

ACADEMIC YEAR 2022/2023

General Information	
Integrated Teaching	VETERINARY PHARMACOLOGY and TOXICOLOGY
Teaching Modules	Veterinary Pharmacology Veterinary Chemotherapy Veterinary Toxicology
Degree Course	Veterinary Medicine (LM42)
Course Year	3 rd
European Credit Transfer and Accumulation System (ECTS)	12 (Frontal lessons: 10 ECTS; practical activities: 2 ECTS)
Scientific Disciplinary Sector	VET/07
Language	Italian
Academic calendar	1/7 weeks period
Attendance	Mandatory

Professors / Lecturers	E-mail	Telephone
Giuseppe Crescenzo	giuseppe.crescenzo@uniba.it	080 5443923
Nicola Pugliese	nicola.pugliese@uniba.it	080 5443923
Claudia Zizzadoro	claudia.zizzadoro@uniba.it	080 5443924
Olimpia Lai	olimpia.lai@uniba.it	080 5443922
Headquarters	Veterinary Medicine Campus , S.P. n° 62 per Casamassima km 3, 70010 Valenzano (BA)	
Virtual headquarters	Piattaforma Microsoft Teams (access code e93q6km)	
Tutoring (time and day)	Prof. Giuseppe Crescenzo: martedì_14:30 - 17:30 / mercoledì_14:30 - 17:30 dr. Nicola Pugliese: lunedì_15:00 - 18:00 / giovedì_15:00 – 18:00 dr. Claudia Zizzadoro: mercoledì_15:00-17:00 / giovedì_11:30-13:30 dr. Olimpia Lai: martedì_13:00-15:00 / mercoledì_13:00-15:00 in sede o da remoto (tramite piattaforma Teams), previo appuntamento concordato via email	

Syllabus	
Learning Objectives	<p>Within the teaching of "Veterinary Pharmacology and Toxicology", the teaching modules of "Veterinary Pharmacology" and "Veterinary Chemotherapy" aim to make the students understand what is meant by responsible, safe and effective use of the drugs and chemotherapeutics that are addressed to treatment, prevention and more general control of the diseases affecting both domestic and wild animals, also in the light of the potential impact that such use can have on the health of the consumers of animal products, as well as on the ecosystems.</p> <p>As for the teaching module of "Veterinary Toxicology", the purpose is to make the students understand: how domestic and wild animals can get exposed to the various toxic substances of natural and anthropogenic origin; how this exposure can be dangerous to the health of the animals, to their natural conservation and to the health of the consumers of animal products; how this exposure and its associated risk can be recognized and reduced; how the negative consequences of a possible exposure can be managed by appropriate therapies.</p>
Prerequisites	Propedeutics: General Pathology. Students should possess knowledge and competences regarding the anatomy, physiology and immunology of higher animals, as well as regarding microbiology.

<p>Contents of the Integrated Teaching</p>	<ul style="list-style-type: none"> • Presentation of the Integrated Teaching: Learning objectives, Professors/Lecturers, Teaching Modules, Organization of the lessons, Reference books and additional study material, Learning assessment and evaluation criteria, Biosafety rules for students' participation in the practical lessons
<p>Contents of the Teaching Module of VETERINARY PHARMACOLOGY</p> <p>Teachers: Giuseppe CRESCENZO Claudia ZIZZADORO</p> <p>ECTS:3</p> <p>Hours: 30</p>	<p>The module refers to Basic Science</p> <ul style="list-style-type: none"> • Introduction to Veterinary Pharmacology: <ul style="list-style-type: none"> ➤ Main definitions ➤ Principles of pharmacosurveillance and pharmacovigilance • General part: <ul style="list-style-type: none"> ➤ Pharmacodynamics ➤ Pharmacokinetics ➤ Pharmaceutics ➤ Drug toxicity and Untoward reactions to drugs ➤ Drug safety • Special part: <ul style="list-style-type: none"> ➤ Pharmacology of the Autonomic Nervous System (ANS) <ul style="list-style-type: none"> ▪ Anatomical and functional organization of the ANS ▪ Pharmacology of the Sympathetic ANS ▪ Pharmacology of the Parasympathetic ANS ▪ Drugs enhancing the cholinergic neurotransmission ➤ Pharmacology of the Somatic Nervous System <ul style="list-style-type: none"> ▪ Anatomical and functional organization of the motor end plate ▪ Pharmacological modulation of the motor end plate ➤ Pharmacology of the somatosensory afferents <ul style="list-style-type: none"> ▪ Nerve impulse conduction ▪ Local anaesthetics ➤ Pharmacology of the Central Nervous System (CNS): <ul style="list-style-type: none"> ▪ CNS-depressant drugs <ul style="list-style-type: none"> - General anaesthetics - Tranquillizers - Sedatives - Narcotic analgesics - Cannabinoids ▪ CNS-stimulant drugs <ul style="list-style-type: none"> - Respiratory analeptics - Methylxanthines ➤ Drugs modulating the immune response: <ul style="list-style-type: none"> ▪ Anti-allergic drugs ▪ Non-steroidal antiinflammatory drugs ▪ Steroidal antiinflammatory drugs ▪ Immunosuppressive drugs ➤ Drugs acting on the respiratory system ➤ Drugs modulating renal functions ➤ Drugs acting on the gastrointestinal system ➤ Drugs acting on the cardiovascular system
<p>Contents of the Teaching Module of VETERINARY CHEMOTHERAPY</p> <p>Teacher:</p>	<p>The module refers to Basic Science</p> <ul style="list-style-type: none"> • Introduction to Veterinary Chemotherapy: <ul style="list-style-type: none"> ➤ Main definitions • General Part: <ul style="list-style-type: none"> ➤ Selective toxicity ➤ MIC, clinical efficacy and toxicity of chemotherapeutic agents

<p>Nicola PUGLIESE</p> <p>ECTS: 3</p> <p>Hours: 30</p>	<ul style="list-style-type: none"> ➤ Ecotoxicity of chemotherapeutic agents ➤ General concepts of drug resistance • Special Part: <ul style="list-style-type: none"> ➤ Antiseptics and disinfectants ➤ Antibacterial drugs <ul style="list-style-type: none"> ▪ Beta-lactams ▪ Polypeptide antibiotics ▪ Glycopeptide antibiotics ▪ Sulfonamides and pyrimidine derivatives ▪ Quinolones and fluoroquinolones ▪ Rifamycins ▪ Nitrofurans and nitroimidazoles ▪ Aminoglycosides ▪ Tetracyclines ▪ Phenicol ▪ Macrolides, lincosamides and diterpenes ➤ Antifungal drugs <ul style="list-style-type: none"> ▪ Polyenes ▪ Azoles ▪ Allylamines ▪ Mitotic spindle inhibitors ➤ Ectocides <ul style="list-style-type: none"> ▪ Pyrethrins and pyrethroids ▪ Organophosphates and Carbamates ▪ Formamidines ▪ Phenylpyrazoles ▪ Nitroguanidine ▪ Isoxazolines ▪ Macrocyclic lactones ▪ Arthropode Growth Regulators ▪ Spinosidine ➤ Endocides <ul style="list-style-type: none"> ▪ Antinematodal drugs ▪ Anticestodal drugs ▪ Antitrematodal drugs ➤ Antiprotozoal agents for the control of: <ul style="list-style-type: none"> ▪ Coccidiosis ▪ Cryptosporidiosis ▪ Toxoplasmosis ▪ Leishmaniosis ▪ Piroplasmosis ▪ Giardiasis ➤ Antiviral drugs <ul style="list-style-type: none"> ▪ Purine and Pyrimidine analogues ▪ Retroviral protease inhibitors ▪ Neuroaminidase inhibitors ▪ Immunostimulants ➤ Anticancer drugs <ul style="list-style-type: none"> ▪ Principles of anticancer chemotherapy ▪ Resistance to anticancer drugs ▪ Alkylating agents ▪ Vinca alkaloids
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	<ul style="list-style-type: none"> ▪ Corticosteroids ▪ Tyrosine kinase inhibitors ▪ Anthracyclines
<p>Contents of the Teaching Module of VETERINARY TOXICOLOGY</p> <p>Teachers: Giuseppe CRESCENZO Olimpia LAI</p> <p>ECTS: 4</p> <p>Hours: 40</p>	<p>The module refers to Basic Science</p> <ul style="list-style-type: none"> • Introduction to Veterinary Toxicology: <ul style="list-style-type: none"> ➤ Main definitions • General Part: <ul style="list-style-type: none"> ➤ Categories of toxic substances ➤ Sources of toxic substances ➤ Factors influencing toxicity ➤ Doses in toxicology ➤ Toxicokinetics and Toxicodynamics ➤ Toxicity tests ➤ Toxicological risk assessment ➤ Daignosis and Management of toxicosis in the animals <ul style="list-style-type: none"> ▪ Suspected and Certain diagnosis ▪ Management of intoxication cases ▪ Decontamination practices ▪ Antidotes and Antagonists • Special Part: <ul style="list-style-type: none"> ➤ Toxicoses due to environmental pollutants <ul style="list-style-type: none"> ▪ Heavy metals ▪ Persistent Organic Pollutants (DDT, Dioxins and Dioxin-like substances) ➤ Toxicoses due to pesticides <ul style="list-style-type: none"> ▪ Organophosphates e Carbamates ▪ External antiparasitics ▪ Anticoagulant rodenticides ▪ Herbicides ▪ Molluscicides ➤ Toxicoses due to biocontaminants <ul style="list-style-type: none"> ▪ Mycotoxins ▪ Algal biotoxins ➤ Toxicoses due to plants ➤ Toxicoses due to venomous animals • Residue Toxicology: <ul style="list-style-type: none"> ➤ Implications of the presence of xenobiotic substance residues in the foodstuffs of animal origin for public health ➤ Residue classification ➤ Toxicological risk assessment of residues ➤ Residue limits ➤ Main national and european regulations in force
<p>Practical activities</p> <p>Teachers: Claudia ZIZZADORO Nicola PUGLIESE Olimpia LAI</p> <p>ECTS: 2</p> <p>Hours: 30</p>	<ul style="list-style-type: none"> • Pharmaceutical calculations I <ul style="list-style-type: none"> ➤ Physical quantities and Measurement units used in drug prescription and administration • Pharmaceutical calculations II <ul style="list-style-type: none"> ➤ Dose calculation and set up of solutions • Drug Formulations <ul style="list-style-type: none"> ➤ Comparative analysis of different drug formulations • Reporting “Adverse Drug Reactions” (ADR) and Access to drug-related Databases • Sample collection for toxicological analysis

Organization of the Practical lessons	<p>Practical lessons will be scheduled during the course of the bimester, according to the progress of the theoretical lessons.</p> <p>Depending on the type of practical activity to be performed and number of attendants, students will be divided in differently sized groups. Particularly:</p> <ul style="list-style-type: none"> ➤ for the practical lessons that will be held in the lecture hall, students will likely be divided into two groups and each activity replicated for each group; ➤ for the practical activities that will take place in the laboratory, groups of 8-10 students will be formed and each activity replicated for each group.
Biosafety rules for students' participation in the practical lessons	<p>For the practical activities that will take place in the laboratory, students will be allowed to enter the laboratory only if wearing the appropriate personal protective clothing (lab coat) and equipment (gloves) and in accordance with the current Regulations of the Department of Veterinary Medicine of the University of Bari in the matter of Entrance to and Attendance and Functioning of the Laboratories.</p> <p>(https://w3.uniba.it/ricerca/dipartimenti/dipmedveterinaria/regolamenti/regolamento-dei-laboratori-dimev.pdf)</p>

Study Material for self-study	
Reference Books	<p>Teaching Modules of "Veterinary Pharmacology" and "Veterinary Chemotherapy": Farmacologia Veterinaria, 2^a edizione (2021); Belloli C, Carli S, Ormas P. eds.</p> <p>Teaching Module of "Veterinary Toxicology": Veterinary Toxicology – Basic and clinical principles, 3^a edizione (2018); R.C. Gupta eds.</p>
Additional material	A supplementary study material, consisting of textual and audiovisual documents for more in-depth study, as well as of the pdf version of the power point presentations shown during the lessons, will be provided by the teachers during the course of the teaching and made accessible online in a dedicated room of the Microsoft TEAMS Platform

Work Schedule			
Ore			
Total	Lectures	Hands-on (laboratory, working groups, seminars, field trips)	Out-of-class study hours / Self-study hours
130	100	30	170
ECTS			
12	10	2	/

Teaching Strategy	<p>For all of the three teaching modules, the teaching activity will be mainly based on traditional theoretical lessons held in the lecture hall (<i>lectures</i>). The theoretical lessons, however, will be combined with innovative teaching strategies, including <i>problem solving</i>, <i>case study</i> and <i>roleplaying</i>, in order to allow the integration of information that is necessary for a full learning process and consolidation of knowledge and competences delivered by the teaching.</p> <p>All teaching activities will be carried out by using multimedia, including applications for smartphones and tablets, such as Kahoot, Tasks or MindMup. This will promote continuous student-teacher interaction and more active involvement of those students with special educational needs due to specific learning disabilities.</p> <p>During the practical lessons, more room will be left to <i>problem solving</i> and <i>learning by doing</i>, with simulations of actual or verisimilar situations in which the students will have to autonomously apply the knowledge acquired during the theoretical lessons using logical thinking, so as to build and strengthen their abilities and competences.</p>
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	Finally, teachers will provide students with textual and audiovisual documents for more in-depth study, as well as with self evaluation tests related to the various contents of the teaching programme, so as to help them develop self-directed learning skills.
Expected Learning Outcomes	<p>Note: Knowledge, abilities, and competences that the students will acquire through the present teaching are related to the Day One Competences (DOC) adopted by the ECCVT on 26/03/2015 (https://www.eaeve.org/fileadmin/downloads/eccvt/2015_2_D1C_Adopted_Annex_5.4.1.pdf)</p>
Knowledge and understanding on:	<p>By the end of the teaching period, students are expected to have acquired knowledge and understanding of the following points:</p> <ul style="list-style-type: none"> • the pharmacodynamic and pharmacokinetic events underlying the response of animal organisms to the various classes of drugs and toxic substances, and the different types of effects that the various classes of drugs and toxic substances can produce, either alone or in combination, as a consequence of their interaction with animal organisms; • the factors causing inter-species and intra-species (inter-individual and intra-individual) variations in the quali-quantitative aspects of the drug/toxicant-organism interaction as well as in the effects produced by it • the mechanisms responsible for development and diffusion of drug resistance in pathogens and problems generated by this phenomenon • origin of the various toxic substances, modalities of animal exposure to these substances and potential impact on the health of the different animal species • how the administration of drugs to food producing animals, or the exposure of these animals to natural and anthropogenic toxicants, leads to the exposure of consumers of animal products to the residues of these xenobiotics and problems generated by this phenomenon • principles of antidote therapy and decontamination • principles that regulate the movement of pollutants along the trophic chain
Applying knowledge and understanding on:	<p>By the end of the teaching period, students are expected to be able to:</p> <ul style="list-style-type: none"> • indicate the appropriate classes of drugs and chemotherapeutics for treatment and/or prevention of the most common diseases affecting the various species of veterinary interest, as well as the criteria that guide the definition of the administration protocols (dose, route and specific mode of administration, administration intervals, duration of the treatment) of the drugs and chemotherapeutics more commonly used in veterinary medicine • carry out the pharmaceutical calculations that are preliminary to prescription and administration of drugs to the various animal species of veterinary interest, including calculations for prescription and preparation of medicated feed • understand and interpret information reported on the packaging and in the leaflet of the medicines used in the animals of veterinary interest • consult the main information sources regarding the medicines available on the market • report adverse reactions to drugs and chemotherapeutics • properly and responsibly approach the use of drugs and chemotherapeutics as tools for preserving the health of the animals and the safety of their possible products, taking into account the need to avoid toxicity in the treated animals, as well as to limit development and diffusion of chemotherapy resistance, impact on ecosystems and exposure of the consumers of foodstuffs of animal origin to potentially toxic pharmacological residues • identify the sources of possible animal exposure to natural and anthropogenic toxic substances, elaborate strategies to reduce this exposure and its associated risk in order to preserve the health of the animals and of the consumers of animal foodstuffs, indicate the criteria that guide management and treatment of contamination and intoxication cases • properly collect the biological samples for laboratory toxicological analysis

<p>Transversal Competences</p>	<p>The integrated teaching of "Veterinary Pharmacology and Toxicology" will contribute to the acquisition of the following transversal competences by students:</p> <ul style="list-style-type: none"> • <i>Autonomous judgement</i> By the end of the teaching period, students should be autonomously able to: <ul style="list-style-type: none"> ○ suspect untoward responses to drugs and chemotherapies in the treated animals and propose the adoption of appropriate measures to preserve the health of the animals and of possible consumers of animal foodstuffs ○ recognize possible negative effects of drugs and chemotherapeutics on the handling persons or the environment, and propose the adoption of appropriate measures to protect either of them ○ predict how a possible mistake in the administration and/or management of a pharmaceutical product may impact on the safety and/or efficacy profile of the administered drug or chemotherapeutic agent ○ predict how the intervention of certain factors (e.g.: concurrent administration of other drugs or concurrent exposure to environmental pollutants; change in the animal species; concurrent disease conditions) can modify the pharmacodynamic and/or pharmacokinetic behavior of a drug or chemotherapeutic agent and which type of variations could occur in the observed effects ○ critically interpret the information about the properties of drugs and chemotherapeutics and related medicinal products that can be found in both the sales and scientific literature ○ recognize and predict the situations in which animal exposure to toxic substances of natural or anthropogenic origin may occur based on identification of the most critical activities that are carried out in a certain geographic area (e.g. presence of factories, garbage dumps, agricultural activities, urban maintenance), and propose the adoption of appropriate measures for risk mitigation ○ choose and implement the most appropriate basic remedies in case of animal exposure to toxic substances ○ recognize and predict situations of chemical contamination in which the safety of animal foodstuffs could be compromised, thereby contributing to the development of plans for public health protection that involve the withdrawal from the market of animal products that can be potentially dangerous for the consumers • <i>Communication skills</i> By the end of the teaching period, students should be able to: <ul style="list-style-type: none"> ○ communicate with colleagues and scientific community, as well as with owners and keepers of the animals, and with local authorities, using each time the most appropriate register of language and demonstrating a good command of the pharmaco-toxicological lexicon • <i>Autonomous and continuous learning</i> By the end of the teaching period, students should be autonomously able to: <ul style="list-style-type: none"> ○ study topics of pharmacological and/or toxicological interest that are not covered by the present teaching and/or deepen the knowledge of the topics that have been dealt with during the course of the teaching ○ keep themselves up-to-date on continuous changes involving the drug market (e.g.: registration of new veterinary and human medicines, withdrawal of marketed veterinary and human medicines) and drug legislation (new laws and regulations) ○ keep themselves critically informed about current news and updates on environment (with particular regard to problems of pollution and ecological disasters)
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<p>ECCVT Day One Competences (adopted on 26/3/2015) linked to the present Integrated Teaching</p>	<p>Knowledge: 2.1; 2.2; 2.3; 2.4; 2.5; 2.7; 2.8; 2.9</p> <p>Competences: 1.4; 1.6; 1.8; 1.11; 1.13; 1.18; 1.25; 1.26; 1.27; 1.34</p>
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<p>Assessment and Feedback</p>	
<p>Methods of assessment</p>	<p>Passing the exam of the integrated teaching of "Veterinary Pharmacology and Toxicology" allows the acquisition of 12 ECTS. The exam consists of two parts. The first part focuses on the teaching modules of "Veterinary Pharmacology" and "Veterinary Chemotherapy"; the second part focuses on the teaching module of "Veterinary Toxicology" and can be sustained only by the students that have passed the first part. The two parts of the exam can be sustained during the same exam session or in separate exam sessions. Both parts of the exam have to be passed in order to acquire the 12 ECTS.</p>
<p>Evaluation criteria</p>	<p>During the examination procedure, students will have to demonstrate:</p> <ul style="list-style-type: none"> • Knowledge and Understanding (scored from 1 to 8 points): <ul style="list-style-type: none"> ○ extensive and in-depth knowledge and understanding of the contents of the programmes of the three modules forming the whole integrated teaching • Applying knowledge and understanding (scored from 1 to 8 points): <ul style="list-style-type: none"> ○ knowledge and understanding of how the theoretical concepts of pharmacology and toxicology apply to the practical use of drugs and chemotherapeutics in the animals, as well as to the practical management of the situations of animal exposure to toxic substances ○ knowledge and understanding of the implications that drug use in the animals can have for the environment and human beings ○ knowledge and understanding of the implications that exposure of food-producing animals to toxic substances can have for consumers of foodstuffs of animal origin • Autonomous judgement (scored from 1 to 8 points): <ul style="list-style-type: none"> ○ ability to recognize and predict problematic situations related to the use of drugs and chemotherapeutics in the animals and/or to the exposure of the animals to toxic substances, as well as ability to propose strategies for optimal management and resolution of the problems identified, so as to preserve the health of the animals, of the human beings and of the environment • Communication skills (scored from 1 to 3 points):

	<ul style="list-style-type: none"> ○ ability to present the topics studied ○ ability to explain their own reasonings and points of view in a clear and logical way ○ ability to use the medical/scientific and technical/specialist terminology properly • Autonomous and continuous learning (scored from 1 to 3 points): <ul style="list-style-type: none"> ○ capacity to consult and understand scientific literature and databases, as well as to analyse scientific and technical documents to get information for professional updating and in-depth learning
Criteria for assessment and attribution of the final mark	<p>The final mark of the exam of "Veterinary Pharmacology and Toxicology" will be the expression of the collective judgement of the examination board regarding the extent to which the expected learning outcomes have been achieved by the student. The partial marks obtained for each of the two parts of the exam (i.e. "Veterinary Pharmacology and Chemotherapy" and "Veterinary Toxicology") according to the evaluation criteria reported above will contribute to the definition of the final mark. The final mark of the exam is expressed in thirties and a minimum mark of 18 is needed for passing the exam.</p> <p>The students receiving the maximum possible score for all of the learning indicators can be awarded the distinction "<i>cum laude</i>" at the discretion of the examination board.</p>
Additional information	