Faculty of Dentistry
1st year, 2nd semester

HANDBOOK
Macroscopic Anatomy II
Microscopic Anatomy and Embryology I

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LEARNING OBJECTIVES

Aims of the lectures in Anatomy - Presentation of important and/or complicated topics such as: 1st semester - the structure of the body wall (e.g. thorax, pelvis), extremities and the cranium, 2nd semester - the morphology of internal organs including the cardiovascular, digestive and urogenital systems; 3rd semester - the composition of the central nervous system, together with the organs of special senses and topography of body regions, and the 4th semester is devoted entirely to maxillofacial topographical anatomy.

Aims of the lectures in Histology - Presentation of the cell, basic principles in cellular morphology, detailed description of the epithelial, connective, muscle and nervous tissues. During the 3 semesters, the lectures contribute to the gross anatomical description of organs with a detailed presentation of their fine structures, including ultrastructural details. Important chapters: basic tissues, viscera, central nervous system.

Aims of the lectures in Embryology - Presentation of the early development from the differentiation of the germ cells to the formation of the human embryo (basic embryology) as well as the development of the locomotor system (1st semester). In the 2nd and 3rd semesters, the embryology topics will complement the gross anatomy and histology lectures of the organs and systems, also mentioning the most frequent malformations.

For the deeper understanding of relatively difficult questions small group discussions may be organized during the practical dissection room classes.

Aims of the practical dissection classes - In the first three semesters, based on their weekly programs, the students will study the morphology of the human body using anatomical specimens (bones, joints, muscles, viscera, brain) as well as learning the basic principles of dissection, including the proper usage of tools (scalpel, forceps, scissors) under the supervision of their lab instructors. The anatomy of the locomotor system and the peripheral nervous system will be principally taught in the dissecting room.

Aims of the histology practical classes - Under supervision by the lab instructor, the students will learn the use of the light microscope and the individual viewing of histology slides will facilitate the understanding of the basic tissues (epithelial, connective, muscle and nervous) and the fine structure of the organs.

The knowledge of students will be tested by regular mid-term examinations

Lectures:
First semester: 1x 45 min (Macroscopic Anatomy I) ; second semester: 2x 2x45 min (Macroscopic Anatomy II and Microscopic Anatomy and Embryology I) third semester: 2x 45 min (Microscopic Anatomy II)

Topics:
First semester: Gross anatomy of the bones, joints and muscles; central and peripheral nervous systems and meninges

Second semester: Morphology of the heart and vessels, thoracic/abdominal/pelvic viscera, body cavities and serous membranes. Sectional anatomy of the thorax, abdomen and pelvis. Description of the diaphragms. Maxillofacial Anatomy, organs, cavities, nervous and vascular supply of the head and neck regions, including topographical and cross sectional anatomy.

General embryology, general histology (basic tissues). Histology and embryology of the heart and vessels, gastrointestinal and urogenital organs. Maxillofacial Histology and Embryology.

Third semester: Development of the skull, spine and limbs. Histology and embryology of the lymphatic system, central and peripheral nervous system together with the organs of special senses and endocrine organs. Microscopy of the CNS.
RULES AND REGULATIONS IN THE DISSECTING ROOM

IT IS STRICTLY FORBIDDEN to eat, drink, smoke, to chow gums, or to use music devices. No telephone calls, please.
Bags and coats should be left in the lockers before entering the dissecting room. The lockers will have to be locked using your padlocks.
Please, remember to keep your valuables always on you, or lock them in the lockers since the department takes no responsibility for lost items.
Everybody is supposed to behave conforming to the spirit of the site in the dissecting room. Loud speech, out-of-place jokes and any kind of behaviour, disregarding the dignity of human corpses, should strictly be avoided.

Students are expected to be prepared for the practical work.
Students should take care of the furniture and equipment of the dissecting room. Do not sit on the dissection tables or stand on the tripod stools to avoid accidents. Fire and work safety regulations should be maintained. The dissection room is a hazard area. Cleanliness and order should be kept.

Working in the dissection room involves the use of sharp and pointed tools, injuries should be reported to the lab instructor. The technical personnel will provide first aid when necessary.
The white lab coats should be worn while in the dissection room, but should be removed before leaving the dissection room area. The purpose of wearing the lab coats is to protect one’s clothing from contacting the cadaver specimen. Furthermore we advise you to wear closed toed shoes and clothing covering the legs. In the end of the class, lab coats should be emptied and put away in your personal bag. Fresh lab coats are provided every 2nd week or when necessary.
Only the members of the study group can participate in the sessions, visitors may be present only with prior permission by the lab instructor. Students can leave the sessions only with the approval of the lab instructor.

NO RECORDINGS ARE ALLOWED WHILE IN THE DISSECTION ROOM.

Specimen preparations should be wrapped and labeled. Dissection materials of other groups or individuals should not be handled. Dissected cadaver pieces should be discarded in a designated container and discarded blades have to be collected separately.
Dissecting rooms are closed between 6:00 PM to 8:00 AM and over the weekends Students may not stay in the dissecting room without the supervision of one of the assistants of the department. In the absence of an instructor, the technical personnel should ask the students to leave the dissecting room.

SMOKING IS STRICTLY FORBIDDEN ON THE DEPARTMENTAL PREMISES INCLUDING THE GARDEN AND THE YARD!
ED I.  Macroscopic Anatomy 2

ANNOUNCEMENTS

Subject matter of the 2nd semester

I. Macroscopy of the cardiovascular system
   • heart
   • blood vessels in general
   • pulmonary circulation
   • systemic circulation
   • veins

II. Macroscopy of internal organs
   • gastrointestinal tract
   • respiratory tract
   • urogenital tract
   • separation of body cavities, peritoneum
   • pelvic floor, perineum

III. Maxillofacial Anatomy
   • morphology of the structures of the head & neck region
   • morphology of teeth

Acceptance of the semester
Active participation in dissection room lab sessions is obligatory. Students should attend at least
75% of the scheduled hours, as well as successfully passing (with a mark 2) the obligatory midterm
test, to gain a signature proving the validity of the semester. Absences are therefore limited in
25%.

Obligatory midterm test
   Date: Week 9, April 13
   Topics: Internal organs: Cardiovascular, gastrointestinal and respiratory tracts (except for the
   head&neck region), retroperitoneum, urogenital system, perineal region

In case of absence, or an unsuccessful midterm result, students will have to attend a retake exam
(TBA). The semester is only accepted if the midterm is successfully passed (with at least a mark 2).

Non-obligatory practical assessments
   Date: Week 14, May 21, last practical class
   Topics: *Upper and lower limbs
   *Internal organs (except for the viscera of the head & neck region)
**Exemptions:** Students earning marks 3, 4 or 5 in the non-obligatory practical assessments may request an exemption from the relevant practical parts of the final examination. Here their marks will be counted in the result of the final examination upon successfully passing the written part.

**Exam competition**
We invite our students having a valid mark from the 1st semester to participate in a written competition test from the topics of the 2 semesters of the subject. Students achieving good marks (4 or 5) at the test may be exempted from written part of the final examination. The best 5 students are invited to participate in a Macroscopy pin test to determine the final order of competitors.

**Final examination**
Topics: Subject matter of the two semesters of Macroscopic Anatomy

Only those students are eligible to sit for the final examination who have successfully finished their dissection task

The final exam consists of practical and theoretical parts:
1. Written pretest (Macroscopic Anatomy questions)
2. Oral examination (Identification of structures on anatomical projections, including relevant theoretical questions)

**Marking system**
The final result of the examination is calculated from 5 partial marks
1. Written test (unless exempted)
2. *Limbs
3. *Internal organs (except for those in the head&neck region)
4. Maxillofacial Anatomy specimens
5. Macroscopy of the central nervous system (brain and spinal cord)
<table>
<thead>
<tr>
<th>Week</th>
<th>Lectures</th>
<th>Practical sessions</th>
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<tr>
<td><strong>Week 2</strong>&lt;br&gt;02.22-26.</td>
<td>3. Cardiac vessels, conducting system. Surface projection. Auscultation points. Pericardium. <em>(Kozsurek)</em>&lt;br&gt;4. Stomach and small intestines (duodenum, jejunum, ileum) <em>(Adám)</em></td>
<td>Dissection of the ventral regions (cadaver)&lt;br&gt;Morphology of the heart</td>
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<td><strong>Week 3</strong>&lt;br&gt;03.1-5.</td>
<td>5. Liver, gall bladder, pancreas, spleen. <em>(Ádám)</em>&lt;br&gt;6. Large intestine, rectum. Portocaval anastomoses <em>(Alpár)</em></td>
<td>Dissection of the ventral regions (cadaver)&lt;br&gt;Morphology of the heart</td>
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<td><strong>Week 4</strong>&lt;br&gt;03.8-12.</td>
<td>7. Peritoneum, peritoneal recesses, peritoneal relations of abdominal organs. <em>(Szél)</em>&lt;br&gt;8. Morphology of the kidney, capsules of the kidney, ureter, urinary bladder. Organs, vessels and nerves of the retroperitoneum <em>(Gallatz)</em></td>
<td>Dissection of the ventral regions (cadaver), opening of the abdominal cavity. Celiac trunk, duodenum</td>
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<td><strong>Week 5</strong>&lt;br&gt;03.15-19</td>
<td>9. Morphology and coats of the testicle <em>(Barna)</em>&lt;br&gt;10. Morphology of the epididymis, spermatic cord, seminal vesicle and prostate <em>(Vereczki)</em></td>
<td>Branches of the superior mesenteric artery&lt;br&gt;Dissection of the retroperitoneal organs</td>
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<td><strong>Week 6</strong>&lt;br&gt;03.22-26.</td>
<td>11. Morphology of penis and male urethra. Male perineum <em>(Pálfy)</em>&lt;br&gt;12. Ovary, Fallopian tube and uterus <em>(Lendvai)</em></td>
<td>Male genital system&lt;br&gt;Pelvic floor</td>
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<td><strong>Week 7</strong>&lt;br&gt;03.29-04.02.</td>
<td>13. Vagina, female perineum, external genital organs <em>(Alpár)</em>&lt;br&gt;14. Blood supply and lymphatic drainage of the abdomen and lesser pelvis <em>(Kocsis)</em></td>
<td>Female genital system</td>
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<td><strong>Week 8</strong>&lt;br&gt;04.05-09.</td>
<td>15. Muscles of facial expression, muscles and triangles of the neck, cervical fasciae <em>(Gerber)</em>&lt;br&gt;16. Temporomandibular joint, muscles of mastication <em>(Gallatz)</em></td>
<td>Lesser pelvis&lt;br&gt;Perineum</td>
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<td><strong>Week 9</strong>&lt;br&gt;04.12-16.</td>
<td>17. Oral cavity, tongue, hard and soft palates <em>(Gerber)</em>&lt;br&gt;18. Faunal isthmus, pharynx <em>(Shahbazi)</em></td>
<td><strong>MIDTERM</strong>: Gastrointestinal system, respiratory tract, (except for the head and neck region), urogenital system, retroperitoneal organs, perineum.---------------------------&lt;br&gt;Muscles of facial expression, neck muscles, muscles of mastication, temporomandibular joint</td>
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<tr>
<td><strong>Week 11</strong>&lt;br&gt;04.26-30.</td>
<td>21. Radiological anatomy of the oral cavity (maxilla, mandible, maxillary sinus, teeth) <em>(Gerber)</em>&lt;br&gt;22. Topography of salivary glands. <em>(Gallatz)</em></td>
<td>Dissection of the face, neck, parotid region (cadaver and prosections)</td>
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<td><strong>Week 12</strong>&lt;br&gt;05.03-07.</td>
<td>23. Vessels of the head and neck region. Lymphatic drainage, cutaneous innervation. <em>(Shahbazi)</em>&lt;br&gt;24. Trigeminal nerve (CN 5) <em>(Durst)</em></td>
<td>Dissection of the infratemporal and pterygopalatine fossae/regions&lt;br&gt;Orbit, macroscopy of cranial nerves (prosections)</td>
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<td><strong>Week 13</strong>&lt;br&gt;05.10-14.</td>
<td>25. Orbit, eye bulb. Extraocular muscles and eye movements. Oculomotor nerve (CN 3), trochlear nerve (CN 4), abducens nerve (CN 6). Facial nerve (CN 7) <em>(Shahbazi)</em>&lt;br&gt;26. Glossopharyngeal nerve (CN 9), vagus nerve (CN 10), accessory nerve (CN 11), hypoglossal nerve (CN 12) <em>(Kozsurek)</em></td>
<td>Dissection of the head and neck regions, branches of cranial nerves (cadaver)</td>
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<td><strong>Week 14</strong>&lt;br&gt;05.17-21.</td>
<td>27. Sympathetic and parasympathetic nervous systems <em>(Tóth)</em>&lt;br&gt;28. Innervation of the teeth and gingiva. Anatomical bases of dental anaesthesia <em>(Gerber)</em></td>
<td>Revision&lt;br&gt;<strong>Non-obligatory assessment</strong>: Limbs and internal organs (except for the head and neck region)</td>
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Macroscopic Anatomy II

TOPICS OF THE FINAL EXAMINATION

Musculoskeletal Anatomy
General osteology, classification of bones
General arthrology
Components and classification of joints
General myology
Joints and muscles of the shoulder girdle.
Shoulder joint, movements and muscles.
Axilla, the quadrangular and triangular spaces
Muscle/fascial compartment of the arm (cross section)
Elbow joint, the gross anatomy of the muscles acting upon it. Cubital fossa
Muscle/fascial compartments of the forearm (cross section)
Movements and muscles of the radiocarpal joint
Osteofibrous spaces and muscle compartments of the hand, tendinous sheaths
Joints and muscles of the thumb and fingers

Composition of the pelvis (bones, ligaments and membranes)
External and internal muscles of the hip, supra- and infrapiriform hiati
Hip joint and the muscles concerned with the movements
Osteofibrous compartments, muscles and cross section of the thigh
Knee joint and the muscles concerned with the movements. Popliteal fossa
Subinguinal hiatus, femoral trigone, adductor canal
Osteofibrous compartments, muscles and the cross section of the leg
Ankle joint, subtalar and talocalcaneonavicular joints together with the muscles acting upon them.
Structure of the foot, arches of the foot

Blood supply and innervation of the upper and lower limbs
Blood supply and innervation of the trunk
Brachial plexus, lumbar plexus, sacral plexus.
Dorsal branches of the spinal nerves, intercostal nerves

Structure of vertebrae
Structure of the vertebral column together with the muscles acting upon it
Back muscles
Joints, movements and muscles of the head&neck
Deep neck muscles (scalene and prevertebral muscles)
Muscles of the nape (suboccipital trigone)
Osteofibrous structure of the thoracic cage (bones, joints, ligaments, muscles, movements)
Diaphragm
Muscles and layers of the abdominal wall, rectus sheath
Inguinal canal, femoral canal

Bones, spaces and connections of the skull, external and internal skull bases
Neurocranium, components and cavities (anterior, middle and posterior cranial fossae)
Viscerocranium, components and cavities (walls and connections of the nasal cavity, orbit, oral cavity, pterygopalatine and infratemporal fossae)

**Circulatory system**
- 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
- Pulmonary circulation
  - Ascending aorta, arch of aorta and its branches
  - Thoracic aorta and its branches
  - Abdominal aorta and its branches
  - Celiac trunk and its branches
  - Superior mesenteric artery and its branches
  - Inferior mesenteric artery and its branches
  - External and internal iliac artery and its 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
  - Cutaneous veins and lymphatic vessels of trunk

**Digestive system**
- Tongue (parts, vessels, innervation)
- Salivary glands (anatomy)
- Isthmus of fauces
- Palate, palatine muscles
- Pharynx, (shape, position, parts, muscles)
- Topography of the pharynx, para- and retropharyngeal spaces
- Esophagus (anatomy)
- Stomach (shape, position, parts)
- Peritoneal relations of stomach
- Blood supply and innervation of stomach
- Duodenum (shape, position, divisions, vessels)
- Jejunum-ileum (shape, position, vessels)
- Rectum, anal canal (shape, position, vessels)
- Liver (shape, position)
- Gall bladder and biliary passages (anatomy)
- Liver (peritoneal relations, vessels)
- Circulation of liver, liver sinusoids
- Pancreas (shape, position, vessels)
- Peritoneum, greater and lesser omentum, mesentery, omental bursa
Respiratory system
Trachea and bronchial tree
Lung (shape, parts, surfaces, hilum)
Lung (position, topography, vessels, nerves)
Surface projection of pleura and lung

Body cavities
Thoracic wall
Pleura, pleural cavity
Mediastinum (divisions and content)
Diaphragm
Abdominal cavity (divisions and surface projections)
Abdominal wall (muscles, fasciae)
Rectus sheath
Hernia sites

Urogenital system
Kidney (shape, position, hilum, sinus, capsules)
Kidney (section, vascular architecture)
Renal pelvis and calyces
Ureter
Urinary bladder (shape, position, muscles, vessels)
Female urethra
Testis (shape, position, vessels)
Epididymis, vas (ductus) deferens, spermatic cord
Scrotum, coats of testis
Seminal vesicle
Prostate
Male urethra, bulbourethral gland
Penis (shape, position, mechanism of erection, vessels, nerves)
Pelvic floor, male perineum
Hernia canals (inguinal and femoral)
Ovary (shape, position, vessels)
Uterine tube (shape, position, vessels)
Uterus (shape, parts, wall, cavity)
Uterus (position, supporting structures, vessels)
Broad ligament (lig. latum) and its components
Vagina, female perineum
External female genital organs (mons pubis, labia, vestibule of vagina, greater vestibular gland, vessels)

Macroscopy of the nervous system
Intracranial topography
Dura mater, dural sinuses
Arachnoid mater, pia mater, cisterns, CSF circulation
Description of the spinal cord. Spinal nerves
Meninges and blood supply of the spinal cord
IV. ventricle
Medulla oblongata
Pons, Midbrain
Cerebellum
Diencephalon (parts, blood supply). Thalamus, hypothalamus
III. ventricle
Telencephalon, blood supply. Hemispheres
Basal ganglia
Lateral ventricles
Internal carotid artery (course, parts and branches)
Vertebral artery (course and branches)
Circle of Willis
Veins of the brain
Macroscopy of the cerebral cortex including the location of the most important centres
Cranial nerves, 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 system (cranial, cervical, thoracic and lumbar parts)
Sympathetic trunk
Parasympathetic system (cranial and sacral parts)
Extraocular muscles. Eye movements.
Eyelids, conjunctiva, fasciae of the orbit, lacrimal apparatus

**MAXILLOFACIAL ANATOMY**
Muscles of mastication
Muscles of facial expression
Superficial muscles of the neck, muscle triangles
Deep muscles of the neck and the laminae of the cervical fascia
Subclavian artery and its branches
Common and external carotid arteries and their branches
Maxillary artery and its branches
Veins of face and neck
Oral cavity (divisions, boundaries)
Frontal section of the oral cavity
Floor of mouth, sulcus lateralis linguae
Types and morphology of teeth
Blood supply and innervation of teeth
Tonsils (anatomy)
Faucial isthmus, palate
Macroscopy of the tongue
Salivary glands together with topography
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, vessels, nerves); Skeleton and joints of larynx
Laryngeal ligaments (fibroelastic membranes, mucous membrane)
Muscles of larynx, innervation
ED Microscopic Anatomy and Embryology I. Announcements

Subject matter of the semester

Histology
Microscopy of basic tissues
- epithelia, glandular tissues
- connective and supporting tissues
- types of muscle tissue
- histology of the corpuscular elements of blood, cells of the red bone marrow.
Microscopic structure of internal organs within the
- cardiovascular
- gastrointestinal
- respiratory
- urogenital systems
- embryology of maxillofacial structures: development of the face, derivatives of the pharyngeal arches/clefts/pouches, tooth development; histology of salivary glands and teeth

Embryology
- Basic principles of human development, introduction to the clinical embryology.
- General embryology, including spermatogenesis, oogenesis, fertilization, cleavage, blastulation, formation of germinal layers, body axes, molecular basis of right-left asymmetry, formation of the placenta, fetal membranes, fetal circulation.
- Organ development including the cardiovascular, digestive, respiratory, urogenital systems together with their malformations
- Histology and embryology of maxillofacial structures: development of the face, derivatives of the pharyngeal arches/clefts/pouches, tooth development

Midterm test (obligatory)

Topics: General embryology, general histology
Date: Week 11, April 26
In case of absence, or an unsuccessful midterm result, students will have to attend a retake exam (TBA). The semester is only accepted if the midterm is successfully passed (with at least a mark 2).

Acceptance of the semester

Active participation in histology laboratory sessions is obligatory. Students should attend at least 75% of the scheduled hours, and successfully pass (with at least a mark 2) the obligatory midterm test*, to gain a signature proving the validity of the semester. Absences are therefore limited in 25%.

Semifinal examination

The semifinal exam consists of a written test (Histology and Embryology questions with photographs, images or schematic drawings)

Topics: Subject matter of the present semester: General and Organ/System based Histology and Embryology, including Maxillofacial Histology and Embryology
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<th>Week</th>
<th>Lectures</th>
<th>Histology Laboratory</th>
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<tr>
<td>Day</td>
<td>Time</td>
<td>Monday 12:00-13:40 (Huzella lecture hall)</td>
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<tr>
<td>Week 1</td>
<td>02. 15-19.</td>
<td>1. Epithelial tissues, cell contacts, intercellular connections (<em>Gerber</em>)&lt;br&gt;2. Glandular epithelium (<em>Puskár</em>)</td>
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<tr>
<td>Week 2</td>
<td>02.22-26.</td>
<td>5. Supporting tissues (cartilage, bone) (<em>Puskár</em>)&lt;br&gt;6. Ossification, bone remodelling (<em>Gerber</em>)</td>
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<td>03.1-5.</td>
<td>7. Muscle tissues, nervous tissues (<em>Barna</em>)&lt;br&gt;8. Histology of vessels (<em>Nagy</em>)</td>
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<td>Week 3</td>
<td>03.8-12.</td>
<td>9. Histology of the tongue and airways (<em>Hanics</em>)&lt;br&gt;10. Histology of the esophagus and stomach (<em>Vereczki</em>)</td>
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<td>Week 4</td>
<td>03.29-04.02.</td>
<td>13. Microscopical anatomy of the small and large intestines (<em>Barna</em>)&lt;br&gt;14. Histology of the liver and pancreas (<em>Tóth</em>)</td>
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<td>04.05-09.</td>
<td>15. Neurulation, folding of the embryo. Body axes, left-right lateralization, asymmetry (<em>Vereczki</em>)&lt;br&gt;16. Placenta, placental circulation, fetal membranes (<em>Gerber</em>)</td>
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<td>05.03-07.</td>
<td>23. Histology of the airways. Pharyngeal arches, development of the foregut, midgut and hindgut (<em>Nagy</em>)&lt;br&gt;24. Histology of teeth I (<em>Gallatz</em>)</td>
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<td>Week 7</td>
<td>05.10-14.</td>
<td>25. Histology of teeth II. (<em>Gerber</em>)&lt;br&gt;26. Tooth development, malformations (<em>Shahbazi</em>)</td>
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<td>05.17-21.</td>
<td>27. Development of the face, malformations (<em>Gallatz</em>)&lt;br&gt;28. Parodontal tissues (<em>Gerber</em>)</td>
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<td>Week</td>
<td>Digital histology slides</td>
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<td><strong>List of slides</strong></td>
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<td><strong>Histology laboratory practices</strong></td>
<td><strong>Mondays 14.30-16.00</strong></td>
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### Week 1 (02.15-19)

#### Simple epithelial tissues
- 50. Simple squamous epithelium (endothelium, elastic artery, HE)
- 3. Simple columnar epithelium (gall bladder, HE)
- 4. Pseudostratified simple columnar epithelium (epididymis, HE)

#### Stratified epithelial tissues
- 5. Stratified squamous nonkeratinized epithelium (esophagus, HE)
- 6. Stratified squamous keratinized epithelium (palmar skin, HE)
- 7. Stratified columnar epithelium (penis, HE)
- 8. Transitional epithelium (urinary bladder, HE)

#### Glandular epithelium
- 10. Goblet cells (large intestine, HE)
- 11. Holocrine secretion (sebaceous gland, hairy skin, HE)
- 12. Apocrine secretion (prostate, HE)
- 13. Merocrine secretion (submandibular gland, HE)

### Week 2 (02.22-26)

#### Connective tissue fibres
- 14. Collagen fibres (tendon, HE)
- 15. Elastic fibers (large artery, RF)
- 16. Reticular fibers (liver, silver impregnation)

#### Differentiation between epithelial and connective tissues (hairy skin, Azan)
- 19. Embryonic connective tissue - mesenchyme (umbilical cord, HE)

#### Connective tissue cells, types of connective tissue
- 20. Connective tissue cells (scar tissue, HE) **Demonstration: 81. Cell rich connective tissue (uterus, HE)**
- 21. Mast cells (peritoneum, toluidine blue)
- 22. Fat cells – adipocytes (tongue, Sudan III.)
- 52. Blood cells (blood smear – May-Grünwald-Giemsa)

### Week 3 (03.1-5)

#### Supporting tissues
- 23. Hyalin cartilage (rib, HE)
- 24. Elastic cartilage (epiglottis, RF)
- 25. Fibrous cartilage (meniscus, HE)
- 26. Bone – cross section (Schmorl)

#### Types of ossification, bone restructuring
- 28. Endochondral ossification (phalanx, HE)
- 29. Intramembranous ossification (calvarium, HE)

### Week 4 (03.8-12)

#### Smooth, striated and cardiac muscle types
- 30. Smooth muscle – cross and longitudinal sections (Jejunum, HE)
- 31. Striated muscle – longitudinal section (HE)
- 32. Striated muscle – cross section (HE)
- 34. Cardiac muscle - cross section (HE)
- 35. Cardiac muscle - longitudinal section, Purkinje-fibers (HE)

#### Blood vessels
- 50. Elastic artery (carotid artery, HE) **Demonstration: 15. Elastic artery (RF)**
- 51. Medium-sized artery and vein (HE) **Demonstration: Muscular artery and vein (RF)**
- 34. Arterioles, capillaries, venules, (cardiac muscle, HE)

#### Peripheral nervous system
- 36. Peripheral nerve – cross section (HE) **Demonstration: Peripheral nerve (OsO4); Periph nerves in skin (HE)**
- 37. Pseudounipolar neurone (DRG, HE)
- 38. Multipolar neurones (autonomic ggl, AgNo3) **Demonstration: Myenteric plexus in the gut wall (HE)**

### Week 5 (03.15-19)

**March 15 National Holiday - NO CLASS**
<table>
<thead>
<tr>
<th>Week 6 03.22-26.</th>
<th>Gastrointestinal tract</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>53. Lip (HE)</td>
</tr>
<tr>
<td></td>
<td>54. Filiform papillae (tongue, HE)</td>
</tr>
<tr>
<td></td>
<td>56. Circumvallate papillae (tongue, HE) <strong>Demonstration: ÁOK 50. Folate papillae (tongue, HE)</strong></td>
</tr>
<tr>
<td></td>
<td>Respiratory tract</td>
</tr>
<tr>
<td></td>
<td>71. Larynx, (HE)</td>
</tr>
<tr>
<td></td>
<td>72. Trachea (HE)</td>
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<tr>
<td></td>
<td>73. Lung (HE)         <strong>Demonstration: ÁOK 61. Fetal lung (HE)</strong></td>
</tr>
<tr>
<td></td>
<td>Gastrointestinal tract</td>
</tr>
<tr>
<td></td>
<td>5. Esophagus, HE</td>
</tr>
<tr>
<td></td>
<td>61. Esophago-gastric junction (cardia) (HE)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 7 03.29-04.02.</th>
<th>Gastrointestinal tract</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>62. Stomach (fundus) (HE)</td>
</tr>
<tr>
<td></td>
<td>63. Stomach (fundus) (PAS-Congo-haematoxylin stain)</td>
</tr>
<tr>
<td></td>
<td>64. Pylorus (gastro-duodenal junction, HE)</td>
</tr>
<tr>
<td></td>
<td>65. Duodenum (HE)</td>
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<tr>
<td></td>
<td>30. Jejunum (HE)</td>
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<td></td>
<td>66. Ileum (HE)</td>
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<td></td>
<td>10. Colon (HE)</td>
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<tr>
<td></td>
<td>67. Appendix (vermiform appendix; HE)</td>
</tr>
</tbody>
</table>

| Week 8 04.05-09. | **EASTER MONDAY - NO CLASS** |

<table>
<thead>
<tr>
<th>Week 9 04.12-16.</th>
<th>Gastrointestinal tract</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>68. Liver (swine, AZAN)</td>
</tr>
<tr>
<td></td>
<td>69. Liver (human, HE)</td>
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<tr>
<td></td>
<td>16. Liver, (AgNO3 impregnation)</td>
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<tr>
<td></td>
<td>3. Gall bladder (HE)</td>
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<tr>
<td></td>
<td>70. Pancreas (HE)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 10 04.19-23.</th>
<th>Urinary system and placenta</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Kidney (HE)</td>
</tr>
<tr>
<td></td>
<td>91. Ureter (HE)</td>
</tr>
<tr>
<td></td>
<td>8. Urinary bladder (HE)</td>
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<tr>
<td></td>
<td>3. Placenta (HE)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 11 04.26-30.</th>
<th>MIDTERM TEST (written) : Histology and Embryology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male genital system</td>
<td>74. Testis (HE)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 12 05.03-07.</th>
<th>Male genital system</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>12. Prostate gland (HE)</td>
</tr>
<tr>
<td></td>
<td>75. Spermatid cord (HE)</td>
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<tr>
<td></td>
<td>76. Seminal vesicle (HE)</td>
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<td></td>
<td>7. Penis (HE)</td>
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<td></td>
<td>77. Glans penis (HE)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 13 05.10-14.</th>
<th>Female genital system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>78. Ovary (H-E)</td>
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<tr>
<td></td>
<td>79. Ovary, corpus luteum (HE) 81. Uterus, proliferation phase (HE)</td>
</tr>
<tr>
<td></td>
<td>80. Uterine tube (oviduct) (HE) 82. Uterus, secretory phase (HE)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 14 05.17-21.</th>
<th>Tooth development, salivary glands, stology of the oral cavity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>57. Developing tooth (AZAN) <strong>Demonstration: ÁOK 54 a, b. Ground tooth (unstained)</strong></td>
</tr>
<tr>
<td></td>
<td>58. Parotid gland (HE)</td>
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<tr>
<td></td>
<td>13. Submandibular gland (HE)</td>
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<tr>
<td></td>
<td>60. Submandibular gland (haematoxylin and mucicarmin stain)</td>
</tr>
<tr>
<td></td>
<td>59. Sublingual gland (HE)</td>
</tr>
</tbody>
</table>
ED I  Microscopic Anatomy 1

Topic list for the semifinal examination

General Histology
Concept of basic tissues
Definition and classification of epithelial tissue
Simple epithelia
Stratified epithelia
Glandular epithelia
Pigment epithelium, sensory neuroepithelium
Cells of connective tissue
Ground substance and fibres of connective tissue
Types of connective tissue
Blood and the corpuscular elements of blood
Histology of the bone marrow, maturation of erythrocytes and platelets
Differentiation of granulocytes, lymphocytes and monocytes
Histology of cartilage and bone tissue
Intramembranous ossification. Endochondral ossification. Growth and remodeling of bone
Smooth muscle and myoepithelial cells
Skeletal muscle tissue
Cardiac muscle tissue
Histology of arteries and arterioles
Histology of veins and capillaries

Histology of organs
Wall structure of hollow organs
General composition of parenchymal (solid/compact) organs
Histology of the lip and tongue
Histology of the respiratory tract. Larynx. Trachea. Lung
Histology of the esophagus and stomach
Histology of the small and large intestines. Fine structure of the intestinal vili, enteroendocrine system
Histology of the liver. Gall bladder, biliary ducts
Histology of the pancreas
Histology of kidney. Ureter. Urinary bladder
Histology of the male and female gonads and genital organs/ducts
Histology of the uterus (proliferative, secretory phases) menstrual cycle, vagina

General Embryology
Spermatogenesis, spermiogenesis
Oogenesis
Fertilization, cleavage of the zygote
Blastocyst formation; the bilaminar embryonic disc
Implantation
Formation of body axes
Formation of the intraembryonic mesoderm; the notochord
Neurulation (neural tube and neural crest)
Derivatives of ectoderm
Derivatives endoderm
Differentiation of the intraembryonic mesoderm
Folding of the embryo
Development of the primitive cardiovascular system
The structure and function of the placenta
Development of the fetal membranes (chorion and amnion) and the umbilical cord

**Development of internal organs**
Development of the heart, looping of the heart tube
Formation of atria, development of the interatrial septum
Formation of ventricles, development of the aorticopulmonary septum
Development of arteries
Development of the inferior vena cava
Development of the portal vein
Development of the suprior vena cava, azygos and hemiazygos veins
Fetal circulation
Development and differentiation of the midgut
Development and differentiation of the hindgut
Formation of the liver and pancreas
Development of the lower airways including the lungs
Kidney development
Development of the urinary passages
Gonadal development
Development of the male genital tract
Development of the female genital tract
Development of the male/female external genitals
Development and divisioning of the body cavities
Development of the peritoneum

**Maxillofacial Histology and Embryology**
Enamel; Amelogenesis
Dentin; Dentinogenesis
Structure of the dental papilla
Cementum (two types)
Parodontium
Gingiva – subdivisions and histology
Tooth development
Tooth eruption
Development of the mandible and maxilla
Development of the face. Formation of the nasal cavity and paranasal sinuses
Microscopic Anatomy and development of the primary and secondary palates
Microscopic Anatomy and development of the tongue
Microscopic Anatomy and development of salivary glands
Derivatives of pharyngeal pouches and grooves
Derivatives of pharyngeal arches
RECOMMENDED BOOKS

List of textbooks


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

The Developing Human – Clinically Oriented Embryology, 10th ed. by KL Moore, TVN Persaud and M Torchia, Saunders, 2015; ISBN 978032333384


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).