response. The student applies the principles of animal welfare, biosecurity, and responsible use of medicines; maintains accurate clinical records, communicates professionally with the clients and veterinary team members.

Course content

DON

Practical work on clinical cases of companion animals in outpatient and, depending on the organization of teaching, inpatient conditions, under the supervision of a teacher. Patient admission and identification, taking a medical history, safe handling and restraint, systematic clinical examination, and assessment of body condition, nutritional status, and welfare. Formulating a problem list, justifying differential diagnoses, and creating a diagnostic plan. Collecting, labeling, storing, and preparing samples for testing; performing selected basic diagnostic procedures and interpreting laboratory and other diagnostic findings within the context of the clinical case. Creating a treatment plan, calculating doses and administering the prescribed therapy, pain assessment and management, and monitoring the patient's response. Preventive healthcare and counseling of clients. Implementing biosecurity measures, responsible use of medicines, maintaining accurate clinical records, case presentation, and communicating professionally with clients and veterinary team members. Recognizing the need for consultation or patient referral.

Recommended literature

1. Nelson R, Couto G: Small animal internal medicine, 6th Edition, Elsevier Science, 2019.
2. Ettinger S, Feldman E, Cote E: Textbook of veterinary internal medicine expert consult, 8th Edition, Elsevier Science, 2017.
3. Trailović D: Gastroenterologija pasa i mačaka, FVM, Beograd, 2011.
4. Andrić N i sar: Bolesti pasa i mačaka 1, FVM, Beograd, 2021.
5. Quesenberry KE, Orcutt CJ, Mans C, Carpenter JW: Ferrets, Rabbits and Rodents: Clinical Medicine and Surgery, 4th Edition, Elsevier, 2021.

Hours	**Lectures:**	**Practicals:** DON 4

Student workload in hours, per semester

Total 60	During active teaching /	Time for self studies including examination preparation 60

Teaching methods

Practical work of students on clinical cases, organized by cases, samples, and procedures, under the supervision of teachers in the respective fields. Demonstration of the procedures, performance of procedures by the students under supervision, immediate feedback, and re-performance as needed. Analysis and presentation of clinical cases, interpretation of diagnostic findings, and discussion of treatment selection and monitoring the patient's response to treatment. Maintaining a clinical rotation logbook with a clear distinction between observation, assisting, and performing procedures under supervision.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Final exam	30
Participation in practicals		Seminars	70

Colloquium			

Study programme: Integrated academic studies in veterinary medicine

Course title: Clinical pathology of farm animals

Lecturer/lecturers: Sreten Nedić, Assistant Professor; Ivan Vujanac, Full Professor; Radiša Prodanović, Associate Professor; Sveta Arsić, Assistant Professor; Predrag Simeunović, Teaching Assistant PhD; Aleksandra Mitrović, Teaching Assistant; Slobodanka Vakanjac, Full Professor; Vladimir Magaš, Full Professor; Milan Maletić, Associate Professor; Miloje Đurić, Associate Professor; Ljubodrag Stanišić, Assistant Professor; Jovan Blagojević, Teaching Assistant; Radmila Resanović, Full Professor; Miloš Vučićević, Associate Professor; Branko Petrujkić, Full Professor; Stamen Radulović, Associate Professor; Dejan Perić, Assistant Professor; Katarina Nenadović, Associate Professor; Vladimir Drašković, Assistant Professor; Radovan Marčetić, Teaching Assistant

Course status: Obligatory

ECTS credits: 2.0

Prerequisites: Diseases of ruminants 1, Diseases of ruminants 2, Swine disease, Obstetrics and reproduction 1, Obstetrics and reproduction 2 and Poultry diseases resolved

Course aims

The aim of the course is that students acquire knowledge about the etiology, pathogenesis, clinical picture, diagnosis and differential diagnosis, basic clinical skills important for the treatment and prevention of diseases of farm animals.

Course outcomes

Upon successful completion of the clinical rotation, the student will be able to, in a clinical and production environment on production animals, to assess the health status of an individual animal and the herd/flock, collect relevant anamestic and epidemiological data, perform a clinical examination, and assess health, welfare, and production indicators; identify health and production problems; apply appropriate diagnostic, therapeutic, and preventive measures, including the principles of biosecurity and responsible use of medicines; and professionally document and justify their findings.

Course content

DON

Collecting anamestic data on an individual animal and the herd/flock. Proper handling and restraint of animals. Performing a clinical examination of different categories of production animals. Assessing the health status of the herd/flock based on clinical, reproductive, and production indicators. Independent use of diagnostic procedures and diagnosing diseases in production animals. Collecting, labeling, and sending samples for laboratory testing. Interpreting laboratory findings within the context of a specific clinical case or herd/flock health assessment. Implementing preventive measures and therapy for diagnosed diseases in production animals under field conditions. Recognizing complex situations on the farm and providing expert consultations as needed.

Recommended literature

1. Radojičić B, Bojkovski J, Jonjić B, Ćutuk R: Bolesti preživara, Naučna KMD, 2017.
2. Šamanc AH: Bolesti organa za varenje goveda, Naučna KMD, 2009.
3. Šamanc AH: Bolesti respiratornog i kardiovaskularnog sistema goveda, Naučna KMD, 2010.
4. Šamanc AH: Bolesti svinja, Naučna KMD, 2009.
5. Pavlović V: Porodiljstvo, sterilitet i veštačko osemenjavanje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2018.
6. Pavlović V, Pavlović M, Vakanjac S: Dijagnostika graviditeta domaćih životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2010.
7. Petrujkić T: Reprodukcija svinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2011.
8. Vuković D, Miljković V: Klinička primena hormona u reprodukciji ženki domaćih životinja, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2008.
9. Resanović R, Palić T, Vučićević M: Bolesti živine, Beograd, 2021.

Recommended reading:

10. Prodanović R: Poremećaji energetskog metabolizma krava, Naučna KMD, 2025.
11. Šamanc AH, Vujanac MI: Bolesti sirišta goveda, Naučna KMD, 2013.
12. Divers TJ, Simon FP, William CR: Rebhun's Diseases of Dairy Cattle, St. Louis: Saunders Elsevier, 2008.
13. Pugh DG, Baird AN: Sheepand goat-medicine, St. Louis: Saunders Elsevier, 2002.
14. Zimmerman JJ, Karriker LA, Ramirez A, Schwartz KJ, Stevenson GW: Diseases of swine, Blackwell, Iowa State University, USA, 2012.

Hours	**Lectures:**	**Practicals:** DON: 4

Student workload in hours, per semester

Total 60	During active teaching /	Time for self studies including examination preparation 60

Teaching methods

Practical work in the field with healthy and sick animals.

Evaluation and grading (maximum 100 points)			
Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Final exam	30
Participation in practicals		Seminars	70
Colloquium			

Study programme: Integrated academic studies in veterinary medicine

Course title: Clinical pathology of equidae

Lecturer/lecturers: Stefan Đoković, Associate Professor; Vanja Krstić, Full Professor; Predrag Stepanović, Associate Professor; Nenad Andrić, Full Professor; Nikola Krstić, Full Professor; Vladimir Magaš, Full Professor; Darko Davitkov, Associate Professor; Anja Ilić Božović, Assistant Professor; Maja Vasiljević, Assistant Professor; Miloš Đurić, Assistant Professor; Lazar Marković, Teaching Assistant

Course status: Obligatory

ECTS credits: 1.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

To enable students to understands the role and responsibilities of veterinarians in clinical work with equidae and acquire skills important for direct involvement in clinical practice and independent problem solving.

Course outcomes

Upon successful completion of the clinical rotation, the student will be able, under the supervision of a teacher, to safely approach, handle, and perform appropriate restraint of equines; collect relevant anamnestic data and perform a systematic clinical examination; formulate a problem list, justify differential diagnoses, and recognize emergency conditions; select and perform basic diagnostic procedures and interpret the findings obtained while considering their limitations; propose and implement appropriate therapeutic and preventive measures, including pain assessment and management, and monitor the patient's response. The student applies the principles of animal welfare, biosecurity, and responsible use of medicines; communicates professionally with the clients and veterinary team members; and maintains accurate clinical records.

Course content

DON (additional forms of teaching)

Practical work on clinical cases of equines in outpatient and field conditions, under the supervision of a teacher. Safe approach, handling, and restraint of equines. Collecting anamestic data on health status, nutrition, husbandry, purpose, and previous treatment. Systematic general clinical examination and targeted examinations of organ systems. Basic assessment of gait and lameness and hoof examination; clinical assessment of patients with colic and respiratory disorders; basic examination of the skin, eye, and oral cavity, and recognizing signs of reproductive disorders. Formulating a problem list, justifying differential diagnoses, and creating a diagnostic plan. Collecting and preparing samples, performing selected basic diagnostic procedures, and interpreting findings. Recognizing emergency conditions and applying basic initial management measures. Basic wound management and bandaging. Treatment planning, calculating doses and administering the prescribed therapy, pain assessment and management, monitoring the response to therapy, and assessing the prognosis. Preventive healthcare, welfare assessment, and implementation of biosecurity measures. Maintaining accurate clinical records, case presentation, communicating professionally with clients and veterinary team members, and assessing the need for patient referral for a specialist examination.

Recommended literature

1. Trailović D: Equine diseases, Naučna KMD, Belgrade, 2011.
2. Reed SM, Bayly WM, Selon DC: Equine Internal Medicine, 3rd Edition, Saunders/Elsevier, St. Louis, 2010.
3. Orsini JA, Divers TJ: Equine Emergencies: Treatment and Procedures, Saunders/Elsevier, St. Louis, 2008.
4. Celia Marr, Bowen M: Cardiology of the Horse, 2nd Edition, Saunders/Elsevier, 2010.
5. Hinchcliff K, Kaneps A: Equine Sports Medicine and Surgery: Basic and clinical sciences of the equine athlete, 2nd Edition, Sounders/Elsevier, 2014.

Hours	**Lectures: -**	**Practicals:** DON: 2

Student workload in hours, per semester

Total 30	During active teaching	Time for self studies including examination preparation 30

Teaching methods

Practical work of students on clinical cases of equines, organized by cases and procedures, under the supervision of teachers in the respective fields. Demonstration and performance of procedures by students, with immediate feedback. Analysis and presentation of clinical cases, interpretation of diagnostic findings, and discussion on the choice of therapy and patient monitoring. Maintaining a clinical rotation logbook.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Final exam	30
Participation in practicals		Seminars	70
Colloquium			

Study programme: Integrated academic studies in veterinary medicine

Course title: Urgent and mobile clinic

Lecturer/lecturers: Bogomir Bolka Prokić, Associate Professor; Milan Maletić, Associate Professor; Vladimir Magaš, Full Professor; Miloje Đurić, Associate Professor; Ivan Vujanac, Full Professor; Radiša Prodanović, Associate Professor; Stefan Đoković, Associate Professor; Milan Hadži Milić, Assistant Professor; Maja Vasiljević, Assistant Professor; Ljubodrag Stanišić, Assistant Professor; Sreten Nedić, Assistant Professor; Sveta Arsić, Assistant Professor; Risto Dučić, Teaching Assistant; Emilija Vujić, Teaching Assistant; Stefan Veličković, Teaching Assistant

Course status: Obligatory

ECTS credits: 1.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Students acquire practical knowledge of basic emergency procedures (admission and triage of the patient, determination of life-threatening status, endotracheal intubation, placement of a nasal catheter, tracheotomy, pain therapy). Practical application of anesthetic protocols in emergencies. Students get acquainted with the practical aspects of clinical pathology and therapy of social and farm animals and gain practical experience for direct involvement in clinical practice.

Course outcomes

Upon successful completion of the clinical rotation, the student will be able, under the supervision of a teacher, to safely approach, and appropriately restrain an animal; perform triage and initial clinical assessment, recognize life-threatening conditions, and perform basic first aid, stabilization, and pain management procedures. The student selects and performs basic diagnostic procedures, interprets available findings, proposes and implements treatment measures, and repeatedly reassesses the patient's condition and response to intervention. In mobile practice conditions, the student performs selected basic clinical procedures, adapts their work to the available resources, and assesses the need for patient transport, consultation, or referral. Throughout their work, the student applies the principles of animal welfare, biosecurity, and responsible use of medicines; communicates professionally and maintains accurate clinical records.

Course content

DON

Introduction to the most common emergencies, triage of emergency patients, resuscitation protocols, basic emergency procedures, anesthesia and analgesia of emergency patients. Fixing the animals, resolving the retention of placenta and uterine prolapse, and placing a Biner suture. Castration of stallions, boars and ruminants, sow ovariectomy, cesarean section, ruminotomy and abomazopexy, treatment of umbilical and scrotal hernias, hematomas and abscesses, correction of teeth and treatment of hooves.

Recommended literature

1. Pavlović V i sar: Porodiljstvo, sterilitet i veštačko osemenjavanje, Naučna KMD, 2018.
2. Milosavljević SP: Specijalna hirurgija velikih životinja u terenskim uslovima, Ljubostinja Trstenik, 2018.
3. Tadić M, Milosavljević P: Acropodium bovis, klinika, patologija i terapija, Dečje novine, 1991.
4. Noakes DE, Parkinson TJ, England GCW: Veterinary reproduction and obstetrics, Saunders Elsevier, 2009.
5. Youngquist RS, Threlfall WR: Large Animal Theriogenology, Saunders Elsevier, 2007.
6. Vasić J: Osnovi veterinarske hirurgije, FVM, Beograd, 2019.
7. Vučković D i sar: Veterinarska anesteziologija, 2009.
8. Silverstein DC, Hopper K: Small animal critical care medicine, Saunders Elsevier, 2009.
9. Hansen B: Acute pain management. In Mathews K.A. editors: The Vetrerinary Clinics of North America Small Animal: managment of pain, Philadelphia, Saunders, 2009.
10. Aldrich J: Global assessment of the emergency patient, Vet. Clin. North. Am. Small Anim. Pract, 35:281, 2005.
11. Waldrop JE, Rozanski EA, Swanke ED: Causes of cardiopulmonary arrest, resuscitation management, and functional autocome in dogs and cats surviving cardiopulmonary arrest, J. Vet. Emerg. Crit. Care, 14:22, 2004.

Hours	**Lectures: -**	**Practicals:** DON: 2

Student workload in hours, per semester

Total 30	During active teaching /	Time for self studies including examination preparation 30

Teaching methods

Practical work of students on emergency and field clinical cases, under the supervision of teachers in the respective fields. Demonstration of procedures, performance of specific tasks by students, with immediate feedback and reassessment of performance. Teamwork, case presentation, and discussion on management priorities. Maintaining a clinical rotation logbook with a clear distinction between observation, assistance, and supervised performance.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points

Lecture attendance		Final exam	30
Participation in practicals		Seminars	70
Colloquium			

Study programme: Integrated academic studies in veterinary medicine

Course title: Food hygiene and technology of animal origin

Lecturer/lecturers: Tijana Ledina, Associate Professor; Dragan Vasilev, Full Professor; Neđeljko Karabasil, Full Professor; Snežana Bulajić, Full Professor; Mirjana Dimitrijević, Full Professor; Radoslava Savić Radovanović, Full Professor; Silvana Stajković, Associate Professor; Nikola Čobanović, Associate Professor; Nevena Grković, Associate Professor; Branko Suvajdžić, Assistant Professor; Jasna Lončina, Assistant Professor; Ivan Vićić, Teaching Assistant

Course status: Obligatory

ECTS credits: 1.0

Prerequisites: Basic principles of food hygiene, Milk hygiene and technology, Meat hygiene and technology 1 and 2 attended classes

Course aims

To understand the role and responsibilities of veterinarians in the process of food production, conducting inspections and the process of laboratory testing.

Course outcomes

Upon successful completion of the clinical rotation, the student will be able to comprehend the complexity and interconnectedness of processes in food production and production process control, as well as food safety and quality assessment; the student will be able to perform examinations of dairy animals, including the assessment of animal welfare and protection conditions in the dairy production chain; perform ante-mortem inspection of animals and post-mortem inspection of meat, including the assessment of animal welfare and protection conditions in the meat production chain; identify key parameters of relevance for food safety and quality, and apply appropriate good hygiene practices throughout the food production chain. Upon successful completion of the clinical rotation, the student will be able to assess food of animal origin, including composite food, for public consumption, and implement food sampling and laboratory testing procedures.

Course content

DON

Veterinary profession in the meat and dairy industry and other products of animal origin. Control of raw materials. Control of technological procedures in meat and milk production. Checking the application of good manufacturing practice and good hygiene practice. Traceability of production and control processes. Sampling procedure for testing (sensory, microbiological, chemical, physicochemical, immunochemical and physical tests). Laboratory testing of food.

Recommended literature

1. Teodorović V, Dimitrijević M, Karabasil N, Vasilev D: Higijena i tehnologija mesa (udžbenik), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2015.
2. Teodorović V, Bunčić O, Karabasil N, Dimitrijević M, Vasilev D: Higijena i tehnologija mesa (praktikum), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2012.
3. Katić V, Bulajić S: Higijena i tehnologija mleka, Fakultet veterinarske medicine, Univerzitet u Beogradu, Centar za izdavačku delatnost i promet učila, 2018.

Hours	**Lectures:** 0	**Practicals:** DON 2

Student workload in hours, per semester

Total 30	During active teaching /	Time for self studies including examination preparation 30

Teaching methods

Conditions of real production and processing of food, implementation of official control and laboratory testing of food.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Final exam	30
Participation in practicals		Seminars	70
Colloquium			

Study programme: Integrated academic studies in veterinary medicine

Course title: Administrative veterinary medicine

Lecturer/lecturers: Vladimir Nešić, Full Professor; Jelena Aleksić Radojković, Associate Professor; Dajana Davitkov, Assistant Professor

Course status: Obligatory

ECTS credits: 1.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is for the student to apply the knowledge acquired in the regulations in veterinary medicine in specific situations by working together in the field with a veterinary inspector in all facilities where animals are bred and perform veterinary activities. In cooperation with the Veterinary Administration, the student will be acquainted with the procedure and manner of action in case of infectious animal diseases. The goal is for the student to learn to correctly fill in international certificates, solutions, certificates and other documentation related to domestic and international trade in animals, food, products and by-products of animal origin. Provides basic knowledge of EU regulations in the field of control of infectious animal diseases and zoonoses, animal welfare, domestic and international trade in animals and products.

Course outcomes

Upon successful completion of the clinical rotation, the student will be able to independently interpret national and EU regulations, as well as to correctly complete certificates and other documentation necessary for performing veterinary activities. The student should acquire knowledge and become familiar with the organization of the veterinary service in the Republic of Serbia and the European Union. Upon successful completion of the clinical rotation, the student will be able to apply relevant regulations to a specific case, conduct the basic official control procedure, identify established non-compliances and assess their significance for animal health, animal welfare, and public health, prepare appropriate official documentation, propose measures, and professionally justify their decision.

Course content

1. Filling forms and veterinary certificates;
2. Control of the work of facilities in which veterinary activity is performed;
3. Control of the work of facilities in which food of animal origin is sold;
4. Control of the work of facilities in which animals are kept;
5. Veterinary Directorate - simulation of the occurrence of infectious diseases and ways of acting in order to prevent their spread.

Recommended literature

1. Veterinary Law; Animal Welfare Act; Food Safety Act; Law on Medicines and Medical Devices; By-laws in the field of veterinary medicine
2. Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law')
3. Directive 2003/99/EC on the monitoring of animal diseases and infections
4. Directive 92/118/EEC - animal health and public health requirements for trade in and imports into the EU of certain products
5. Regulation (EU) 2026/1818 of the European Parliament and of the Council of 17 June 2026 on the welfare of dogs and cats and their traceability

Hours: one working week	**Lectures:**	**Practicals:** DON: 1

Student workload in hours, per semester

Total 30	During active teaching /	Time for self studies including examination preparation 30

Teaching methods

Practical field work, filling out forms.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Final exam	30
Participation in practicals	60	Seminars	70
Colloquium			

Study programme: Integrated academic studies in veterinary medicine

Course title: Laboratory practice

Lecturer/lecturers: Nataša Stević, Associate Professor; Jakov Nišavić, Full Professor; Dejan Krnjaić, Full Professor; Andrea Radalj, Associate Professor; Danica Bogunović, Associate Professor; Nevenka Aleksić, Full Professor; Tamara Ilić, Full Professor; Sonja Radojičić, Full Professor; Dragan Bacić, Associate Professor; Sonja Obrenović, Full Professor; Uroš Glavinić, Associate Professor; Marko Ristanić, Assistant Professor; Vladimir Kukolj, Full Professor; Darko Marinković, Full Professor; Sanja Aleksić Kovačević, Full Professor; Slađan Nešić, Associate Professor; Ivana Vučićević, Associate Professor; Milan Aničić, Assistant Professor; Milan Rajković, Teaching Assistant PhD; Tamara Radovanović, Teaching Assistant; Isidora Prošić, Teaching Assistant; Aleksandar Nikšić, Teaching Assistant; Nemanja Jovanović, Assistant Professor; Ana Milosavljević, Teaching Assistant; Stefan Jelisić, Teaching Assistant

Course status: Obligatory

ECTS credits: 1.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Acquainting the student with methods of sample handling, processing, and preparation for testing. The student should acquire the necessary knowledge and skills to work with infectious material; to use the appropriate sampling and packaging methods; to adequately store the material and apply biosecurity measures in laboratory work with infectious material. Additionally, the course aims to acquaint students with classical and molecular genetic methods of laboratory diagnostics in veterinary medicine. The student should be able to interpret the obtained test results as well as to independently complete a report on the performed examination. Acquainting the student with procedures in laboratory for pathology.

Course outcomes

Upon successful completion of the clinical rotation, the student will be able to correctly select, collect, label, process, and prepare biological material for laboratory testing; apply the basic principles of laboratory diagnostics across all fields of veterinary laboratory diagnostics; critically interpret the obtained results within the context of the clinical case; and assess their significance for establishing a diagnosis and making clinical decisions, while applying the principles of biosecurity, quality control, professional communication, and maintenance of laboratory records. The student should be able to implement prevention and eradication programs for infectious animal diseases that are appropriate for individual animal species and comply with accepted standards of animal health, animal welfare, and public health.

Course content

DON (additional forms of teaching)

Sampling, packaging, and shipment of materials for laboratory testing; epizootiological survey; assessment of anamnestic data validity; sample preparation and processing; sample testing using various classical and molecular laboratory methods for the diagnosis of viral, bacterial, fungal, and protozoal infections of farm animals, social animals, wildlife and bees; evaluation of diagnostic test results in different phases of control/eradication of infectious diseases; testing reports; methods of application of test material to laboratory animals. Additionally, students will be introduced to the application of molecular methods in the detection of genetic relatedness, parenthood, and pedigree of animals for selection purposes, as well as to examine the expression of different animal genes under the influence of various physical, chemical, and biological pollutants. Nutrigenomics. In the Laboratory for pathology (TSE, PH and IHH departments) student will be introduced with sampling, preparing of samples for examinations and with diagnostic methods used in the examinations.

Recommended literature

1. Milić N, Krnjaić D, Mišić D, Nišavić J, Radojičić M: Mikrobiologija sa imunologijom, Naučna KMD, Beograd, 2017.
2. Nišavić J, Milić N, Knežević A: Laboratorijska dijagnostika virusnih infekcija, Naučna KMD, Beograd, 2013.
3. MacLachlan NJ, Dubovi EJ: Fenner's Veterinary Virology, 5th Edition, Academic Press, 2016.
4. Tizard I: Veterinary Immunology, 10th Edition, Saunders, 2017.
5. Markey B, Leonard F, Archambault M, Cullinane A, Maguire D: Clinical Veterinary Microbiology, Mosby, Elsevier, 2013.
6. Kulišić Z: Helmintologija, Veterinarska komora, Beograd, Srbija, 2001.
7. Ilić T, Dimitrijević S: Protokol praktične nastave iz kliničke parazitologije, Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, 91 strana, 2017.
8. Radojičić S, Valčić M, Đuričić B: Infektivne bolesti životinja-specijalni deo, Autorsko izdanje, Beograd, 2011.
9. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, 8th Edition, 2018. www.oie.int
10. Baumans V: Science-based assessment of animal welfare: laboratory animals, Rev. sci. tech. Off. int. Epiz., 24 (2), 503-514, 2005.
11. Stevanović J, Stanimirović Z, Glavinić U: Molekularno-genetičke metode u veterinarskoj medicini, Fakultet veterinarske medicine, Univerzitet u Beogradu, Autorizovana skripta, 2020.

<table>
<tr><td colspan="5">12. Đelić N, Stanimirović Z: Principi genetike, Fakultet veterinarske medicine, Univerzitet u Beogradu, Datastatus, Beograd, 2019.
13. Cunha MV, Inácio J: Veterinary infection biology: Molecular diagnostics and high-throughput strategies, Humana Press, 2015.
14. Marinković D, Nešić V: Tehnika obdukcije životinja sa osnovama tanatologije, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2013.
15. Nešić S, Vučićević I: Praktikum iz patohistologije za studente Fakulteta veterinarske medicine, Naučna KMD, Beograd, 2018.</td></tr>
<tr><td colspan="2">Hours</td><td colspan="2">Formal lecture: /</td><td>Practicals: DON:1</td></tr>
<tr><td colspan="5">Student workload in hours, per semester</td></tr>
<tr><td>Total 30</td><td colspan="2">During active teaching /</td><td colspan="2">Time for self studies including examination preparation 30</td></tr>
<tr><td colspan="5">Teaching methods
Practical laboratory work.</td></tr>
<tr><td colspan="5">Evaluation/Grading (maximum 100 points)</td></tr>
<tr><td>Pre-exam requirements</td><td>Points</td><td>Final exam</td><td colspan="2">Points</td></tr>
<tr><td>Participation in formal lecture</td><td></td><td>Final exam</td><td colspan="2">30</td></tr>
<tr><td>Participation in practicals</td><td></td><td>Seminars</td><td colspan="2">70</td></tr>
<tr><td>Colloquium</td><td></td><td></td><td colspan="2"></td></tr>
</table>

Study programme: Integrated academic studies in veterinary medicine

Course title: Clinical pathology and therapy of social animals

Lecturer/lecturers: Miloš Đurić, Assistant Professor; Vanja Krstić, Full Professor; Radmila Resanović, Full Professor; Nenad Andrić, Full Professor; Predrag Stepanović, Associate Professor; Miloš Vučićević, Associate Professor; Stefan Đoković, Associate Professor; Darko Davitkov, Associate Professor; Bogomir Bolka Prokić, Associate Professor; Miloje Đurić, Associate Professor; Marko Jumake Mitrović, Associate Professor; Anja Ilić Božović, Assistant Professor; Milan Hadži Milić, Assistant Professor; Maja Vasiljević, Assistant Professor; Natalija Milčić Matić, Assistant Professor; Ljubodrag Stanišić, Assistant Professor; Lazar Karić, Teaching Assistant

Course status: Elective

ECTS credits: 9.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is to enable the student to work independently with social animals in accordance with the rules of the profession and on the basis of the latest scientific and professional knowledge.

Course outcomes

The student is able to recognize the symptoms of social animal diseases, sample tissues for testing, apply adequate diagnostic procedures and use appropriate therapeutic protocols.

Course content

Lectures

The most significant diseases of social animals - new findings related to the etiopathogenesis of the disease and therapeutic protocols.

DON+SRW

Practical work with social animals in ambulances and in field conditions.

Recommended literature

1. Quesenberry K, Mans C, Orcutt C, Carpenter JW: Ferrets, Rabbits and Rodents: Clinical Medicine and Surgery, 4th Edition, Elsevier Health Sciences, 2020.
2. Nelson R, Couto G: Small animal internal medicine, 6th Edition, Elsevier Science, 2019.
3. Vail DM, Thamm D, Liptak J, Withrow and MacEwen's: Small Animal Clinical Oncology, 6th Edition, Elsevier Science, 2019.
4. Reed S, Warvick B: Equine Internal Medicine, 3rd Edition, Sounders Elsevier, 2010.

Hours	**Lectures:** 1	**Practicals:** DON+SRW: 5 (2+3)

Student workload in hours, per semester

Total 270	During active teaching 90	Time for self studies including examination preparation 180

Teaching methods

Interactive theoretical classes with the use of presentations, pictures, schemes and clinical cases and tasks. Work in the conditions of real veterinary practice of social animals.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Written exam	
Participation in practicals		Oral exam	30
Colloquium		Practical exam	70
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Diagnostic procedures in internal medicine of social animals

Lecturer/lecturers: Darko Davitkov, Associate Professor; Vanja Krstić, Full Professor; Nikola Krstić, Full Professor; Radmila Resanović, Full Professor; Nenad Andrić, Full Professor; Mirjana Lazarević-Macanović, Full Professor; Predrag Stepanović, Associate Professor; Miloš Vučićević, Associate Professor; Stefan Đoković, Associate Professor; Marko Jumake Mitrović, Associate Professor; Anja Ilić Božović, Assistant Professor; Miloš Đurić, Assistant Professor; Natalija Milčić Matić, Assistant Professor

Course status: Elective

ECTS credits: 9.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

The aim of the course is for the student to understand the indications for the application of diagnostic procedures in the internal medicine of social animals. Also, the student should interpret the findings in order to detect pathological changes and make an exact diagnosis of the disease.

Course outcomes

Student is capable of recognizing, analyzing and interpreting pathological changes using diagnostic procedures.

Course content

Lectures

Diagnostic procedures in veterinary medicine. Application of ultrasound diagnostics. Application of radiological diagnostics. Application of endoscopic diagnostics. Interpretation of pathological changes in ultrasound, radiological and endoscopic imaging.

DON+SRW

Practical work with patients. Case analysis and indications for the application of diagnostic procedures. Interpretation of findings.

Recommended literature

1. Thrall D: Textbook of Veterinary Diagnostic Radiology, 7th Edition, WB Saunders Company, Philadelphia, 2017.
2. Quesenberry K, Mans C, Orcutt C, Carpenter JW: Ferrets, Rabbits and Rodents: Clinical Medicine and Surgery, 4th Edition, Elsevier Health Sciences, 2020.
3. Nelson R, Couto G: Small animal internal medicine, 6th Edition, Elsevier Science, 2019.
4. Matton JS, Nyland TG: Small Animal Diagnostic Ultrasound, 3rd Edition, WB Saunders Company, Philadelphia, 2014.

Hours	**Lectures:** 1	**Practicals:** DON+SRW: 5 (2+3)

Student workload in hours, per semester

Total 270	During active teaching 90	Time for self studies including examination preparation 180

Teaching methods

Interactive theoretical classes with the use of presentations, pictures, schemes and clinical cases and tasks. Work in the conditions of real veterinary practice of social animals.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Practical exam	50
Participation in practicals		Final exam	50
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Breeding, pathology and therapy of farm animals

Lecturer/lecturers: Radislava Teodorović, Full Professor; Dragan Šefer, Full Professor; Radmila Resanović, Full Professor; Slobodanka Vakanjac, Full Professor; Ivan Vujanac, Full Professor; Predrag Simeunović, Teaching Assistant PhD

Course status: Elective

ECTS credits: 9.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Breeding, pathology and therapy of farm animals aims to prepare students through theoretical and practical education for independent work and more direct involvement in clinical practice in conditions of intensive production of farm animals (poultry, pigs and ruminants).

Course outcomes

After completing theoretical and practical training, the student acquires knowledge and skills to recognize and diagnose health problems at the farm level, recognize and eliminate errors that led to the emergence of technopathy, make a plan of preventive measures to preserve animal health that contributes to productivity and profitability of organized farm production. Preparation and master thesis defense in front of the Commission composed of professors engaged in the elective course.

Course content

Lectures

Zoohygiene in poultry, Zoohygiene in pig breeding, Zoohygiene in ruminants breeding, Clinical nutrition of poultry, Clinical nutrition of pigs, Clinical nutrition of ruminants, Selected chapters from clinical pathology of poultry, Selected chapters from clinical pathology of pigs, Selected chapters from clinical pathology of ruminants, Selected chapters from ruminant reproduction, Selected chapters from pig reproduction.

Practicals

Practical classes are conducted at Departments of the Faculty of Veterinary Medicine involved in teaching and in teaching bases outside the faculty (pigs, sheep, goats and cattle farms).

DON (additional forms of teaching)

Working with a mentor on the preparation of a graduate thesis.

SRW (study research work)

Recommended literature

1. Asaj A: Higijena na farmi i u okolišu, Medicinska naklada, Zagreb, 2003.
2. Radenković B, Janković Lj, Đorđević M, Teodorović R: Zoohigijena I, P. Print, Beograd, 2016.
3. Marković R, Petrujkić B, Šefer D: Bezbednost hrane za životinje, Fakultet veterinarske medicine, 2018.
4. NOVUS: Nutrition of hyperprolific sows, Novus International, Editorial Agricola Espanola, S.A., 2019.
5. Šamanc AH: Bolesti respiratornog i kardiovaskularnog sistema goveda, Naučna KMD, Beograd, 2010.
6. Šamanc AH: Bolesti organa za varenje kod goveda, Naučna KMD, Beograd, 2011.
7. Šamanc AH, Vujanac MI: Bolesti sirišta goveda, Naučna KMD, Beograd, 2013.
8. Šamanc AH: Bolesti svinja, Naučna KMD, Beograd, 2009.
9. Swayne DE, Boulianne M, Logue CM, McDougald LR, Nair V, Suarez DL, de Wit S, Grimes T, Johnson D, Kromm M, Prajitno TY, Rubinoff I, Zavala G: Diseases of Poultry, 14th Edition, John Wiley & Sons, 2019.

Recommended reading:

In agreement with the mentor, the candidate will use scientific - professional literature in the field of the thesis topic.

Hours	**Lectures:** 1	**Practicals:** 5 (2+3)

Student workload in hours, per semester

Total 270	During active teaching 90	Time for self studies including examination preparation 180

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations, films), practical exercises on healthy and sick animals in teaching bases with which the Faculty has signed a cooperation agreement.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	10	Written exam	30
Participation in practicals	40	Oral exam	
Colloquium			

Seminars	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Farm biosecurity

Lecturer/lecturers: Radiša Prodanović, Associate Professor; Radmila Resanović, Full Professor

Course status: Elective

ECTS credits: 9.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Farm biosecurity aims to prepare students through theoretical education and practical work on farms (cattle, sheep, goats, pigs and poultry) to independently assess the biosecurity of farms and make recommendations for the application of biosecurity measures that reduce the risk of disease transmission, correct and precise dosing of drugs in order to achieve better efficiency and avoid the occurrence of resistance and side effects by increasing productivity and profitability of production.

Course outcomes

After completing theoretical and practical training, the student acquires knowledge and skills to recognize biosecurity risks in farm production, to make recommendations for their elimination and make a plan of biosecurity measures that protect the farm from infectious agents from outside, as well as transmission between production categories within the farm. The student is trained to conduct rational pharmacotherapy, apply safe drugs, which contributes to the overall biosecurity of farm production. Preparation and master thesis defense in front of the Commission composed of professors engaged in the elective course.

Course content

Lectures

Selected chapters from follows parts: the welfare of farm animals (cattle, sheep, goats, pigs and poultry). Biosecurity on dairy cow farms, biosecurity on sheep and goat farms, biosecurity on commercial pig farms, biosecurity on poultry farms.

Practicals

Practical lectures are hold at Departments of the Faculty of Veterinary Medicine and in teaching bases outside the faculty (pig and cattle farms).

DON (additional forms of teaching)

Working with a mentor on the preparation of a graduate thesis.

SIR (study research work)

Recommended literature

1. Pinillos RG, Appleby MC, Manteca X, Scott-Park F, Smith C, Velarde A: One Welfare - a platform for improving human and animal welfare, Veterinary Record, 179, 412-413, 2016.
2. Isomura R, Matsuda M, Sugiura K: An epidemiological analysis of the level of biosecurity and animal welfare on pig farms in Japan and their effect on the use of veterinary antimicrobials, The Journal of Veterinary Medical Science, 80, 1853-1860, 2018.
3. Pandolfi F, Edwards SA, Maes D, Kyriazakis I: Connecting different data sources to assess the interconnections between biosecurity, health, welfare, and performance in commercial pig farms in Great Britain, Frontiers in Veterinary Science, 5, 41, 2018.
4. Smith M, Sherman D: Goat Medicine, 2nd Edition, chapter 20, Herd Health Management and Preventive Medicine, Wiley Blackwell, 2009.
5. Bojkovski J: Biosecurity measures on pig farms, Lambert Academic Publishing, 2015.
6. Ćupić V, Muminović M, Kobal S, Velev R: Farmakologija za studente veterinarske medicine, III издање, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, Sarajevo, Ljubljana, Skoplje, 2019.

Hours	**Lectures:** 1	**Practicals:** 5 (2+3)

Student workload in hours, per semester

Total 270	During active teaching 90	Time for self studies including examination preparation 180

Teaching methods

Theoretical classes with interactive learning, with the application of audio-visual methods (PowerPoint presentations, films), practical exercises at clinics and laboratories of the Faculty and in teaching bases with which the Faculty has signed a cooperation agreement.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lecture attendance	10	Written exam	30

Participation in practicals	40	Oral exam	
Colloquium			
Seminars	20		

Study programme: Integrated academic studies in veterinary medicine

Course title: Preventive veterinary medicine

Lecturer/lecturers: Radislava Teodorović, Full Professor; Milutin Đorđević, Full Professor; Vladimir Drašković, Assistant Professor

Course status: Elective

ECTS credits: 9.0

Prerequisites: Enrolled semester in which the course is taken

Course aim

The aim of the course is to make students more familiar with the specific aspects of organic and commercial production of farm animals, to understand the importance of timely implementation of veterinary - preventive measures and to be able to independently implement these measures in a given situation.

Course outcomes

Upon successful completion of the course, students should be able to: independently organize and apply veterinary - preventive measures in order to prevent the occurrence and suppress infectious animal diseases and zoonoses; to know how to sample, pack, transport and deliver a sample for microbiological analysis or for the diagnosis of parasitic zoonoses; to know the methods of diagnosing diseases of bees and broods caused by bacteria, viruses and fungi, protozoa, endoparasites and ectoparasites; to apply methods in order to regulate the population of insects and urban pests; to evaluate the choice of location for harmless disposal of organic waste as well as the assessment of hygienic conditions, accommodation and care of laboratory and exotic animals.

Course content

Lectures

1) Economics in preventive medicine. 2) Animal species that endanger the urban environment. 3) Farm animal breeding as an environmental risk. 4) Technological and technical norms of facilities for accommodation and breeding of animals in organic production. 5) Drug based prevention of bacterial, protozoal and viral infections of animals. 6) Hygienic - technological aspects of organic waste removal. 7) Vaccinology. 8) Diagnosis of infectious diseases. 9) Diagnosis of parasitic zoonoses important for identification. 10) Veterinary preventive measures. 11) National and EU regulations on the detection and prevention of infectious animal diseases. 12) Hygiene of accommodation and care of domestic animals in commercial farms. 13) Hygiene of accommodation and care of domestic, exotic and laboratory animals.

Practicals

DON+SRW

1) Introduction to specific aspects of organic production; biosecurity measures and harmless waste disposal in organic production. 2) Methods of diagnosing diseases of bees and brood caused by bacteria, viruses and fungi, protozoa, endoparasites and ectoparasites. 3) Examination of the degree of air, soil and water pollution. 4) Planning a "virtual" farm for organic animal production. 5) Planning and practicing "simulated" vaccination / preventive action for different species of animals. 6) Planning the selection of sites and facilities for harmless removal of organic waste. 7) Vaccine applications, control of post-vaccination immunity, performance of efficacy and toxicity tests. 8) Sampling of materials in the field, packaging, transport and delivery for microbiological analysis. 9) Sampling, packaging and sending of material for diagnostics of parasitic zoonoses of protozoal and helminthic etiology. 10) Practical application of preventive measures. 11) Training simulation of the implementation of measures in the detection, control and eradication of infectious diseases. 12) Field work on the assessment of hygienic conditions, accommodation and care of animals in commercial farms. 13) Assessment of hygienic conditions, accommodation and care of laboratory and exotic animals.

Recommendedliterature

1. Teodorović V, Bunčić O, Kulišić Z, Radenković-Damnjanović B, Teodorović R, Đorđević M, Mirilović M: Trichinella-trichinellosis, 2007.
2. Vučinić M, Radenković-Damnjanović B, Petričević S: Gajenje nojeva, Beograd, 2003.
3. Dobrić Đ: Bolesti pčela, FVM, Beograd, 2000.
4. Vučinić M, Radenković-Damnjanović B, Teodorović R, Janković Lj: Bioklimatologija i biometeorologija, FVM, Beograd, 2006.
5. Asaj A: Higijena na farmi i u okolišu, Medicinska naklada, Zagreb, 2003.
6. Lewis DI: Animal experimentation: implementation and application of the 3Rs, Emerg Top Life Sci. 3 (6): 675-679, 2019.
7. Đukić D, Milošević G, Škrinjar M: Aeromikrobiologija, 2008. https://www.researchgate.net/publication/324437875.

<table>
<tr><td colspan="5">8. Ristić M, Radenković B, Đorđević M: Neškodljivo uklanjanje uginulih životinja i nejestivih proizvoda zaklanih životinja, FVM, Beograd, 2000.
9. Radenković-Damnjanović B, Janković Lj, Đorđević M, Teodorović R: Zoohigijena 1, FVM, Beograd, 2016.
10. Valčić M, Robertson I, Kulišić Z, Goss S: Specijalna epizootiologija, Compendium bolesti sa liste a i značajnijih bolesti sa liste b međunarodne organizacije za epizootije OIE, Veterinarska komora Srbije, Beograd, 2004.</td></tr>
<tr><td colspan="2">Hours</td><td colspan="2">Lectures: 1</td><td>Practicals: DON+SRW: 2+3</td></tr>
<tr><td colspan="5">Student workload in hours, per semester</td></tr>
<tr><td>Total 270</td><td colspan="2">During active teaching 90</td><td colspan="2">Time for self studies including examination preparation 180</td></tr>
<tr><td colspan="5">Teaching methods
Theoretical, interactive and practical teaching.</td></tr>
<tr><td colspan="5">Evaluation and grading (maximum 100 points)</td></tr>
<tr><td colspan="2">Pre-exam requirements</td><td>Points</td><td>Final exam</td><td>Points</td></tr>
<tr><td colspan="2">Lecture attendance</td><td>10</td><td>Written exam</td><td></td></tr>
<tr><td colspan="2">Participation in practicals</td><td>40</td><td>Final exam</td><td>30</td></tr>
<tr><td colspan="2">Seminars</td><td>20</td><td></td><td></td></tr>
</table>

Study programme: Integrated academic studies in veterinary medicine

Course title: Veterinary practice in organic livestock production

Lecturer/lecturers: Vladimir Dimitrijević, Full Professor; Žolt Bečkei, Associate Professor; Elmin Tarić, Assistant Professor

Course status: Elective

ECTS credits: 9.0

Prerequisites: Animal breeding 1, Animal breeding 2, Pharmacology and toxicology 1, Pharmacology and toxicology 2, Animal nutrition 1 and Animal nutrition 2 resolved

Course aims

Acquiring knowledge about the use of standards and the control of production phases of organic production in animal breeding; the insight into the role of veterinarians in the organisation and implementation of organic production measures in animal breeding; introduction to the tasks of a veterinarian in prevention, diagnostics and the treatment of illnesses in animals in accordance to the requirements and principles of organic production in animal breeding.

Course outcomes

The student should be able to:

- understand the basic principles of organic production in animal breeding;
- be familiar with the standard and regulations in relation to breeding animals in organic animal breeding;
- be familiar and understand the principles of veterinarian monitoring in organic animal breeding;
- be capable of noticing inaccuracies and problems that occur as a result of omission in the technology of breeding;
- be capable of applying measures of prevention, diagnostics and therapy in accordance with the requirements and principles of organic production in animal breeding.

Course content

Lectures

General principles of organic animal breeding production (standards and regulations); Veterinarian monitoring in organic animal breeding; Strategies of promoting animal health; Prevention, diagnostics, therapy (conventional and alternative) in organic production in animal breeding; Most common problems and misunderstandings between veterinarians and breeders.

SRW

Individual work with students on selected assignments dealing with different species of farm animals (cattle, sheep, goats, pigs, poultry and others) and problems ranging from standards and regulations to health care in accordance with the requirements and principles of organic production in animal breeding. Students would choose a mentor with expertise in a selected research area and ability to provide adequate guidance, assistance and suggestions.

DON

Upon elective field of specialization and personal interest of each student individual/small group workshops in selected field of organic livestock production in aim to profound knowledge of interest.

Recommended literature

1. Dimitrijević V, Savić M, Trailović R, Bečkei Ž: Stočarstvo-farmske i socijalne životinje, Fakultet veterinarske medicine, Univerzitet u Beogradu, Beograd, 2020.
2. Konvalina P: Organic Farming. A Promising Way of Food Production, IntechOpen, 2016.
3. Telford L, Macey A: Organic Livestock Handbook, 2nd Edition, Canadian Organic Growers Inc., 2014.
4. Vaarst M, Roderick S, Lund V, Lockeretz W: Animal Health and Welfare in Organic Agriculture, 1st Edition, CABI, 2003.

Hours	**Lectures:** 1	**Practicals:** DON+SRW: 2+3

Student workload in hours, per semester

Total 270	During active teaching 90	Time for self studies including examination preparation 180

Teaching methods

Theoretical interactive lectures with participation, inclusion of students and sharing experience with veterinarians and breeders under the requirements of organic livestock production, seminars on predefined topics, application of audio-visual methods of teaching (PowerPoint presentation, video materials).

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance	30	Seminar	70
Participation in practicals			
Colloquium			
Seminars			

Study programme: Integrated academic studies in veterinary medicine

Course title: Control of food of animal origin

Lecturer/lecturers: Neđeljko Karabasil, Full Professor; Silvana Stajković, Associate Professor; Dragan Vasilev, Full Professor; Snežana Bulajić, Full Professor; Mirjana Dimitrijević, Full Professor; Radoslava Savić Radovanović, Full Professor; Nikola Čobanović, Associate Professor; Nevena Grković, Associate Professor; Tijana Ledina, Associate Professor; Branko Suvajdžić, Assistant Professor; Jasna Lončina, Assistant Professor; Ivan Vićić, Teaching Assistant

Course status: Elective

ECTS credits: 9.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

Understand the food control procedure for assessing the safety and quality of food of animal origin.

Course outcomes

Upon completion of the program, the student is expected to be able to considers the complexity and connection of processes in the production and control of food of animal origin; apply the procedure of food control from the raw materials, processes, products, sampling, testing and interpret the results relevant to the assessment of food safety and quality.

Course content

Lectures

Food quality (Factors: hygienic, technological, nutritional, sensory and market/consumer). The role and responsibility of veterinarians in the process of controlling the production and inspection of food for public consumption. Parameters for assessing food safety and quality. Sampling, transport, storage and handling of test specimens. Test procedure: sensory, microbiological, parasitological, chemical, physicochemical, physical and immunochemical tests. Presentation and interpretation of test results.

Practicals

Sampling and handling of test specimens. Sensory evaluation of meat and dairy products. Microbiological analysis of meat and dairy products. Chemical analysis of meat and dairy products.

Recommended literature

1. Teodorović V, Dimitrijević M, Karabasil N, Vasilev D: Higijena i tehnologija mesa (udžbenik), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2015.
2. Teodorović V, Bunčić O, Karabasil N, Dimitrijević M, Vasilev D: Higijena i tehnologija mesa (praktikum), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2012.
3. Katić V, Bulajić S: Higijena i tehnologija mleka, Fakultet veterinarske medicine, Univerzitet u Beogradu, Centar za izdavačku delatnost i promet učila, 2018.
4. Karabasil N, Savić Radovanović R, Stajković S, Čobanović N, Suvajdžić B: Kontrola namirnica animalnog porekla (praktikum), Fakultet veterinarske medicine, Univerzitet u Beogradu, CID, Beograd, 2020.

Hours	**Lctures:** 1	**Practicals:** DON+SRW: 2+3

Student workload in hours, per semester

Total 270	During active teaching 90	Time for self studies including examination preparation 180

Teaching methods

Interactive theoretical classes with the use of presentations, pictures, schemes, cases and tasks, and practicals in slaughterhouse/food processing plant and laboratories for food testing.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Written exam	50
Participation in practicals		Oral exam	
Colloquium			
Seminars	50		

Study programme: Integrated academic studies in veterinary medicine

Course title: Integrated food control

Lecturer/lecturers: Radoslava Savić Radovanović, Full Professor; Neđeljko Karabasil, Full Professor; Mirjana Dimitrijević, Full Professor; Snežana Bulajić, Full Professor; Dragan Vasilev, Full Professor; Silvana Stajković, Associate Professor; Nikola Čobanović, Associate Professor; Nevena Grković, Associate Professor; Tijana Ledina, Associate Professor; Branko Suvajdžić, Assistant Professor; Jasna Lončina, Assistant Professor; Ivan Vićić, Teaching Assistant

Course status: Elective

ECTS credits: 9.0

Prerequisites: Enrolled semester in which the course is taken

Course aims

To understand the complexity and connection of process steps in the food production chain, the importance of prerequisite programs, as well as the concept of hazard analysis, risk assessment and risk management.

Course outcomes

Upon completion of the program, the student is expected to be able to:

- Apply the rules of good manufacturing practice and good hygiene practice in the food production chain;
- Analyzes and assesses risk in the food production chain and manages risk.

Course content

Lectures

The concept of integrated food control systems. Hazard analysis, risk assessment and risk management. Determination of critical control points. Determining critical limits. Methods for monitoring critical limits at critical control points. Validation and verification. Documentation and records.

Practicals

Hazard analysis and risk assessment for selected flow chart of food production (meat and meat products, milk and dairy products, fish and seafood, eggs, honey). Identification of critical control points. Establishment of critical limits and monitoring procedure.

Recommended literature

1. Teodorović V, Dimitrijević M, Karabasil N, Vasilev D: Higijena i tehnologija mesa (udžbenik), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2015.
2. Teodorović V, Bunčić O, Karabasil N, Dimitrijević M, Vasilev D: Higijena i tehnologija mesa (praktikum), Fakultet veterinarske medicine, Univerzitet u Beogradu, Naučna KMD, Beograd, 2012.
3. Katić V, Bulajić S: Higijena i tehnologija mleka, Fakultet veterinarske medicine, Univerzitet u Beogradu, Centar za izdavačku delatnost i promet učila, 2018.
4. Karabasil N, Savić Radovanović R, Stajković S, Čobanović N, Suvajdžić B: Kontrola namirnica animalnog porekla (praktikum), Fakultet veterinarske medicine, Univerzitet u Beogradu, CID, Beograd, 2020.

Hours	**Lectures:** 1	**Practicals:** DON+SRW: 2+3

Student workload in hours, per semester

Total 270	During active teaching 90	Time for self studies including examination preparation 180

Teaching methods

Interactive teaching, with case reports, solving tasks independently and / or in a team.

Evaluation and grading (maximum 100 points)

Pre-exam requirements	Points	**Final exam**	Points
Lecture attendance		Written exam	
Participation in practicals		Oral exam	
Colloquium		Seminars	50
Seminars	50		