MACROSCOPIC ANATOMY AND EMBRYOLOGY II.

Credit value: 9

Number of lessons per week: 9 lecture: 3 practical course: 6 seminar: 0
Type of the course: compulsory course
Subject code: AOKANT853_2A
Name of the course leader: Dr Alpár Alán (full professor)

Objectives of the subject, its place in the medical curriculum:
Demonstration of the macroscopical composition of the human body specifically to provide the future clinicians/medical doctors with a valid body of information with relevance to clinically significant morphological structures. Development of internal organs – this part describes the intrauterine differentiation and growth of internal organs with relevance to the general medical curriculum. Teaching is done in the form of lectures and dissection classes.

Place where the subject is taught (address of the auditorium, seminar room, etc.):
Semmelweis University, Department of Anatomy, Histology and Embryology
Budapest 1094, Tűzoltó utca 58.

Successful completion of the subject results in the acquisition of the following competencies:
Understanding the macroscopical composition of the human body together with the position and topographical relation of organs. Clear understanding of structure and function. Ability to perform basic preparatory tasks during dissection. Identification of general directions/landmarks on the cadaver together with the recognition of significant organs/body parts. Acquiring knowledge of surface features and/or sectional anatomy forming basis for clinical diagnostics (palpation, auscultation, etc.) and the use of radiological imaging methods. Understanding of human development in order to draw parallels with macroscopical anatomy.

Course prerequisites:
Macroscopic Anatomy and Embryology I.
Number of students required for the course (minimum, maximum) and method of selecting students:
Obligatory for all registered students, on the basis of registration via the NEPTUN system

How to apply for the course:
Via the NEPTUN system.

Detailed curriculum:
List of lectures

1. week:	Nasal cavity, paranasal sinuses Oral cavity, tongue, palate, faucial isthmus Salivary glands
2. week:	Morphology and development of teeth Pharynx, esophagus Larynx
3. week:	Development of the face, malformations Development of the pharyngeal arches, development of the foregutThoracic cavity, mediastinum. Chambers of the heart, external features. Structure of heart wall, valves, fibrous skeleton. Pericardium
4. week:	Cardiac vessels and nerves, conducting system. Surface projection. Auscultation points. Development of the heart Development of arteries and veins
5. week:	Morphology of trachea and the lung. Pleura. Development of the respiratory system. Postpartum adaptation of the circulatory system Stomach and small intestines (duodenum, jejunum, ileum)
6. week:	Liver, gall bladder, pancreas, spleen. Large intestine, rectum
7. week:	Peritoneal relations of abdominal organs. Development of the peritoneum, separation of body cavities Morphology of the kidney, capsules of the kidney, ureter, urinary bladder. Morphology and coats of the testicle
8. week:	Morphology of the epididymis, spermatic cord, seminal vesicle and prostate Morphology of penis and male urethra. Male perineum Ovary, Fallopian tube and uterus

9. week:	Vagina, female perineum, external genital organs Development of the urinary system Development of genital organs
10. week:	Topographical divisions of the central nervous system, developmental units Meninges, epidural and subarachnoideal spaces, ventricles, choroidal plexus, CSF Lobes of the cerebral cortex, topographical subdivisions, structure and function of the medial, lateral and basal cortical fields
11. week:	Topography and components of the basal ganglia and the diencephalon (thalamus, hypothalamus), the 3rd ventricle. Topography and components of the brainstem (midbrain, pons and medulla oblongata), the 4th ventricle. Arterious, venous and lymphatic circulation of the brain
12. week:	The autonomic nervous system. Sympathetic and parasympathetic nervous system. Cranial nerve nuclei Trigeminal nerve (CN 5), facial nerve (CN 7)
13. week:	Glossopharyngeal nerve (CN 9), vagus nerve (CN 10) Spinal cord, spinal ganglia, spinal segment. Spinal nerves, nerve plexuses Lymphatic system. Regional lymphatic drainage of organ, lymph nodes.
14. week:	Intracranial topography, orbit Topographical relations of the thoracic cavity Topographical relations of the abdominal cavity

Topics of dissection classes

1-2. weeks:	Dissection of the head and neck organs.
3-6. weeks:	Opening of the thoracic and abdominal cavities, dissection of thoracic and abdominal organs
7-9. weeks:	Dissection of the retroperitoneal region and perineum together with organs of the lesser pelvis.
10-12. weeks:	Dissection/ inspection of the brain and spinal cord. Intracranial topography.
13-14. weeks:	Cranial nerve branches. Cross sections of the trunk. Revision

Other subjects concerning the border issues of the given subject (both compulsory and optional courses). Possible overlaps of themes:

Microscopic Anatomy and Embryology I - II..

Special study work required to successfully complete the course:

All students are required to *demonstrate their knowledge and motivated practical work* by the completion and demonstration of a dissected specimen or region once during the two semesters of the Academic year.

Requirements for participation in classes and the possibility to make up for absences:

Active participation in practical lessons is obligatory. Students should attend at least 75% of the scheduled hours, absences therefore are limited in **25%**. Attendance will be recorded in the dissection room classes.

Methods to assess knowledge acquisition during term time:

During the semester, both practical and theoretical knowledge will regularly be evaluated. Attendance is obligatory at the two mid-term tests (held approximately on weeks 7 and 12). Anatomy mid-terms may be oral or written (computer based) exams. Students absent from the mid-term test should reattend at one of the two further occasions or their semester will not be accepted. The time and topics of midterm tests will be announced in the departmental homepage at the beginning of the semester (http://semmelweis.hu/anatomia).

Requirements for signature:

Active participation in at least 75% of dissection room sessions, including the midterm tests (irrespective of the result) is obligatory for every student. Missed practical classes cannot be made up for.

Type of examination:

Final (written and oral) examination, topics: subject matter of the subjects Macroscopic Anatomy and Embryology I-II. Final examinations consist of written (theoretical) and oral (practical) parts

Examiners are delegated by the Course Director with the consent of the Head of Department.

Requirements of the examination:

During the final examination the knowledge of students will be tested. The examination starts with a written pretest (e-learning module "Moodle") to be followed by an oral test in Macroscopic Anatomy (identification of structures on true anatomical specimens) including relevent theoretical questions from the subject matter of the semester.

Topic list for the semifinal examination:

Macroscopic Anatomy I.
(see there)

Macroscopic Anatomy II.

Internal organs of the head & neck region (morphology and development)

Oral cavity (divisions, boundaries)
Floor of mouth, sulcus lateralis linguae
Macroscopy of the tongue
Types and morphology of teeth, blood supply and innervation
Tooth development
Salivary glands together with topography
Faucial isthmus, palate. Tonsils
Pharynx and parapharyngeal spaces
Blood supply and innervation of pharynx
Pharyngeal muscles
Nose, nasal cavity (boundaries, nasal meatus, vessels)
Paranasal sinuses (connections, vessels)
Larynx (shape, position, muscles, vessels, nerves)
Skeleton and joints of larynx together with the fibroelastic membranes, mucous membrane
Common and external carotid arteries and their branches. Maxillary artery and its branches
Venous drainage of face and neck
Lymph nodes and lymphatic vessels of the head&neck
Development of the face, including the developemnt of the oral and nasal cavities
Development and differentiation of the foregut
Derivatives of the branchial arches
Derivatives of the branchial pouches and grooves
Development of the teeth and tongue

Circulatory system (morphology and development)

Shape, external features of heart
Chambers of heart
Endocardium, ostia, valves of heart
Skeleton of heart, anuli fibrosi
Structure of heart wall
Pulse generating and conducting system of heart
Pericardium
Position and surface projections of heart
Percussion and auscultation (area of cardiac dullness, heart sounds)
Radiology of heart
Early circulation (formation of vessels, basis vascular systems of the embryo/fetus)
Heart development
Pulmonary circulation
Ascending aorta, arch of aorta and its branches
Subclavian artery and its branches
Thoracic aorta and its branches
Abdominal aorta and its branches
Development of arteries (aorta, branchial arterious arches, umbilical arteries)
Celiac trunk and its branches
Superior mesenteric artery and its branches
Inferior mesenteric artery and its branches
External and internal iliac arteries and their branches
Internal pudendal artery and its branches
Superior vena cava and its tributaries
Inferior vena cava and its tributaries
Azygos and hemiazygos veins and their tributaries
Portal vein and its tributaries, portocaval anastomoses
Development of veins (inferior v. cava, portal v., superior v. cava, azygos and hemiazygos veins)
Fetal circulations
Lymphatic drainage of the abdominal and pelvic organs
Thoracic duct, right lymphatic trunk

Morphology and development of the thoracic, abdominal and pelvic organs

Trachea and bronchial tree
Lung (shape, parts, surfaces, hilum)
Lung (position, topography, vessels, nerves)
Surface projection of pleura and lung
Pleura, pleural cavity

Mediastinum (divisions and content)
Development of the lower airways including the lung
Description and topography of the esophagus
Stomach (shape, position, parts, blood supply and innervation). Peritoneal relations
Duodenum (shape, position, divisions, vessels)
Jejunum-ileum (shape, position, vessels)
Large intestine (shape, position, vessels)
Rectum, anal canal (shape, position, vessels)
Liver (shape, position, peritoneal relations, vessels)
Gall bladder and biliary passages (anatomy)
Pancreas (shape, position, vessels)
Peritoneum, greater and lesser omentum, mesentery, omental bursa
Formation and differentiation of the midgut
Formation and differentiation of the hindgut
Development of liver and pancreas
Development of the peritoneum
Formation of body cavities, development of the diaphragm
Kidney (shape, position, hilum, sinus, capsules, vascular architecture)
Renal pelvis and calyces. Ureter
Urinary bladder (shape, position, muscles, vessels)
Female urethra
Male urethra, bulbourethral gland
Development of kidneys
Development of urinary passages
Testis (shape, position, vessels). Scrotum, coats of testis
Epididymis, vas (ductus) deferens, spermatic cord
Seminal vesicle, prostate
Penis (shape, position, mechanism of erection, vessels, nerves)
Pelvic floor, male perineum (connective tissue spaces)
Hernia canals (inguinal and femoral)
Ovary (shape, position, vessels)
Uterine tube (shape, position, vessels)
Uterus (shape, parts, position, supporting structures, vessels) Broad ligament
Vagina, female perineum (connective tissue spaces)
External female genital organs (mons pubis, labia, vestibule of vagina, greater vestibular gland, vessels)
Development of gonads, formation and migration of primordial germ cells
Development of male genital system
Development of female genital system
Development of the external genital organs

Macroscopy of the nervous system

Intracranial topography Dura mater, dural sinuses
Arachnoid mater, pia mater, cisterns, CSF circulation
Description and meninges of the spinal cord
Brain stem (medulla oblongata, pons, midbrain)
Cerebellum
Diencephalon (parts, blood supply). Thalamus, hypothalamus
Lateral ventricles, III. ventricle, IV. ventricle
Hemispheres
Internal carotid artery (course, parts and branches)
Vertebral artery (course and branches)
Circle of Willis
Veins of the brain
Cranial nerve nuclei, macroscopy of cranial nerves together with the brain, dural and skull exits
Branches of cranial nerves (CN 3, CN 4, CN 5, CN 6, CN 7, CN 9, CN 10, CN 11, CN 12)
General composition of the autonomic nervous system
Sympathetic nervous system (cranial, cervical, thoracic and lumbar parts)
Sympathetic trunk
Parasympathetic system (cranial and sacral parts)
Topography of the orbit. Extraocular muscles. Eye movements.
Eyelids, conjunctiva, fasciae of the orbit, lacrimal apparatus

Method and type of evaluation:

Final examinations are composed of written theoretical and oral practical parts. The written theoretical examination is done using an e-learning module while the practical examination is conducted in the dissection room on real prosected cadaver specimen.
Examiners are delegated by the Course Director with the consent of the Head of Department.
Students are given separate marks for each part of the examination. Unsuccessful partial examinations result in the failure of the final -examination. When failing at the practical part, the written test will not have to be repeated in case the result was a 4 or a 5 only. Upon the termination of the examination the Chairman of the Examination Committee composes the final mark from the partial marks earned in the written and practical parts.

How to register for the examination?

Via the NEPTUN system.

Possibilities for exam retake:
According the Study and Examination Policy

Printed, electronic and online notes, textbooks, guides and literature (URL address for online material) to aid the acquisition of the material:

Recommended textbooks

Sobotta Atlas of Human Anatomy, 15th English ed. Musculoskeletal system, internal organs, head, neck, neuroanatomy, By Waschke & Paulsen, ISBN-13: 9780702052507 2013

Gray's Anatomy for students with STUDENT CONSULT Online Access, 3rd Edition by R. Drake, A. W. Vogl, A. Mitchel, Elsevier; 2014; ISBN 9780702051319

THIEME Atlas of Anatomy, General Anatomy and Musculoskeletal System, 2014 by Schuenke, ISBN: 9781604069228

THIEME Atlas of Anatomy, Head, Neck and Neuroanatomy, 2016 by Schuenke, ISBN: 9781626231207

THIEME Atlas of Anatomy, Internal Organs, 2016 by Schuenke, ISBN: 9781626231665

McMinn and Abrahams' Clinical Atlas of Human Anatomy with STUDENT CONSULT Online Access , 7th Edition By Abrahams, Spratt, Loukas & van Schoor ISBN-13: 9780723436973 , 2013

Netter: Atlas of Human Anatomy, Including Student Consult Interactive Ancillaries and Guides, 6th Edition, 2014.

Human Anatomy, Color Atlas and Textbook, 6th Edition by J Gosling, P Harris, J Humpherson, I Whitmore and P Willan; ISBN 9780723438274 Elsevier, 2016.

Functional Anatomy, Histology and Embryology for medical and dental students by M. Réthelyi and J. Szentágothai, Medicina, 2018.

Langmann's Medical Embryology, 13th Edition by TW Sadler, Wolters Kluwer, ISBN 9781469897806, 2014

Gray's Anatomy. The Anatomical Basis of Clinical Practice; 41st edition by S. Standring: 2015 ISBN : 9780702052309

Netter's Clinical Anatomy with Online Access, 3rd Edition, by J. Hansen, 2014, eBook ISBN: 9781455770632
eBook ISBN: 9780323312899 014

Anatomy, A Photographic Atlas, 8th Edition by Rohen, Yokochi; Wolters Kluwer, 2016, ISBN: 978-1-4963-0870-2

Bräuer: Sobotta Flashcards (Muscles; Bones, Ligaments, and Joints) URBFI, 2013.

RMH McMinn: Last's Anatomy, Regional and Applied. Churchill Livingstone, Edinburgh 1990. ISBN 0-443-03484-4

Regional Anatomy, by T Tömböl, Medicina 2008, ISBN 963 242 186 8

Sectional Anatomy – Workbook, by A. Nemeskéri; István Apáthy's Foundation, 2001.

Neuroanatomy An Illustrated Colour Text, 4th Edition by Crossman & Neary Publication Date: 13/04/2010 ISBN-13: 97807020308

The Developing Human – Clinically Oriented Embryology, 10th ed. by KL Moore, TVN Persaud and M Torchia, Saunders, 2015; ISBN 9780323313384

Further study aids:

To be downloaded from the homepage of the Department of Anatomy, Histology and Embryology (http://semmelweis.hu/anatomia) or from Knowledgebase on the Library homepage: (https://lib.semmelweis.hu/knowledge_base).