Module title:	Diagnostic imaging of large animal	**ECTS**	**2**
Polish translation:	Diagnostyka obrazowa dużych zwierząt		
Course:	**Veterinary Medicine**		

Module language: English		Stage: JM-FVM	
Form of studies: ☒ intramural ☐ extramural	Type of module: ☐ basic ☒ directional ☒ mandatory ☐ elective	Semester: 7	☐ winter semester ☒ summer semester
Academic year:	**2022/2023**	Catalogue number:	FVM-V-JMSS-07W-D30_20

Module coordinator:	Tomasz Jasiński DVM, PhD
Teachers responsible for the module:	Academic teachers of the Institute of Veterinary Medicine; Department of Large Animal Disease and Clinic; Visiting professors; PhD students in accordance to the internal legal acts; other specialists in the field of study
Unit responsible for the module:	Institute of Veterinary Medicine, Department of Large Animal Diseases and Clinic
Faculty in charge:	Faculty of Veterinary Medicine
Objectives of the module:	The course aims to familiarize students with common techniques for imaging physiological and pathological changes occurring in farm animals and horses. 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. <u>Lectures (10x1 hour):</u> 1. Basic diagnostic imaging techniques - digital radiology, contrast radiology, radiation protection, ultrasound, endoscopy - principles of imaging and clinical applications. 2. Advanced diagnostic imaging techniques - computed tomography, magnetic resonance imaging, scintigraphy - principles of imaging and clinical applications. 3. Diagnostic imaging of the digit - basic views and techniques and their clinical applications. 4. Diagnostic imaging of the digit - additional views and techniques and their clinical applications. 5. Diagnostic imaging of the fetlock joint - basic views and techniques and their clinical applications. 6. Diagnostic imaging of the metacarpus and metatarsus - basic views and techniques and their clinical applications. 7. Diagnostic imaging of the carpal and tarsal joints - basic views and techniques and their clinical applications. 8. Diagnostic imaging of the appendicular skeleton - additional views and techniques and their clinical applications. 9. Diagnostic imaging of the axial skeleton - basic views and techniques and their clinical applications. 10. Diagnostic imaging of the axial skeleton - additional views and techniques and their clinical applications. <u>Clinical exercises (10x2 hours):</u> 1. Diagnostic imaging of the head and spine - CT 2. Diagnostic imaging of the head and spine - X-ray 3. Diagnostic imaging of the forelimb - X-ray 4. Diagnostic imaging of the hindlimb - X-ray 5. Diagnostic imaging of the forelimb - ultrasound 6. Diagnostic imaging of the hindlimb - ultrasound 7. Diagnostic imaging of the thorax - ultrasound/X-ray 8. Diagnostic imaging of the thorax - endoscopy 9. Diagnostic imaging of the abdomen - ultrasound 10. Diagnostic imaging of the abdomen - gastroscopy
Teaching forms, number of hours:	a) Lectures: 10 hours b) Clinical exercises: 20 hours
Teaching methods:	Lectures: original multimedia presentations prepared by academic teachers; Clinical exercises: preparation and conduct of diagnostic imaging protocols; clinical case presentations; analysis of examinations results; supplementary materials, discussion

Formal prerequisites and initial requirements:	Passing the courses: Animal Anatomy, Animal Physiology, Biophysics, Biochemistry, Veterinary pharmacology, and Pathomorphology		
Learning outcomes:	Knowledge: 01 - the student knows the physical interactions used in common imaging methods; 02 - the student knows the principles of preparing the patient for imaging under sedation and general anesthesia; 03 - the student knows the safety rules and procedures during the ultrasound examination; 04 - the student knows the safety rules and procedures during the X-ray examination including the rules of radiation protection and the use of contrast media; 05 - the student knows the rules and safety procedures during endoscopic examinations;	Skills: 01 - the student can conduct an interview and a clinical trial aimed at selecting or excluding the use of common imaging techniques; 02 - the student can choose a common imaging technique for the clinical situation; 03 - the student can prepare the patient for ultrasound, X-ray, and endoscopic examination; 04 - the student can perform the ultrasound, X-ray, and endoscopic examination; 05 - the student can assess the results of the ultrasound, X-ray, CT, MRI, and endoscopic examination; 06 - the student can use scientific sources in assessing the results of an imaging study.	Competences: 01 - the student is ready to choose a modern common technique based on specialist knowledge; 02 - the student is aware of their knowledge and the benefits of using common imaging techniques; 03 - the student is aware of the need for continuing education and is ready to deepen his/her knowledge using scientific sources; 04 - the student acquires competence in cooperation with a radiologist in the selection and evaluation of the results of imaging examinations.
Assessment methods:	Effects - knowledge: 01, 02, 03 and skills: 01, 02, 03, 04, 05, 06 - written test in class; Learning outcomes - knowledge: 04, 05; skills: 01, 02, 03, 04, 05, 06; and competences: 01, 02, 03, 04 - written exam. Written tests (two in a semester) and written exam in the form of a mixed test, a total of 20 to 40 questions (open, to be completed and single/multiple choice). The exam covers all content of the semester. Students have to obtain a minimum of 51% points to pass the test and exam. The dates of the 1st and 2nd written test and the exam take place in the same form. Apart from the indicated methods of verification of learning outcomes, no additional are envisaged. In a top-down situation, suspending the implementation of classes at the university and the need for distance learning, other methods of verifying the learning outcomes implemented are appropriate to the situation.		
Formal documentation of learning outcomes:	Written test, written exam. Entry into the eHMS system and documentation contained in the 'Course File' (individual student assessment cards, attendance lists, the pool of questions for written and oral forms, students' essays)		
Elements impelling final grade:	To verify the learning outcomes: 1. attendance at lectures, 2. evaluation from the first test, 3. evaluation from the second test, 4. final exam grade; For each of the elements (2-3), the result is pass (1) or fail (0). To take the final exam, each element (2-3) has to be passed. The final exam is a 30-question, multiple-choice writing test. Each answer is scored on a 0-1 scale. Maximum points: 30 points. A number of points is obtained for which a grade is given according to the given criteria - points / grade: 0–15 points – 2; 16–18 points – 3; 19–21 points – 3.5; 22–24 points – 4; 25–27 points – 4.5; 28–30 points – 5. A student who has not obtained the specified minimum an acceptable number of points from the evaluation of test does not obtain credit for the course.		
Teaching base:	Classrooms, lecture rooms, ambulatory rooms, stable, x-ray room, CT room, MRI room.		

Obligatory and supportive materials[23]:

Obligatory

1. Turek B.F., Domino M.A., Jasiński T.J. (2024) Equine Radiography: Handbook for Veterinary Medicine Students , Warsaw University of Life Sciences Press
2. Butler J.A. et al. (2008) Clinical radiology of the horse 3rd Edition, Wiley-Blackwell
3. Kidd J.A., Lu K.G., Frazer M.L. (2014) Atlas of Equine ultrasonography, Wiley-Blackwell
4. Thrall G. (2017) Textbook of Veterinary Diagnostic Radiology 7th Edition, Elsevier Urban & Partner

Supportive

1. Weaver M. et al. (2010) Handbook of Equine Radiography 1st Edition, Saunders Ltd.
2. Díaz G.M., et al. (2019) A Practical Guide to Equine Radiography, 5m Pubishing
3. Costa L.R.R., Paradis M.R. (2017) Manual of Clinical Procedures in the Horse, 1st Edition, Wiley-Blackwell
4. Kimberlin L. (2016) Atlas of Clinical Imaging and Anatomy of the Equine Head, John Wiley & Sons Inc
5. Schwarz T. (2011) Veterinary Computed Tomography, Iowa State University Press

6. Murray R.C. (2010) Equine MRI, John Wiley and Sons Ltd Indicated by the teacher of scientific publications in the field of discussed content of education and scientific research conducted in the unit
ANNOTATIONS -

Quantitative summary of the module:

Estimated number of work hours per student (contact and self-study) essential to achieve presumed learning outcomes of the module - base for quantifying ECTS:	**60 h**
Total ECTS points, accumulated by students during contact learning:	**2 ECTS**

Learning outcomes of the module relative to the learning outcomes of the subject:

Outcome category	Learning outcomes:	Learning outcomes relative to the course outcomes	Impact on the each for course outcomes
Knowledge	01 - the student knows the physical interactions used in common imaging methods;	B.W.4, B.W.6	for each 2
Knowledge	02 - the student knows the principles of preparing the patient for imaging under sedation and general anesthesia;	B.W.4, B.W.5	for each 2
Knowledge	03 - the student knows the safety rules and procedures during the ultrasound examination;	B.W.4, B.W.6	for each 2
Knowledge	04 - the student knows the safety rules and procedures during the X-ray examination including the rules of radiation protection and the use of contrast media;	B.W.4, B.W.6	for each 2
Knowledge	05 - the student knows the rules and safety procedures during endoscopic examinations;	B.W.4, B.W.6	for each 2
Skills	01 - the student can conduct an interview and a clinical trial aimed at selecting or excluding the use of common imaging techniques;	B.U.1, B.U.2, B.U.3	for each 2
Skills	02 - the student can choose a common imaging technique for the clinical situation;	A.U.1, B.U.7	for each 2
Skills	03 - the student can prepare the patient for ultrasound, X-ray, and endoscopic examination;	A.U.1, B.U.1, B.U.7, B.U.11	for each 2
Skills	04 - the student can perform the ultrasound, X-ray, and endoscopic examination;	A.U.1, B.U.1, B.U.7	for each 2
Skills	05 - the student can assess the results of the ultrasound, X-ray, CT, MRI, and endoscopic examination;	A.U.1, B.U.7	for each 2
Skills	06 - the student can use scientific sources in assessing the results of an imaging study;	A.U.1, B.U.7	for each 2
Competences	01 - the student is ready to choose a modern common technique based on specialist knowledge;	KS.1, KS.2, KS.5	for each 2
Competences	02 - the student is aware of their knowledge and the benefits of using common imaging techniques;	KS.1, KS.2, KS.4, KS.5	for each 2
Competences	03 - the student is aware of the need for continuing education and is ready to deepen his/her knowledge using scientific sources;	KS.4, KS.8	for each 2
Competences	04 - the student acquires competence in cooperation with a radiologist in the selection and evaluation of the results of imaging examinations;	KS.3, KS.5, KS.6, KS.7, KS.9	for each 2