



COURSE UNIT (MODULE) DESCRIPTION

| Course unit (module) title | Code |
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| Applied Anatomy and Fundamentals of Radiology , academic year 2025/2026 | TANA2115 |

| Academic staff | Core academic unit(s) |
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| Coordinating: Prof. Janina Tutkuvienė Others: <u>Applied Anatomy part:</u> Lecturers of the Department of Anatomy, Histology and Anthropology. <u>Fundamentals of Radiology part:</u> Lecturers of the Department of Radiology, Nuclear Medicine and Medical Physics. | Department of Anatomy, Histology and Anthropology, Institute of Biomedical Sciences, Vilnius University Faculty of Medicine, Čiurlionio str. 21, Vilnius Department of Radiology, Nuclear Medicine and Medical Physics, Institute of Biomedical Sciences, Vilnius University Faculty of Medicine, Santariškių str. 2, Vilnius |

| Study cycle | Type of the course unit |
|--------------------|-------------------------|
| Integrated studies | Compulsory |

| Mode of delivery | Semester or period when it is delivered | Language of instruction |
|---|---|-------------------------|
| Remote lectures, face-to-face and remote seminars, face-to-face practical classes | Year 2, 4 th semester | Lithuanian and English |

| Requisites | |
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| Prerequisites: The course of Applied Anatomy and Fundamentals of Radiology may be taken after taking Human Anatomy course | Corequisites (if any): none |

| Number of ECTS credits allocated | Student's workload (total) | Contact hours | Individual work |
|----------------------------------|----------------------------|---------------|-----------------|
| 5 | 135 | 66 | 69 |

| Purpose of the course unit |
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| <p>The aim of this course is to present a more detailed knowledge about the structural features of different topographical regions of the human body, relations and interactions of organs and other structures; to introduce students to different radiological methods (conventional radiology (rentgenology) and angiography, densitometry, computed tomography, ultrasound diagnostics, magnetic resonance imaging), diagnostic technology background, indications and contraindications, radiation safety aspects, means of protection against ionizing radiation, exposure optimization techniques, contrast medium and principles of their usage in radiological research. To review the historical aspects of the emergence of radiological methods, perspectives for development. Special attention is paid to the anatomy of living human body – clinical significance of structure and position of structural elements or organs of a certain area. Students are introduced to methods of anatomical examinations of a living person. This course allows students to master organotopic, skeletotopic and sintopic relations between structures of various topographic regions, also cross-sectional anatomy in various planes of the human body, application points and areas of surface anatomy important in</p> |

| clinical practice – in therapy (for percussion, palpation, auscultation), surgery, neurology, anaesthesiology (points of nerve blockades, puncture sites). Students are introduced to radiographic images of the human body. | | |
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| Learning outcomes of the course unit | Teaching and learning methods | Assessment methods |
| General competencies | | |
| After successful completion of this semester the student will be able: | | |
| Act fairly and according to ethical obligations, be empathic; think critically and self-reflectively; be creative and take the initiative; be goal-oriented; communicate with others. | Lectures, practical classes, and seminars; collaboration-based study strategy (work in pairs or small groups). | Continuous cumulative assessment during the semester. |
| Make an assessment within the scope of one's competence and, if necessary, ask for help; act in the face of new situations and adapt to them; act independently; solve problems and make decisions; communicate and work in a team with other students; organise and plan. | Lectures, practical classes, and seminars, independent studies; collaboration-based study strategy (work in pairs or small groups). | Continuous cumulative assessment during the semester. |
| Analyse and synthesize; apply theoretical knowledge in practice. | Practical classes and seminars, independent studies; methods of proactive lecturing (group discussions). | Continuous cumulative assessment during the semester. |
| Special competencies | | |
| After successful completion of this semester the student will be able: | | |
| Describe body surface anatomy and understand clinical importance of its changes. Find application points of the body surface and describe their clinical importance. | Theoretical material during lectures. Demonstration and study of specimens, anatomical models, schemes and video material. Methods of proactive lecturing (group discussions); collaboration-based study strategy (work in pairs or small groups). | Continuous cumulative assessment during practical classes and seminars. |
| Describe relations and normal variety of various structures of different topographical regions, and account for the clinical importance of anatomical features and their changes. | Theoretical material during lectures. Demonstration and study of specimens, anatomical models, schemes and video material. Methods of proactive lecturing (group discussions); collaboration-based study strategy (work in pairs or small groups). | Continuous cumulative assessment during practical classes and seminars. |
| Describe age-related changes and variety of different body parts and organs, as well as their clinical importance. | Theoretical material during lectures. Demonstration and study of specimens, anatomical models, schemes and video material during practical classes and independent studies. Collaboration-based study strategy (work in pairs or small groups). | Continuous cumulative assessment during practical classes and seminars. |
| Recognize different human body structures of particular topographic areas in specimens, models, radiographic and other human body examination images. | Study of body examination images (radiographic, CT, MRI, ultrasound) during practical classes and independent studies. Collaboration-based study strategy (work in pairs or small groups). | Continuous cumulative assessment during practical classes and seminars. |
| Ability to describe radiological research methods, know the principles of their operation; application of most recent radiological methods in different clinical fields. Understand reconstruction methods, quality criteria, radiological anatomy, and basic pathological signs of radiological images. | Practical classes and lectures | Continuous cumulative assessment during practical classes and seminars. |

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| Understand contrast medium usage in radiological examinations, computed tomography, magnetic resonance imaging. Know side effects of contrast medium, provide first aid in case of allergic reactions. | Lectures and seminars | Continuous cumulative assessment during practical classes and seminars. |
| Understand staff and patients' radiation safety principles, know doses of ionizing radiation, units of measurement. Understand application of principles for protection from radiation and optimization of exposure. Ability to use protection against ionizing radiation. | Practical classes and lectures | Continuous cumulative assessment during practical classes and seminars. |

| Content | Contact hours | | | | | | | Individual work: time and assignments | |
|---|---------------|-----------|----------|-----------|-----------------|------------|----------------------|---------------------------------------|--|
| | Lectures | Tutorials | Seminars | Workshops | Laboratory work | Internship | Contact hours, total | Individual work | Tasks for individual work |
| 1. Surface anatomy of upper extremity, application points and areas of structures. Clinical anatomy of the structures of upper extremity. Surface anatomy of lower extremity, application points and areas of structures. Clinical anatomy of the structures of lower extremity. | 10 | | 4 | 2 | | | 16 | 16 | To revise normal anatomy of the upper and lower limbs. To independently study sections, radiographic, CT, MRI images and angiograms of limbs, video material about them. To perform individual and group tasks. |
| 2. Surface anatomy of trunk, application points and areas. Clinical and age-related anatomy of the structures of back and thoracic organs. Optimal skin sections, points and areas of clinically important blood vessels and nerves, and their applied anatomy. Surface anatomy of abdomen and pelvis, application points and areas. Clinical anatomy of weak points and serous membrane of the abdominal wall. Clinical and age-related anatomy of the abdominal cavity organs. Clinical and age-related anatomy of female and male pelvic organs. | 8 | | 4 | 2 | | | 14 | 15 | To revise normal anatomy of the back, thorax, abdomen and pelvis. To independently study sections, radiographic, CT, MRI, ultrasound images and angiograms of the trunk, video material about it. To perform individual and group tasks. |
| 3. Surface anatomy of head and neck, application points and areas of structures. Clinical and age-related anatomy of the cerebral part of the head. Clinical and age-related anatomy of the facial part of the head. Clinical and applied anatomy of the nerves of the head. Clinical and age-related anatomy of the organs of neck areas. | 6 | | 2 | 2 | | | 10 | 12 | To revise normal anatomy of the head and neck. To independently study sections, radiographic, CT, MRI, ultrasound images and angiograms of head and neck, video material about them. To perform |

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| 4. Introduction to the radiology. The history of radiology, x-ray discovery, types of radiation. History of radiology in Lithuania and abroad, future perspectives. Information technologies in radiology. | | | 2 | | | | 2 | 2 | To prepare for the practical classes. To perform individual and group tasks. |
| 5. Conventional radiology. Methods of conventional radiology (roentgenology) – roentgenoscopy (fluoroscopy), roentgenography; basic principles, advantages and disadvantages, analogical and digital imaging (X-ray diagnostics), quality criteria, etc., | 1 | | | 2 | | | 3 | 3 | To prepare for the practical classes. To perform individual and group tasks. |
| 6. Means and methods for protection against ionizing radiation. Units of measurement for ionizing radiation. Principles of radiation safety, exposure optimization. | 1 | | 2 | 2 | | | 5 | 5 | To prepare for the practical classes. To perform individual and group tasks. |
| 7. Contrast medium and their usage in X-ray diagnostics. | 1 | | | | | | | | |
| 8. Sonography. Theoretical principles of vibrations and waves. Propagation of acoustic waves in fluids and biological tissues. Generation and registration of ultrasonic waves. Biological effects of ultrasound: cavitation and thermal effect. Diagnostic ultrasound systems. Imaging modes. Optimisation and management of machines' control parameters. Future perspectives and recent advancement in ultrasonic methods in medicine. | 1 | | | 2 | | | 3 | 3 | To prepare for the practical classes and seminar. To perform individual and group tasks. |
| 9. Principles of operation of magnetic resonance imaging, main indications and contraindications. Sequences selected during examination. Classification of MRI tomographs, recent sequences and future perspectives. | 2 | | 2 | 2 | | | 6 | 6 | To prepare for the practical classes. To perform individual and group tasks. To independently learn to distinguish between T1, T2, and dark liquid sequences. |
| 10. Principles of computed tomography operation, image analysis. Principles of sequential, spiral, single-slice and multislice computed tomography, design of different generations of machines, main indications and contraindications. Main imaging parameters, CT workflow and personnel. | 2 | | 2 | 2 | | | 6 | 6 | To prepare for the practical classes. To perform individual and group tasks. |
| Total | 32 | | 18 | 16 | | | 66 | 69 | |

| Assessment strategy | Weight % | Deadline | Assessment criteria |
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| Work during lectures, practical classes and seminars. Four cumulative colloquia are organized: three – of Applied Anatomy, one – Fundamentals of Radiology. At the end of the course, the final | | During semester | Attendance of more than 75 % of seminars and practicals of Applied Anatomy part and Fundamentals of Radiology part is required (i.e. up to 25 % can be missed with a justifiable reason). Active attendance of lectures is welcomed, as well as performance of additional tasks given in lectures or seminars. |

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| cumulative score of this joint subject is calculated. | | | During the semester, three cumulative colloquia of Applied Anatomy from three different topographical regions (Limbs, Trunk, and Head and Neck) and one major colloquium of Fundamentals of Radiology are organized. If the student does not pass the colloquia, they must be passed next time – an additional opportunity is given to eliminate the debt. Theoretical and practical knowledge is assessed during the colloquia (tests) of Applied Anatomy and Fundamentals of Radiology. Tests are taken in computer classrooms or remotely. |
| Three cumulative colloquia of Applied Anatomy from three different topographical regions (Limbs, Trunk, and Head and Neck) | 60 | During semester | Colloquiums are held as Tests in the VU VMA platform and are evaluated in a 10-score system. Results of colloquiums are not rounded. The colloquium is passed (credited) if the final assessment is ≥ 5.0 scores. If a colloquium, given in the study plan, is failed, a student is provided with an opportunity to retake it at an allotted time: a total of two re-takes of the same colloquium are organized during the semester and another re-take is organized during the debt week (at the beginning of the next semester). <u>The cumulative part of the colloquia of Applied Anatomy (60.0 %)</u> is assessed taking into account the proportion of the studies of the three topographic areas of the body: maximal accumulated part during the colloquium on Limbs compounds 24.0%; Trunk – 20%; Head and neck – 16.0 %. |
| One large cumulative colloquium of Fundamentals of Radiology | 40 | During semester | One major colloquium of <u>Fundamentals of Radiology</u> part compounds 40.0 % of the final cumulative assessment. <u>The joint subject of Applied Anatomy and Fundamentals of Radiology is credited</u> at the end of the course, if the student meets the attendance requirements and passes four colloquia. <u>Cumulative score (final grade) of the joint subject is determined according to the scheme as follows:</u> 10 – if the total score is ≥ 90.0 % 9 – if the total score is ≥ 83.0 % 8 – if the total score is ≥ 75.0 % 7 – if the total score is ≥ 65.0 % 6 – if the total score is ≥ 55.0 % 5 – if the total score is ≥ 50.0 % 4 – if the total score is < 50.0 % (not passed) |

| Author (-s) | Publishing year | Title | Issue of a periodical or volume of a publication | Publishing house or web link |
|---|-----------------|---|--|---------------------------------|
| Required reading | | | | |
| 1. (Moore K.L.), Dalley A.F., Agur M.R. | 2010-2023 | Moore's Clinically Oriented Anatomy | 6- 9 th ed. | Lippincott Williams and Wilkins |
| 2. Standring S. (Ed.) | 2008-2021 | Gray's Anatomy: The anatomical basis of clinical practice | 40-42 nd ed. | Churchill Livingstone |
| 3. Netter F. H. | 2010-2022 | Netter Atlas of Human Anatomy | 5-8 th ed. | Elsevier |
| 4. Möller B., Reif E. | 2010-2025 | Pocket Atlas of Radiographic Anatomy | 3 rd , 4 th ed. | Thieme |
| 5. Möller B., Reif E. | 2006-2017 | Pocket Atlas of Sectional Anatomy, CT and MRI imaging | 2-4 th ed. Vol.1,2,3 | Thieme |
| 6. William Herring | 2019-2023 | Learning Radiology: Recognizing the basics | 4 th , 5 th ed. | Elsevier |
| Recommended reading | | | | |

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| 1. (Moore K.L.), Dalley A.F., Agur M.R. | 2011-2023 | (Moore's) Essential Clinical Anatomy | 4-7 th ed. | Lippincott Williams and Wilkins |
| 2. Lampignano J., Kendrick L.E. | 2013-2024 | (Bontrager's) Handbook of Radiographic Positioning and Techniques | 8-11 th ed. | Mosby; Elsevier |
| 3. Goldberg S., Ouellette H. | 2010-2016 | Clinical Anatomy Made Ridiculously Simple (WIN/MAC) | 4 th ed. | Medmaster |
| 4. Dixon A.K., Bowden D.J., Logan B.M., Ellis H. | 2017 | Human Sectional Anatomy: Pocket atlas of body sections, CT and MRI images | 4 th ed. | CRC Press |
| 5. Zaheer, A., Raman S.P., Rosado-de-Christenson M.L., Martinez-Jimenez S., Garrana S.H., Fananapazir G., Rogers D., Foster B.R. | 2016-2023 | Imaging Anatomy: Chest, Abdomen, Pelvis | 2 nd -3 rd ed. | Elsevier |
| 6. Dugani S., Alfonsi J.E., Agur A.M.R., Dalley A.F. | 2016 | Clinical Anatomy Cases: An Integrated Approach with Physical Examination and Medical Imaging | 1 st ed. | LWW |
| Links to recommended el. books and other links: | | | | |

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| Netter's Concise Radiologic Anatomy | 2 nd ed. | https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20170047572 |
| Netter's Clinical Anatomy | 5 th ed. | https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20200019894 |
| Netter Atlas of Human Anatomy | 8 th ed. | https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20180044345 |
| Gray's Anatomy | 42 nd ed. | https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20170037291 |
| Gray's Anatomy for Students | 5 th ed. | https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20210023117 |
| McMinn and Abrahams' Clinical Atlas of Human Anatomy | 8 th ed. | https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20160031704 |
| Atlas of Peripheral Nerve Blocks and Anatomy for Orthopaedic Anesthesia | Open source | https://archive.org/details/AtlasOfPeripheralNerveBlocksAndAnatomyForOrthopaedicAnesthesia |
| | | http://radiopaedia.org/ |
| | | http://www.radiologyassistant.nl/ |
| Links to el. publications (available in MF): | | https://www.clinicalkey.com/#!/browse/books/%7B%22indexOverride%22:%22GLOBAL%22,%22query%22:%22anatomy%22%7D |