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ERASMUS + PROJECT : AG-LAB

Project "Improving skills in laboratory practice for agro-food specialists in eastern Europe» (Ag-Lab)

Program Erasmus +, project KA2 n° 586383-EPP-1-2017-1-SI-EPPKA2-CBHE-JP (2017-2978/001-001)

Objectives:

- to complete the diploma in veterinary medicine with the knowledge and skills necessary for the work at laboratory according to the elaborated references / professional competences;
- to provide the comprehension of laboratories organisation and activities;
- to provide the knowledge of actual laboratory methods and national and international norms related to the laboratory practice and to develop the capacity for the permanent up-grading of professional knowledge;
- to reinforce relations between universities and laboratories in agro-food sector and to create the conditions for the sustainable cooperation through the web-portal and other means.

Methods:

- the theoretical and practical classes in form of modules integrated into curricula (30% of the general curriculum);
- the practical trainings and study visits to laboratories of national and foreign institutions ;
- the on-line lectures;
- case-studies.

Quality assurance:

- the examination in the end of every course with the results reflected into the supplement to the diploma (modules, number of hours and notes);
- the tests of knowledge before the training study visit and after it;
- the evaluation of the provided training quality by students (clearness, completeness, practical usefulness etc.) with the further work for the improvement;
- the questioners for unit heads of the laboratories after receiving students for the practical training;
- the report of the common lectures and trainings with universities;
- further feedback of graduators launching their professional activities at laboratories.

Modules for the subject "Chemical and toxicological methods of diseases diagnostic"

Module / Topic	Topic	Hours		
		including		
		Lectures	Practical classes	Individual work
1	2	3	4	5
Module 1. Organization of haematological laboratory reseaches				
Topic 1.1. Objects of toxicological and biochemical analyses. Monitoring and meta-analysis of laboratory researches methods.	**4**	2	-	2

Topic 1.2. Sampling procedures for chemical and toxicological analyses. Impact of medicines on results of biochemical analyses.	**6**	2	2	2
Total	**10**	**4**	**2**	**4**
Module 2. Laboratory diagnostic of pathologies of respiratory and cardio-vascular systems.				
Topic 2.1. Biochemical methods and diagnostic algorithms at cardio-vascular diseases in animals.	**6**	2	-	4
Topic 2.2. Biochemical methods and diagnostic algorithms at respiratory diseases in animals.	**6**	2	2	2
Total 2	**12**	**4**	**2**	**6**
Module 3. Laboratory diagnostic of pathologies of liver, kidneys and pancreas.				
Topic 3.1–3.2. Biochemical methods and diagnostic algorithms at liver and biliary tracts diseases.	**14**	4	4	6
Topic 3.3. Biochemical methods and diagnostic algorithms at pancreatitis in pets.	**10**	2	2	6
Topic 3.4. Biochemical methods and diagnostic algorithms at kidneys and urinary tracts diseases.	**8**	2	2	4
Total 3	**32**	**8**	**8**	**16**
Module 4. Laboratory diagnostic of metabolic diseases.				
Topic 4.1. Biochemical methods and diagnostic algorithms at diseases generated by carbohydrates and lipids metabolism distortion (acidosis, ketosis, diabetes).	**8**	2	2	4
Topic 4.2–4.3. Biochemical methods and diagnostic algorithms at diseases generated by macro and microelements metabolism distortion (rickets, osteodystrophy, pasture tetanus, microelementosis).	**12**	2	4	6
Topic 4.4 Biochemical methods and diagnostic algorithms at diseases generated by vitamin metabolism distortion (A-, D- and E-vitmibs deficiency).	**12**	2	4	6
Topic 4.5. Informative value of indices of lipids peroxide oxidation and antioxidant body protection at internal diseases in animals.	**6**	2	2	2
Topic 4.6. Changes of connective tissue indices at differential diagnostic of animals internal diseases.	**4**	2	-	2
Total 4	**42**	**10**	**12**	**20**
Module 5. Biochemical algorithms at pathologies of endocrine system				
Topic 5.1. Laboratory diagnostic and biochemical algorithms at pathologies of thyroid in animals.	**8**	2	2	4

Topic 5.2. Biochemical methods and diagnostic algorithms at pathologies of pre-thyroids in animals.	**6**	2	2	2
Total 5	**14**	**4**	**4**	**6**
Module 6. Organization of procedures of toxicological analyses				
Topic 6.1. Work organization of chemical and toxicological departments of veterinary laboratories (according to ISO 17025)	**8**	2	-	6
Topic 6.2. Rules of sampling, packaging and transfer of pathological and biological materials to chemical and toxicological departments of veterinary laboratories.	**10**	2	2	6
Topic 6.3. Methods of detection of poisonous matters from different objects of veterinary control (pathological material).	**10**	2	2	6
Module 6	**28**	**6**	**4**	**18**
Module 7. Modern methods of chemical and toxicological analysis				
Topic 7.1. Ecotoxicology. Toxicology and radiobiology at poisoning by matters of anthropogenic origin. Identification and quantitative definition of heavy metals by atomic-absorption spectrophotometry, ICP-OES.	**16**	2	4	10
Topic 7.2. Identification and quantitative definition of pesticides (fungicides, herbicides, zoocides, synthetic pyrethroids) by LC-MS/MS, GC-MS/MS.	**20**	4	4	12
Topic 7.3. Diagnostic methods of micotoxines (HPLC, ELISA), identification of micotoxines in products of animal and plant origins.	**18**	4	4	10
Topic 7.4. Definition of toxicity on biological models (biosamples).	**18**	4	4	10
Total 7	**72**	**14**	**16**	**42**
TOTAL	**210**	**50**	**48**	**112**

Modules for the subject "Laboratory practice in veterinary medicine (hygiene of foodstuffs)"

Number of credits – 9 (270 hours)

№	Module / topic	Number of hours			Credits
		lectures	PC	IW	
Module 1. Good laboratory practice					
Module 1. Activity organization and metrological provision of laboratory					
1	***Topic 1.*** Procedures for confirmation of laboratory diagnostic efficiency (internal and cross audit,	2	2	6	1 (30 hours)

	verification), quality assurance of laboratory researches (intra and inter-laboratory control*)*. Validation of analytical methods. Proficiency testing.				
2	***Topic 2.*** Rules of the laboratory biosafety and use of biological materials and samples in researches. Organization of measures for recycling of laboratory wastes, used samples, materials and chemical agents.	2	-	6	
3	***Topic 3.*** Documents management at food enterprise and food stuffs control laboratory (necessary documents, software for documents management and registration, registers, experts' conclusions). Management of information. .	2	4	6	
	Total	***6***	***6***	***18***	
Module 2. Bases of legislation related to foodstuffs and food quality and safety. Methods for control of foodstuffs quality and safety.					
6	***Topic 1.*** Modern methods for the detection of animal ADN species, including ADN of ruminants, mammals, rodents, poultry, in foodstuffs, feeds and combined feeds. Analyses of allergens in raw materials and foodstuffs (soy beans, histamine, casein, egg white etc.) by EIZA and PCR methods.	2	2	6	2 credits (60 hours)
7	***Topic 3.*** National and EU standards of control and labelling of foodstuffs containing GMO. Qualitative and quantitative control of GMO.	2	2	6	
8	***Topic 4.*** Laboratory methods of water quality and safety detection.	2	4	10	
9	***Topic 5.*** Laboratory radiological control of foodstuffs and raw materials.	2	4	8	
	Total 2	***10***	***14***	***36***	
Module 3. Hygienic bases of milk production and laboratory monitoring and its quality and safety					
10	***Topic 1.*** Scientific and methodological bases of monitoring of milk quality and safety. Organization of the work in laboratory for milk quality analyses.	2	4	8	2 credits (60 hours)
11	***Topic 2.*** Protocol of milk sampling for laboratory analysis and requirements for their transporting.	2	4	8	
12	***Topic 3.*** Transformation of antibiotics into milk and their carence. Methods for detection of antibiotics residues in milk (ELIZA).	2	4	10	
13	***Topic 4.*** National standards and EU regulation №	2	4	10	

	2074/2005 related to laboratory researches for calculation of КМАФАнМ and somatic cells in milk				
	Total	***8***	***16***	***36***	
Modules 4. Analysis of dangerous compounds in foodstuffs and feeds, risk assessment					
14	***Topic 1.*** Requirements of national and EU legislation related to control methods and maximum tolerable levels of pollutants in foodstuffs and feeds.	4	-	6	3 credits (90 hours)
15	***Topic 2.*** Development of scientifically justified plans of state monitoring of veterinary drugs residues and pollutants in alive animals, raw animal products and other plans of laboratory researches for the state laboratory control.	2	2	6	
16	***Topic 3.*** Sampling of storage of samples of foodstuffs and feeds for monitoring of pollutants residues, toxic matters and veterinary drugs.	2	2	6	
17	***Topic 4.*** Detection of residues of antibiotics and anti-bacterial matters by ELIZA methods in raw milk, meat, fish, eggs and honey.	2	4	6	
18	***Topic 5.*** Detecton of micotoxins in grains, foodstuffs, feeds by ELIZA, liquid chromatography, thin layer chromatography.	2	4	6	
19	***Topic 6.*** Detection of hormones, beta-antagonists in meat by ELIZA, liquid chromatography with double mass-spectrometer (LC/MS/MS).	2	4	6	
20	***Topic 7.*** Detection of toxic elements (led, cadmium, arsenic, mercury, copper, zinc, iron, manganese, aluminium, sodium, chrome, selenium, bore) in foodstuffs, feeds, water by atomic absorption spectrometry and high performance liquid chromatography.	2	4	6	
21	***Topic 8.*** Modern molecular and genetic methods of analysis of animal products (PCR) and their application for food safety control.	2	4	6	
	Total	***18***	***24***	***48***	
Module 5. Public health					
22	***Topic 1.*** Food diseases of microbial origin (food toxic infections and toxicosis). Risk factors of zoonosis agents transmitting though foodstuffs.	4	2	8	1 credit (30 hours)
23	***Topic 2.*** Notion of the epidemiological research. Principles of epidemiological observation. Study of outbreaks of food related diseases.	4	2	10	
	Total	***8***	***4***	***18***	

	TOTAL	**50**	**64**	**156 (58 %)**	**9 (270 hours)**

Modules for the subject "Laboratory practice in veterinary medicine (diagnostic of infectious diseases)"

Number of credits – 26 (780 hours)

№	Module / topic	Number of hours			Credits
		lectures	PC	IW	
Module 1. Organization of laboratory activity					
1	***Topic 1.*** Groups of laboratories pathogenicity, construction, work rules, safety techniques in different groups and personal prophylaxis, classification. Rules of the laboratory biosecurity and their application. Risks management. Equipment of working place.	–	2	6	4 credits (120 hours)
2	***Topic 2.*** Organizational structure of the laboratory service in the country. Proficiency testing. Biosecurity and biorisks, edition of Standard operational procedures.	2	2	6	
3	***Topic 3.*** Principles of automation infectious diseases diagnostic.	2	–	6	
4	***Topic 4.*** Metrology issues and international system of units Ci. Knowledge and application of procedures of measurement equipment calibration and verification.	2	–	6	
5	***Тема 5.*** International standards ISO related to laboratory researches.	4	2	5	
6	***Topic 6.*** International standards and national practice of epizootic surveillance and epizootic analysis.	4	4	8	
7	***Topic 7.*** EU and national veterinary legislation related to laboratory researches and diagnostic (EU legislation and standards, international standards, procedures and instructions for laboratory researches. Official tests and in haus-methods. Programmes, treaties and laws related to microbiological researches of dangerous agents.	2	–	6	
8	***Topic 8.*** International legislation and organizations in the field of epizootic control (OIE, FAO, EFSA).	4	2	8	
9	***Topic 9.*** Modern systems of monitoring of	4	4	8	

	infectious diseases (WAHIS, EMPRES-AH)				
10	***Topic 10.*** Ethic codex for laboratory stuff. Application of laboratory information systems (ZIS).	2	–	6	
11	***Topic 11.*** Requirements to the organization and functioning of laboratories, buildings, measurement and analytical equipment, auxiliary equipment in microbiological laboratories.	2	–	7	
	Total – 120 hours – 4 credits	28	16	76	
Module 2. Laboratory diagnostic in pathological-morphological department. Studied material, laboratory animals and experimental researches.					
12	***Topic 1.*** Laboratory diagnostic in pathological-morphological department. Rules of laboratory biosecurity, use of animals, biological materials and samples.	–	8	4	1 credit (30 hours)
13	***Topic 2.*** Requirements and rules of animals keeping. Contamination methods and rules of dissection of laboratory animals. Blood sampling. Sampling and transport of biological material for bacteriological analyses. Reception of samples.	–	6	8	
	Total – 30 hours – 1 credit	–	14	16	
Module 3. General microbiological issues in laboratory					
12	***Topic 1.*** Microscopy of bacteria of different nosologic groups. Preparation of swab samples, imprint smears from microorganisms cultures and studied material. Мікроскопія бактерій різних нозологічних груп. Preparation of colorants, coloration peculiarities of different nosologic groups.	–	4	2	2 credits (60 hours)
13	***Topic 2.*** Preparation and treatment principles of biological and pathologic-anatomic samples from animals, products of animal origin, feeds, soil, water, plants. Recycling rules for wastes, used samples, materials and chemical agents.	2	2	4	
14	***Topic 3.*** Methods of mobility study of different taxonomic groups of microorganisms. Storage of microorganisms.	–	2	2	
15	***Topic 4.*** Disinfection of laboratory vessels, instruments, clothes, biological materials and equipment. Control of disinfection and sterilization quality. Sanitary condition of laboratory buildings.	–	2	4	
16	***Topic 5.*** Chromatogenous milieus. Preparation of nutritive milieus for cultivation of microorganisms of different nosologic groups, their sterilisation and	–	2	4	

	pH definition. Use of ready nutritive milieus.				
17	***Topic 6.*** Primary inoculation from pathological and biological clinical materials, objects from environment.	–	2	3	
18	***Topic 7.*** Extraction methods of clean cultures of aerobic and anaerobic microorganisms. Application of express-tests for extraction and identification of pathogenic agents.	2	2	4	
19	***Topic 8.*** Definition of cultural, morphologic and fermentation peculiarities of isolated microorganisms cultures in different nosologic groups.	–	2	4	
20	***Topic 9.*** Morphology of fungi and actinomyces. Study of their morphologic peculiarities.	–	2	4	
21	***Topic 10.*** Methods of microorganism species definition. Work with main determinants of bacteria.	–	2	3	
Total 2 – 60 hours – 2 credits		4	22	34	
Module 4. Laboratory diagnostic of foodstuffs. Definition of microorganisms sensibility to antibiotics and bacteriophages.					
25	***Topic 1.*** Definition of microorganisms' sensitivity to antibiotics by ELIZA method. Detection of antibiotics residues in meat, milk, fish, eggs by the microbiological method.	2	6	8	3 credits (90 hours)
26	***Topic 2.*** Extraction of bacteriophages and phagotyping. Definition of phagosensitivity.	2	4	8	
	Topic 3. Laboratory analysis of milk and dairy products (QMAFAnM - Quantity of Mesophilic Aerobic and Facultative Anaerobic Microorganisms, *Staph., Str., Salmonella, Proteus, Listeria monocytogenes*, lactic microorganisms).	4	10	16	
	Topic 4. Laboratory analysis of meat and meat products (КМАФАнМ, *Staph., Str., E.coli, Salmonella, Proteus, Listeria monocytogenes, Cl. Bac. anthracis)* Laboratory analysis of fish, eggs and feeds.	4	10	16	
Total – 90 hours – 3 credits		12	30	48	
Module 5. Laboratory researches on diagnostic of infectious diseases of animals.					
26	***Topic 1.*** Actual epizootic situation in the world and in the country.	2	4	8	4 кредити (120 годин)
27	***Topic 2*** International standards, world and national practices of animals' infectious diseases diagnostic,	4	2	4	

	recommended and alternative laboratory methods.				
28	***Topic 3.*** Laboratory methods of diagnostic of cattle infectious diseases including the diseases to be notified to OIE.	4	4	3	
29	***Topic 4.*** Laboratory methods of diagnostic of porcine infectious diseases.	4	4	3	
30	***Topic 5.*** Laboratory methods of diagnostic of poultry infectious diseases.	2	2	5	
31	***Topic 6.*** Laboratory methods of diagnostic of horses infectious diseases.	2	2	3	
32	***Topic 7.*** Laboratory methods of diagnostic of sheep infectious diseases.	2	2	3	
33	***Topic 8.*** Laboratory methods of diagnostic of dogs infectious diseases.	4	2	3	
34	***Topic 9.*** Laboratory methods of diagnostic of cats infectious diseases.	2	2	5	
35	***Topic 10.*** Laboratory methods of diagnostic of laboratory animals' infectious diseases.	–	–	5	
36	***Topic 11.*** Laboratory methods of diagnostic of exotic animals' infectious diseases.	–	2	2	
37	***Topic 12.*** Laboratory methods of diagnostic of fish's infectious diseases.	2	2	5	
38	***Topic 13.*** Laboratory methods of diagnostic of insects' infectious diseases.	–	2	4	
39	***Topic 14.*** Quality detection of veterinary immunological products (vaccines, serums).	4	2	3	
Total – 120 hours – 4 credits		32	32	56	
Module 6. Immunologic and molecular – genetic diagnostic					
39	***Topic 1.*** Laboratory methods for study of immunologic system. Serological reactions. Immunological and chemical methods of analysis. Immunological and chemical analytical methods: definition, analytical characteristics, performing principles, approaches to measurement of reaction results. Radiologic and immunologic analysis (PIA): types, peculiarities of methods, research stages, advantages and disadvantages.	2	2	2	
40	***Topic 2***. Practical use of monoclonal antibodies.	2	6	2	

41	***Topic 3***. Definition of resistance and virulence of microorganisms.	4	4	2	4 кредити (60годин)
43	***Topic 4.*** Molecular and genetic research methods. PCR: equipment, organization of technological process, rules of sanitary and anti-epidemiological regulation. Preparation of samples for nucleonic acids testing. PCR: principles, analytical procedure, mistakes, ADN-probes. Detection methods of amplification products. Interpretation of results. PCR – real time analysis.	6	10	14	
44	***Topic 5.*** Equipment for ELIZA. Measurement and auxiliary equipment for ELIZA. Classification of ELIZA methods. Main stages of ELIZA. Possible mistakes. Evaluation of results. Principles of performing, advantages, disadvantages, analytical characteristics.	4	10	14	
Total – 84 hours – 4 кредити		18	32	34	
Module 7. Laboratory diagnostic of viral diseases					
60	***Topic 1.*** Rules of work in viral laboratory.	–	2	2	5 credits (150 hours)
61	***Topic 2.*** Viroscopy. Definition of inclusion bodies, elementary bodies. Detection of vibrions and intracellular inclusion bodies.	–	6	2	
62	***Topic 3.*** Sampling of pathological materials of ill and dead animals. Conservation, transporting and preparation for analysis.	2	6	4	
63	***Topic 4.*** Indication of viruses. Titration of viruses. Cells culture. Methods of viruses indication of cells culture. Use of chicken embryos. Indication of viruses in chicken embryos.	4	6	2	
67	***Topic 5.*** Serological reactions in the virology. Reaction of detention of re-agglutination.	–	10	2	
68	***Topic 6.*** Serological reactions in the virology РН, РНГА, РДП, РІФ, ІФА	2	20	2	
70	***Topic 7.*** Laboratory diagnostic of rabies.	2	2	2	
71	***Topic 8.*** Laboratory diagnostic of Newcastle disease and avian influenza.	2	2	4	
72	***Topic 9.*** Laboratory diagnostic of bluetongue.	2	2	4	
73	***Topic 10.*** Laboratory diagnostic of cattle pneumonia.	2	2	2	

74	***Topic 11.*** Laboratory diagnostic of porcine respiratory syndrome and circovirus.	4	4	4	
75	***Topic 12.*** Laboratory diagnostic porcine African fever and porcine classic fever.	2	2	2	
77	***Topic 13.*** Laboratory diagnostic of nodular dermatitis.	2	2	2	
79	**Topic 14.** Laboratory diagnostic of prion infections.	–	4	–	
80	***Topic 15.*** Immunodiffusion reaction in agar gel on the example of cattle leucosis diagnostic.	2	4	4	
81	***Topic 16.*** ELIZA analysis on the example of cattle leucosis diagnostic.	2	2	8	
Total – 150 hours – 5 credits		28	76	46	
Module 8. Laboratory diagnostic in the environment.					
84	***Topic 1.*** Methods of detection and identification of infection agents (bacteria, fungi, viruses) in the environment.	–	4	2	1 credit (30 hours)
80	***Topic 2.*** Methods of detection and identification of infection agents (bacteria, fungi, viruses) in the air.	–	4	2	
81	***Topic 3.*** Methods of detection and identification of infection agents (bacteria, fungi, viruses) in the water.	–	4	2	
82	***Topic 4.*** Methods of detection and identification of infection agents (bacteria, fungi, viruses) in the soil.	–	4	2	
83	***Topic 5.*** Laboratory methods of disinfection assessment.	–	4	2	
Total 9 – 30 hours – 1 credits		–	20	10	
Module 9. Methods and instruments of biostatistics in laboratory practice.					
82	***Topic 1.*** Bases of biostatistics.	2	4	8	2 credits (60 hours)
83	***Topic 2.*** Assessment of laboratory methods for the use in epizootological researches.	2	4	8	
84	***Topic 3.*** Practical tools for the statistic treatment, programming in “R”.	4	4	8	
85	***Topic 4.*** Visualization of data in “R”.	4	4	8	
Total 2 – 60 hours – 2 credits		12	16	32	
Total 26 credits		**138**	**276**	**366**	**26 credits**

				(780 hours)