

ANATOMY	
GENERAL INFORMATION	
Course coordinator	Associate Professor Antonio Kokot, MD, PhD
Assistant/Associate	Professor Robert Selthofer, MD, PhD Associate Professor Igor Lekšan, MD, PhD Assistant Professor Darija Šnajder Mujkić, MD, PhD Assistant Professor Tanja Kovač, MD, PhD Antun Šumanovac, MD, PhD Nenad Koruga, MD, PhD Marko Sablić, MD Zvonimir Popović, MD Marko Kovačević, MD Marta Blješić, MD
Study Programme	Integrated undergraduate and graduate university study of Medicine
Status of the course	Mandatory
Year of study, semester	1 st year, 1 st semester
ECTS	23
Workload (hours)	Lectures (60); Seminars (80); Exercises (100)
Expected number of students	70
COURSE DESCRIPTION	
Course objectives	
<p>Anatomy studies the normal structure of the human body. The goal is to study the features through Systematic Anatomy organs, their blood supply and innervation. In the systematic approach, organs are grouped according to their common function. There is a special emphasis in teaching on general anatomical principles important for understanding the structure and function of the human body. In addition to systematic anatomy, topographic anatomy is also studied, which involves learning the characteristics of organs with regard to their location and mutual relationship with surrounding structures. In the topographical approach, organs are grouped according to location, i.e. position in the body. All organs in the body belong to anatomical region and body system. Therefore, in clinical practice, the diagnosis is made according to both a systematic and a topographical approach. The human body can be clearly divided into eight major parts/modules (head, neck, chest, abdomen, pelvis, back, upper and lower limbs) which can be further divided into regions. Studying the body through regions enables a better understanding of the relationship between structure and function of organs.</p>	
Enrolment requirements and entry competencies	
There are no special requirements for this course except those defined by the curriculum of the entire study program	
Learning outcomes at the Programme level	
1.1., 1.2., 2.1, 2.2., 2.3., 3.4.,3.5., 4.2.	
Learning outcomes (5-10)	
<p>After attending lectures, completing seminars and exercises, independent study and passing the exam, students will be able to:</p> <ol style="list-style-type: none"> 1. Determine the anatomical nomenclature 2. Interpret parts and individual anatomical structures of each organ 	

3. Assess the irrigation and innervation of each organ
4. Analyze the structures of the locomotor apparatus and their function
5. Review the content of a particular region and the topographic relationships of particular anatomical structures
6. Compare basic knowledge of anatomy with clinically significant entities
7. Connect the knowledge of anatomy and the principles of physical examination of the patient, as well as the presentation of anatomical structures with different imaging diagnostic procedures
8. Critically judge the existence of anatomical anomalies and differences in relation to textbook descriptions of the so-called "standardized body"
9. Support the practice of working with a dead human body
10. Evaluate the significance of the donation program on anatomy

Course content

Lectures

Introduction to anatomy (acquainting the student with anatomical terminology and organization, defining the nomenclature and basic principles of the structure of general groups of anatomical structures, clarifying the similarities and differences of certain structures within each group. Foundations of the organization of body systems). Introduction to osteology (division and role of bone substance in bones: compact and spongy. Organization of spongy substance in bone trabeculae: functional significance, examples of femoral and humeral ends. Structure and function (organization) of the connective bone covering (periosteum and articular cartilage). Medullary cavity and bone marrow: types and their functional significance. Division of bones into basic types according to external features: long, short, plate-like and irregular, and subtypes (pneumatic, sesamoid, accessory). Ossification, primary and secondary centers of ossification, epiphyseal plates (traction and compressive) and epiphyseal lines, the relationship of articular elements to epiphyseal plates. Bone growth and bone fracture healing. Principles of neurovascular supply to bones and the connection with the processes of bone development, growth and ossification. Fractures and fracture healing and the role of periosteum). Trunk bones. Upper limb skeleton. Skeleton of the lower extremities. Bones of the neurocranium. Bones of the viscerocranium. Introduction to syndesmology (division of joints and interosseous joints according to morphological characteristics. Division of synovial joints according to the shape of articular bodies. Axes and planes of motion and functional anatomy of joints. Organization (structure and function) of articular cartilages and elements of the joint capsule. Relationship between the synovial membrane and the joint cavity. Ligaments: division and types in relation to joint cavity and joint capsule. Additional elements of joints. Relation between stability and mobility of joints and basic biomechanical principles. Principles of neurovascular supply of joints). Trunk joints. Joints of the upper limbs. Joints of the lower limbs. Introduction to myology (types of muscle tissue according to structure, function and distribution in the human body. Structural components of skeletal muscle and division according to the shape of the muscle belly, regressive and atavistic muscle variations. Tendons, aponeuroses. Fasciae and retinacula, fascial and muscle partitions, tendon sheaths. Relationship between form (and appearance of muscles) and function, interrelationship of fiber length, range of motion and force of muscle contraction. Muscle biomechanics, muscle tone and contraction. Division of muscles according to functions (agonists, antagonists, synergists), isometric and isotonic contraction. Mutual relationships of the shape of bones, position of joints and attachment of muscles to the movements performed by muscles. Principles of neurovascular supply of muscles, tendons and ligaments). Trunk and back muscles. Muscles of the upper and lower extremities. Morphology of the central nervous system. Development of the brain, membranes, brain ventricles and blood vessels of the brain. The parasympathetic system in the head and neck area. Ear. Eye. Nose and paranasal sinuses. Oral cavity.

Pharynx and parapharyngeal spaces. Principles of structure of spinal nerves. Front wall of the abdominal wall. Middle chest, trachea and lungs. Heart. Development of the mesentery. Organs of the digestive system. Urinary system. Female and male genitals.

Seminars

Morphology of the central nervous system. Brain ventricles and blood vessels of the brain. Regio parotidomasseterica. Ear. Eye. Regio faciei anterior. Infratemporal fossa. Submandibular trigonum. Trigonum caroticum and blood vessels of the brain. Regio colli lateralis et fossa jugularis. Regio pectoralis. Heart. Development of mesentery, anterior abdominal wall, inguinal canal. Retroperitoneum. Truncus coeliacus, a. mesenterica superior et inferior. A bowl system. Fossa axillaris and upper arm. Forearm and hand. Upper leg, lower leg and foot.

Exercises

Recognition and differentiation of human body structures (cadaver): vertebrae, ribs, sternum, scapula, clavícula, humerus, radius, ulna, ossa carpi (proximal and distal row), ossa metacarpi, phalanx. Skeleton of the lower extremities, pelvis, femur, tibia, fibula, ossa tarsi (topography), ossa metatarsi, phalanx. Intervertebral discs, ligaments, joints between vertebrae, joints of the head and spine, joints of ribs and sternum, joints of ribs and vertebrae. Pectoral and clavicle joint, acromion and clavicle joint, shoulder joint, humerus and ulna joint, humerus and thumb joint, thumb and ulna joints, hand joints. Inguinal symphysis, joint between the sacrum and coccyx, hip joint, knee joint, lower leg joint, foot joints. Frontal bone, occipital bone, sphenoid bone, parietal bone, temporal bone. Connections between the bones of the neurocranium. Front, middle and back cranial fossa, boundaries and communications with other areas of the head and neck. Ethmoid bone, nasal bone, cochlea, lacrimal bone, cheek bone, palatine bone, upper jaw, lower jaw, lower nasal concha, lingual bone. Ligaments of facial bones. Shoulder muscles (m. supraspinatus, m. infraspinatus, m. subscapularis, m. teres major et minor, m. deltoideus). Muscles that connect the torso with the shoulder girdle (m. trapezius, m. latissimus dorsi). Chest muscles that move the upper limb (m. serratus anterior, m. pectoralis major, m. pectoralis minor). Upper arm muscles (m. biceps brachii, m. coracobrachialis, m. brachialis, m. triceps brachii). Muscles of the forearm (extensors and flexors) and hand (thenar and hypothenar, interosseous and lumbrical). Pelvic floor muscles (diaphragma pelvis et urogenitale). Posterior pelvic muscles (gluteal and rotators). Muscles (anterior, medial and posterior groups) and fascia of the upper leg. Muscles of the lower leg (anterior, lateral and posterior - superficial and deep group) and feet (medial, lateral and central). Retinaculum musculorum flexorum, retinaculum musculorum extensorum sup. et inf. Retinaculum musculorum fibularium sup. et inf. Morphology of the telencephalon, diencephalon, mesencephalon, medulla oblongata, medulla spinalis, gray and white matter of the brain and spinal cord, basal ganglia of the telencephalon, commissural and associative fibers. The parasympathetic system in the head and neck area. General organization of autonomic nervous system fibers, parasympathetic and sympathetic ganglia in the head and neck area. Muscles: masseter muscle, buccinator muscle, digastricus muscle, stylohyoideus muscle. Fascias: fascia parotidea, fascia masseterica. Parotid gland. Blood vessels: a. carotis externa (in general), a. temporalis superficialis, v. retromandibularis, v. temporalis superficialis. Nerves and ganglia: n. auriculotemporalis, n. facialis with branches, n. tympanicus, ganglion oticum. Parotid lymph nodes. External ear – auricle, external auditory canal and eardrum. Middle ear – walls, auditory ossicles, auditory tube. Inner ear – bony and membranous labyrinth with parts. Vascularization and innervation of the ear. N. vestibulocochlearis (with course). Bony demarcation of the orbit and communication. Blood vessels: a. et v. ophthalmica. Nerves and ganglia: n. opticus and visual pathway, n. oculomotorius, n. trochlearis, n. abducens, n. trigeminus (in general), n. ophthalmicus with branches, ganglion ciliare, sympathetic complex along the a. ophthalmicus. Blood vessels: a. et v. facialis. External nose: structure, vessels and nerves. Nasal cavity: structure and boundaries, olfactory mucosa, vascularization and innervation. Blood vessels:

a. maxillaris (a. sphenopalatine). Nerves and ganglia: fila olphactoria, n. maxillaris with branches, ganglion pterygopalatinum. Paranasal sinuses. Lymphatic drainage of the face. Muscles: m. epicranii, m. temporalis, masticatory muscles and mastication. Fasciae: fascia temporalis, layers of the head. A. maxillaris, pterygoid venous plexus with communications, n. mandibularis, chorda tympani, ganglion submandibulare et sublinguale, n. maxillaris, ganglion pterygopalatinum. Atriculo-temporomandibularis. Lymph nodes of the head. Suprahyoid muscles and platysma. Oral cavity - vestibule: lips, cheeks, gums and teeth. Oral cavity in the narrower sense. Language. Blood vessels: a. et v. Lingualis. Submandibular ganglion. Lymph of the tongue. Hard and soft palate. Submandibular triangle. Submandibular and sublingual gland. N. mandibularis, n. mylohyoideus, n. hypoglossus; Submandibular lymph nodes. Muscles of the pharynx, nasopharynx, oropharynx, laryngopharynx, vascularization and innervation of the pharynx. Parapharyngeal space. Muscles – sternocleidomastoideus and omohyoideus. Neck fascia. Lingual triangles. Blood vessels: a. carotis communis, a. carotis externa et interna with branches, v. jugularis interna et externa. Nerves: n. glossopharyngeus, n. vagus, n. accessorius, n. hypoglossus, ansa n. hypoglossi, truncus sympathicus (generally and the neck part). Pharynx. Parapharyngeal space. Thyroid gland, parathyroid glands; larynx (cartilages, muscles and innervation), trachea. Blood vessels: truncus brachiocephalicus, venae brachiocephalicae, v. jugularis anterior. Nerves: n. laryngeus recurrens. Muscles: m. trapezius, mm. scaleni, m. splenius capitis, m. levator scapulae. Contents: fossa supraclavicularis major et minor, scalene openings. Blood vessels: a. et v. subclavia with branches, venous angle. Nerves: n. phrenicus, cervical plexus, brachial plexus. Muscles: pectoralis major, serratus anterior, latissimus dorsi, teres major, subscapularis, triceps brachii, subclavius, deltoideus. Breast, blood vessels (a. et v. thoracica interna), breast lymph. Muscles of the chest wall (mm. intercostales, mm. subcostales, m. transversus thoracis, mm. levatores costarum), diaphragm. Blood vessels: aa. et vv. intercostales. Nerves: nn. intercostales, n. phrenicus. Trachea, bronchi, lungs (accommodation, lobes, hilus), pleura (borders, pleural sinuses), lung lymph. Heart. Thymus. Esophagus. Thoracic lymphatic duct. Blood vessels: aorta, branches of the aortic arch, thoracic aorta and branches, truncus pulmonalis, vena cava superior, venae brachiocephalicae, vena azygos, vena hemazygois. Nerves: n. vagus, n. phrenicus, truncus sympathicus, n. splanchnic major and minor. Jejunum. Ileum. Appendix. The large intestine (ascending, transverse, descending, sigmoid, straight intestine, anal canal). Blood vessels: abdominal aorta with branches, inferior vena cava, portal blood flow system and its connection with other systems. Abdominal lymph. Abdominal wall muscles: m. rectus abdominis, m. obliquus abdominis externus, m. obliquus abdominis internus, m. transversus abdominis, m. pyramidalis. Fascia of the abdominal muscles, fascia transversalis, sheath of the flat abdominal muscle (layers, content), linea alba, lig. Inguinal. Canalis inguinalis. Peritoneum, mesogastrium, mesentery and mesocolon. Muscles: m. quadratus lumborum, m. iliopsoas, m. psoas minor. Blood vessels: aa. lumbales, vv. lumbales, v. lumbalis ascendens. Nerves: n. subcostalis, plexus lumbaris. Nerves: plexus lumbalis et sacralis with branches. Stomach, duodenum, spleen, pancreas. Liver and bile ducts, gall bladder. Vascularization and innervation and lymphatic drainage. Blood vessels: abdominal aorta with branches, inferior vena cava, portal blood flow system and its connection with other systems. Kidneys, adrenal glands, ureters. Blood vessels: a. et v. renalis. Bladder. Urethral tube (men and women). Supply areas t. coeliacus, a. mes. sup. and a. mes. inf. Blood vessels: aorta abdominalis – truncus coeliacus; inferior vena cava. Nerves: plexus coeliacus, nervi splanchnici, pars abdominalis systematis sympathici. Pelvic floor muscles (diaphragma pelvis et urogenitale). Trigonum urogenitale. Male reproductive organs: testis, epididymis, vas deferens, seminal vesicle, prostate gland, bulbourethral gland, external genitalia. Female reproductive organs: ovary, fallopian tube, uterus, birth canal, external genitalia. Blood vessels: a. et v. iliaca communis, a. et v. iliaca interna with branches, a. et v. iliaca externa, a. et v. testicularis s. ovarica. Nerves: plexus pudendus, pars pelvina et sacralis systematis parasymphatici. Fossa axillaris, upper arm, forearm

and hand. Muscles: m. pectoralis major, m. serratus anterior, m. atissimus dorsi, m. teres major, m. subscapularis, m. triceps brachii, m. subclavius, m. deltoideus. A. et v. axillaris with branches, v. cephalica. Nerves: plexus brachialis. M. trapezius, m. latissimus dorsi, m. serratus anterior, m. pectoralis major, m. pectoralis minor. Blood vessels: a. et v. brachialis, a. cubitalis. Nerves: n. musculocutaneus, n. radialis. Muscles of the forearm and hand. Fascia of the forearm, retinaculum flexorum. Furrows and canals of the forearm, carpal canals. Guyon's canal. Blood vessels: a. et v. radialis, a. et v. ulnaris, arcus palmaris superficialis et profundus, superficial veins of the hand. Nerves: n. medianus, n. ulnaris. Foramen suprapiriforme et infrapiriforme. Regio glutealis - foramen ischiadicum majus et minus. Fossa ischiorectalis. Regio femoris – trigonum femorale, canalis femoralis, canalis adductorius. Blood vessels: a. et v. femoralis with branches. Nerves: n. femoralis, n. obturatorius, n. ischiadicus. Retinaculum musculorum flexorum, retinaculum musculorum extensorum sup. et inf. Retinaculum musculorum fibularium sup. et inf. Fossa poplitea. Regio cruris anterior. Regio cruris posterior. Pes - canalis tarsalis, dorsum et planta. Blood vessels: a. et v. poplitea, a. tibialis anterior, a. tibialis posterior, a. dorsalis pedis, v. saphena magna et parva. Nerves: n. peroneus, n. tibialis, n. plantaris med. et lat.

Mode of teaching

Lectures; Seminars; Exercises

Student obligations

Students are expected to attend all class sessions, as well as to take all the examinations. However, they are allowed for excused absences, totalling 30% of all classes.

Monitoring student work (*alignment of learning outcomes, teaching methods, and grading*)

After the completion of each teaching topic (after the end of the exercises), the work, activity, commitment and knowledge of the students are evaluated and they are awarded points in the form of +, 0 or - (+ indicates exceptional knowledge and commitment in class, the student is awarded an additional 0.4 points in the grading system; 0 indicates average knowledge and effort in the class, zero additional points are awarded in the grading system; - indicates an insufficient level of knowledge and effort in the class, the student must pass the topic on one of the next exercises)

Evaluation of the written part of the final exam:

Percentage of correct answers (%)	Grade points
>95,00	10
90,00-94,99	9
85,00-89,99	8
80,00-84,99	7
75,0-79,99	6
70,00-74,99	5
65,00-69,99	4
60,00-64,99	3

Teaching activity	ECTS	Learning outcome	Student activity	Assessment methods	Grade points	
					Min.	Max.
Exercises	10	1-10	Active participation in exercises	Oral	5	12
Written colloquium A1	3	1-10	Studying for the written exam	Writing	3	10
Written colloquium A2	3	1-10	Studying for the written exam	Writing	3	10
Written colloquium A3	3	1-10	Studying for the written exam	Writing	3	10
Practical exam	2	1-10	Studying for the practical exam	Writing	6	13
Oral exam	2	1-10	Studying for the oral exam	Oral/ Writing	30	45
Total	23				50	100

Evaluation of the practical part of the final exam:

Correct answers	Grade points
30	13
29	12
28	11
27	10
26	9
25	8
24	7
23	6

Calculation of final grade:

The points obtained during the class (exercises), the written part of the final exam and the practical part of the final exam are joined by the points obtained during the oral exam. The final grading is done by absolute distribution, i.e. based on the final achievement and is compared with the numerical system as follows: A – excellent (5): 80-100 evaluation points; B – very good (4): 70-79.99 grade points; C – good (3): 60-69.99 grade points; D – sufficient (2): 50-59.99 grade points.

Required reading (available in the library and through other media)

Title	Number of copies in the library	Availability through other media
Marušić A, Krmpotić-Nemanić J. Anatomija čovjeka 2004. Medicinska naklada	10	
Krmpotić-Nemanić J. Anatomija čovjeka, Zagreb 1993. Medicinska Naklada, 5. pretiskano izdanje	15	

Waldayer, Anatomija čovjeka, Zagreb 2009., Golden Marketing – Tehnička knjiga	5	
Sobotta: Atlas of Human Anatomy. Urban and Schwartzberg, Munchen, 1983.	26	
Additional reading		
<ol style="list-style-type: none"> 1. Nikolić V., Keros P. Klinička anatomija abdomena, Zagreb 2000. Naklada Ljevak 2. Kahle W, H Leonhardt, W Platzer: Sustav organa za pokretanje, Zagreb 1989. JUMENA, 4. prerađeno izdanje; Utrobni organi, Zagreb 1990. JUMENA, 4. prerađeno izdanje; Živčani sustav i osjetila, Zagreb 1996. Medicinska Naklada, 4.pretiskano izdanje 3. Keros P., Krmpotić - Nemanić J., Vinter I.: Perovićeve anatomija čovjeka, Medicinski fakultet Sveučilišta u Zagrebu, 1989. 		
Course evaluation procedures		
Anonymous, quantitative, standardized student survey providing feedback on the course as well as on the work of course coordinators and their assistants/associates is being conducted by the QA Office of the Faculty of medicine Osijek.		
Note /Other		
E-learning does not count towards course contact hours, but is being used in teaching and comprises links to various web pages, as well as video and audio materials available on web pages.		