



**University "Ss. Cyril and Methodius" - Skopje**  
**FACULTY OF VETERINARY MEDICINE - SKOPJE**



# **STUDY GUIDE**

**for the doctoral (PhD) studies in third cycle of Veterinary  
Medicine on the Faculty of Veterinary Medicine - Skopje**

## 1. INTRODUCTION

In order to comply with the new Law of Higher Education (Official Gazette no. 35/2008 and no. 103/2008) and implementing the recommendations of the Bologna Declaration, Teaching and Scientific council of the Faculty of Veterinary Medicine Skopje (FVMS) decided to implement a program for doctoral studies of third cycle in the field of veterinary medicine for obtaining the title of Ph.D.

The study program is implemented within the School of Doctoral Studies at the University "Ss. Cyril and Methodius". Given that this program is no longer organized by specializations in which the mobility of students was hampered or limited, students will get significantly greater mobility in selecting subjects for the content of which they will be interested and in tune with the theme of their doctoral thesis.

New doctoral studies provide designing curriculum depending on the specifics of the theme of the candidate, the current research activities of the institution, as well as the future professional engagement of the candidate. The study program will be organized as a program for PhDs in order to educate researchers showing greater interest in science as a profession, and for researchers who want to connect veterinary science with practice by which they will acquire academic qualifications for work in certain veterinary subspecialties.

Besides the "internal mobility" these doctoral studies are an opportunity for mobility to other, related programs and faculties within the university. At the European veterinary faculties is emphasizes the need for adoption of joint programs for doctoral studies (Baljer, G. et al., Journal of Veterinary Medical Education 31 (3), 239-241, 2004). As a result of the previously mentioned need for cooperation, in future perspectives are opened for cooperation in joint doctoral programs with the veterinary faculties in Europe (joint study programme).

New doctoral studies are an integral part of the new model for building a career which gives a better perspective for the future researchers on their individual development and an opportunity for bigger choice in the early stage of their professional career. Upon successful completion, young scientists will gain the ability for independent research in multidisciplinary teams from many areas of biotechnology and medical sciences.

The program of the proposed doctoral course will develop in line with the existing scientific potential of the faculty, students expressed interest and the need of the employers, with accurately described competencies and skills that doctoral candidates will possess after the end of the course. The content of the subjects will be constantly updating and if necessary each will be coordinated in order to avoid overlap with contents of undergraduate courses. Teaching will be based as much as possible on the practical work of students in acquiring the relevant and latest scientific knowledge. From the start of their doctoral course students should join the work of scientific projects and continuously monitor the scientific literature in order to develop their own critical stance toward their own results and ideas. Besides that the students, if necessary will be allowed study visit in the appropriate foreign scientific institutions in order to master the specific techniques and skills.

Innovativeness of the program lies in a completely new approach that allows maximum creativity of the student who in collaboration with the mentor will shape their own study program based on the offered subjects. Also this program allows greater freedom and initiative of the student to devote to learning of those contents which will be in tune with the theme of their thesis or, in general, with their scientific interest. As a result, students will be established as top experts in conducting scientific processes in a particular scientific discipline. The involvement of scientists from other scientific institutions in realization of the program will allow development of cooperation in solving the given scientific problems.

## 2. GENERAL PART

- **Realized by:** University "St. Cyril and Methodius" - Faculty of Veterinary medicine - Skopje
- **Study program:** Doctor of Science (in veterinary medicine) third cycle of studies
- **Duration of studies:** three years (6 semesters)

The conditions and enrolment at the studies are in accordance with the Higher Education Act, the Rules for doctoral studies, as well with the detail specific criteria published in the announcement by the University, St. Cyril and Methodius" in Skopje.

The basic requirements for entering the study program of the third cycle:

1. Diploma/Certificate:

- for completed integrated first and second cycle i.e. completed second cycle of studies in Bologna in the field of veterinary medicine, medical sciences, natural sciences and biotechnological sciences, or
- for Master of Science in the old curriculum of the above indicated areas or
- for acquired 300-360 credits from related studies of regulated professions, or
- for title of specialist in adequate specialization

2. Spoken English (Certificate of Faculty of Philology "Blazhe Koneski" or an international certificate such as TOEFL, FCE, CAE)<sup>1</sup>.

Criteria for ranking the candidates:

- The success gained at the previous integrated cycle i.e. previous two cycles
- Published publications
- Participation in national and international research projects
- Study visit abroad
- Knowledge of other languages
- Interview
- Motivation letter
- Recommendations and other specific criteria

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<sup>1</sup>If a student obtained the education of the previous two cycles in English as proof of knowledge of English will be considered the diploma for completed second cycle or integrated first and second cycle of studies.

### 3. STUDY PROGRAM STRUCTURE

**Scientific field:**

Biotechnical sciences

**Scientific sub-field:**

Veterinary medicine

**Scientific disciplines:**

- Anatomy of animals
- Biophysics
- Embryology
- Physiology
- Histology
- Immunology
- Microbiology
- Molecular biology
- Pathology
- Pathophysiology
- Diseases in ruminants
- Diseases in non-ruminants
- Diseases of poultry
- Diseases of fish, bees and game
- Pharmacology and toxicology
- Parasitological diseases
- Infectious diseases
- Radiobiology
- Surgery
- Ophthalmology
- Orthopedics
- Radiology and physical therapy
- Andrology and artificial insemination
- Gynecology, obstetrics and sterility
- Therapy and health protection of animals
- Endocrinology and biotechnology of reproduction
- Zoohygiene
- Hygiene and technology of products and raw materials of animal origin
- Health protection of animals in aspect of environment protection
- Nutrition - dietetics
- Veterinary legislative
- Forensic veterinary medicine
- History and ethics, deontology in veterinary medicine

Study program of the third cycle of studies (or doctoral studies) at the Faculty of veterinary medicine in Skopje, is organized in accordance with the Law on Higher Education of the Republic of Macedonia and the Rules for the third cycle of studies at UKIM as three year study program, which contains total of 180 ECTS credits in which each credit corresponds to 30 hours of total working engagement.

The total number of credits (180) are acquired in several fields i.e. integral parts of the third cycle (doctoral) studies:

- Training for research = 30 ECTS:
  - Three compulsory courses for gaining generic knowledge = 12 ECTS, and

- Doctoral seminars, conferences and workshops for research practice = 18 ECTS
- Education consisted of ten courses from the sub-field and area of research = 30 ECTS, and
- Registration, preparation and presentation of the doctoral dissertation = 120 ECTS

Teaching of the courses will be carried out in Macedonian and / or English depending on the linguistic homogeneity or heterogeneity of the students. The doctoral thesis will be written in Macedonian and / or English language. Presentation of doctoral thesis will be in public, in Macedonian or English.

The structure of the study program for doctoral studies (the distribution of credits and liabilities of the subjects per semester) is shown in Table 1.

**Table 1: STRUCTURE OF THE STUDY PROGRAM FOR DOCTORAL STUDIES (the distribution of credits by courses and liabilities by semesters)**

<b>I YEAR</b>		
<b>1 Semester</b>		
No.	Activity	ECTS
1	Compulsory course (gaining generic knowledge)	4
2	Compulsory course (gaining generic knowledge)	4
3	Compulsory course (gaining generic knowledge)	4
4	Elected course (sub-field and area of research)	3
5	Elected course (sub-field and area of research)	3
6	Elected course (sub-field and area of research)	3
7	Elected course (sub-field and area of research)	3
8	Elected course (sub-field and area of research)	3
9	Elected course (sub-field and area of research)	3
Total:		30

<b>2 Semester</b>		
No.	Activity	ECTS
1	Elected course (sub-field and area of research)	3
2	Elected course (sub-field and area of research)	3
3	Elected course (sub-field and area of research)	3
4	Elected course (sub-field and area of research)	3
5	Doctoral seminar with presentation	2
6	Research (preparation of the theme of the doctoral dissertation)	14
7	Annual conference with presentation of report	2
Total:		30

<b>II YEAR</b>		
<b>3 Semester</b>		
No.	Activity	ECTS
1	Preparation and filing in a topic for the doctoral dissertation and research	28
2	Doctoral seminar with presentation of report	2
Total:		30

4 Semester		
No.	Activity	ECTS
1	Work shop for research practise	3
2	Research and publication of the results	25
3	Annual conference with presentation of report	2
Total:		30

III YEAR		
5 Semester		
No.	Activity	ECTS
1	Research and publication of the results	28
2	Doctoral seminar with presentation of report	2
Total:		30

6 Semester		
No.	Activity	ECTS
1	Work shop for research practise	3
2	Research and writing the thesis	25
3	Annual conference with presentation of report	2
Total:		30

## LIST OF COURSES

### I). Courses for general generic knowledge organized by the School of Doctoral Studies:

1. Ethics (4 ECTS points)
2. Use of animals in scientific and research purposes (4 ECTS points)
3. Methods of clinical research and verification of laboratory results (4 ECTS points)

### II). Elective courses from the sub-field and area of research:

- 1.
- 2.
- 3.
- 4.
5. selected by the candidate together with his/her mentor
6. offered in Appendix 1. Every course takes 3 ECTS points.
- 7.
- 8.
- 9.
- 10.

- Respective programs, with a brief description of the contents are given in Appendix 1.

## 4. EXPLANATION FOR REALIZATION OF THE STUDY PROGRAM

The study program for the most part will be realized at the FVMS. Some of the contents of a program, if necessary, will be performed at other institutions of the country and abroad with which the faculty has or will establish research collaboration.

FVMS is housed in 5 buildings with a total area of 3660 m<sup>2</sup>, with the administrative part, 3 lecture rooms (50, 40 and 30 seats, respectively), an computer classroom, library and

12 laboratories (Table 2). The faculty has equipment worth around 2 million Euros (Table 2). Within the faculty operate three institutes, 20 departments, 1 clinic and 4 centres. The Food Institute has 6 departments (Department for Food Safety and Veterinary Public Health; Department for domestic animals feed; Department of Chemistry; Department of Pharmacology and Toxicology, Department of Economics with Management and Department for Administrative Veterinary), 5 laboratories (laboratory of microbiology of food and feed; laboratory for determination the quality of food and feed; laboratory for residues and contaminants; laboratory for determination the quality of raw milk and laboratory of Pharmacology and Toxicology) and 2 centres (Centre for adverse events and information for veterinary drugs and educational centre for food safety and veterinary public health). The veterinary Institute has 9 departments (Department of health of farmed animals; Department of health of pet animals and equines; Department of biology and pathology of fish, bees and game, Department of diagnostic imaging; Department of veterinary surgery, Department of microbiology and parasitology, Department of pathology and forensic medicine, Department of pathophysiology and Department of animal hygiene and protection of animal environment), 5 laboratories (laboratory of bacteriology, laboratory of virology, laboratory for serology and molecular diagnostics, laboratory of parasitology and parasitic diseases and laboratory for TSE), X-ray room and a clinic (clinic for pet animals). The Institute of Biomedicine and reproduction has 5 departments (Department of Biochemistry and cell biology; Department of radiobiology, Department of Functional Morphology, Department of animal husbandry and Department of reproduction) and 2 centres: centre for artificial insemination (with 2 laboratories: laboratory for production, cryopreservation and control of domestic animals semen, and laboratory for assisted reproduction) and centre for animal welfare.

37 permanent employees (19 teachers and 18 assistants, Table 3) are hired in the teaching and research activities at the Faculty and 67 people for technical and administrative support. The teaching staff of the Faculty for Natural Sciences and Mathematics, University "Ss. Cyril and Methodius" also takes part in the teaching. The faculty has a ramified network of international cooperation with many universities and institutes abroad.

**Place for realization of the study program:** Faculty of Veterinary Medicine, Lazar Pop Trajkov 5-7, 1000 Skopje, and if necessary other units of the University and Institutions with which the Faculty/University cooperates in teaching and research activity

**Number of students enrolled per year:** 25

**Space and equipment:** 5 buildings with a total area of 3660 m<sup>2</sup>, 3 lecture room (50, 40 and 30 seats, respectively), an computer classroom, library, 15 laboratories, a clinic and an X-ray cabinet with the following equipment:

**Table 2: STUDY PROGRAMME REALIZATION PLACE, FACILITIES AND EQUIPMENT**

<b><i>Facilities</i></b>	<b><i>Equipment</i></b>
<b>Laboratory for serology and molecular diagnostics (for serological testing)</b>	<ul style="list-style-type: none"> <li>• ELISA readers <ul style="list-style-type: none"> <li>▪ BDSL Immunoscan PLUS</li> <li>▪ HumaReader HS</li> </ul> </li> <li>• Shaker with incubator <ul style="list-style-type: none"> <li>▪ Heidolph TITRAMAX 1000/INKUBATOR 1000</li> </ul> </li> <li>• Water baths <ul style="list-style-type: none"> <li>▪ MEMMERT 350W</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ P SELECTA</li> <li>• Microtitration pipettors</li> <li>• Refrigerators for cooling (5 °C), freezing (-24 °C) and deep freezing (-80 °C)</li> </ul>
<b>Laboratory for serology and molecular diagnostics (for molecular diagnostics, PCR)</b>	<ul style="list-style-type: none"> <li>• Laminar chambers <ul style="list-style-type: none"> <li>- TERMOVENT</li> <li>- FASTER BH-EN 2003</li> <li>- TELSTAR</li> </ul> </li> <li>• Centrifuges <ul style="list-style-type: none"> <li>- MIKRO 120</li> <li>- EPPENDORF</li> </ul> </li> <li>• Wortex <ul style="list-style-type: none"> <li>- VWR International</li> <li>- Heidolph</li> </ul> </li> <li>• Theromocycle reader <ul style="list-style-type: none"> <li>- BIO RAD IQ5 RT-PCR</li> <li>- TECHNE TC-412</li> </ul> </li> <li>• Systems for gel-electrophoresis (GEF) <ul style="list-style-type: none"> <li>- VWR</li> <li>- BIO RAD PowerPac Basic</li> </ul> </li> <li>• Ultraviolet (UV) reader <ul style="list-style-type: none"> <li>- VWR GenoView</li> </ul> </li> <li>• Sequencioner <ul style="list-style-type: none"> <li>- Applied Biosystems ABI PRISM 310 Genetic Analyzer</li> </ul> </li> <li>• Microtitration pipettors</li> <li>• Refrigerators for cooling (5 °C), freezing (-24 °C) and deep freezing (-80 °C)</li> </ul>
<b>Laboratory for bacteriology</b>	<ul style="list-style-type: none"> <li>• Fluorescent microscope -Olympus</li> <li>• Laminar chamber - Telstar</li> </ul>



	<ul style="list-style-type: none"> <li>• Thermostat - Sutjeska</li> <li>• Refrigerator on -20°C Gorenje</li> <li>• Refrigerator - Frinko</li> <li>• Refrigerator - Celex</li> <li>• Magnet shaker - Technica</li> </ul>
<b>Laboratory for virology</b>	<ul style="list-style-type: none"> <li>• Water bath - Sutjeska</li> <li>• Inverse microscope - Kruss</li> <li>• Centrifuge - Eppendorf</li> <li>• Laminar chamber - Thermo</li> <li>• Cell culture incubator - Thermo</li> <li>• Egg incubators (2) -Brinsea</li> <li>• Laminar chamber - Fast</li> <li>• Centrifuge - Hettich Micro 200</li> <li>• Inverse microscope with fluorescence - Hund</li> <li>• Centrifuge -Sigma</li> <li>• CO<sub>2</sub>incubator - Leec</li> <li>• monochanel and multichannel pipettors</li> <li>• Refrigerator on -80°C -( II Shin)</li> </ul>
<b>Laboratory for parasitology</b>	<ul style="list-style-type: none"> <li>• microscope Eclipso 600 Nikon</li> <li>• microscopes Nikon-3</li> <li>• thermostatSutjeska</li> <li>• centrifuge - Labofuge 200 with fixed rotor</li> <li>• centrifuge Hettich Universal 32</li> <li>• refrigerator – Gorenje</li> <li>• sterilizator–Instrumentaria, Zagreb</li> <li>• magnet shaker - Technica</li> <li>• Baerman apparatus</li> <li>• Mc master chambers</li> </ul>

	<ul style="list-style-type: none"> <li>• heating plate Mini-tube</li> </ul>
<b>Laboratory for food and feed microbiology</b>	<ul style="list-style-type: none"> <li>• RT-PCR,</li> <li>• PFGE,</li> <li>• Vitek 2,</li> <li>• Colony counter</li> <li>• Autoclaves,</li> <li>• Sterilizers,</li> <li>• Incubators,</li> <li>• Stomacher,</li> <li>• Dilumats,</li> <li>• Microscopes,</li> <li>• Water baths,</li> <li>• Lyophilizers,</li> <li>• Centrifuges,</li> <li>• Spectrophotometer,</li> <li>• Laminar cabinets,</li> <li>• Water distillers and deionizers,</li> <li>• refrigerators,</li> <li>• freezers,</li> <li>• weighing machines,</li> <li>• laboratory furniture with the appropriate installation,</li> <li>• laboratory inventory with chemicals,</li> <li>• operating supplies and other accessory equipment</li> </ul>
<b>Laboratory for residues and contaminants</b>	<ul style="list-style-type: none"> <li>• Gas chromatograph with ECD and FID Hewlett Packard 5890 Series II,</li> <li>• Headspace sampler- Hewlett Packard 649E ,</li> <li>• Atomic absorption spectrometer with flame photometry AAS Analyst 400 Perkin Elmer,</li> <li>• Atomic absorption spectrometer with Graphite furnace AAS Analyst 600 Perkin Elmer,</li> </ul>

	<ul style="list-style-type: none"> <li>• Balance ,</li> <li>• System analysis of mercury,</li> <li>• Spectrophotometer,</li> <li>• Gas chromatograph with mass detector-Varian 3900,</li> <li>• Nitrogen evaporator,</li> <li>• homogeniser,</li> <li>• Ultratureks homogeniser,</li> <li>• Vacuum pump</li> <li>• Centrifuge,</li> <li>• Blender,</li> <li>• Gas chromatograph with mass detector - Hewlett Packard 5890 Series II,</li> <li>• ELISA Reader ,</li> <li>• Water bath</li> <li>• Vortex mixer for test tubes,</li> <li>• Magnetic mixer</li> <li>• pH meter,</li> <li>• ELISA kit,</li> <li>• Laboratory furniture with digesters with the necessary installation for work</li> <li>• Laboratory inventory (glassware)</li> <li>• Chemicals and other auxiliary equipment</li> </ul>
<b>Laboratory for quality of food and feed</b>	<ul style="list-style-type: none"> <li>• Digestor- Faster</li> <li>• Moisture meters – Sartorius</li> <li>• Oven – Binder GmbH</li> <li>• Sterilizer – Instrumetaria Zagreb</li> <li>• Centrifuge – Funke-Dr.N.Gerber</li> <li>• Water bath – Techne</li> </ul>

	<ul style="list-style-type: none"> <li>• Heating coating- Hozic Elektromehanika Kranj</li> <li>• Heating coating– Hozic</li> <li>• Electric hot plate – Schott Instruments</li> <li>• Hot plate – Schott Instruments</li> <li>• Sand bath – Inko</li> <li>• Sand bath – J.P. selecta</li> <li>• Oven for burning – SNOL</li> <li>• Apparatus for incineration of protein – Gerhardt</li> <li>• Analytical balance – Sartorius</li> <li>• Analytical balance – Sartorius</li> <li>• Balance – Tehnica</li> <li>• Hectolitre balance – Kitt Electric Laboratory</li> <li>• Vacuum pump – Sartorius</li> <li>• Apparatus for distillation of protein – PBI</li> <li>• Refractometer</li> <li>• Saharomat-Polaroid - Shmidt + Haenchs</li> <li>• Spectrofotometer – Perkin Elmer</li> <li>• Saharofleks - Shmidt+Haenchs</li> <li>• dispenzer – Brand</li> <li>• dispenzer – OPTIFIX</li> <li>• Apparatus for distillation of wine – Gibertini Elettronica SRL</li> <li>• Titrator – Metrohn</li> <li>• refrigerator – Gorenje</li> <li>• pH-meter – Sartorius</li> <li>• freezer</li> <li>• laminar chamber</li> </ul>
<b>Laboratory for raw milk quality</b>	<ul style="list-style-type: none"> <li>• FOSS Milkoscan 4000: instrument for chemical analysis of raw</li> </ul>

	<p>milk (fat, protein, lactose, dry matter);</p> <ul style="list-style-type: none"> <li>FOSS Fossomatic 5000: instrument for somatic cell counting in raw milk;</li> <li>FOSS Bactocount IBC: instrument for measuring total bacteria count in raw milk;</li> <li>Funke Gerber Cryostar I: instrument for determining the freezing point of raw milk;</li> <li>DSM Delvo test: test for detecting the presence of inhibitors (antibiotics) in raw milk</li> </ul>
<b>Laboratory for radiobiology</b>	<ul style="list-style-type: none"> <li>High Purity P-Type Coaxial Germanium Detector and Cryostat (GC018-7500SL, S/N b 04029)</li> <li>Liquid Nitrogen Filling System (D 50, NTD 50)</li> <li>Top Opening Lead Shielding (IGS4, S/N 4648)</li> <li>2 Alpha Detectors (A450-20AM, S/N 57070, 57071)</li> <li>2 Alpha Spectrometers (7401VR, S/N 06041467, 06041468)</li> <li>Rotary Vacuum Pump (Trivac D2. 5E, S/N 30000046188)</li> <li>0-6 kV High Voltage Power Supply (3106D, S/N 09042823)</li> <li>Spectroscopy Main Amplifier (2026, S/N 09042746)</li> <li>3ADC/MCA (Multiport-II, MP2-3U, S/N 09043055)</li> <li>NIM BIN /Power Supply (7023, S/N 040823)</li> <li>Dell OtipleX GX270 Computer (S/N G40K71J) , Monitor (S/N BH68-00563D-02)</li> <li>Genie-2000 Based Spectroscopy Software (G2K-CPCE10, V3.0)</li> <li>Germanium detector (GAMMA3)</li> <li>Detector preamplifier test point voltage at 45000V</li> </ul>
<b>Laboratory for pharmacology and toxicology</b>	<ul style="list-style-type: none"> <li>Routine equipment for handling with experimental animals</li> <li>Equipment for measuring and registration of vital parameters in experimental animals (blood pressure gas flow, infusion pumps, ECG etc)</li> </ul>
<b>Laboratory for biochemistry</b>	<ul style="list-style-type: none"> <li>Spectrophotometer – Cecil Instruments</li> <li>Centrifuge</li> <li>Water bath – Memmert</li> <li>Water bath from 0-100° C – Lauda RMG</li> <li>PCR Thermo Cycler - Perkin Elmer Cetus</li> </ul>

<b>Centre for adverse events and information for veterinary drugs</b>	<ul style="list-style-type: none"> <li>• Computer with software for collecting, monitoring, processing and evaluation of adverse effects related with use of veterinary medical preparates and human medical preparates during treatment of the animals.</li> </ul>
<b>Center for animal welfare</b>	<ul style="list-style-type: none"> <li>• Centrifugation machine</li> <li>• Water bath</li> <li>• pH meter</li> <li>• Analytical scales</li> <li>• Refrigerator cooling (4°C)</li> <li>• Deep freeze (-22°C)</li> <li>• Chamber of cooling (4°C)</li> <li>• Chamber of deep freeze (-22°C)</li> <li>• Laminar chamber</li> <li>• Magnetic mixer</li> <li>• Termostate</li> <li>• Cryotome</li> <li>• Microtome</li> <li>• Meat slicer</li> <li>• Nikonmicroscope with morphometry software(Lucia G/M)</li> <li>• Inventory with laboratory chemicals</li> <li>• Supplies and accessories</li> </ul>
<b>University veterinary hospital for pet animals and equines</b>	<ul style="list-style-type: none"> <li>• Apparatus for inhalation anesthesia of small animals with components and spare parts Matrix,</li> <li>• Ventilator Surgivet,</li> <li>• Thermocauter Koagol 150,</li> <li>• Monitor for vital functions ECG, pulsoxymeter, capnograph with respiratory and non invasive venous pressure Mindray, MEC 1200 Vet,</li> <li>• Perfusor JorVet, J-1060,</li> <li>• Infusion pump JorVet, J-1047,</li> <li>• Ultrasonic apparatus for cleaning teeth Bonart medical, ART-M1,</li> <li>• Negatoscope JorVet, J-1022,</li> <li>• Ultrasound Mindray, DP-6600 Vet,</li> <li>• Surgical light Dr. Mach,</li> <li>• Surgical table Krusse,</li> <li>• Tables for physical examination Krusse,</li> <li>• Lamb for clinical examination JorVet,</li> <li>• Otoscope with ophthalmoscope Krusse,</li> <li>• Apparatus for measuring specific weight of urine Krusse,</li> <li>• Electronic scales Krusse,</li> <li>• Sterilizer Sutjeska,</li> <li>• Stand for medicines and instruments Krusse,</li> <li>• Table on wheels for patients JorVet</li> </ul>

	<ul style="list-style-type: none"> <li>• Stand for infusions Krusse</li> <li>• Surgical set for standard surgical interventions Krusse</li> <li>• Cages for intensive care</li> <li>• ECG apparatus CARDIOLINE ar 600adv</li> </ul>
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**Table 3: Teaching staff on the study program**

***a) Teachers (employed on the Faculty)***

No.	SECOND NAME	NAME	RANGE	COURSE OF THE PhD STUDIES	eMail
01	Stojkovski	Velimir	PhD - professor	<ul style="list-style-type: none"> <li>• Comparative biochemistry</li> <li>• Biochemical methods</li> <li>• Neurobiochemistry</li> <li>• Molecular cell biology</li> </ul>	vstojkovski@fvm.ukim.edu.mk
02	Ilieski	Vlatko	PhD - professor	<ul style="list-style-type: none"> <li>• Selected topics from histology and embryology</li> <li>• Comparative anatomy in mammals</li> <li>• Applied anatomy in mammals</li> <li>• Histological, histochemical, immunohistochemical, and morphometric methods in biomedicine science</li> </ul>	vllieski@fvm.ukim.edu.mk
03	Hristovski	Misho	PhD - professor	<ul style="list-style-type: none"> <li>• Fishery and health protection of fish</li> <li>• Apiculture and health protection of bees</li> <li>• Hunting and health protection of hunting game</li> </ul>	hristovskim@fvm.ukim.edu.mk
04	Prodanov	Risto	PhD - professor	<ul style="list-style-type: none"> <li>• Nutritional disorders in pet animals</li> <li>• Veterinary legislative and</li> </ul>	rprodanov@fvm.ukim.edu.mk

				<p>ethics</p> <ul style="list-style-type: none"> <li>• Nutrition models with nutrition pathology in farm animals</li> </ul>	
05	Dovenski	Toni	PhD - professor	<ul style="list-style-type: none"> <li>• Biotechnology of reproduction (assisted reproduction)</li> <li>• Diagnostics and treatment of infertility in domestic animals</li> <li>• Herd health and production management in dairy farms</li> <li>• Udder diseases</li> </ul>	dovenski@fvm.ukim.edu.mk
06	Petkov	Vladimir	PhD - professor	<ul style="list-style-type: none"> <li>• Selected topics from physiology of animals</li> <li>• Selected topics from physiology of fish</li> <li>• Selected topics from physiology of birds</li> </ul>	petkov@fvm.ukim.edu.mk
07	Trojachanec	Plamen	PhD - professor	<ul style="list-style-type: none"> <li>• Herd health and production management in dairy farms</li> <li>• Surgical techniques in pet animals</li> <li>• Surgical techniques in production animals</li> <li>• Special orthopedic diseases</li> </ul>	plament@fvm.ukim.edu.mk
08	Mitrov	Dine	PhD- professor	<ul style="list-style-type: none"> <li>• Herd health and production management in dairy farms</li> <li>• Selected topics from radiology and physical therapy</li> </ul>	mitrov@fvm.ukim.edu.mk



				<ul style="list-style-type: none"> <li>• Neonatal diseases in ruminants</li> <li>• Metabolic diseases in ruminants</li> <li>• Laboratory diagnostic of internal organ diseases in ruminants</li> <li>• Serological methods in veterinary diagnostics</li> <li>• Molecular methods in veterinary diagnostics</li> </ul>	
09	Velev	Romel	PhD-professor	<ul style="list-style-type: none"> <li>• Selected topics from general pharmacology</li> <li>• Physiological basis of veterinary clinical pharmacology</li> <li>• Fundamentals of veterinary toxicology</li> <li>• Pharmacological methods on experimental animals, pharmacological-chemical and methods of clinical examinations of drugs</li> </ul>	vromel@fvm.ukim.edu.mk
10	Mrenoshki	Slavcho	PhD-professor	<ul style="list-style-type: none"> <li>• Advanced methodologies in veterinary epidemiology</li> <li>• Serological methods in veterinary diagnostics</li> <li>• Molecular methods in veterinary diagnostics</li> <li>• Virological methods</li> </ul>	mrenoski@fvm.ukim.edu.mk

				<p>in veterinary diagnostics</p> <ul style="list-style-type: none"> <li>• Bacteriology and diagnostics of most important bacterial diseases</li> </ul>	
11	Ulchar	Igor	PhD-professor	<ul style="list-style-type: none"> <li>• Selected topics from pathophysiology</li> <li>• Veterinary laboratory medicine</li> <li>• Cytological diagnostics</li> <li>• Laboratory diagnostics of the internal diseases in small animals</li> </ul>	iulcar@fvm.ukim.edu.mk
12	Sekulovski	Pavle	PhD-professor	<ul style="list-style-type: none"> <li>• Food safety and veterinary public health</li> <li>• Food microbiology</li> <li>• Molecular-genetic methods and epidemiology of food poisoning</li> </ul>	pavles@fvm.ukim.edu.mk
13	Sekovska	Blagica	PhD-professor	<ul style="list-style-type: none"> <li>• Management of the supply chains of animal products and quality management</li> <li>• Marketing and management of the veterinary practice</li> <li>• Communicological and ethical principles in the relationship with clients</li> <li>• Economy in animal health and production</li> </ul>	bsekovska@fvm.ukim.edu.mk
14	Hajrulai-Musliu	Zehra	PhD-professor	<ul style="list-style-type: none"> <li>• Analytical methods for food safety monitoring</li> <li>• Residues and</li> </ul>	zhajrulai@fvm.ukim.edu.mk

				<p>contaminants as a chemical risks for food safety</p> <ul style="list-style-type: none"> <li>Chemistry and analysis of food</li> </ul>	
15	Nikolovski	Goran	PhD - ass. professor	<ul style="list-style-type: none"> <li>Nutritional disorders in pet animals</li> <li>Pancreatic diseases in pet animals</li> <li>Laboratory diagnostics of internal diseases in small animals</li> <li>Veterinary laboratory medicine</li> </ul>	gnikolovski@fvm.ukim.edu.mk
16	Stefanovska	Jovana	PhD - ass. professor	<ul style="list-style-type: none"> <li>Laboratory diagnostics in veterinary parasitology</li> <li>Parasitic diseases in wild animals</li> <li>Parasitic zoonoses</li> <li>Immunoparasitology</li> </ul>	jstefanovska@fvm.ukim.edu.mk
17	Popovska-Perchnik	Florina	PhD - ass. professor	<ul style="list-style-type: none"> <li>Selected topics from histology and embryology</li> <li>Histological, histochemical, immunohistochemical, and morphometric methods in biomedicine science</li> </ul>	florinap@fvm.ukim.edu.mk
18	Pendovski	Lazo	PhD - ass. professor	<ul style="list-style-type: none"> <li>Selected topics from histology and embryology</li> <li>Comparative anatomy in mammals</li> <li>Applied anatomy in mammals</li> </ul>	lpendovski@fvm.ukim.edu.mk

				<ul style="list-style-type: none"> <li>Histological, histochemical, immunohistochemical, and morphometric methods in biomedicine science</li> </ul>	
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***b) Teachers (retired)***

No.	SECOND NAME	NAME	RANGE	COURSE OF THE PhD STUDIES	eMail
01	Dodovski	Metodija	PhD-professor	<ul style="list-style-type: none"> <li>Technology and technopathies in intensive poultry production</li> <li>OIE listed avian diseases Diagnostic methods of the poultry diseases</li> <li>Epizootiology of infectious diseases of poultry in Republic of Macedonia with principles for prevention</li> </ul>	-

***c) Teachers engaged from other institutions***

No.	SECOND NAME	NAME	RANGE	COURSE OF THE PhD STUDIES	eMail
01	Ristoski	Trpe	PhD-Ass. professor	<ul style="list-style-type: none"> <li>Selected topics from general pathology</li> <li>Selected topics from special pathology</li> <li>Oncology</li> <li>Dermatopathology</li> <li>Veterinary legislative and ethics</li> </ul>	tristoski@fvm.ukim.edu.mk

**Table 4: List of mentors**

No.	SECOND NAME	NAME	RANGE	eMail
01	Ilieski	Vlatko	PhD – professor	vllieski@fvm.ukim.edu.mk

02	Dovenski	Toni	PhD – professor	dovenski@fvm.ukim.edu.mk
03	Mitrov	Dine	PhD – professor	mitrov@fvm.ukim.edu.mk

## APPENDIX 1

### A. VIEW OF THE COMPULSORY COURSES OF THE STUDY PROGRAMME OF PhD STUDIES OF VETERINARY MEDICINE

Course	Use of animals for science research purpose	4.0 ECTS								
Code										
Year of study	I									
Semester	winter									
Total teaching lessons	120									
Realized by	prof. Vlatko Ilieski, PhD									
Purpose and objectives of the course program	This course elaborates the 3-R concept for protection of animals during their use in science research purposes, and practical examples for complete implementation of the 3-R concept. The 3-R concept is crucial for improvement of science and for animal welfare, and is important for ethical and legal reasons, as a fundamental principle of human experimental procedure. This course gives definition of 3-R and obtains guides and directions for using these principles in practice.									
Contents of the course program	<p><b>Theory classes.</b>3-R concept: Replacement – using of methods with avoiding or replacing the use of animals in cases when is it possible; Reduction – minimisation of number of animals used in experiment – for example with improvement of the experimental design and statistical analysis used in the research; Modification, alternative (refinement) – improvement of the experimental procedures and other factors with impact on animals, as accommodation and care for decreasing their suffering, torturing and improvement of welfare during rest of their lives.</p> <p><b>Practicals.</b> Within this course the <i>Council Directive 86/609/EEC of 24 November 1986 on the approximation of laws, regulations and administrative provisions of the Member States regarding the protection of animals used for experimental and other scientific purposes</i> is elaborated. This directive includes the principles of ethical evaluation of the projects; approving of projects, promotion of alternative views in science research work; accommodation and use of animals in science research work; classification of cruelty towards animals, their reusing and their accommodation and nursing. According the Animal Welfare Law this directive implementation of this directive is legal obligation within process of design and realization of the science researching. Teaching includes also information for directions for nursing and accommodation of laboratory animals, including the minimal conditions for accommodation of different animal species, and euthanasia procedures regulated by the Animal Welfare Law.</p> <p>Course also includes explanation of principles of design of science researching project, its justification from aspect of evaluation of injury (of animals) and the benefit of the project, demonstration of manual for obtaining licence for use of animals in different science researching or testings, as well as the work of the ethic committees.</p>									
Organization	60 hours theory classes and practicals 60 hours other forms of activity									
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.									
Specific recommendations related with teaching	<p><b>Scoring of the student's activities:</b></p> <table><tr><th>Activity type</th><th>Points</th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>60.0</td></tr><tr><td>Written essay – project with oral presentation</td><td>30.0</td></tr><tr><td>Attendance and activity</td><td>10.0</td></tr></table>		Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	Written essay – project with oral presentation	30.0	Attendance and activity	10.0
Activity type	Points									
2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0									
Written essay – project with oral presentation	30.0									
Attendance and activity	10.0									

	Total:	100.0
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
	85-92	9 (B)
93-100	10 (A)	
<b>Basic teaching aids</b>	1. д-р Влатко Илиески м-р Лазо Пендовски Хумана еутаназија на животните;	
	2. Hammond-Seaman, A; Ilieski, V; Pendovski ,L; and Thomas G (eds) (2008)"The 3Rs Concept The legal Framework on the Protection of Animals;;Proceedings of the Workshop", 28March 2008, SS Cyril & Methodius University Congress Center, Ohrid Republic of Macedonia	
	3. Vlatko Ilieski Plamen Trojancanec Lazo Pendovski Ksenija Ilievska, Endoscopy and bronchoscopy of dog plastinated specimen Educational CD	
	4. Project Western Balkan veterinary network for Animal welfare	
	www.WBVN.ne	

## B. VIEW OF THE ELECTIVE COURSES OF THE STUDY PROGRAMME OF PhD STUDIES OF VETERINARY MEDICINE

<b>Course</b>	<b>Comparative biochemistry</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS01	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Velimir Stojkovski, PhD	
<b>Purpose and objectives of the course program</b>	The aim of the course is to introduce the students with the molecular differences of organisms and to help them in explaining and understanding the biological importance and development of the organisms throughout the evolution. Special attention will be given to species like domestic and farm animals, and the differences and metabolic composition between different species and within the species.	
<b>Contents of the course program</b>	The course covers the comparative biochemistry of nucleic acids and nuclear proteins, the structural difference and metabolism of proteins, molecular evolution, plasma proteins, yolk proteins and metal binding proteins, immunoproteins, respiratory pigments, peptide hormones, toxic proteins and peptides, muscle proteins, extracellular structural and secretor proteins, small nitrogen components, structure and metabolism of carbohydrates, glycolysis, lipids, sterols and steroids, ester hydrolyses, ATP-ases, carboanhydrases, oxidative metabolism and secondary metabolism.	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
	<b>Total:</b>	<b>100.0</b>
<b>Evaluation of</b>	<b>Periodical evaluations: two(written)</b>	

<b>knowledge</b>	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	<b>to 59</b>	<b>5 (F)</b>
	<b>60-68</b>	<b>6 (E)</b>
	<b>69-76</b>	<b>7 (D)</b>
	<b>77-84</b>	<b>8 (C)</b>
	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	1. Devlin, T. (1997): Textbook of biochemistry with clinical correlations, 4th ed. John Wiley & Sons inc. pub. New York 2. Stryer (1993): Biochemistry, 4th ed. W.H. Freeman & co. New York. 3. Lehninger, A.L., Nelson, D.L. and Cox, M.M. (2000) Principles of Biochemistry, 3rd ed. Worth Publishers. New York, 2000. 4. Џекова-Стојкова, С. (1999): Биохемија. Медицински факултет, Скопје. 5. Стојковски, В. (2001): Ветеринарна клиничка биохемија. Киро Дандаро, Битола.	

<b>Course</b>	<b>Biochemical methods</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS02	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Velimir Stojkovski, PhD	
<b>Purpose and objectives of the course program</b>	The aim of the course is to acquaint the students with the up-to-date methods used in biochemistry and clinical biochemistry for analytical and diagnostic purposes.	
<b>Contents of the course program</b>	Spectrophotometry. Chromatography (gel filtration, ion-exchange chromatography, affinity chromatography. HPLC. ELISA. PCR.	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	<b>to 59</b>	<b>5 (F)</b>
	<b>60-68</b>	<b>6 (E)</b>
	<b>69-76</b>	<b>7 (D)</b>
	<b>77-84</b>	<b>8 (C)</b>
	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	Стојковски, В. (1994): Биохемиски методи. Елнат, Куманово.	

<b>Course</b>	<b>Neurobiochemistry</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS03	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	



<b>Total teaching lessons</b>	90														
<b>Realized by</b>	prof. Velimir Stojkovski, PhD														
<b>Purpose and objectives of the course program</b>	The main aim of the subject is to acquaint the students with the biochemical structure and organization of the nervous system.														
<b>Contents of the course program</b>	Blood-brain barrier, cerebrospinal fluid, function and circulation; the neuron and its biochemistry; brain biochemical content; synapses, synaptogenesis, myelination, synaptic function, biochemistry of brain development; biochemical mechanisms of nervous signals, channels, pumps and transporters; neurotransmitters and synaptic transmission, neurotransmitter receptors and their molecular aspects.														
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b> <table border="1"> <thead> <tr> <th>Activity type</th><th>Points</th></tr> </thead> <tbody> <tr> <td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>60.0</td></tr> <tr> <td>Written essay – project with oral presentation</td><td>30.0</td></tr> <tr> <td>Attendance and activity</td><td>10.0</td></tr> <tr> <td>Total:</td><td>100.0</td></tr> </tbody> </table>	Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	Written essay – project with oral presentation	30.0	Attendance and activity	10.0	Total:	100.0				
Activity type	Points														
2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0														
Written essay – project with oral presentation	30.0														
Attendance and activity	10.0														
Total:	100.0														
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b> <b>Final grade mark forming criteria:</b> <table border="1"> <thead> <tr> <th>Points</th><th>Grade mark</th></tr> </thead> <tbody> <tr> <td>to 59</td><td>5 (F)</td></tr> <tr> <td>60-68</td><td>6 (E)</td></tr> <tr> <td>69-76</td><td>7 (D)</td></tr> <tr> <td>77-84</td><td>8 (C)</td></tr> <tr> <td>85-92</td><td>9 (B)</td></tr> <tr> <td>93-100</td><td>10 (A)</td></tr> </tbody> </table>	Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark														
to 59	5 (F)														
60-68	6 (E)														
69-76	7 (D)														
77-84	8 (C)														
85-92	9 (B)														
93-100	10 (A)														
<b>Basic teaching aids</b>	1. Materials prepared by the course teacher 2. Extracts from the referent literature 3. Internet														

<b>Course</b>	<b>Molecular cell biology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS04	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Velimir Stojkovski, PhD	
<b>Purpose and objectives of the course program</b>	In this course students will gain knowledge in understanding the mechanisms of cell biology at the molecular level and regulation of these mechanisms.	
<b>Contents of the course program</b>	The course covers several aspects of molecular cell biology, particularly the mechanism apoptosis / necrosis; kinase / phosphatase classification and regulation; factors of transcription, classification and regulation; flow of information in gene expression, regulation of cell growth, cohesion of cells and tissues - cytoskeleton; extracellular metrics, lipid mediators, regulation and function; DNA repair mechanisms.	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	

<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	<b>to 59</b>	<b>5 (F)</b>
	<b>60-68</b>	<b>6 (E)</b>
	<b>69-76</b>	<b>7 (D)</b>
	<b>77-84</b>	<b>8 (C)</b>
	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	Berns, W.M. (1997): Cells. University of California, Irvine.	

Course	Selected topics from histology and embryology	3.0 ECTS
Code	FVMS DS05	
Year of study	I	
Semester	winter or summer	
Total teaching lessons	90	
Realized by	ass. prof. Florina Popovska-Perchinik, PhD	
Purpose and objectives of the course program	The aim of this course is for the student to fully comprehend the embryonic development and structural organization of a particular organ systems in domestic animals and other vertebrates. The morphological features of the relevant histological components will be thoroughly studied in order for a student to understand the connection of the structural organization with the principle of functioning. Therewith, students will learn about the differences in microscopic structure of the organ systems in mammals and other vertebrates, linking it with their development and function.	
Contents of the course program	<b>Theory classes.</b> Detailed elaboration of some chapters from the early stages of embryonic development, organogenesis and microscopic analysis of the structural organization of organs of digestive, respiratory, lymph, endocrine, cardiovascular, nervous, urogenital system, sense organs, skin and its derivatives. <b>Practicals.</b> Laboratory exercises (structural analysis with microscope), seminars, as well as individual work with students.	
Organization	30hours theory classes and practicals 60 hours other forms of activity	
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
Specific recommendations related with teaching	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>70.0</b>
	Written essay – project with oral presentation	<b>20.0</b>
	Attendance and activity	<b>10.0</b>
	Total:	<b>100.0</b>
Evaluation of knowledge	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	<b>to 59</b>	<b>5 (F)</b>
	<b>60-68</b>	<b>6 (E)</b>

		<b>69-76</b>	<b>7 (D)</b>	
		<b>77-84</b>	<b>8 (C)</b>	
		<b>85-92</b>	<b>9 (B)</b>	
		<b>93-100</b>	<b>10 (A)</b>	
<b>Basic teaching aids</b>	1. K. Поповски, Л. Кочоски: Ембриологија, Факултет за ветеринарна медицина, Скопје, 2004 2. Jo Ann Eurell and Brian Frappier: Dellman's Textbook of Veterinary Histology, Blackwell, 1998 3. V. Pantić: Histologija, Medicinska Knjiga, Beograd, 1995 4. A. Hraste: Histologija domaćih životinja, Školska knjiga Zagreb, 1991			
<b>Additional teaching aids</b>	1. Zvonimir Kozarić: Veterinarna histologija, Naklada Karolina, Zagreb, 1997 2. K.Babić, A. Hraste: Anatomija i histologija domaćih životinja, Školska knjiga Zagreb, 1997 3. Elizabeth Aughey, Fredric L. Frye: A Color Handbook of Comparative Veterinary Histology & Clinical Correlates, Iowa State University Press, 2001 4. William J. Banks: Applied Veterinary Histology, Mosby, 1993 5. H.C. Juncqueira: Basic histology, Lange, 2005 6. T. Sadler: Langman's Medical embryology, Walters Kluwel, Lippincot Williams, 1996 7. W.K. Latshaw: Veterinary Developmental anatomy, 1987			

<b>Course</b>	<b>Comparative anatomy of mammals</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS06	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Vlatko Ilieski, PhD ass. prof. Lazo Pendovski, PhD	
<b>Purpose and objectives of the course program</b>	The subject aims to introduce students to the scope and field of the anatomy, the position of domestic species in the zoological system, division of animal body organ systems, descriptive terms and areas of the body.	
<b>Contents of the course program</b>	The topographical anatomy of musculoskeletal system (knowledge of organization and classification of bones, the joints formed between bones, organization and classification of muscles, muscle sheaths, tendons, tendon sheaths and synovial bursas), topographic anatomy of the head and neck (bones and muscles of head and neck, nasal cavity, paranasal sinuses, nasopharynx, larynx, trachea, oral cavity, teeth, tongue, salivary glands, chewing apparatus, pharynx, esophagus), the topography of the thoracic cavity, of the thorax (bones and muscles of the thoracic wall, pleura and mediastinum, lung anatomy, review of the conducting airways), topographic anatomy of the heart, topographic anatomy of the abdomen (abdominal muscles, serous membranes, anatomy of simple and complex stomachs, anatomy of the small and large intestines, anatomy and topography of the accessory glands of the digestive system), the topography of the urogenital organs (kidneys, male reproductive system, female reproductive system and mammary glands), anatomy of the central nervous system (meninges, anatomy and vascularisation of the brain and spinal cord, cranial nerves, spinal nerves and ganglia), autonomic (visceral) nervous system (sympathetic and parasympathetic division, intramural nervous system) eye, ear, common integumentum (skin) and skin glands, nails, claws, hooves and horns. It will also be studied topographical anatomy of poultry.	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific</b>	<b>Scoring of the student's activities:</b>	

<b>recommendations related with teaching</b>	<b>Activity type</b>		<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours		<b>60.0</b>
	Written essay – project with oral presentation		<b>30.0</b>
	Attendance and activity		<b>10.0</b>
	Total:		<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>		
	<b>Final grade mark forming criteria:</b>		
		<b>Points</b>	<b>Grade mark</b>
		<b>to 59</b>	<b>5 (F)</b>
		<b>60-68</b>	<b>6 (E)</b>
		<b>69-76</b>	<b>7 (D)</b>
		<b>77-84</b>	<b>8 (C)</b>
<b>Basic teaching aids</b>			

<b>Course</b>	<b>Applied anatomy of mammals</b>		<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS07		
<b>Year of study</b>	I		
<b>Semester</b>	winter or summer		
<b>Total teaching lessons</b>	90		
<b>Realized by</b>	prof. Vlatko Ilieski, PhD ass. prof. Lazo Pendovski, PhD		
<b>Purpose and objectives of the course program</b>	Theoretical and practical teaching of the course is aimed to introduce the students with anatomic features of animal organism with clinical relevance. During the practical classes will be used radiograms on which the anatomy of living animals will be studied comparatively.		
<b>Contents of the course program</b>	The course includes the clinical anatomy of head and neck, clinical anatomy of front and rear limbs, and clinical anatomy of thorax, abdomen and pelvic cavity. Students will learn to identify bones and external bone features on the live animal, to identify the attachments of each muscle, surgical approach to the cavities of the head, neck structures, organs and other anatomical structures in the thoracic and abdominal cavity and limbs, knowledge of the names and positions of the openings that are associated with the cranial nerves, identification of the direction of movement and distribution of surface nerves and blood vessels of head, neck, body and limbs.		
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity		
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.		
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>		
	<b>Activity type</b>		<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours		<b>60.0</b>
	Written essay – project with oral presentation		<b>30.0</b>
	Attendance and activity		<b>10.0</b>
<b>Evaluation of knowledge</b>	Total:		<b>100.0</b>
	<b>Periodical evaluations: two(written)</b>		
	<b>Final grade mark forming criteria:</b>		
		<b>Points</b>	<b>Grade mark</b>
		<b>to 59</b>	<b>5 (F)</b>
		<b>60-68</b>	<b>6 (E)</b>
		<b>69-76</b>	<b>7 (D)</b>

		<b>77-84</b>	<b>8 (C)</b>	
		<b>85-92</b>	<b>9 (B)</b>	
		<b>93-100</b>	<b>10 (A)</b>	
<b>Basic teaching aids</b>	1. Materials prepared by the course teacher 2. Extracts from the referent literature 3. Internet			

Course	Histological, histochemical, immunohistochemical, and morphometric methods in biomedicine science		3.0 ECTS
Code	FVMS DS08		
Year of study	I		
Semester	winter or summer		
Total teaching lessons	90		
Realized by	prof. Vlatko Ilieski, PhD ass. prof. Lazo Pendovski, PhD ass. prof. Florina Popovska-Perchinik, PhD		
Purpose and objectives of the course program	PhD students will gain knowledge about basic principles of dyeing methods in immunohistochemistry, the application of various chemicals used in preparation of histological, immunohistochemical and histoenzymatic slices.		
Contents of the course program	Basic functioning mechanisms of various types of microscopes (light, fluorescence, confocal, electronic). Students will learn about technical problems during the process of tissue preparation and about morphometrical methods in macroscopic and microscopic analysis. Detailed procedures used in quality evaluation of meat product and other tissues and organic systems will be taught as well.		
Organization	30hours theory classes and practicals 60 hours other forms of activity		
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.		
Specific recommendations related with teaching	Scoring of the student's activities:		
	Activity type	Points	
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	
	Written essay – project with oral presentation	30.0	
	Attendance and activity	10.0	
	Total:	100.0	
Evaluation of knowledge	Periodical evaluations: two(written)		
	Final grade mark forming criteria:		
	Points	Grade mark	
	to 59	5 (F)	
	60-68	6 (E)	
	69-76	7 (D)	
	77-84	8 (C)	
	85-92	9 (B)	
93-100	10 (A)		
Basic teaching aids	1. Materials prepared by the course teacher 2. Extracts from the referent literature 3. Internet		

<b>Course</b>	<b>Laboratory diagnostics in veterinary parasitology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS09	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	ass. prof. Jovana Stefanovska, PhD	

<b>Purpose and objectives of the course program</b>	Students on PhD studies will gain knowledge of parasitic diagnostics methods with which parasitic diseases are diagnosed and determination of parasites and their development forms.															
<b>Contents of the course program</b>	<b>Theory classes.</b> methods of feces examinations, parasitological methods of examining: skin, respiratory organs, digestive system, nerve system, blood and biopsy materials, histopathological examinations, parasite DNA detection. <b>Practicals.</b> Direct faeces smear, qualitative coprological examinations, flotation of eggs and cysts, sedimentation, Baerman concentration, cultivation of larvae (Volkenburg and Sullivan method) micrometry, quantitative coprological examinations, (McMasters method), Waidy method, interpretation, identification of helminthes eggs, identification of cysts and oocysts, histopathological analysis, identification of microfilariae, trichinoscopic examinations (compression method and method of artificial digestion) molecular diagnostics with PCR and real-time PCR															
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity															
<b>Teaching methods</b>	Theory classes and practicals: interactive Written assay: learning with use of referent literature and internet, making of written assay; oral presentation and discussion of the written assay.															
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b> <table><tr><th>Activity type</th><th>Points</th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>70.0</td></tr><tr><td>Written essay – project with oral presentation</td><td>20.0</td></tr><tr><td>Attendance and activity</td><td>10.0</td></tr><tr><td>Total:</td><td>100.0</td></tr></table>		Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	70.0	Written essay – project with oral presentation	20.0	Attendance and activity	10.0	Total:	100.0				
Activity type	Points															
2 periodical evaluations during the teaching or written exam with duration of 2 hours	70.0															
Written essay – project with oral presentation	20.0															
Attendance and activity	10.0															
Total:	100.0															
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th>Points</th><th>Grade mark</th></tr><tr><td>to 59</td><td>5 (F)</td></tr><tr><td>60-68</td><td>6 (E)</td></tr><tr><td>69-76</td><td>7 (D)</td></tr><tr><td>77-84</td><td>8 (C)</td></tr><tr><td>85-92</td><td>9 (B)</td></tr><tr><td>93-100</td><td>10 (A)</td></tr></table>		Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark															
to 59	5 (F)															
60-68	6 (E)															
69-76	7 (D)															
77-84	8 (C)															
85-92	9 (B)															
93-100	10 (A)															
<b>Basic teaching aids</b>	1. Foreyt,William: J . Veterinary Parasitology Reference Manual, Ames, IA: Iowa State University Press, 2001 2. Sloss, M.: Veterinary Clinical Parasitology, Iowa State Press, 1994 3. William J. Foreyt: Veterinary parasitology reference manual, Pullman, WA 99164, 1997															
<b>Additional teaching aids</b>	1. Bowman , D.D. Georgis, W.B. : Parasitology for Veterinarians, Saunders, 1995 2. Jorgen Hansen and Brian Perry: The epidemiology, diagnosis and control of helminth parasites of ruminants, ILRAD, 1994 3. Ministry of agriculture, fisheries and food:Manual of veterinary parasitological laboratory techniques, MAFF/ADAS, 1996															

<b>Course</b>	<b>Fishery and health protection of fish</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS10	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Misho Hristovski, PhD	
<b>Purpose and objectives of the course program</b>	The aim of this course is introducing students with scientific and practical aspects of biological characteristics of fish, intensive production and diagnosis of fish diseases and implementation of preventive measures, control, medication and eradication of fish diseases.	
<b>Contents of the</b>	<b>Theory classes and practicals.</b> Meaning of fishery and aquaculture.	



<b>course program</b>	Taxonomy of fish. Endangered fish species. Modification of natural habitats. Dams and other hydrological objects. Water quality. Introduced species. Overloaded fishing. Trading. Aquaculture. Basic features of fish diseases. Viral, bacterial, fungal and parasitic diseases in fish. Exotic and non-infectious diseases in fish. Diseases of roe, larvae and aquaria fish. Biological antagonists and pests of fish. Prevention of diseases and health protection in man from zoonoses. Diseases control and elimination measures. Legislative for suppression of most important diseases in fish.															
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity															
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b> <table><tr><th><i>Activity type</i></th><th><i>Points</i></th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td><b>60.0</b></td></tr><tr><td>Written essay – project with oral presentation</td><td><b>30.0</b></td></tr><tr><td>Attendance and activity</td><td><b>10.0</b></td></tr><tr><td>Total:</td><td><b>100.0</b></td></tr></table>		<i>Activity type</i>	<i>Points</i>	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>	Written essay – project with oral presentation	<b>30.0</b>	Attendance and activity	<b>10.0</b>	Total:	<b>100.0</b>				
<i>Activity type</i>	<i>Points</i>															
2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>															
Written essay – project with oral presentation	<b>30.0</b>															
Attendance and activity	<b>10.0</b>															
Total:	<b>100.0</b>															
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th><i>Points</i></th><th><i>Grade mark</i></th></tr><tr><td><b>to 59</b></td><td><b>5 (F)</b></td></tr><tr><td><b>60-68</b></td><td><b>6 (E)</b></td></tr><tr><td><b>69-76</b></td><td><b>7 (D)</b></td></tr><tr><td><b>77-84</b></td><td><b>8 (C)</b></td></tr><tr><td><b>85-92</b></td><td><b>9 (B)</b></td></tr><tr><td><b>93-100</b></td><td><b>10 (A)</b></td></tr></table>		<i>Points</i>	<i>Grade mark</i>	<b>to 59</b>	<b>5 (F)</b>	<b>60-68</b>	<b>6 (E)</b>	<b>69-76</b>	<b>7 (D)</b>	<b>77-84</b>	<b>8 (C)</b>	<b>85-92</b>	<b>9 (B)</b>	<b>93-100</b>	<b>10 (A)</b>
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<b>85-92</b>	<b>9 (B)</b>															
<b>93-100</b>	<b>10 (A)</b>															
<b>Basic teaching aids</b>	Христовски М., Стојановски С.: Биологија, одгледување и болести на рибите. Национален форум за заштита на животните на Македонија, Скопје. 2005.															

<b>Course</b>	<b>Apiculture and health protection of bees</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS11	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Misho Hristovski, PhD	
<b>Purpose and objectives of the course program</b>	The aim of this course is introducing students with scientific and practical aspects of biological characteristics of bees, intensive production and diagnosis of bee's diseases and implementation of preventive measures, control, medication and eradication of bee's diseases.	
<b>Contents of the course program</b>	Meaning of apiculture, Taxonomy and types and of bees, Members of the bee family, Biological characteristics of the honey bee, Starting the apiculture, Beehives, tools and equipment for apiculture, Apiculture technology, Honey giving plants, Bee products, Health protection of bees	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>

	Attendance and activity	10.0														
	Total:	100.0														
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th>Points</th><th>Grade mark</th></tr><tr><td>to 59</td><td>5 (F)</td></tr><tr><td>60-68</td><td>6 (E)</td></tr><tr><td>69-76</td><td>7 (D)</td></tr><tr><td>77-84</td><td>8 (C)</td></tr><tr><td>85-92</td><td>9 (B)</td></tr><tr><td>93-100</td><td>10 (A)</td></tr></table>		Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark															
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69-76	7 (D)															
77-84	8 (C)															
85-92	9 (B)															
93-100	10 (A)															
<b>Basic teaching aids</b>	<p>1. Христовски М. и Цветковиќ А.: Болести, штетници и труења на пчелите. Интерна скрипта. Факултет за ветеринарна медицина во Скопје, Скопје.</p> <p>2. Христовски М.: Пчеларството во 21 век. Национален форум за заштита на животните на Македонија, Скопје, 2004.</p> <p>3. Кипријановска Х., Наумовски М.: Пчеларство. Скопје, 2002.</p> <p>4. Шљахов П.: Пчеларство. III поправено издание, Наша книга, Скопје. 1990.</p>															

Course	Hunting and health protection of hunting game	3.0 ECTS
Code	FVMS DS12	
Year of study	I	
Semester	winter or summer	
Total teaching lessons	90	
Realized by	prof. Misho Hristovski, PhD	
Purpose and objectives of the course program	The aim of this course is introducing students with scientific and practical aspects of biological characteristics of hunting game, intensive production and diagnosis of game diseases and implementation of preventive measures, control, medication and eradication of game diseases.	
Contents of the course program	Taxonomy and division of hunting game. Biological characteristics of hunting game in Republic of Macedonia: wild fowl, wild leporides and rodents, wild hoofed animals, wild carnivores. Endangered species. Measures of protection of hunting game	
Organization	30hours theory classes and practicals 60 hours other forms of activity	
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
Specific recommendations related with teaching	Scoring of the student's activities:	
	Activity type	Points
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0
	Written essay – project with oral presentation	30.0
	Attendance and activity	10.0
Total:	100.0	
Evaluation of knowledge	Periodical evaluations: two(written) Final grade mark forming criteria:	
	Points	Grade mark
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
	85-92	9 (B)
	93-100	10 (A)
Basic teaching aids	1. Закон за ловство на Р.Македонија. Службен весник на РМ бр. 26 од 24.02.2009 год. 2. Лапчевик Е., Јакшиќ Б.: Болести дивлјачи, кознашица и кунича	



	Издавачко-Информативни центар студената Београд, Београд, 1976. 3. Трпков Б., Дончев И., Дроздовски И.: Ловечки прирачник. Сојуз на ловечки организации на Македонија, Скопје, 1978. 4. Трпков Б.: Ловство. Шумарски факултет Скопје, Скопје, 1989.
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Course	Parasite diseases in wild animals	3.0 ECTS														
Code	FVMS DS13															
Year of study	I															
Semester	winter or summer															
Total teaching lessons	90															
Realized by	ass. prof. Jovana Stefanovska, PhD															
Purpose and objectives of the course program	The aim of this course is to introduce the PhD students with most important parasitic disease affecting the wildlife.															
Contents of the course program	<b>Theory classes.</b> Epidemiology, zoonoses, parasite diseases, risk factors of parasite diseases appearance, wild and domestic animals contacts, cohabitation of wild and domestic animals, (migration, nomadic way of livestock farming, Protostomatic diseases: Coccidiosis, Piroplasmosis, Sarcocystosis, Toxoplasmosis, Histomoniasis. Diseases caused by helminthes, diseases caused by arthropods, Parasitological diagnostics in wild animals, basic monitoring, prevention and therapy of parasite diseases in wild animals <b>Practicals.</b> Processing and preparation of diagnostic material; marking, listing and interpreting diagnostic materials. Parasitological mapping; Identification of helminthes, protozoa and arthropods. Coprological tests and egg identification, the influence of parasite diseases on general health condition of wild animals, serological and molecular diagnostics methods, interpretation of the monitoring results, gathering and sampling of feces, recognizing of epidemiological situation in wild animals resorts (natural and intensive). Coprological monitoring in the field (how to gather material in the right places before and after the shooting ) therapy based on the monitoring, group therapy, therapy by using more antihelmiths simultaneously, individual therapy, disinfection, deratization in farming of wild animals.															
Organization	30hours theory classes and practicals 60 hours other forms of activity															
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
Specific recommendations related with teaching	<b>Scoring of the student's activities:</b> <table><tr><th>Activity type</th><th>Points</th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>60.0</td></tr><tr><td>Written essay – project with oral presentation</td><td>30.0</td></tr><tr><td>Attendance and activity</td><td>10.0</td></tr><tr><td>Total:</td><td>100.0</td></tr></table>		Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	Written essay – project with oral presentation	30.0	Attendance and activity	10.0	Total:	100.0				
Activity type	Points															
2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0															
Written essay – project with oral presentation	30.0															
Attendance and activity	10.0															
Total:	100.0															
Evaluation of knowledge	<b>Periodical evaluations: two(written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th>Points</th><th>Grade mark</th></tr><tr><td>to 59</td><td>5 (F)</td></tr><tr><td>60-68</td><td>6 (E)</td></tr><tr><td>69-76</td><td>7 (D)</td></tr><tr><td>77-84</td><td>8 (C)</td></tr><tr><td>85-92</td><td>9 (B)</td></tr><tr><td>93-100</td><td>10 (A)</td></tr></table>		Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark															
to 59	5 (F)															
60-68	6 (E)															
69-76	7 (D)															
77-84	8 (C)															
85-92	9 (B)															
93-100	10 (A)															
Basic teaching aids	1. Materials prepared by the course teacher 2. Extracts from the referent literature 3. Internet															

Course	Technology and technopathies in intensive poultry production		3.0 ECTS
Code	FVMS DS14		
Year of study	I		
Semester	winter or summer		
Total teaching lessons	90		
Realized by	prof.Metodija Dodovski, PhD		
Purpose and objectives of the course program	Advanced introduction with technological normatives of extensive breeding of different production categories of poultry and their impact on poultry's productive and health status.		
Contents of the course program	Technology of incubation, technology of parent stock-heavy lines and light lines, technology of broiler production, technology of table egg layers, technopathies and metabolic disorders in intensive production.		
Organization	30hours theory classes and practicals 60 hours other forms of activity		
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.		
Specific recommendations related with teaching	Scoring of the student's activities:		
	Activity type		Points
	2 periodical evaluations during the teaching or written exam with duration of 2 hours		60.0
	Written essay – project with oral presentation		30.0
	Attendance and activity		10.0
	Total:		100.0
Evaluation of knowledge	Periodical evaluations: two(written)		
	Final grade mark forming criteria:		
	Points		Grade mark
	to 59		5 (F)
	60-68		6 (E)
	69-76		7 (D)
	77-84		8 (C)
	85-92		9 (B)
93-100		10 (A)	
Basic teaching aids	Breeding manuals from different breeders, articles from scientific journals		

<b>Course</b>	<b>OIE listed avian diseases</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS15	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof.Metodija Dodovski, PhD	
<b>Purpose and objectives of the course program</b>	Advanced introduction with OIE listed avian diseases and training for fast and correct diagnosis, therapy recommendation and proposing preventive and control measures.	
<b>Contents of the course program</b>	Chlamydiosis, infectious bronchitis, infectious laryngotracheitis, influenza, mycoplasmosis, tuberculosis, duck viral enteritis, duck viral hepatitis, fowl cholera, pox, salmonellosis, campylobacteriosis, infectious bursal disease, Marek disease, Newcastle disease, avian metapneumovirus.	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific</b>	<b>Scoring of the student's activities:</b>	

<b>recommendations related with teaching</b>	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
	85-92	9 (B)
	93-100	10 (A)
<b>Basic teaching aids</b>	Y.M. Saif: Diseases of Poultry, 12 <sup>th</sup> edition	

<b>Course</b>	<b>Diagnostic methods of poultry diseases</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS16	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof.Metodija Dodovski, PhD	
<b>Purpose and objectives of the course program</b>	Advanced introduction and application of certain parasitological, bacteriological, mycological, virological, serological and molecular diagnostic methods.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Isolation and identification of some important bacterial and fungal pathogens in poultry, isolation of virus on embryonated eggs, hemagglutination, hemagglutination inhibition, ELISA, conventional PCR, real-time PCR.	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
<b>Evaluation of knowledge</b>	Total:	<b>100.0</b>
	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
	85-92	9 (B)
	93-100	10 (A)
<b>Basic teaching aids</b>	Manual of Diagnostic Tests and Vaccines for Terrestrial Animals - OIE, 2011	

Course	Epizootiology of infectious diseases of poultry in Republic of Macedonia with principles for prevention		3.0 ECTS
Code	FVMS DS17		
Year of study	I		
Semester	winter or summer		
Total teaching lessons	90		
Realized by	prof.Metodija Dodovski, PhD		
Purpose and objectives of the course program	Epizootiological situation of certain infectious diseases in Republic of Macedonia and eradication experiences during outbreaks, principles of poultry health and prevention with biosecurity measures on the farm.		
Contents of the course program	Epizootiological situation of certain infectious diseases in Republic of Macedonia and eradication experiences during outbreaks, principles of poultry health and prevention with biosecurity measures on the farm.		
Organization	30hours theory classes and practicals 60 hours other forms of activity		
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.		
Specific recommendations related with teaching	Scoring of the student's activities:		
	Activity type	Points	
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	
	Written essay – project with oral presentation	30.0	
	Attendance and activity	10.0	
	Total:	100.0	
Evaluation of knowledge	Periodical evaluations: two(written)		
	Final grade mark forming criteria:		
	Points	Grade mark	
	to 59	5 (F)	
	60-68	6 (E)	
	69-76	7 (D)	
	77-84	8 (C)	
	85-92	9 (B)	
	93-100	10 (A)	
Basic teaching aids	1. Y.M. Saif: Diseases od Poultry, 12 <sup>th</sup> edition 2. articles from scientific journals		

<b>Course</b>	<b>Selected topics from general pharmacology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS18	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Romel Velev, PhD	
<b>Purpose and objectives of the course program</b>	Purpose of this course is to broaden the student's knowledge of fundamentals of pharmacokinetics, drug metabolism, the mechanism of receptor action drug interaction, and to know the side effects of drugs commonly used in veterinary clinical practice	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Pharmacokinetic basis and drug disposition interspecies variations. Concept of bioavailability and administration of the veterinary dosage forms. Interpretation of changes in drug disposition and interspecies justification. Mechanism of receptor effect of drugs. Drug interactions on receptor level and related acting mechanisms. Adverse effects of drugs (mechanisms, collecting, reporting and analysis).	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	

<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	Tests	<b>20.0</b>
	Written essay – project with oral presentation	<b>10.0</b>
	Attendance and activity	<b>45.0</b>
	Final oral exam	<b>25.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	<b>to 59</b>	<b>5 (F)</b>
	<b>60-68</b>	<b>6 (E)</b>
	<b>69-76</b>	<b>7 (D)</b>
	<b>77-84</b>	<b>8 (C)</b>
	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	Adams H. R.: Veterinary Pharmacology and Therapeutics. 8-th edition. Iowa State University Press. Ames, 2001	

<b>Course</b>	<b>Physiological basis of veterinary clinical pharmacology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS19	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof.Romel Velez, PhD	
<b>Purpose and objectives of the course program</b>	Purpose of this course is to introduce students with structure, mode of action and pharmacokinetics of individual groups of veterinary drugs in certain species; scientific basis for their safe and efficient use of ethical, environmental implications and implications on human health from the use of veterinary drugs in veterinary practice	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Structure, acting mechanism and pharmacokinetics of drugs acting on digestive system and metabolism; fluids and electrolytes; drugs acting on heart and circulation; antibiotics and chemotherapeutics; anti-inflammatory drugs; hypnotics, sedatives and anesthetics; antihelminthics and ectoparasitics; sexual hormones; dermatological drugs; ophtalmic drugs; analgesics etc. Rational application of drugs. Problems with antibiotic resistance. Ecological and human health implications with usage of the veterinary drugs. Veterinary drugs residues and causes for their presence in animal products (milk, meat, honey, contamination trajectories, farmaco-toxicological meaning, metabolism, diagnostics, carence, MRL, legal regulations). Detection of antibiotics in environment.	
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	Tests	<b>20.0</b>
	Written essay – project with oral presentation	<b>10.0</b>
	Attendance and activity	<b>45.0</b>
	Final oral exam	<b>25.0</b>
<b>Evaluation of</b>	<b>Total:</b>	<b>100.0</b>
	<b>Periodical evaluations: two(written)</b>	

<b>knowledge</b>	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
	85-92	9 (B)
	93-100	10 (A)
<b>Basic teaching aids</b>	1. Adams H. R.: Veterinary Pharmacology and Therapeutics. 8-th edition. Iowa State University Press. Ames, 2001 2. J. Desmond Baggot: The Physiological Basis of Veterinary Clinical Pharmacology. Blackwell Science, 2001	
<b>Additional teaching aids</b>	Francetić I., Vitezić D., Vrhovac B.: Osnove kliničke farmakologije, Školska knjiga, Zagreb, 2007	

<b>Course</b>	<b>Fundamentals of veterinary toxicology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS20	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof.Romel Velez, PhD	
<b>Purpose and objectives of the course program</b>	The goal of this course is to introduce the student with the main principles of veterinary toxicology.	
<b>Contents of the course program</b>	Structure, mode of action and pharmacokinetics of toxic substances, pathogenesis, clinical diagnosis and treatment of poisoned animals, ethical, environmental implications and implications on human health from potential use of toxic substances; evaluation of products of animal origin contaminated with toxins etc.	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	Tests	20.0
	Written essay – project with oral presentation	10.0
	Attendance and activity	45.0
	Final oral exam	25.0
	Total:	100.0
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two (written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
	85-92	9 (B)
	93-100	10 (A)
<b>Basic teaching aids</b>	1. Srebočan, V.: <b>Otrovanja</b> . in: Srebočan, V., Gomerčić, H.: Veterinarski priručnik. 4 izdanje, JUMENA, Zagreb 1989. 2. Srebočan, V.: <b>Veterinarska toksikologija</b> . Medicinska naklada, Zagreb 1993. 3. Dilov, P., Georgiev, B., Borissova, L., Stoyanov, K., Vrbcheva, V., Lazarova, S., Kostadinov, J., Kirov, K., Alexandrov, M., Angelov: <b>Veterinary medical toxicology</b> . Sofia., 2005. 4. Čupić, V.: <b>Najčešća trovanja u veterinarskoj medicini</b> . Univerzitet u	



	Beogradu, Fakultet veterinarske medicine, Beograd 1999.
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Course	Pharmacological methods on experimental animals, pharmacological-chemical and methods of clinical examinations of drugs	3.0 ECTS														
Code	FVMS DS21															
Year of study	I															
Semester	winter or summer															
Total teaching lessons	90															
Realized by	prof. Romel Velez, PhD															
Purpose and objectives of the course program	The purpose of this course is learning the basics, theory and practical application of methods and principles of application and pharmacological methods for measuring parameters (cardiovascular, respiratory, etc.). Dealing with experimental animals after administration of drugs; pharmacological methods of measuring the concentrations of drugs and endogenous substances in tissues and body fluids and understanding and specific work on the problem of clinical trials of drugs (drafting, plan and randomization of clinical pharmacological research, data processing and types of clinical trials of drugs).															
Contents of the course program	<b>Theory classes and practicals.</b> Design of experimental model in laboratory animals and testing of drug groups (sepsis and septic condition causing model, inflammation causing model, pain causing model). Preparation, organization, implementation and evaluation of drug clinic trial results. Clinical trial ethics (Council Directive 86/609/EEC of 24 November 1986 on the approximation of laws, regulations and administrative provisions of the Member States regarding the protection of animals used for experimental and other scientific purposes).															
Organization	30hours theory classes and practicals 60 hours other forms of activity															
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
Specific recommendations related with teaching	<b>Scoring of the student's activities:</b> <table><tr><th>Activity type</th><th>Points</th></tr><tr><td>Tests</td><td>20.0</td></tr><tr><td>Written essay – project with oral presentation</td><td>10.0</td></tr><tr><td>Attendance and activity</td><td>45.0</td></tr><tr><td>Final oral exam</td><td>25.0</td></tr><tr><td>Total:</td><td>100.0</td></tr></table>		Activity type	Points	Tests	20.0	Written essay – project with oral presentation	10.0	Attendance and activity	45.0	Final oral exam	25.0	Total:	100.0		
Activity type	Points															
Tests	20.0															
Written essay – project with oral presentation	10.0															
Attendance and activity	45.0															
Final oral exam	25.0															
Total:	100.0															
Evaluation of knowledge	<b>Periodical evaluations: two(written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th>Points</th><th>Grade mark</th></tr><tr><td>to 59</td><td>5 (F)</td></tr><tr><td>60-68</td><td>6 (E)</td></tr><tr><td>69-76</td><td>7 (D)</td></tr><tr><td>77-84</td><td>8 (C)</td></tr><tr><td>85-92</td><td>9 (B)</td></tr><tr><td>93-100</td><td>10 (A)</td></tr></table>		Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark															
to 59	5 (F)															
60-68	6 (E)															
69-76	7 (D)															
77-84	8 (C)															
85-92	9 (B)															
93-100	10 (A)															
Basic teaching aids	1. Stojanovic D.: Models of sepsis on Laboratory animals. Scientific Veterinary Institute "Novi Sad"- Novi Sad, 2009 2. Francetić I., Vitezić D., Vrhovac B.: Osnove kliničke farmakologije, Školska knjiga, Zagreb, 2007															

Course	Biotechnology of reproduction (Assisted reproduction)		3.0 ECTS
Code	FVMS DS23		
Year of study	I		
Semester	winter or summer		
Total teaching lessons	90		
Realized by	prof.Toni Dovenski, PhD		
Purpose and objectives of the course program	The aim of this course is to train students for the application of modern technologies of assisted reproduction in animals and humans, such as cryo-conservation of gametes and embryos; application of new methods for insemination (laparoscopic, endoscopic) of the animals, insemination with sexed semen, with a minimum concentration of sperm, embryo transfer, in vitro fertilization, cloning and the creation of transgenic animals.		
Contents of the course program	Hormonal regulation of sexual functions. Physiology and Biochemistry of the sirs ejaculates. Artificial insemination in different species of domestic mammals. Assessment and Conservation of the ejaculates. Procedures and manipulation with the doses for artificial insemination. Procedure with liquid and deep frozen semen during the insemination. Modern methods of insemination: with sexed semen, with a minimum concentration of sperm. Laparoscopic insemination in small ruminants. Trans-cervical insemination in bitches. Embryo transfer. IVP (IVM / IMF / IVC), Ovum Pick-Up method. Cloning		
Organization	30hours theory classes and practicals 60 hours other forms of activity		
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.		
Specific recommendations related with teaching	Scoring of the student's activities:		
	Activity type		Points
	2 periodical evaluations during the teaching or written exam with duration of 2 hours		60.0
	Written essay – project with oral presentation		30.0
	Attendance and activity		10.0
	Total:		100.0
Evaluation of knowledge	Periodical evaluations: two(written)		
	Final grade mark forming criteria:		
	Points		Grade mark
	to 59		5 (F)
	60-68		6 (E)
	69-76		7 (D)
	77-84		8 (C)
	85-92		9 (B)
	93-100		10 (A)
Basic teaching aids	1. Поповски К., К'нчев Љ.: Ендокринологија на репродукцијата. Ветеринарен Институт-Ветеринарен факултет Скопје, 1998 2. Ian R. Gordon: Laboratory Production of Cattle Embryos, CABI Publishing, 2003 3. H. Kanagawa, I. Shimohira, N. Saitoh: Mannual Of Bovine Embryo Transfer, Japan Livestock Technology Association, 1995		
Additional teaching aids	1. Toni Dovenski: Real possibilities for using embryo transfer in cattle genetic improvement, Clinica Veterinaria, Subotica, Proceedings 17-21, 2011 2. T. Dovenski, V. Petkov, P. Trojačanec, Lj. Mickov, B. Atanasov, M. Nikolovski, Lj. Kočoski: Application of novel biotechnical methods for improvement of ovine reproductive efficiency, Scientific Symposium: Reproduction in domestic animals, Proccedings, 2011 3. T. Dovenski, P. Trojacanec, V. Petkov, F. Popovska-Percinic, Lj. Kocoski: Using of ultrasound guided Ovum Pick-Up (OPU) in Bovine Embryo Industry as an alternative to superovulatory treatment, 2 <sup>nd</sup> Conference of Balkan Network for Animal Reproduction Biotechnology,		



Proceedings, 36-39 Sofia, Bulgaria, 2011																
Course	Diagnostics and therapy of infertility in domestic animals	3.0 ECTS														
Code	FVMS DS24															
Year of study	I															
Semester	winter or summer															
Total teaching lessons	90															
Realized by	prof.Toni Dovenski, PhD															
Purpose and objectives of the course program	The aim of this course is to familiarize students with the latest discoveries in animal infertility such as ovarian cycling problems, ovulation disturbances, cystic formation in ovaries, and infectious, alimentary and immunological etiology of infertility. Students are supposed to understand the ethiology, pathogenesis, diagnostics, prognosis, therapy and prevention of these reproductive abnormalities.															
Contents of the course program	Anatomical, functional and breeding etiological factors in animal infertility; Influence of nutrition, infectious, parasitic and metabolic factors in animal infertility; Influence of animal breeding programs and farm management in animal infertility; Inflammation processes in uterus, oviducts and ovaries as factor for animal infertility; Puerperal disorders as factor for animal infertility (in mammals);Basic principles of ultrasonographic examination of the reproductive tract as a modern diagnostic method for reproductive disorders; Modern approach in the treatment and prevention of reproductive disorders; Using of hormonal and other treatment methods.															
Organization	30hours theory classes and practicals 60 hours other forms of activity															
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
Specific recommendations related with teaching	<b>Scoring of the student's activities:</b> <table><tr><th>Activity type</th><th>Points</th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>60.0</td></tr><tr><td>Written essay – project with oral presentation</td><td>30.0</td></tr><tr><td>Attendance and activity</td><td>10.0</td></tr><tr><td>Total:</td><td>100.0</td></tr></table>		Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	Written essay – project with oral presentation	30.0	Attendance and activity	10.0	Total:	100.0				
Activity type	Points															
2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0															
Written essay – project with oral presentation	30.0															
Attendance and activity	10.0															
Total:	100.0															
Evaluation of knowledge	<b>Periodical evaluations: two(written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th>Points</th><th>Grade mark</th></tr><tr><td>to 59</td><td>5 (F)</td></tr><tr><td>60-68</td><td>6 (E)</td></tr><tr><td>69-76</td><td>7 (D)</td></tr><tr><td>77-84</td><td>8 (C)</td></tr><tr><td>85-92</td><td>9 (B)</td></tr><tr><td>93-100</td><td>10 (A)</td></tr></table>		Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark															
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69-76	7 (D)															
77-84	8 (C)															
85-92	9 (B)															
93-100	10 (A)															
Basic teaching aids	1. Мицковски Г.: Физиологија и патологија на репродукцијата. Ветеринарен Институт-Ветеринарен факултет, Скопје, 2000 2. David E. Noakes, Geoffrey H. Arthur, Timothy J. Parkinson, Gary C. W. England: Veterinary Reproduction and Obstetrics, Elsevier Health Sciences, 2001 3. Claus D. Buergelt: Color Atlas of Reproductive Pathology of Domestic Animals, Mosby, 1997															
Additional teaching aids	1. T. Dovenski, Lj. Kocoski, P. Trojacanec, V. Petkov, G. Mickovski, D. Mitrev, I. Naletoski: Influence of infectious diseases on reproductive performance of dairy cows. "Clinica Veterinaria" p. 15-19, Neum, BiH, 2006 2. T. Dovenski, Lj. Kočoski, P. Trojačanec, K. Popovski, G. Mickovski, V. Petkov, S. Veselinović, V. Ivkov, N. Ivančev, R. Ičkov, Lj. Mickov:															

	Ultrazvučna dijagnostika i odgovarajuća terapija funkcionalnih poremećaja jajnika mlečnih krava, "Clinica veterinaria" Zbornik radova, 35-40, Budva, S.R. Jugoslavija, 2000
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Course	Herd health and production management in dairy farms	3.0 ECTS														
Code	FVMS DS25															
Year of study	I															
Semester	winter or summer															
Total teaching lessons	90															
Realized by	prof.Toni Dovenski, PhD prof. Plamen Trojchanec, PhD prof. Dine Mitrov, PhD															
Purpose and objectives of the course program	Determining the aims and systemic strategies, managing the data logs organizing farm visitation protocols, familiarizing with the epidemiological and economical aspects in HHM. Familiarizing with the principles of monitoring and managing during the dry period;Dairy production and metabolic disorders;Reproductive performance in diary animals;Udder performance;Feet disorders;Control of infectious diseases.															
Contents of the course program	Basic principles, aims and systemic strategies in herd health management of farm animals for milk and meat production (farm visitation protocol, data logging, epidemiological and economic aspects of HHM);Monitoring of herd reproduction: Calf management, determining and execution of protocols; Determining the aims; Optimization of milk production: principles and methods in optimizing digestion in fore stomachs, managing metabolic disorders related with rumen; aim determination, realization and monitoring; Dry period monitoring: Strategies before and during the dry period; physiological changes, disorders and prevention during the dry period. Udder health management: determining the aims; pathophysiology, epidemiology and types of infection. Executing a protocol. Analysis, solutions, treatment and monitoring. Monitoring of the reproductive performances: defining aims for optimization of reproductive performances; Reproductive parameters; Executing, concluding and monitoring. Feet health monitoring: defining aims and executing monitoring protocols; Analysis, decisions, treatments and monitoring. Control of infectious diseases: Monitoring and control of common infectious diseases such as BVDV, IBR/IPV, BRSV, PRRS, leptospyrosis, paratuberculosis, salmonellosis, brucellosis, leucosis, etc.															
Organization	30hours theory classes and practicals 60 hours other forms of activity															
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
Specific recommendations related with teaching	<b>Scoring of the student's activities:</b> <table><tr><th>Activity type</th><th>Points</th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>60.0</td></tr><tr><td>Written essay – project with oral presentation</td><td>30.0</td></tr><tr><td>Attendance and activity</td><td>10.0</td></tr><tr><td>Total:</td><td>100.0</td></tr></table>		Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	Written essay – project with oral presentation	30.0	Attendance and activity	10.0	Total:	100.0				
Activity type	Points															
2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0															
Written essay – project with oral presentation	30.0															
Attendance and activity	10.0															
Total:	100.0															
Evaluation of knowledge	<b>Periodical evaluations: two(written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th>Points</th><th>Grade mark</th></tr><tr><td>to 59</td><td>5 (F)</td></tr><tr><td>60-68</td><td>6 (E)</td></tr><tr><td>69-76</td><td>7 (D)</td></tr><tr><td>77-84</td><td>8 (C)</td></tr><tr><td>85-92</td><td>9 (B)</td></tr><tr><td>93-100</td><td>10 (A)</td></tr></table>		Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark															
to 59	5 (F)															
60-68	6 (E)															
69-76	7 (D)															
77-84	8 (C)															
85-92	9 (B)															
93-100	10 (A)															
Basic teaching	1. Brand A., J.P.T.M. Noordhuizen, Y.H, Schukken: Herd Health and															

<b>aids</b>	<p>Production management in dairy practice. Wageningen Pres, The Netherland, 1997</p> <p>2. Radostits O.M., Leslie K.E., Fetrow J., Herd Health: Food Animal Production Medicine, 2. edition. W.B. Saunders Company, 2001</p> <p>3. Blood, D. C.; Radostits, O. M.: Herd Health Management, W.B. Saunders Company, 1985</p>
<b>Additional teaching aids</b>	<p>1. Dovenski T. et al.: Menadžment zdravlja stada i proizvodnje u farmskom uzgoju mlečnih goveda, 6. "Clinicaveterinaria" Zbornik, 204-210, 2004</p> <p>2. Josef G. Regli: Herd Health Management and Record Keeping for Dairy Sheep, <a href="http://www.ansci.wisc.edu/">http://www.ansci.wisc.edu/</a></p> <p>3. USDA Sustainable Research and Education (SARE) Program, Managing for Herd Health in Alternative Swine Systems: A Guide, <a href="http://www.pfi.iastate.edu/pigs.htm/">http://www.pfi.iastate.edu/pigs.htm/</a>, 2007</p>

Course	Udder diseases	3.0 ECTS
Code	FVMS DS26	
Year of study	I	
Semester	winter or summer	
Total teaching lessons	90	
Realized by	prof.Toni Dovenski, PhD	
Purpose and objectives of the course program	The aim of the course is familiarizing with the physiology and pathology of the udder.	
Contents of the course program	Humoral regulation of the lactation; Causes for non-inflammatory and inflammatory disorders of the udder and teats followed by milk drainage disorders; Possibilities for ultrasonographic and other types of diagnostic methods in determining and treating udder disorders; Clinical and laboratory methods in diagnosis and treatment of udder disorders; Preventive methods for eradicating of udder diseases.	
Organization	30hours theory classes and practicals 60 hours other forms of activity	
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
Specific recommendations related with teaching	Scoring of the student's activities:	
	Activity type	Points
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0
	Written essay – project with oral presentation	30.0
	Attendance and activity	10.0
	Total:	100.0
Evaluation of knowledge	Periodical evaluations: two(written)	
	Final grade mark forming criteria:	
	Points	Grade mark
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
	85-92	9 (B)
	93-100	10 (A)
Basic teaching aids	1. Sarne de Vlieghe: Udder Health in Dairy Heifers. University of Gent Dissertation, 2004 2. Roger Blowey, Peter Edmondson: Mastitis Control in Dairy Herds, CAB International, 2010 3. Kiro R Petrovski: In vitro and in vivo studies on treatment and prevention of bovine mastitis, Massey University, Palmerston North.	

	New Zealand, 2011															
<b>Course</b>	<b>Selected topics of animal physiology</b>	<b>3.0 ECTS</b>														
<b>Code</b>	FVMS DS27															
<b>Year of study</b>	I															
<b>Semester</b>	winter or summer															
<b>Total teaching lessons</b>	90															
<b>Realized by</b>	prof.Vladimir Petkov, PhD															
<b>Purpose and objectives of the course program</b>	The aim of this course is advanced level studying of the normal functions of the cell, organs, and body systems. Physiology studies normal processes in animal body and its relations with the outside environment. The students will learn some laboratory and biochemical procedures that are used for monitoring the normal functions of the body which are correlated with the animal welfare in the breeding programs.															
<b>Contents of the course program</b>	<b>Theoryclasses.</b> Animal physiology PhD studies course offers the student to choose one of the following chapters: The molecular and cellular basis of physiological regulation; Neurophysiology; Cardiovascular physiology; Gastrointestinal physiology and metabolism; Endocrinology; Animal reproduction physiology and lactation; Renal physiology; Respiratory functions; Homeostasis, and the immune system.By choosing one or more of these chapters, students are able to concentrate on particular area of animal physiology which would be relevant to their idea of the further scientific arrangements. <b>Practicals.</b> This part of the course offers the PhD students to be familiarized with certain laboratory procedures and examinations that will help them to monitor and examine the normal bodily functions. These laboratory methods include: hematology, biochemistry, endocrinology, urology, neurology, cardiology and pulmology.															
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity															
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
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<b>Basic teaching aids</b>	1. Materials prepared by the course teacher 2. Extracts from the referent literature 3. Internet															

Course	Selected topics of physiology of fish		3.0 ECTS														
Code	FVMS DS28																
Year of study	I																
Semester	winter or summer																
Total teaching lessons	90																
Realized by	prof.Vladimir Petkov, PhD																
Purpose and objectives of the course program	The aim of this course is advanced level studying of the normal functions of organs, body systems and organism of fish. Physiology studies normal processes in animal body and its relations with the outside environment. The students will learn some laboratory and biochemical procedures that are used for monitoring the normal functions of the fish organism.																
Contents of the course program	<b>Theoryclasses.</b> Fish physiology PhD studies course offers the student to choose one of the following chapters: The molecular and cellular basis of physiological regulation; Neurophysiology; Cardiovascular physiology; Gastrointestinal physiology and metabolism; Endocrinology; Fish reproduction physiology; Renal physiology; Respiratory functions; Homeostasis, and the immune system.By choosing one or more of these chapters, students are able to concentrate on particular area of animal physiology which would be relevant to their idea of the further scientific arrangements. <b>Practicals.</b> This part of the course offers the PhD students to be familiarized with certain laboratory procedures and examinations that will help them to monitor and examine the normal functions of fish organism.																
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<b>Course</b>	<b>Selected topics of physiology of birds</b>		<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS29		
<b>Year of study</b>	I		
<b>Semester</b>	winter or summer		
<b>Total teaching lessons</b>	90		
<b>Realized by</b>	prof.Vladimir Petkov, PhD		
<b>Purpose and objectives of the course program</b>	The aim of this course is advanced level studying of the normal functions of organs, body systems and organism of birds. Physiology studies normal processes in animal body and its relations with the outside environment. The		

	students will learn some laboratory and biochemical procedures that are used for monitoring the normal functions of the avian organism.														
<b>Contents of the course program</b>	<p><b>Theory classes.</b> Avian physiology PhD studies course offers the student to choose one of the following chapters: The molecular and cellular basis of physiological regulation; Neurophysiology; Cardiovascular physiology; Gastrointestinal physiology and metabolism; Endocrinology; Fish reproduction physiology; Renal physiology; Respiratory functions; Homeostasis, and the immune system. By choosing one or more of these chapters, students are able to concentrate on particular area of animal physiology which would be relevant to their idea of the further scientific arrangements.</p> <p><b>Practicals.</b> This part of the course offers the PhD students to be familiarized with certain laboratory procedures and examinations that will help them to monitor and examine the normal functions of avian organism.</p>														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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<b>Course</b>	<b>Surgical techniques in pet animals</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS30	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Plamen Trojchanec, PhD	
<b>Purpose and objectives of the course program</b>	The course should allow enhancement of theoretical and practical knowledge required for understanding the etiology and pathogenesis and mastering the surgical techniques during trauma, emergency and elective situations, including oncological interventions in companion animals.	
<b>Contents of the course program</b>	<p><b>Theory classes and practicals.</b> Surgery approach to the nasal meatuses, surgery approach to the larynx, diaphragmatic hernia, pneumothorax, surgery approach to the lower parts of respiratory tract, diseases of the teeth and oral cavity, diseases of oropharynx, diseases of oesophagus, gastrotomy, gastric dilatative volvulus, pyloric stenosis, enterotomy, surgical treatment of colic in horse, perianal fistula, rectal prolapse, perineal hernia, surgical operations of the liver, spleen, pancreas, renal, urethral and bladder calculi, cystotomy, urethrotomy/stomy, nephrotomy, ovariohysterectomy, Caesarean section, pyometra, uterine torsion, prolapse of vagina and uterus, neoplasms, puerperal</p>	



	injuries of perineum, vestibuloplastics, mammary gland, prostate, penis and preputium, phymosis and paraphymosis.														
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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<b>Basic teaching aids</b>	<ol style="list-style-type: none"> <li>1. Materials prepared by the course teacher</li> <li>2. Тројачанец П., <i>Прирачник по општа хирургија</i>, 2005, Факултет за Ветеринарна медицина Скопје;</li> <li>3. Тројачанец П., <i>Основи на ветеринарна хирургија</i>, Факултет за Ветеринарна медицина Скопје;</li> <li>4. Тројачанец П., Илиевска К., 2009, <i>Основи на ветеринарната анестезиологија</i></li> <li>5. Slatter Douglas, <i>Textbook of small animal surgery</i> 2nd edition, 2002 Saunders;</li> <li>6. Fossum Theresa W., <i>Small animal surgery</i> 2nd ed., 2002 Mosby;</li> <li>7. Thurmon J.C., Tranquilli W.J., Benson G.J. Lumb &amp; Jones <i>Veterinary Anesthesia</i> 3rd edition. 1996, Williams &amp; Wilkins;</li> <li>8. Perimatei D., Flo G., DeCamp C. <i>Small animal orthopedics and fracture repair</i> 2006 Saunders;</li> <li>9. Harari J. <i>Small animal surgery</i> 1996 Williams &amp; Wilkins; Swaim S., Henderson R. <i>Small animal wound management</i> 1990 Williams &amp; Wilkins;</li> </ol>														
<b>Additional teaching aids</b>	<ol style="list-style-type: none"> <li>1. Vasić J., <i>Osnovi veterinarske hirurgije</i> 1996,</li> <li>2. Budić Z., Cvetković Z., Petković B. <i>Anestezija malih životinja</i> 1997 Prosveta; Veterinarski fakultet Beograd;</li> <li>3. Vjekoslav Srebočan, Hrvoje Gomerčić <i>Veterinarski priručnik</i>, četvrto dopunjeno izdanje, Zagreb</li> </ol>														

<b>Course</b>	<b>Surgical techniques in production animals</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS31	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Plamen Trojchanec, PhD	
<b>Purpose and objectives of the course program</b>	The courseshould allowenhancement of the theoretical andpracticalknowledgeon the situation analysis at the individualor on a herd level,including theproductiondiseases thatrequire surgicalintervention, deepening the techniquesfor performingcertain surgicalprocedures onproductiveanimals,including the diseasesof the acropodiumandelaborationof preventive measures.	

<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Instrumentation. Preoperative preparation. Taming. Sedation and anesthesia. Decornuation. Trepanation of frontal sinus. Operative procedures on eye and orbit. Tracheotomy. Oesophagotomy. Explorative laparotomy. Ruminotomy. Surgical diseases of abomasum. Intestinal obstructions.Hernia and umbilical mass management. Abdominocentesis and liver biopsy. Caesarean section. Vaginal prolapse. Uteral prolapse. Perineal lacerations. Preputial prolapse. Penis hematoma. Urolythiasis. Intromission prevention. Vasectomy. Congenital anomalies. Orifitium stenosis. Membrane obstructions. Traumatic lacerations. Amputations of papilla. Lameness and economic implications; terminology. Interdigital necrobacillosis. Interdigital hyperplasia. Solear ulcers. White line disease. Laminitis. Other pathologic conditions on the hoof. Digit amputation. Corrective procedure.															
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity															
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
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<b>Additional teaching aids</b>	Greenough P. Bovine laminitis and lameness, 2007, Saunders															

<b>Course</b>	<b>Special orthopedic diseases</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS32	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Plamen Trojachanec, PhD	
<b>Purpose and objectives of the course program</b>	The courseshould allowenhancement of theoretical andpracticalknowledgerequiredfor understanding theetiology andpathogenesis of orthopedic disease andmastering thetechniquesfor surgical interventionson muscle-skeletal system,includingjoints,tendons, ligaments.	
<b>Contents of the</b>	<b>Theory classes and practicals.</b> Orthopedic examination, fracture reduction	



<b>course program</b>	systems, diseases of bones and joints, diseases of muscles, tendons, and adnex, diseases of hoof.														
<b>Organization</b>	30hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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<b>Additional teaching aids</b>	<ol style="list-style-type: none"> <li>1. Тројачанец П., Основина ветеринарна хирургија, Факултет за Ветеринарна медицина Скопје;</li> <li>2. Тројачанец П., Илиевска К., 2009, Основи на ветеринарната анестезиологија</li> </ol>														

<b>Course</b>	<b>Selected topics of radiology and physical therapy</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS33	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Dine Mitrov, PhD	
<b>Purpose and objectives of the course program</b>	<p>With this course the PhD students would be more in detail introduced with veterinary general radiology and physical therapy. General radiology obtains all information about formation and physical features of the X rays, their application in medicine in general, radiation sources and formation of radiogram. Clinical radiology is very important part of veterinary medicine and deals with various issues of pathological disorders in the organs and organic systems in domestic animals.</p> <p>Physical therapy (physiotherapy) is medical discipline where the therapy uses natural factors (light, water, air, electricity etc.) and it is based of scientific knowledge from physics, chemistry, electrotechnics, electronic, biology and medicine. The part of the course dealing with physical therapy is separated in general and special part. General part concerns fundamentals of the physical therapy, theoretic basis of physiotherapy, mechanism of therapy effect of the physical techniques, biophysical basis of the physical medicine and organization in and of physical therapy departments itself. The special part is divided on physical therapy and physical diagnostics. Physical therapy includes electrotherapy, phototherapy, hydrotherapy, thermotherapy, pelotherapy, kerytherapy, masotherapy and ultrasonotherapy. Physical diagnostics includes electrodiagnostics, ultrasonodiagnostics, thermography and biotelemetry.</p>	

<b>Contents of the course program</b>	<b>Theory classes.</b> <b>Radiology:</b> X-ray device and cabinet. The occurrence and properties of x-rays. Radiograph at radioscopy and radiographs. Native radiography and recording with contrast agents. X-ray devices for special purpose. Prevention and protection against ionizing radiation. Visual (radiological) diagnosis of diseases of the respiratory system, heart and major blood vessels in the thoracic cavity, digestive and urogenital system and musculoskeletal system. Diagnostics in forensic purposes. Physical properties of ultrasound. Ultrasound image, ultrasonography of the liver, spleen, pancreas, heart, kidneys and bladder. <b>Physical therapy:</b> I. General part: Fundamentals of the physical therapy Theoretic basis of physiotherapy. Mechanism of therapy effect of physiotherapy. Specificity of the irritation effect of the physical techniques. Biophysical basis of the physical medicine. Organization in and of physical therapy departments. II. Special part: Electrotherapy (direct and alternately currents with low frequency: galvanotherapy, ionotherapy and faradization; modulated and high frequency currents: ultrashort waves, microwaves and electronarcosis).Phototherapy(lucotherapy, chromotherapy, actinotherapy and heliotherapy).Hydrotherapy (general and local hydrotherapeutic procedures).Thermotherapy (therapy with heath and cooling) Pelotherapy. Kerytherapy.Masotherapy (active and passive massage).Ultrasonotherapy. <b>Practicals.</b> Work with patients on Clinic, and using of Faculty's radiogram library.																
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity																
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.																
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<b>Basic teaching aids</b>	<ol style="list-style-type: none"><li>1. Branislav Petrovic, Anica Jankovic-Zagorcic: Veterinarska rentgenologija. Veterinarski fakultet Beograd, 1985.</li><li>2. Mensur Sehic: Opcia rendgenologija u veterinarskoj medicini. Janko, Zagreb, 1995.</li><li>3. Mensur Sehic, Vladimir Butkovic, Damir Zubnic, Damir Stanin: Fizikalna medicina u terapiji i dijagnostici domacih zivotinja. Kratis, Zagreb, 1997.</li><li>4. Mensur Sehic: Klinicka rentgenologija u veterinarskoj praksi. Intergrafika, Zagreb, 2002.</li><li>5. Branislav Petrovic, Borislav Draganovic, Jovan Gligorijevic: Osnovi fizikalne medicine. Beograd, 1972.</li><li>6. Mensur Sehic: Osteoartropatije u domacih zivotinja. Zagreb, 2000.</li><li>7. Mensur Sehic: Bolesti organa i organskih sustava. Zagreb, 2004.</li><li>8. Mensur Sehic: Bolesti kosti, zglobova, tetiva i zivcanog sustava u domacih zivotinja. Zagreb, 2004.</li></ol>																

Course	Neonatal diseases in ruminants		3.0 ECTS														
Code	FVMS DS34																
Year of study	I																
Semester	winter or summer																
Total teaching lessons	90																
Realized by	prof. Dine Mitrov, PhD																
Purpose and objectives of the course program	In this course students will learn in detail about the diseases that are common in newborn ruminants, their etiology, prevention and treatment, as well as procedures with the newborn in the first days after birth.																
Contents of the course program	<p><b>Theory classes.</b> Acceptance and proper treatment of the young after birth, as well as proper care during and after the puerperium. Injuries to the infant during delivery. Heredity, organic and infectious diseases of infants during the first days and after puerperium.</p> <p><b>Seminar.</b> Comparative application of physiology of newborns in different ruminant species.</p> <p><b>Practicals.</b> Treatment of infant after delivery, processing umbilical cord, assess the vitality of the infant, resuscitation, examination of the litter, treatment of patients with clinical signs.</p>																
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<b>Course</b>	<b>Metabolic diseases in ruminants</b>		<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS35		
<b>Year of study</b>	I		
<b>Semester</b>	winter or summer		
<b>Total teaching lessons</b>	90		
<b>Realized by</b>	prof. Dine Mitrov, PhD		
<b>Purpose and objectives of the course program</b>	The course will provide students with broad practical and theoretical knowledge of modern intensive way of growing small and large ruminants. The course will enable the establishment of a system for control of the farm animals herd		

	health, with special methods for diagnosis of metabolic diseases of organic and inorganic nature. In this way it will be determined how farm animals are satisfied with their breeding system, so that any error in diet regime will result in metabolic profile disorders. If the metabolic profile is primary problem in the herd, it results in huge economic losses, so certain adjustments in diet and breeding can be made. The course includes the basics of hematological and biochemical analysis including acid-base balance, ruminal content and urinalysis.														
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Basics of the production diseases. Puerperal paresis. Downer cow syndrome. Hypomagnesaemic tetany. Hypomagnesaemic tetany in calves. Ketosis in ruminants (bovine acetonemia; pregnancy toxemia in sheep). Fatty infiltration of the liver in cattle (fat cow syndrome, pregnancy toxemia in cattle). Diseases caused by nutritional deficits: a deficit of energy and protein; deficits minerals (cobalt, copper, iodine, iron, sodium chloride, zinc, manganese, potassium, selenium and / or vitamin E), nutritional deficiency of calcium, phosphorus and vitamin D and imbalance in the relationship calcium / phosphorus, vitamin deficiencies (vitamin A, vitamin K, hydrosoluble vitamins). Diseases caused by congenital defects. Weight loss or inability to weight gain.														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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<b>Basic teaching aids</b>	Ото М. Радоститс, Клајв Ц. Геј, Кенет В. Хинчклиф, Питер Д. Констабл: Ветеринарна медицина - Учебник за заболувањата на говедата, коњите, овците, свињите и козите, Табернакул, Скопје, 2010														

<b>Course</b>	<b>Laboratory diagnostic of internal organ diseases in ruminants</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS36	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Dine Mitrov, PhD	
<b>Purpose and objectives of the course program</b>	The course is designed for the student to acquire knowledge of the clinical and laboratory diagnostic methods used to control the health status of small and large ruminants. Diseases that occur in small and large ruminants are infectious diseases of viral and bacterial etiology, prion diseases of the CNS, metabolic disorders of organic and inorganic nature and all diseases classified by organic systems. The subject is covering: etiopathogenesis, clinical finding, clinical and	

	laboratory diagnosis, treatment and prophylaxis of ruminants. The course covers the specifics of the mentioned investigation and interpretation of results. The course includes the basics of serological and molecular diagnostics, as well as hematological, biochemical and urinalysis.														
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Differential diagnosis with laboratory findings: anemia, antithrombin III, APTT, bilirubin, urea, creatinine, enzymes, eosinophilia, fibrin degradation products (FDP), hypercalcemia, hyperchloraemia, hyperfibrinogenemia, hyperglobinemia, hyperglycemia, hyperkalaemia, hypernatremia, hyperphosphatemia, hyperproteinemia, hypocalcemia, hypochloremia, hypoglycemia, hypokalaemia, hypomagnesaemia, hyponatremia, hypophosphatemia, hypoproteinaemia, lymphopenia, metabolic acidosis, metabolic alkalosis, monocytosis, neutropenia, neutrophilia, packed cell volume, prothrombin time, respiratory acidosis, respiratory alkalosis, thrombocytopenia. Disturbances in nutritional imbalances: cardiovascular, skin, gastrointestinal, hematopoietic, hepatic, musculoskeletal, neurological, reproductive and respiratory.														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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<b>Basic teaching aids</b>	Ото М. Радоститс, Клајв Ц. Геј, Кенет В. Хинчклиф, Питер Д. Констабл: Ветеринарна медицина - Учебник за заболувањата на говедата, коњите, овците, свињите и козите, Табернакул, Скопје, 2010														

<b>Course</b>	<b>Food safety and veterinary public health</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS37	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Pavle Sekulovski, PhD ass. prof. Dean Jankuloski, PhD	
<b>Purpose and objectives of the course program</b>	Aim of this course is to introduce the students to the role of veterinary profession in food safety and veterinary public health. Students are taught food microbiology, food poisoning, food spoilage as well as European and national food legislation. Risk analysis and process control in food production with contemporary control systems. Role and duties of the official veterinarian in the control of spreading the diseases, hygiene of animals for slaughter, food processing and handling are explained. Longitudinal and integrated approach to the safe food production, animal welfare and influence of food to human health. Within the practicals the students would be trained to perform the duties of the	

	official veterinarians. It includes all the official forms and documents used by the official veterinarians, sampling, packing and sending the samples to the official laboratory. Students would be taught how to collect samples for the official monitoring programs for Salmonella, residues and contaminants in food of animal origin. Methods for testing of food and water microbiology are also included in this course.														
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Basis of food microbiology, foodborne poisonings, spoilage of food, European and national legislative concerning this issue. Risk analysis, process control in food production, contemporary control systems. Role and tasks of the official veterinarian in control of diseases with obligate reporting, hygiene of slaughtering animals, food processing and manipulation related with food safety. Longitudinal and integral approach on safe food production in aspect of animal welfare, hygiene, food safety and impact of food on human health.														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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<b>Basic teaching aids</b>	1. Buncic: Integrated Food Safety and Veterinary Public Health, Cabi International, 2006 2. Food Safety risk analysis, FAO and WHO, 2006 3. Schmidt and Rodrick: Food Safety Handbook, Wiley, 2003														

<b>Course</b>	<b>Food Microbiology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS38	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Pavle Sekulovski, PhD ass. prof. Dean Jankuloski, PhD	
<b>Purpose and objectives of the course program</b>	The purpose of the course is that the students are gained with thorough theoretical and practical knowledge of food microbiology. The lectures include a review of the fundamentals of food microbiology, the metabolism of the microorganisms, the mechanisms of their growth, reproduction and extinction and the factors which influence them. Students will be acquainted in details with the types of microorganisms and their characteristics and the hazards they pose to the human health. In the practical classes students will be introduced with the routine and advanced methods for the detection of the microorganisms as well with the rapid and automatic methods in food microbiology.	
<b>Contents of the</b>	<b>Theory classes and practicals.</b> Fundamentals of ecology and epidemiology.	



<b>course program</b>	Microorganisms present in the stream of food chain. Microbiology of food, feed and drinking water. Control of the microorganisms present on the working surfaces and in environment in object aimed for food production, processing and trading. Ubiquitary microorganisms in food, their useful role and application in process of preservation and modification of food of animal or plant origin. Techniques of microbiological testings, microorganism identification, sampling procedures. Food poisoning: alimentary infections and intoxications, microorganisms which cause diseases and their resources, distribution along the food chain, and their control.	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
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	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
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<b>Basic teaching aids</b>	1. ICMSF: Microorganisms in Foods 6th Ed. Microbial ecology of food commodities, Kluwer Academic/Plenum publishers, 2010 2. John Garbutt: Essentials of Food Microbiology, Arnold, 1997 3. Lund, Baird-Parker,Gould: The Microbiological Safety and Quality of Food. Aspen. 2000	

<b>Course</b>	<b>Molecular-genetic methods and epidemiology of food poisoning</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS39	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Pavle Sekulovski, PhD ass. prof. Dean Jankuloski, PhD	
<b>Purpose and objectives of the course program</b>	The purpose of this course is to introduce the students the contemporary methods of the molecular diagnostic and genetical researches which are used for identification and genetic typisation of the microorganisms which are potential food poisoners.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Typisation of the bacterial isolates : Phenotypic methods (serotyping, phagotyping, antimicrobial resistance) and Genotypic methods (gel electrophoresis, methods based on sequences). Introducing of the various methods of molecular typisation such as: ribotyping, multilocus enzymatic electrophoresis, RAPD (Random Amplification of Polymorphic DNA), PFGE (Pulsed Field Gel Electrophoresis), PCR technique. Essentials of the epidemiology of the food poisoning. Classification of the food poisoning. Types of analytical studies: group study and control case study.	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	

<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
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	<b>69-76</b>	<b>7 (D)</b>
	<b>77-84</b>	<b>8 (C)</b>
	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	<ol style="list-style-type: none"> <li>1. Materials prepared by the course teacher</li> <li>2. Extracts from the referent literature</li> <li>3. Internet</li> </ol>	

<b>Course</b>	<b>Selected topics from pathophysiology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS40	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Igor Ulchar, PhD	
<b>Purpose and objectives of the course program</b>	Advanced description of pathophysiological mechanisms in disease developing in particularly organ systems (according choice of the candidate), pathophysiological mechanisms of the infectious and parasitic diseases are also included.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Disorders in cell function. Pathophysiology of blood. Disorders in red cells functions. Disorders in white cells functions. Hemostasis disorders. Disorders in heart function. Circulation disorders. Metabolic disorders. Disorders of digestive tract functions. Disorders in functions of liver and exocrine pancreas. Disorders of respiratory tract functions. Disorders in urinary system functions. Disorders in endocrine functions. Endogenic biologically active substances in pathophysiological processes. Stress-syndrome. Inflammation. Shock (collapse). Pathophysiology of pain. Immunoassociated disorders. Thermoregulation disorders. Neuromuscular disorders. Disorders of bones and joints. Pathophysiology of malignancies. Inherited anomalies in domestic animals. Pathophysiology of infectious and parasitic diseases.	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
	Total:	<b>100.0</b>



<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	<b>to 59</b>	<b>5 (F)</b>
	<b>60-68</b>	<b>6 (E)</b>
	<b>69-76</b>	<b>7 (D)</b>
	<b>77-84</b>	<b>8 (C)</b>
	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	1. Robert H. Dunlop, Charles-Henri Malbert: Veterinary Pathophysiology, Blackwell Publishing, 2004 2. referent literature from internet	

<b>Course</b>	<b>Veterinary laboratory medicine</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS41	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Igor Ulchar, PhD ass. prof. Goran Nikolovski, PhD	
<b>Purpose and objectives of the course program</b>	Detail introducing with laboratory tests related with hematopoietic system and blood elements, biochemical parameters in the plasma and serum, as well as urine samples.	
<b>Contents of the course program</b>	<b>Theory classes.</b> I. Hematology: red blood cells, platelets and clotting factors, white blood cells. II. Changes in serum: introduction, plasma proteins, electrolytes, minerals, nitrogen substances, carbohydrate, bilirubin and lipid metabolism, clinical enzymatology - plasma enzymes in diagnostics, diagnostic endocrinology, other body fluids. III. System examination: examination based on certain organs, diagnostic profiling and pattern recognition. <b>Practicals.</b> Practical laboratory medicine: sampling and using of external laboratory; side-room testing in veterinary practice; "home laboratory".	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>
	Written essay – project with oral presentation	<b>30.0</b>
	Attendance and activity	<b>10.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	<b>to 59</b>	<b>5 (F)</b>
	<b>60-68</b>	<b>6 (E)</b>
	<b>69-76</b>	<b>7 (D)</b>
	<b>77-84</b>	<b>8 (C)</b>
	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	1. Materials prepared by the course teachers 2. Extracts from the referent literature 3. Internet	

Course	Cytology diagnostics		3.0 ECTS
Code	FVMS DS42		
Year of study	I		
Semester	winter or summer		
Total teaching lessons	90		
Realized by	prof. Igor Ulchar, PhD		
Purpose and objectives of the course program	Introduction with basic principles of cytology diagnostics, which could be used in routine diagnostic practice. Qualitative and quantitative analysis in the aspirate cells from certain organs body fluids, drenage and tissue swabs.		
Contents of the course program	Theory classes and practicals. Preparation and handling with cytological samples. Basics of cytological diagnostics. Skin and subcutaneous tissues. Lymphatic system. Respiratory tract. Body cavities fluids. Oral cavity, digestive tract and their associated structures. Dry-mount fecal cytology. Liver. Urinary tract. Urinary sediment microscopic examination. Reproductive system. Musculoskeletal system. Central nervous system. Eye and its associated structures. Endocrine system. Advanced diagnostic techniques.		
Organization	30 hours theory classes and practicals 60 hours other forms of activity		
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.		
Specific recommendations related with teaching	Scoring of the student's activities:		
	Activity type		Points
	2 periodical evaluationsduring the teaching or written exam with duration of 2 hours		60.0
	Written essay – project with oral presentation		30.0
	Attendance and activity		10.0
	Total:		100.0
Evaluation of knowledge	Periodical evaluations: two(written)		
	Final grade mark forming criteria:		
	Points		Grade mark
	to 59		5 (F)
	60-68		6 (E)
	69-76		7 (D)
	77-84		8 (C)
	85-92		9 (B)
	93-100		10 (A)
Basic teaching aids	1. Paul Canfield, Patricia Martin: Veterinary Cytology - A bench manual for the canine and feline practitioner, University of Sidney, 1998 2. referent literature from Internet		

<b>Course</b>	<b>Selected topics from general pathology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS43	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	ass. prof. Trpe Ristoski, PhD	
<b>Purpose and objectives of the course program</b>	General pathology introduces the students with pathological processes and pathological conditions in the organism, which would make them able for better understanding the pathogenesis of the diseases. Also, general pathology has aim to introduce the students with basic features of the pathohistologic diagnostics, i.e. with sampling and preparation of material for pathohistologic diagnostics, staining of pathohistological preparates, and making the pathohistological diagnosis.	
<b>Contents of the</b>	<b>Theory classes and practicals.</b> Introduction and historic development of	

<b>course program</b>	pathology. Etiology. Degeneration and necrosis. Disorders of circulatory system. Inflammation. Regeneration. Tumors, birth defects, exitus. Immunopathology.														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b> <table border="1"> <thead> <tr> <th>Activity type</th><th>Points</th></tr> </thead> <tbody> <tr> <td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>60.0</td></tr> <tr> <td>Written essay – project with oral presentation</td><td>30.0</td></tr> <tr> <td>Attendance and activity</td><td>10.0</td></tr> <tr> <td>Total:</td><td>100.0</td></tr> </tbody> </table>	Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	Written essay – project with oral presentation	30.0	Attendance and activity	10.0	Total:	100.0				
Activity type	Points														
2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0														
Written essay – project with oral presentation	30.0														
Attendance and activity	10.0														
Total:	100.0														
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two (written)</b> <b>Final grade mark forming criteria:</b> <table border="1"> <thead> <tr> <th>Points</th><th>Grade mark</th></tr> </thead> <tbody> <tr> <td>to 59</td><td>5 (F)</td></tr> <tr> <td>60-68</td><td>6 (E)</td></tr> <tr> <td>69-76</td><td>7 (D)</td></tr> <tr> <td>77-84</td><td>8 (C)</td></tr> <tr> <td>85-92</td><td>9 (B)</td></tr> <tr> <td>93-100</td><td>10 (A)</td></tr> </tbody> </table>	Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark														
to 59	5 (F)														
60-68	6 (E)														
69-76	7 (D)														
77-84	8 (C)														
85-92	9 (B)														
93-100	10 (A)														
<b>Basic teaching aids</b>	1. Culjak K. i sur. : Opšta veterinarska patologija. Horzetsky, Zagreb, 1993. 2. Софреновић Ћ.: Општа патологија. Научна књига, Београд- 1990														

<b>Course</b>	<b>Selected topics from special pathology</b>	<b>3.0 ECTS</b>										
<b>Code</b>	FVMS DS44											
<b>Year of study</b>	I											
<b>Semester</b>	winter or summer											
<b>Total teaching lessons</b>	90											
<b>Realized by</b>	ass. prof. Trpe Ristoski, PhD											
<b>Purpose and objectives of the course program</b>	Special pathology has aim to introduce the students with pathomorphological changes in particular organic systems. With correct determination of found pathomorphological changes, students would be able to give the final diagnosis which caused animal's exitus. Special pathology also has aim to introduce the students with equipment and procedure of animal obduction, as well as with creating of obduction protocol.											
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Digestive system. Hematopoietic organs. Circulatory system. Respiratory system. Urinary system. Genital organs. Central nervous system. Endocrine glands. Musculoskeletal system. Sense organs. Skin.											
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity											
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.											
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b> <table><tr><th><b>Activity type</b></th><th><b>Points</b></th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td><b>60.0</b></td></tr><tr><td>Written essay – project with oral presentation</td><td><b>30.0</b></td></tr><tr><td>Attendance and activity</td><td><b>10.0</b></td></tr><tr><td>Total:</td><td><b>100.0</b></td></tr></table>		<b>Activity type</b>	<b>Points</b>	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>	Written essay – project with oral presentation	<b>30.0</b>	Attendance and activity	<b>10.0</b>	Total:	<b>100.0</b>
<b>Activity type</b>	<b>Points</b>											
2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>60.0</b>											
Written essay – project with oral presentation	<b>30.0</b>											
Attendance and activity	<b>10.0</b>											
Total:	<b>100.0</b>											
<b>Evaluation of</b>	<b>Periodical evaluations: two</b> (written)											

<b>knowledge</b>	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
	85-92	9 (B)
	93-100	10 (A)
<b>Basic teaching aids</b>	1. K.V.F. Jubb, Peter C. Kennedy, Nigel Palmer, M. Grant Maxie: Pathology of domestic animals 5th edition, 2007 2. Jubb K., Kenedy P., Plamer N.: Pathology of domestic animals, 1992. 3. Јакшиќ Б. и Софреновиќ Ѓ. Специјална Патолошка Морфологија, Београд, 1989. 4. Ц. Мицевски и Т. Ристоски: Штенечак - чума кај кучињата, Вет. Фак., Скопје, 2003 5. Мицевски Ц.: Обдукција на домашните животни. Вет. фак. Скопје, 1998.	
<b>Additional teaching aids</b>	Чулјак К., Судариќ Ф.: Специјална патолошка морфологија животиња. Заг-Сар.1990	

<b>Course</b>	<b>Oncology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS45	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	ass. prof. Tpe Ristoski, PhD	
<b>Purpose and objectives of the course program</b>	The aim of this course is to study pathogenesis of tumors (cancerogenesis), their etiology, taxonomy, as well as characteristics of the benign and malignant tumors. Having regard of clinical importance of the tumors, special attention would be given on tumor clinical characteristics, the laboratory diagnostics (pathohistological and cytological) and treatment of the tumors. With application of the most recent classification of tumors, this course includes tumors of all organic systems, with special attention on skin tumors and tumors of mammary gland.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Tumour nomenclature. Features of the benign and malignant tumours. Cancerogenesis: molecular basis of tumours. Tumour etiology. Classification of tumours: mesenchyme tissue tumours, epithelial tissue tumours. Clinical features of the tumours. Laboratory diagnostics of the tumours. Treatment of the tumours	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0
	Written essay – project with oral presentation	30.0
	Attendance and activity	10.0
	Total:	100.0
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two (written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)

		<b>85-92</b>	<b>9 (B)</b>	
		<b>93-100</b>	<b>10 (A)</b>	
<b>Basic teaching aids</b>	1. Donald J. Meuten: Тумори кај домашните животни, 2002 2. Stephen J. Withrow and David M. Vail: Клиничка онкологија кај малите животни 3. Joanna Morris and Jane Dobson: Онкологија кај малите животни 4. Kevin A. Hahn: Ветеринарна онкологија			
<b>Additional teaching aids</b>	1. Ц. Мицевски и Т. Ристоски: Патолошко хистолошки практикум. Вет.факултет, Скопје, 2003. 2. Софреновиќ Ѓ.: Општа патологија. Научна књига, Београд- 1990 3. Чуљак К., Судариќ Ф.: Специјална патолошка морфологија животиња. Заг-Сар.1990			

Course	Dermatopathology	3.0 ECTS														
Code	FVMS DS46															
Year of study	I															
Semester	winter or summer															
Total teaching lessons	90															
Realized by	ass. prof. Trpe Ristoski, PhD															
Purpose and objectives of the course program	Dermatopathology has increasing importance within clinical pathology because the most of the diseases with non-infectious etiology (endocrine disorders, allergic reactions, autoimmune diseases etc.) have manifestations with skin disorders. This course includes skin diseases in domestic animals with infectious and non-infectious etiology. Besides pathohistological diagnostics, during the classes special attention would be given on application of the cytological diagnostics in dermatopathology.															
Contents of the course program	Theory classes and practicals. Inflammatory, degenerative and dysplastic diseases. Neoplasms and other tumours															
Organization	30 hours theory classes and practicals 60 hours other forms of activity															
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
Specific recommendations related with teaching	<b>Scoring of the student's activities:</b> <table><tr><th>Activity type</th><th>Points</th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>60.0</td></tr><tr><td>Written essay – project with oral presentation</td><td>30.0</td></tr><tr><td>Attendance and activity</td><td>10.0</td></tr><tr><td>Total:</td><td>100.0</td></tr></table>		Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	Written essay – project with oral presentation	30.0	Attendance and activity	10.0	Total:	100.0				
Activity type	Points															
2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0															
Written essay – project with oral presentation	30.0															
Attendance and activity	10.0															
Total:	100.0															
Evaluation of knowledge	<b>Periodical evaluations: two (written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th>Points</th><th>Grade mark</th></tr><tr><td>to 59</td><td>5 (F)</td></tr><tr><td>60-68</td><td>6 (E)</td></tr><tr><td>69-76</td><td>7 (D)</td></tr><tr><td>77-84</td><td>8 (C)</td></tr><tr><td>85-92</td><td>9 (B)</td></tr><tr><td>93-100</td><td>10 (A)</td></tr></table>		Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
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69-76	7 (D)															
77-84	8 (C)															
85-92	9 (B)															
93-100	10 (A)															
Basic teaching aids	1. Thelma Lee Gross: Кожни болести кај кучињата и мачките, 2005 2. Danny W. Scott: Атлас во боја по дерматологија кај фармските животни, 2007 3. Чуљак К., Судариќ Ф.: Специјална патолошка морфологија животиа. Заг-Сар. 1990 4. Michael Schaer: Клиничка медицина кај мачките и кучињата.															
Additional teaching aids	Ц. Мицевски и Т. Ристоски: Патолошко хистолошки практикум. Вет. факултет, Скопје, 2003.															

Course	Veterinary legislative and ethics	3.0 ECTS														
Code	FVMS DS47															
Year of study	I															
Semester	winter or summer															
Total teaching lessons	90															
Realized by	prof. Risto Prodanov, PhD ass. prof. Trpe Ristoski, PhD															
Purpose and objectives of the course program	The course includes all legal regulations related with veterinary practice in Republic of Macedonia. Also, special attention is given on the diseases from forensic aspect, first of all the latency, substantiality and lasting of the disease. The ethics in this course is studied from the aspect of the moral and ethical behaviour of the veterinary doctors during the performance of their professional activity. Also, the course introduces the students with the practical implementation of laws in realization of the routine veterinary practice and with veterinary medicine ethics codices.															
Contents of the course program	<b>Theory classes.</b> Legal regulations related with veterinary practice in Republic of Macedonia. Overview of diseases from forensic aspect (latency, substantiality, lasting). Moral and ethical behaviour of the veterinary doctors during the performance of their professional activity. <b>Practicals.</b> Practical implementation of laws in realization of the routine veterinary practice and veterinary medicine ethics codices.															
Organization	30 hours theory classes and practicals 60 hours other forms of activity															
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
Specific recommendations related with teaching	<b>Scoring of the student's activities:</b> <table><tr><th>Activity type</th><th>Points</th></tr><tr><td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>60.0</td></tr><tr><td>Written essay – project with oral presentation</td><td>30.0</td></tr><tr><td>Attendance and activity</td><td>10.0</td></tr><tr><td>Total:</td><td>100.0</td></tr></table>		Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0	Written essay – project with oral presentation	30.0	Attendance and activity	10.0	Total:	100.0				
Activity type	Points															
2 periodical evaluations during the teaching or written exam with duration of 2 hours	60.0															
Written essay – project with oral presentation	30.0															
Attendance and activity	10.0															
Total:	100.0															
Evaluation of knowledge	<b>Periodical evaluations: two (written)</b> <b>Final grade mark forming criteria:</b> <table><tr><th>Points</th><th>Grade mark</th></tr><tr><td>to 59</td><td>5 (F)</td></tr><tr><td>60-68</td><td>6 (E)</td></tr><tr><td>69-76</td><td>7 (D)</td></tr><tr><td>77-84</td><td>8 (C)</td></tr><tr><td>85-92</td><td>9 (B)</td></tr><tr><td>93-100</td><td>10 (A)</td></tr></table>		Points	Grade mark	to 59	5 (F)	60-68	6 (E)	69-76	7 (D)	77-84	8 (C)	85-92	9 (B)	93-100	10 (A)
Points	Grade mark															
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60-68	6 (E)															
69-76	7 (D)															
77-84	8 (C)															
85-92	9 (B)															
93-100	10 (A)															
Basic teaching aids	<ol style="list-style-type: none"><li>Збирка закони од областа на ветеринарното здравство Управа за ветеринарсво МЗШБ</li><li>Terrestrial animal health code OIE 2008</li><li>И. Божков, А. Стојанов, К. Василев Основи на ветеринарно медицинско законодателство и менаџмент Факултет за ветеринарна медицина - Тракијски Универзитет, Стара Загора, Бугарија</li><li>Laurence B. McCullough and James Polk Morris, Implication of History and Ethics to Medicine-Veterinary and Human, Texas University, 1978.</li><li>FAO, FAO Expert Consultation on Food Safety: Science and Ethics, Rome, Italy, 3-5 September 2002.</li></ol>															
Additional teaching aids	<ol style="list-style-type: none"><li><a href="http://www.oie.int">www.oie.int</a></li><li><a href="http://www.pravo.org.mk">www.pravo.org.mk</a></li><li><a href="http://vetlex.taiech.be/">http://vetlex.taiech.be/</a></li></ol>															



Course	Nutrition models with nutritive pathology of farm animals		3.0 ECTS														
Code	FVMS DS48																
Year of study	I																
Semester	winter or summer																
Total teaching lessons	90																
Realized by	prof. Risto Prodanov, PhD																
Purpose and objectives of the course program	In the graduated studies only the basic principles of farm animal nutrition is studied. So, this course gives detailed study of the diet of the certain types and categories of farm animals requires detailed knowledge of the principles of their diet. This is especially applied to the basic nutritional and effective components and the needs of animals depending of the age, stages and technology of production. For this reason the course cover details of the aforementioned parameters. The program includes details of the pathology of nutrition witch can be an issue with certain type of feed used in farm animals diet.																
Contents of the course program	Theory classes and practicals.Specifities in nutrition in certain species and categories of farm animals. Main nutritive and beneficial compounds in animal according the age and production stages and technologies. Pathological aspects of nutrition with certain types of feeds used in farm animals nutrition. Antinutritive substances with biological origin (mycotoxins), and with physical-chemical origin (pesticides, herbicides, etc.). Impact of antinutritive substances on health and productive status in farm animals.																
Organization	30 hours theory classes and practicals 60 hours other forms of activity																
Teaching methods	Theory classes and practicals: interactive Written assay: learning with use of referent literature and internet, making of written assay; oral presentation and discussion of the written assay.																
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Basic teaching aids	1. Ладислав Пжеговиќ, Стјепан Пепелјњак,МИКОТОКСИКОЗЕ,Школска књига Загреб, 1995. 2. FAO ANIMAL PRODUCTION AND HEALTH, PROTEIN SOURCES FOR THE ANIMAL FEED INDUSTRY, Expert Consultation and Workshop Bangkok, 29 April – 3 May 2002. 3. Златан Синовец, Радмила Ресановиќ, Знежана Синовец, МИКОТОКСИНИ. Ветеринарски факултет-Белград. 2006.																

<b>Course</b>	<b>Nutritional disorders in pet animals</b>		<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS49		
<b>Year of study</b>	I		
<b>Semester</b>	winter or summer		
<b>Total teaching lessons</b>	90		

<b>Realized by</b>	prof. Risto Prodanov, PhD ass. prof. Goran Nikolovski, PhD														
<b>Purpose and objectives of the course program</b>	PhD students are going to get the most recent information about the nutritional needs in pet animals. It refers to pets needs in different pathological conditions.														
<b>Contents of the course program</b>	<p><b>Theoryclasses.</b> Disciplines and scientific studies that apply the basic nutrition methods in domestic animals, are applied recently, primary in clinical nutritional aspect, based on scientific information. Themes that are going to be learned will help students to understand the basic nutritional principles for certain pathological conditions, method of application and duration of the specific diet. The material in this subject refers to interpretation of the basic principles of clinical nutrition, which will be done over consultations; respectively students will be introduced to the nutritional needs for different diseases of the organs. Metabolic needs in patients with different diseases are connected to the psychic condition of the patient and special nutritional needs.</p> <p><b>Practicals.</b> Following the diet in hospitalized patients, preparation of appropriate nutritious meals and adequate food application in different patients. Monitoring the diet in these patients is going to be conducted through rotation of the patients with: gastrointestinal disorders, endocrinology disorders, cardiovascular, hepatobiliary and renal disorders. The clinical rotation will finish with monitoring food allergies in pets.</p>														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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<b>Basic teaching aids</b>	<ol style="list-style-type: none"> <li>White, D. Stephen and al.: Purina PetCare Handbook of Canine and Feline Clinical Nutrition. The Gloyd Group Inc., 2010</li> <li>Wills J.M. &amp; Simpson K.W.: The Waltham Book of Clinical Nutrition of the dog and cat. Elsevier science Ltd., 1994</li> </ol>														

<b>Course</b>	<b>Pancreatic diseases in pet animals</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS50	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	ass. prof. Goran Nikolovski, PhD	
<b>Purpose and objectives of the course program</b>	PhD students would be introduced with the endocrinology changes and changes in the exocrine pancreas. The appearance of metastatic changes of the pancreas and their diagnosis are a part of the topics in this subject. It refers primarily to the needs of the pets in different pathology situations.	
<b>Contents of the</b>	<b>Theoryclasses.</b> Changes of the exocrine pancreas, clinical manifestation and	



<b>course program</b>	<p>diagnostics of these conditions are part of the education.</p> <p>Endocrine changes of the pancreas: diabetes mellitus, insulinoma, hypoglycemic syndrome are the most common disorders. The advantage of introducing the endocrinology disorders of pancreas is adequate application of diagnostic and therapeutic protocols.</p> <p>Metastatic changes of pancreas, laboratory diagnosis and ultrasound and other imaging techniques. Therapy protocols at metastatic disorders.</p> <p><b>Practicals.</b> Monitoring patients with acute pancreatitis, therapy and special diet for these patients. Patients with diabetes mellitus- glucose tolerance test, following the curve of glucose in blood, determining optimal insulin dose. Patients with insulinoma, laboratory and therapy protocols. Special diet of patients with insulinoma. Patients with hypoglycemic syndrome, diagnostic and therapy. Observation of patients with pancreatic tumors, chemotherapy.</p>														
<b>Organization</b>	<p>30 hours theory classes and practicals</p> <p>60 hours other forms of activity</p>														
<b>Teaching methods</b>	<p>Theory classes and practicals: interactive</p> <p>Written assay: learning with use of referent literature and internet, making of written assay; oral presentation and discussion of the written assay.</p>														
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<b>Basic teaching aids</b>	<ol style="list-style-type: none"> <li>Ad Rijnberk · Hans S. Kooistra (eds): Clinical endocrinology of dogs and cats. Schlütersche Verlagsgesellschaft mbH &amp; Co. KG, Hans-Buckler-Allee 7, 30173 Hannover, 2010</li> <li>Schaer M.: Clinical medicine of the dog and cat. Manson Publishing Ltd, 2003</li> <li>Nelson R.W. &amp; Couto C.G.: Small animal internal medicine - second edition. Mosby, 2000</li> </ol>														

<b>Course</b>	<b>Laboratory diagnostics for internal diseases of small animals</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS51	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	ass. prof. Goran Nikolovski, PhD prof. Igor Ulchar, PhD	
<b>Purpose and objectives of the course program</b>	Examination of complete blood count, biochemical profiles in gastrointestinal disorders, liver disorders, analysis of blood smear, protein determination, acute phase proteins, lipemia, hemolysis, jaundice. After this course, the student can interpret the laboratory results by him-/herself, to determine certain pathology of organ and organic system and determinate the diagnosis or making some other additional examination.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Examination of total blood count, interpretations of biochemical profile in gastrointestinal and liver changes, analysis of blood	

	smear, detection of proteins, acute phase proteins, lipemia, hemolysis, jaundice.														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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<b>Basic teaching aids</b>	1. Materials prepared by the course teachers 2. Referent literature from Internet														

<b>Course</b>	<b>Management of animal products supply chains and quality management</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS52	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Blagica Sekovska, PhD	
<b>Purpose and objectives of the course program</b>	In this course the PhD students would be introduced with whole process of vertical integration within production from-field-to-fork process, which is one of the main recommendations of the European Union. Traceability of supply chains is principle precondition for introducing the food safety concept, as well as for implementation of total quality control. These type of knowledge would be necessary for those who would work anywhere within the production chain, or in control of food products, especially those from animal origin. Also, within this course the place and role of the consumers would be elaborated. This course would elaborate briefly definition and types of animal products supply chains, transport and logistics, types of distribution, making decisions about the supply chains, their organization, control and economic aspects. Finally, this course would include quality management, total quality management, as well as the place and role of the consumers in the from-field-to-fork process.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Definition of animal products supply chains. Types of animal products supply chains. Measures for improvement of animal products supply chains. Distribution of animal products. Types of distribution. Transport and logistics. Planning of animal products supply chains. Making decisions about animal products supply chains (financial decisions, security decisions, strategic decisions etc.). Organization of animal products supply chains. Control of animal products supply chains. Quality management. Total quality management. Role of the consumers in the from-field-to-fork process	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of	

	written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>40.0</b>
	Written essay – project with oral presentation	<b>40.0</b>
	Attendance and activity	<b>20.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two (written)</b>	
	<b>Final grade mark forming criteria:</b>	
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	85-92	<b>9 (B)</b>
	93-100	<b>10 (A)</b>
<b>Basic teaching aids</b>	<ol style="list-style-type: none"> <li>1. <b>Y. Narahari and S. Biswas:</b> <i>Supply Chain Management: Modeling and Decision Making</i>, Indian Institute of Science, Bangalore</li> <li>2. <b>Благоица Сековска</b> Маркетинг менаџмент на анимални производи, Скопје 2008</li> </ol>	

<b>Course</b>	<b>Marketing and management of veterinary practice</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS53	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Blagica Sekovska, PhD	
<b>Purpose and objectives of the course program</b>	The so-called soft skills are nowadays recognized as necessity for successful development of the veterinary profession. So, this course offers to the students and integrative approach to basic marketing and management principles viewed and applied on micro level - the level of veterinary practice. The course includes service design process, managing models and development of human resources, main principles of communication with clients, meaning of image of veterinary practice in aspect of client attraction, making proper business plan and managing the veterinary practice.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Introduction. Marketing environment in veterinary practice. Knowing the clients of veterinary practice. Marketing instruments in most successful ranking on the market. Veterinary service market. Meaning and development of marketing strategies. Types of marketing strategies suitable for veterinary practice. How to research service market. Organization and control of marketing activities	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>40.0</b>
	Written essay – project with oral presentation	<b>40.0</b>
	Attendance and activity	<b>20.0</b>
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<b>Basic teaching aids</b>	1. Доц. д-р Благлица Сековска: Маркетинг менаџмент на анимални производи, 2008, Скопје 2. Филип Котлер: Маркетинг на услуги 3. Shawn P. Messonnier: Marketing Your Veterinary Practice, Misury, 2000			

Course	Communicological and ethical principles in the relationship with clients	3.0 ECTS														
Code	FVMS DS54															
Year of study	I															
Semester	winter or summer															
Total teaching lessons	90															
Realized by	prof. Blagica Sekovska, PhD															
Purpose and objectives of the course program	Communication with clients today is one of the most important issues for the future development of the veterinary profession. This course would obtain to the students basic knowledge about the principles of business communication, clients' suspects and how these suspects to be satisfied, definition of communication channels, basic principles of public relations, basic principles of ethics in business relationships, models of successful negotiations and contracting as well as communication rules in service activities. The course would be helpful for students for improving development of the veterinary practice, but also in other business relationships.															
Contents of the course program	<b>Theory classes.</b> Definition of communication. Meaning of communication for successful work with clients. Marketing aspects of communication. Interpersonal communication. Organization communication. Models and styles of communication. Solving conflicts. Way of communication with unpleasant clients. Communication in aspect of management. Team building. Team work. <b>Practicals.</b> Making written essay, mini (problem solving) projects on predicated topic, debates, discussions, visit of veterinary ambulances and dramatization of situations in client/veterinarian relationship.															
Organization	30 hours theory classes and practicals 60 hours other forms of activity															
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
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Basic teaching	1. Николас Инд: Корпорациски имиџ															

<b>aids</b>	2. Даниел Перлман, Анја Рој: Меѓународна здравствена пракса 3. current internet pages by recommendation of the course teacher
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Course	Economy in animal health and production	3.0 ECTS														
Code	FVMS DS55															
Year of study	I															
Semester	winter or summer															
Total teaching lessons	90															
Realized by	prof. Blagica Sekovska, PhD															
Purpose and objectives of the course program	The topic of this course is role of the veterinary profession and veterinary company in the process of animal health protection via introduction with veterinary service supply and demand models, consumers' behavior, factors of service development, production theories from aspect of costs and benefit (cost and benefit theory), economical efficiency, analysis of making decisions process during the actions of the veterinarian, the impact of veterinary service in development of husbandry, organization of production in aspect of animal health control.															
Contents of the course program	<b>Theory classes.</b> Economic importance of animal diseases. Economic making decisions in animal health management. Basic economic analysis methods. Application of portfolio theory for optimal choice of veterinary management farm program. Modelling of economics for making decisions in situations with high risk,including the economics in development of veterinary management and health management. Economic importance of the animal health in aspect of market. <b>Practicals.</b> Making written essay, mini (problem solving) projects on predicated topic, debates, discussions, visit of veterinary ambulances.															
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Basic teaching aids	1. A.A. Dijkhuizen, R.S. Morris: Ekonomika zdravlja životinja 2. Tim E. Carpenter: Zdravlje životinja i ekonomika proizvodnje 3. Blagica Sekovska: authorised lectures															

<b>Course</b>	<b>Analytical methods for food safety monitoring</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS56	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	

<b>Realized by</b>	prof. Zehra Hajrula-Musliu, PhD														
<b>Purpose and objectives of the course program</b>	The aim of this course is the understanding of the principles and procedures in the analytical food products. The methodology included in this module will depend on the component that determines the nature of the product which is analyzed, the purpose of analysis and the available equipment.														
<b>Contents of the course program</b>	<p><b>Theory classes.</b> We will review the principles of the most important analytical techniques such as gas and liquid chromatography, spectroscopy, electrophoresis and ELISA methods for determining residues and contaminants in food, protein and fatty acid profile, vitamins and minerals, specific additives in food as well as research on the presence of other toxicological micro ingredients important in food.</p> <p><b>Practicals.</b> In the practical part students will actively participate in the analysis performed to determine the safety of food. While it will have the opportunity to become familiar with analytical methods for monitoring food safety, practical performance of the same, the problems that occur during performance of methods, their verification and validation.</p>														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
<b>Specific recommendations related with teaching</b>	<p><b>Scoring of the student's activities:</b></p> <table border="1"> <thead> <tr> <th>Activity type</th><th>Points</th></tr> </thead> <tbody> <tr> <td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>40.0</td></tr> <tr> <td>Written essay – project with oral presentation</td><td>40.0</td></tr> <tr> <td>Attendance and activity</td><td>20.0</td></tr> <tr> <td>Total:</td><td>100.0</td></tr> </tbody> </table>	Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	40.0	Written essay – project with oral presentation	40.0	Attendance and activity	20.0	Total:	100.0				
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77-84	8 (C)														
85-92	9 (B)														
93-100	10 (A)														
<b>Basic teaching aids</b>	<ol style="list-style-type: none"> <li>1. Materials prepared by the course teacher</li> <li>2. Extracts from referent literature</li> <li>3. Internet</li> </ol>														

<b>Course</b>	<b>Residues and contaminants as chemical risks to food safety</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS57	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Zehra Hajrula-Musliu, PhD	
<b>Purpose and objectives of the course program</b>	The aim of the course is to acquaint PhD students with profound knowledge of monitoring the residues and contaminants in food. They will meet with European and domestic legal framework related to the presence of these substances in food and control their use and penal provisions in case of exceeding the statutory provisions.	
<b>Contents of the course program</b>	<p><b>Theory classes.</b> Anthropogenic and natural contaminants in food. Sources and routes of administration. Chemistry of action and their properties. Possible harmful influences. Meaning of residues of heavy metals, mycotoxins, pesticides and residues of veterinary medicines in food given to their impact on human health (MDK, ADI, PTWI). Risk, risk assessment and risk management. Legislation to use and the EU.</p>	



	<b>Practicals.</b> In the practical part students will participate and take activity in laboratory analysis proving the specific residues and contaminants in food (analysis of veterinary drugs in food, analysis of pesticides in food, analysis of mycotoxins in food, analysis of heavy metals in food, analysis of beta agonists in food, analysis of thyreostatics and stilbens in food, analysis of steroids and lactones of resorcylic acid etc.).	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>40.0</b>
	Written essay – project with oral presentation	<b>40.0</b>
	Attendance and activity	<b>20.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two</b> (written)	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	<b>to 59</b>	<b>5 (F)</b>
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	<b>77-84</b>	<b>8 (C)</b>
	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	<ol style="list-style-type: none"><li>1. Yolanda Picó: Food contaminants and residue analysis, Elsevier, 2008</li><li>2. S. N. Mahindru: Food Contaminants - origin, propagation &amp; analysis, APH Publishing, 2009</li><li>3. Darsa Purnama Siantar, Mary W Trucksess, Peter M Scott: Food contaminants: mycotoxins and food allergens, American Chemical Society, 2008</li></ol>	
<b>Additional teaching aids</b>	<ol style="list-style-type: none"><li>1. Dimitrios J. Fletouris: Drug Residues in Foods: Pharmacology, Food Safety and Analysis (Food Science and Technology), CRC Press; 1st edition, 2000</li><li>2. N.T. Crosby: Determination of Veterinary Residues in Food, Wood head Publishing, 1991</li></ol>	

<b>Course</b>	<b>Chemistry and analysis of food</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS58	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Zehra Hajrula-Musliu, PhD	
<b>Purpose and objectives of the course program</b>	The chemical composition of food is the most importance, from different aspects including nutrition and health, toxicology and safety, microorganisms, chemical and physical changes. The analysis of these compounds provides information on consumers for the nutrition value of food, provides quality during production and storage, and is necessary because of legal regulations.	
<b>Contents of the course program</b>	<b>Theory classes.</b> Thematic units will include legislation for food sampling, preparation of samples, review of methods for determining the basic ingredients, analytical procedure for determining the basic ingredients (water, solids, minerals, fats, proteins, and sugars) and writing analytical reports. <b>Practicals.</b> In the practical part PhD students will have the opportunity to independently participate in the performance analysis for determination of nutrients in food and feed. The program includes: determination of fat	

	infoodproducts bySoxhlet,analysisof fattyacidsby gaschromatography, determination of totalprotein perKjeldahl,identificationand determination ofamino acids, determination of mono andoligosaccharides, provingantioxidants, artificial sweeteners.Quality andsafetyof drinking water and importance of the water for health(determinationof: pH, residualchlorine, chloride, reductionpower,nitrogencompounds (ammonia, nitrite, nitrate) in water, determine thealkalinityandhardnessof water).															
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity															
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.															
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<b>Basic teaching aids</b>	1. H.D. Belitz, W. Grosch, P. Schieberle: Food Chemistry, Springer, 2004 2. T.P. Coultate: Food: The chemistry of its Components 5-th edition, Royal society of Chemistry, 2008															
<b>Additional teaching aids</b>	1. Y. H. Hui, Paul Cornillon, Isabel Guerrero Legarreta, Miang H. Lim, K. D. Murrell, Wai-Kit Nip: Handbook of frozen food, Marcel Dekker, Inc., 2004 2. Ramesh C. Chandan, Arun Kilara and Nagendra, P. Shah: Dairy processing & Quality assurance, Wiley – Blackwell, a Jonh W. Ley, Ltd. 2008 3. Annabel L. Merrill, Bernice K. Watt: Energy value of foods, United States Department of Agriculture. 1973															

<b>Course</b>	<b>Parasite zoonoses</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS59	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	ass. prof. Jovana Stefanovska, PhD	
<b>Purpose and objectives of the course program</b>	With this course PhD student would get extended knowledge about the parasitic zoonoses which are transmissible from animals to humans and vice versa and their diagnostics. Also, they would be able to recognize the risks during handling with animals used in common and science researching work.	
<b>Contents of the course program</b>	<b>Theory classes.</b> Giardiasis, Balantidiosis, Cryptosporidiosis, Toxoplasmosis, Leishmaniasis, Babesiosis, Neurocystisercosis, Echinococcosis, Dipylidiasis, Coenurosis, Fasciitis, ocular larva migrans and visceral larva migrans syndrome, cutaneous larva syndrome, strongyloides, anasakiasis, trichinellosis, dirofilariasis, unusual human infections caused by animal parasites, ticks, insects and other ectoparasites as vectors of human parasite diseases. <b>Practicals.</b> Parasitological examination of feces, blood and tissues.	
<b>Organization</b>	30 hours theory classes and practicals	



	60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b> <table border="1"> <thead> <tr> <th>Activity type</th><th>Points</th></tr> </thead> <tbody> <tr> <td>2 periodical evaluations during the teaching or written exam with duration of 2 hours</td><td>40.0</td></tr> <tr> <td>Written essay – project with oral presentation</td><td>40.0</td></tr> <tr> <td>Attendance and activity</td><td>20.0</td></tr> <tr> <td>Total:</td><td>100.0</td></tr> </tbody> </table>	Activity type	Points	2 periodical evaluations during the teaching or written exam with duration of 2 hours	40.0	Written essay – project with oral presentation	40.0	Attendance and activity	20.0	Total:	100.0				
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<b>Basic teaching aids</b>	<ol style="list-style-type: none"> <li>1. Foreyt, William: J . Veterinary Parasitology Reference Manual, Ames, IA: Iowa State University Press, 2001</li> <li>2. Sloss, M.: Veterinary Clinical Parasitology, Iowa State Press, 1994</li> <li>3. William J. Foreyt: Veterinary parasitology reference manual, Pullman, WA 99164, 1997</li> </ol>														
<b>Additional teaching aids</b>	<ol style="list-style-type: none"> <li>1. Bowman , D.D. Georgis, W.B. : Parasitology for Veterinarians, Saunders, 1995</li> <li>2. Jorgen Hansen and Brian Perry: The epidemiology, diagnosis and control of helminth parasites of ruminants, ILRAD, 1994</li> <li>3. Ministry of agriculture, fisheries and food: Manuel of veterinary parasitological laboratory techniques, MAFF/ADAS, 1996</li> </ol>														

<b>Course</b>	<b>Immunoparasitology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS60	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	ass. prof. Jovana Stefanovska, PhD	
<b>Purpose and objectives of the course program</b>	The aim of the course is understanding the immune and immunopathological mechanisms in parasitic infections. This knowledge will be beneficial in better understanding and performing the laboratory diagnostic procedures and in clinical practices. At the same time it will be a basic foundation for the setting up of future experiments for the development and research of the vaccines against parasites. Immunopathological mechanisms that will be part of the objectives of this course will contribute in better understanding of the selection of adequate therapy and preventive measures for the parasitic diseases.	
<b>Contents of the course program</b>	<b>Theory classes.</b> Basic principles of immunoparasitology. Parasitic antigen presentation, cell mediated and humoral immunity induced with protozoan parasites and helminths. Mechanisms of parasitic invasions of the immune system (immune response to parasites). The role of the network of cytokines in protection against parasitic infections and immunopathology. Parasites and allergies. Possibilities of specific immune protection against parasitic infections (vaccines against parasitic diseases) <b>Practicals.</b> ELISA, dot-ELISA, immunofluorescence, cytometry, real-time PCR	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of	

	written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>40.0</b>
	Written essay – project with oral presentation	<b>40.0</b>
	Attendance and activity	<b>20.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
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	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	1. F. E. G. Cox: Modern Parasitology, 81aeD, IISCI.ne., 2010 2. Phillip Scott: Immunoparasitology, Munksgaard, 2004 3. Heinz Mehlhorn: Progress in Parasitology, Springer, 2011	

<b>Course</b>	<b>Advanced methodologies in veterinary epidemiology</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS61	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Slavcho Mrenoshki, PhD	
<b>Purpose and objectives of the course program</b>	The course includes training of the students for planning and designing studies, understanding and application of epidemiological measures against diseases, selecting the appropriate study design.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Designing control and eradication programs for animal diseases. Most common failures in the implementation of the programs for control and eradication. Development of information systems for the implementation of the epidemiological programs.	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>40.0</b>
	Written essay – project with oral presentation	<b>40.0</b>
	Attendance and activity	<b>20.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two(written)</b>	
	<b>Final grade mark forming criteria:</b>	
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	<b>to 59</b>	<b>5 (F)</b>
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	<b>85-92</b>	<b>9 (B)</b>
	<b>93-100</b>	<b>10 (A)</b>
<b>Basic teaching aids</b>	1. Materials prepared by the course teacher 2. Extracts from the referent literature	

	3. Internet
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Course	Serological methods in veterinary diagnostics		3.0 ECTS
Code	FVMS DS62		
Year of study	I		
Semester	winter or summer		
Total teaching lessons	90		
Realized by	prof. Slavcho Mrenoshki, PhD prof. Dine Mitrov, PhD		
Purpose and objectives of the course program	The course includes training of the students to perform, read and interpret the results from basic and advanced serological methods used in the diagnosis of important diseases in animals, with special emphasis on diseases present in Republic of Macedonia.		
Contents of the course program	Theory classes and practicals.Diagnostic performances of serological methods and influence of the results on the programs for control and eradication of diseases.		
Organization	30 hours theory classes and practicals 60 hours other forms of activity		
Teaching methods	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.		
Specific recommendations related with teaching	Scoring of the student's activities:		
	Activity type	Points	
	2 periodical evaluationsduring the teaching or written exam with duration of 2 hours	40.0	
	Written essay – project with oral presentation	40.0	
	Attendance and activity	20.0	
	Total:	100.0	
Evaluation of knowledge	Periodical evaluations: two(written)		
	Final grade mark forming criteria:		
	Points	Grade mark	
	to 59	5 (F)	
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	77-84	8 (C)	
	85-92	9 (B)	
93-100	10 (A)		
Basic teaching aids	1. Materials prepared by the course teacher 2. Extracts from the referent literature 3. Internet		

<b>Course</b>	<b>Molecular methods in veterinary diagnostics</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS63	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Slavcho Mrenoshki, PhD prof. Dine Mitrov, PhD	
<b>Purpose and objectives of the course program</b>	The course includes training of the students to perform, read and interpret the results from the molecular methods used in the diagnosis of the most important diseases in animals, with special emphasis on diseases present in Republic of Macedonia.	
<b>Contents of the course program</b>	<b>Theory classes and practicals.</b> Molecular diagnostic methods (PCR, real time-PCR). Sequencing – sequence alignment and comparison. Construction of phylogenetic trees and their interpretation. Epidemiological trace-back of the	

	diseases using genetic data.														
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity														
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.														
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77-84	8 (C)														
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93-100	10 (A)														
<b>Basic teaching aids</b>	1. Materials prepared by the course teacher 2. Extracts from the referent literature 3. Internet														

<b>Course</b>	<b>Virological methods in veterinary diagnostics</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS64	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Slavcho Mrenoshki, PhD	
<b>Purpose and objectives of the course program</b>	The course includes advanced training for PhD students for theoretic introduction with most important viral diseases present in Republic of Macedonia, as well as an advanced practical training for their diagnostics.	
<b>Contents of the course program</b>	<b>Theory classes.</b> Introducing the most important viral diseases in Republic of Macedonia, their epidemiology, methods of prevention and control of the diseases, correct choice of material and sampling methods for virological examination, types of virological techniques for viral diseases diagnostics, detection of viral antigen, detection of viral nucleic acid, sequencing and phylogenetic methods. <b>Practicals.</b> Aseptic working technique, preparation of cell cultivation media, preparation of antibacterial and transport media for virological testing samples, preservation of cell cultures, trypsinisation, cell count in Neubauer chamber, passaging of confluent cells, preparation of material for virus isolation, inoculation of material in cell culture, use of embryonated eggs for isolation of viruses and chlamidia, inoculation of material in alantois cavity, inoculation of material in yolk sack, egg lamping, aspiration of alantois fluid, making smear of yolk sack membrane, use of stains for detection of chlamidia, use of agglutination and immunofluorescence methods for detection of viruses, viral antigen detection, detection of viral DNA/RNA.	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations</b>	<b>Scoring of the student's activities:</b>	

<b>related with teaching</b>	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>40.0</b>
	Written essay – project with oral presentation	<b>40.0</b>
	Attendance and activity	<b>20.0</b>
	Total:	<b>100.0</b>
<b>Evaluation of knowledge</b>	<b>Periodical evaluations: two (written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)
<b>Basic teaching aids</b>	1. Materials prepared by the course teacher	
	2. Extracts from the referent literature	
	3. Internet	

<b>Course</b>	<b>Bacteriology and diagnostics of most important bacterial diseases</b>	<b>3.0 ECTS</b>
<b>Code</b>	FVMS DS65	
<b>Year of study</b>	I	
<b>Semester</b>	winter or summer	
<b>Total teaching lessons</b>	90	
<b>Realized by</b>	prof. Slavcho Mrenoshki, PhD	
<b>Purpose and objectives of the course program</b>	The course includes advanced training for PhD students for theoretic introduction with most important bacterial diseases present in Republic of Macedonia, as well as an advanced practical training for their diagnostics.	
<b>Contents of the course program</b>	<p><b>Theory classes</b> would comprised two parts: general and special. General part is upgradation of knowledge from bacteriology gained on graduated studies, and this part is relatively same for all candidates. The special part would be modulated according the special needs of each candidate, i.e. studying of such species of bacterial pathogens related with the PhD study main topic of the candidate.</p> <p><b>Practicals</b> would be realized in Faculty's Laboratory for bacteriology where the candidate would be trained for use of diagnostic techniques for isolation and identification of bacterial species related with his/her PhD study main topic.</p>	
<b>Organization</b>	30 hours theory classes and practicals 60 hours other forms of activity	
<b>Teaching methods</b>	Theory classes and practicals: interactive Written essay: learning with use of referent literature and internet, making of written essay; oral presentation and discussion of the written essay.	
<b>Specific recommendations related with teaching</b>	<b>Scoring of the student's activities:</b>	
	<b>Activity type</b>	<b>Points</b>
	2 periodical evaluations during the teaching or written exam with duration of 2 hours	<b>40.0</b>
	Written essay – project with oral presentation	<b>40.0</b>
	Attendance and activity	<b>20.0</b>
<b>Evaluation of knowledge</b>	Total:	<b>100.0</b>
	<b>Periodical evaluations: two (written)</b>	
	<b>Final grade mark forming criteria:</b>	
	<b>Points</b>	<b>Grade mark</b>
	to 59	5 (F)
	60-68	6 (E)
	69-76	7 (D)
	77-84	8 (C)

		85-92	9 (B)	
		93-100	10 (A)	
<b>Basic teaching aids</b>	1. Materials prepared by the course teacher 2. Extracts from the referent literature and internet			