DESCRIPTION OF COURSE UNIT FOR DOCTORAL STUDIES AT VILNIUS UNIVERSITY

Scientific Area/eas, Field/ds of Science	Medical and health sciences (M 000): Medicine (M 001) Natural Sciences (N 000): Biology (N 010)
Faculty, Institute, Department/Clinic	Faculty of Medicine Institute of Biomedical Sciences Department of Radiology, Nuclear Medicine and Medical Physics Department of Anatomy, Histology and Anthropology
Course unit title (ECTS credits, hours)	**Radiological Anatomy** 8 credits (212 hours)

Study method	Lectures	Seminars	Consultations	Self-study
Number of ECTS credits	-	-	1	7

Method of the assessment (in 10 point system)	Presentation of the report and its evaluation: the report is presented on a target topic that is agreed upon with the coordinating lecturer of the course (the doctoral student must analyze, review, and present the latest scientific publications related to the chosen topic). Report evaluation criteria (minimal passing score – 5 points): a) relevance, novelty and applicability of the material presented to the chosen topic (2 points); b) overall structure and content of the report, clear presentation of the material, rationale, conciseness and specificity (2 points); c) summary, presentation and justification of conclusions (1 point); d) raising problematic questions, presentation of how the reviewed material will be applicability in one's own dissertation (3 points); e) organization of visual aids, ability to participate in discussion, question management, oratory skills (2 points).

PURPOSE OF THE COURSE UNIT

To deepen knowledge of the main methods of radiological anatomy research and normal anatomical variants and variations of a living person, anatomical differences of a living and dead person. To encourage interest and research of radiological anatomy, as well as an application of acquired knowledge, solving interdisciplinary problems of PhD research topics from various scientific fields and areas.

THE MAIN TOPICS OF COURSE UNIT

Basic radiological anatomical research methodologies (imaging). Conventional roentgenology, main physical parameters and protocols of research, advantages and disadvantages, anatomical areas of study. Computed tomography, main physical parameters and protocols of research, advantages and disadvantages, anatomical areas of study. Magnetic resonance tomography, main physical parameters and protocols of research, advantages and disadvantages, anatomical areas of study. Functional anatomy of joints and bones. Computer systems (tools) for documentation and analysis of anatomical images. Basic image reconstruction modes: projections of different intensity, multi-plane and volumetric reconstructions. Objectivity and reliability of radiological methods of anatomical research; interobserver variability. Radiological methods of cadaver examination, understanding virtual autopsy. Normal anatomy and anatomical variants of a living person.

Radiological anatomy of the musculoskeletal system. X-ray image of the skull, main projections and structures visible in them. Radiological features of cranial vault and base. Radiological anatomy of paranasal sinuses. Radiological examinations in odontology. Panoramic X-ray view of the jaws. X-ray image of the spine. Computed tomography and magnetic resonance imaging of the spine. Age-related features and pathological changes of the spine visible in radiological images. Radiological diagnosis of intervertebral disc pathology. X-ray images of the limb bones. Age-related radiological features of the skeleton. Radiological anatomy of joints. MRI of the musculoskeletal system.

Radiological anatomy of the respiratory system. Radiological anatomy of the larynx. X-ray examination of the chest. Frontal (anterior), sagittal (lateral) and oblique views. Outline of the heart in an anterior thoracic radiographs: norm, anatomical and pathological variations. Radiological anatomy of the lungs. Image of the lungs. Contrast X-ray examination of the bronchi.

Radiological anatomy of the digestive system. Contrast examination of esophagus. Radiological image of the stomach, its anatomical variations. Radiological anatomy of the small and large intestine. Radiological anatomy of gallbladder and bile ducts, pancreatic ducts.

Radiological anatomy of the urinary system. Radiological image of the kidneys. Features of kidney topography. Radiologically diagnosed developmental defects of the kidneys. Contrast X-ray examinations of the urinary system. Excretory urogram. Radiological image of renal calyces and pelvises, ureters, urinary bladder.

Radiological anatomy of the sexual organs. Hysterosalpingography.

Radiological anatomy of the circulatory system. Radiological anatomy of the heart. Angiographic image of the coronary arteries. Angiographic studies of aorta and its branches. Radiological anatomy of arteries of the limbs. Radiological anatomy of the venous system. Lymphography.

Radiological anatomy of the nervous system. CT and MRI of the brain. Anatomical structures of the brain visible in radiological images: grey and white substance of the hemispheres, ventricles of the brain, surface features of cerebral hemispheres and cerebellum, elements of diencephalon, structure of the brainstem. Contrast X-ray examination of the vertebral canal. Myelography.

RECOMMENDED LITERATURE SOURCES

1. Core Radiology: A Visual Approach to Diagnostic Imaging, 2nd Edition. Sun E.X., Shi J., Mandell J.C. (editors). Cambridge University Press, 2021.
2. Dalley A.F., Agur M.R. Moore's Clinically Oriented Anatomy (9th Ed.). Lippincott Williams and Wilkins, 2022.
3. e-Anatomy – the interactive atlas of human anatomy https://www.imaios.com/en/e-Anatomy
4. Gray's Anatomy: The anatomical basis of clinical practice. 42nd Edition (edited by S.Standring). Elsevier, 2022. https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20170037291
5. Greenspan A., Beltran J. Orthopaedic Imaging: A Practical Approach, 7th Edition. Lippincott Williams & Wilkins, 2020.
6. Herring W. Learning Radiology: Recognizing the Basics, 4th Edition. Elsevier, 2019. https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20160052609
7. Introduction to Radiology https://introductiontoradiology.net/
8. Kim E.E., Murad V., Paeng J.-C., Cheon G.-J. Atlas and Anatomy of PET/MRI, PET/CT and SPECT/CT (eBook), 2nd Edition. Springer, 2022.
9. Lampignano J. and Kendrick L.E. Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition. Mosby, 2020.
10. May D.A., Morrison W.B., Belair J.A. Musculoskeletal Imaging: The Core Requisites, 5th Edition. Elsevier, 2021.

CONSULTING LECTURERS
1. <u>Coordinating lecturer</u>: Algirdas Edvardas Tamošiūnas (Prof. Dr.).
2. Arūnas Barkus (Assoc. Prof. Dr.).
3. Andrius Brazaitis (Assist. Prof. Dr.).
4. Janina Tutkuvienė (Prof. Dr. HP).
APPROVED:
By Council of Doctoral School of Medicine and Health Sciences at Vilnius University: 29th of September 2022
Chairperson of the Board: Prof. Janina Tutkuviene