SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Diagnostic imaging of small animals

Educational subject description sheet

Basic information

Field of study Veterinary Medicine	**Didactic cycle** 2024/25
Speciality -	**Subject code** WETFVMS_D.540K.01719.24
Organizational unit Faculty of Veterinary Medicine	**Lecture languages** english
Study level long-cycle	**Mandatory** Obligatory subjects
Study form full-time studies	**Block** Major subjects
Education profile General academic	**Disciplines** Veterinary medicine

Coordinator	Małgorzata Domino
Teacher	Małgorzata Domino, Tomasz Jasiński, Katarzyna Skierbiszewska, Natalia Kozłowska

Period Semester 7	**Examination** Pass with grade **Activities and hours** Lecture: 15 Clinical classes: 30	**Number of ECTS points** 3

Goals

Code	Goal
C1	The course aims to familiarize students with common techniques for imaging physiological and pathological changes occurring in small animals. Radiology offers veterinarians several tools that significantly extend diagnostic options. The course aims to prepare students for the proper selection of common imaging techniques and the possibility of clinical applications through active participation in imaging examinations performed using technical solutions commonly used in clinical diagnostics. The content of lecture education provides the theoretical basis for the content of training exercises, the main purpose of which is practical preparation, conduction, and results evaluation of common imaging techniques.

Entry requirements

Animal Anatomy 2, Animal Physiology 2, Biophysics, Biochemistry, Veterinary pharmacology 2, and Pathomorphology 1.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the physical interactions used in common imaging methods.	B.W4, B.W6	Written credit, Test (written or computer based)
W2	the principles of preparing the patient for imaging under sedation and general anesthesia.	B.W4, B.W5	Written credit, Test (written or computer based)
W3	the safety rules and procedures during the ultrasound examination.	B.W4, B.W6	Written credit, Test (written or computer based)
W4	the safety rules and procedures during the X-ray and CT examinations including the rules of radiation protection and the use of contrast media.	B.W4, B.W6	Written credit, Test (written or computer based)
W5	the safety rules and procedures during the MRI examination including the rules for the use of contrast media.	B.W4, B.W6	Written credit, Test (written or computer based)
Skills – Student can:			
U1	conduct an interview and a clinical trial aimed at selecting or excluding the use of common imaging techniques.	B.U1, B.U2, B.U3	Written credit, Test (written or computer based)
U2	choose a common imaging technique for the clinical situation.	B.U7	Written credit, Test (written or computer based)
U3	prepare the patient for ultrasound, X-ray, CT, and MRI examinations.	B.U1, B.U11, B.U7	Written credit, Test (written or computer based)
U4	conduct ultrasound, X-ray, CT, and MRI examinations.	B.U1, B.U7	Written credit, Test (written or computer based)
U5	assess the results of the ultrasound, X-ray, CT, and MRI examinations.	B.U7	Written credit, Test (written or computer based)

Code	Outcomes in terms of	Effects	Examination methods
U6	use scientific sources in assessing the results of an imaging study.	B.U7	Written credit, Test (written or computer based)
Social competences – Student is ready to:			
K1	choose a modern common technique based on specialist knowledge.	KS.1, KS.2, KS.5	Written credit, Test (written or computer based)
K2	evaluation of his knowledge and the benefits of using common imaging techniques.	KS.1, KS.2, KS.4, KS.5	Written credit, Test (written or computer based)
K3	continue education and is ready to deepen his/her knowledge using scientific sources.	KS.4, KS.8	Written credit, Test (written or computer based)
K4	cooperate with a radiologist in the selection and evaluation of the results of imaging examinations.	KS.3, KS.5, KS.6, KS.7, KS.9	Written credit, Test (written or computer based)

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Basics of radiological examination of small animals. Construction of X-ray tube. Radiation protection. Safety in radiology lab. X-ray image formation and interpretation.	W1, W3, W4	Lecture
2.	Basics of computed tomography (CT) and magnetic resonance (MR) imaging. Construction of CT scaner and MRI scaner. Radiation protection. Safety in CT and MRI lab. CT and MRI image formation and interpretation.	W1, W4, W5	Lecture
3.	Diagnostic imaging of head - skull, oral cavity, dental diseases.	W1, W2, W4	Lecture
4.	Diagnostic imaging of head and neck- nasal cavities, sinuses, larynx, trachea.	W1, W2, W4	Lecture
5.	Diagnostic imaging of spine. Myelography - contrast imaging.	W1, W2, W4	Lecture
6.	Diagnostic imaging of thorax - Bronchi and lung radiodiagnosis.	W1, W2, W4	Lecture
7.	Diagnostic imaging of thorax - Diaphragm, mediastinum, and pleural cavity radiodiagnosis.	W1, W2, W4	Lecture
8.	Diagnostic imaging of thorax - Heart and blood vessels radiodiagnosis.	W1, W2, W4	Lecture
9.	Diagnostic imaging of abdomen - Gastrointestinal tract radiodiagnosis. Contrast gastrointestinal tract examination.	W1, W2, W4	Lecture
10.	Diagnostic imaging of abdomen - Glands radiodiagnosis.	W1, W2, W4	Lecture

No.	Course content	Subject's learning outcomes	Activities
11.	Diagnostic imaging of abdomen - Urinary tract radiodiagnosis. Urography - contrast imaging.	W1, W2, W4	Lecture
12.	Diagnostic imaging of abdomen - Reproductive tract radiodiagnosis.	W1, W2, W4	Lecture
13.	Diagnostic imaging of limbs - Bone structure and trauma.	W1, W2, W4	Lecture
14.	Diagnostic imaging of limbs - Bone diseases radiodiagnosis.	W1, W2, W4	Lecture
15.	Diagnostic imaging of limbs - Joint diseases radiodiagnosis.	W1, W2, W4	Lecture
16.	Preparation, conduction, and results evaluation of X-ray examination of the head.	W4, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
17.	Preparation, conduction, and results evaluation of X-ray examination of the spine.	W4, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
18.	Preparation, conduction, and results evaluation of X-ray examination of the thoracic limb.	W4, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
19.	Preparation, conduction, and results evaluation of X-ray examination of the pelvic limb.	W4, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
20.	Preparation, conduction, and results evaluation of X-ray examination of the thorax.	W4, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
21.	Preparation, conduction, and results evaluation of X-ray examination of the abdomen.	W4, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
22.	Preparation, conduction, and results evaluation of CT imaging of the head and spine.	W4, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
23.	Preparation, conduction, and results evaluation of CT imaging the thorax and abdomen.	W4, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
24.	Preparation, conduction, and results evaluation of MR imaging the head.	W5, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
25.	Preparation, conduction, and results evaluation of MR imaging the spine.	W5, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
26.	Preparation, conduction, and results evaluation of ultrasound examination of the gastrointestinal tract.	W3, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
27.	Preparation, conduction, and results evaluation of ultrasound examination of the urinary tract and glands.	W3, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
28.	Preparation, conduction, and results evaluation of ultrasound examination of the reproductive tract and soft tissues.	W3, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
29.	Preparation, conduction, and results evaluation of ultrasound examination of the cardiovascular and respiratory systems.	W3, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes
30.	Basics of sedation and anesthesia for small animals diagnostic imaging.	W3, U1, U2, U3, U4, U5, U6, K1, K2, K3, K4	Clinical classes

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture
Clinical classes	Inference, Mastery of movement and stabilization of the technique, Teaching technique in the form of play, exact, task, Error correction, Teamwork, Individual work, Interpreting the results, Observation, Field observations

Activities	Examination method	Percentage
Lecture	Test (written or computer based)	50%
Clinical classes	Written credit	50%

Activities	Credit conditions
Lecture	The maximum number of points to be obtained is 100 points. A grade is given according to the criteria: <51 - 2; 52-60 - 3, 61-70 - 3+, 71-80 - 4; 81-90 - 4+; > 91 - 5. A student who has not obtained the specified minimum acceptable number of points from the evaluation of exam does not obtain credit for the course.
Clinical classes	The maximum number of points to be obtained is 100 points. A grade is given according to the criteria: <51 - 2; 52-60 - 3, 61-70 - 3+, 71-80 - 4; 81-90 - 4+; > 91 - 5. A student who has not obtained the specified minimum acceptable number of points from the evaluation of exam does not obtain credit for the course.

Literature

Obligatory

1. Thrall D., Robertson I. (2023) Atlas of Normal Radiographic Anatomy and Anatomic Variants in the Dog and Cat, Elsevier
2. Coulson A., Lewis N. (2008) An Atlas of Interpretative Radiographic Anatomy of the Dog and Cat, Wiley-Blackwell
3. Wisner E., Zwingenberger A. (2015) Atlas of Small Animal CT and MRI, Wiley-Blackwell
4. Lisciandro G.R. (2008) Point-of-Care Ultrasound Techniques for the Small Animal Practitioner, 2nd Edition, Wiley-Blackwell

Optional

1. Mannion P. (2008) Diagnostic Ultrasound in Small Animal Practice, Wiley-Blackwell
2. Penninck D., D'Anjou M.A. (2015) Atlas of Small Animal Ultrasonography, 2nd Edition, Wiley-Blackwell
3. Elliott I., Skerritt G. (2013) Handbook of Small Animal MRI, Wiley-Blackwell
4. Wolvekamp P. (2005) Atlas of Radiology of the Traumatized Dog and Cat, Schlütersche
5. Thrall E. (2020) Textbook of Veterinary Diagnostic Radiology, Saunders
6. DuPont G.A., DeBowes L.J. (2008) Atlas of Dental Radiography in Dogs and Cats, Saunders

Calculation of ECTS points

Activity form	Activity hours*
Lecture	15
Clinical classes	30
Preparation for the exam	10

Preparation for exercises	10
Self-study on the content covered in class	10
Student workload	**Hours** 75
Number of ECTS points	**ECTS** 3

* hour means 45 minutes

Effects

Code	Content
KS.1	Absolwent jest gotów do wykazywania odpowiedzialności za podejmowane decyzje wobec ludzi, zwierząt i środowiska przyrodniczego
KS.2	Absolwent jest gotów do prezentowania postawy zgodnej z zasadami etycznymi i podejmowania działań w oparciu o kodeks etyki w praktyce zawodowej oraz do wykazywania tolerancji dla postaw i zachowań wynikających z odmiennych uwarunkowań społecznych i kulturowych
KS.3	Absolwent jest gotów do udziału w rozwiązywaniu konfliktów, a także wykazywania się elastycznością w reakcjach na zmiany społeczne
KS.4	Absolwent jest gotów do korzystania z obiektywnych źródeł informacji
KS.5	Absolwent jest gotów do formułowania wniosków z własnych pomiarów lub obserwacji
KS.6	Absolwent jest gotów do formułowania opinii dotyczących różnych aspektów działalności zawodowej
KS.7	Absolwent jest gotów do rzetelnej samooceny, formułowania konstruktywnej krytyki w zakresie praktyki weterynaryjnej, przyjmowania krytyki prezentowanych przez siebie rozwiązań, ustosunkowywania się do niej w sposób jasny i rzeczowy, także przy użyciu argumentów odwołujących się do dostępnego dorobku naukowego w dyscyplinie
KS.8	Absolwent jest gotów do pogłębiania wiedzy i doskonalenia umiejętności
KS.9	Absolwent jest gotów do komunikowania się ze współpracownikami i dzielenia się wiedzą
B.U1	Absolwent potrafi bezpiecznie i humanitarnie postępować ze zwierzętami oraz instruować innych w tym zakresie
B.U2	Absolwent potrafi przeprowadzić wywiad lekarsko-weterynaryjny w celu uzyskania dokładnej informacji o pojedynczym zwierzęciu lub grupie zwierząt oraz jego lub ich środowisku bytowania
B.U3	Absolwent potrafi przeprowadzać pełne badanie kliniczne zwierzęcia
B.U7	Absolwent potrafi stosować aparaturę diagnostyczną, w tym radiologiczną, ultrasonograficzną i endoskopową, zgodnie z jej przeznaczeniem i zasadami bezpieczeństwa dla zwierząt i ludzi oraz interpretować wyniki badań uzyskane po jej zastosowaniu
B.U11	Absolwent potrafi stosować metody bezpiecznej sedacji, ogólnego i miejscowego znieczulenia oraz oceny i łagodzenia bólu
B.W4	Absolwent zna i rozumie zasady postępowania diagnostycznego, z uwzględnieniem diagnostyki różnicowej, oraz postępowania terapeutycznego
B.W5	Absolwent zna i rozumie zasady przeprowadzania badania klinicznego i monitorowania stanu zdrowia zwierząt
B.W6	Absolwent zna i rozumie sposób postępowania z danymi klinicznymi i wynikami badań laboratoryjnych i dodatkowych