

Semmelweis University
Department of Anatomy, Histology and Embryology

Faculty of Medicine
1st year

ANATOMY HANDBOOK
2018



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Course Director

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Head of Department



Anatomy, Histology and Embryology for EM students

TEACHING DEPARTMENT:

SEMMELWEIS UNIVERSITY

Department of Anatomy, Histology and Embryology

Budapest, Tűzoltó utca 58.

H-1094 Budapest

<http://semmelweis.hu/anatomia>

LEARNING OBJECTIVES

Aims of the lectures in anatomy: Presentation of the important and/or complicated chapters such as introductory chapters, thorax, pelvis, hand, foot, skull, heart, chapters of the visceral organs, central nervous system, **organs of special senses, topographical anatomy.**

Aims of the lectures in cell biology and histology: Presentation of the cell, basic principles in cell biology (mitosis, cytoskeleton, cellular motility), detailed presentation of the basic tissues (epithelial, connective, muscle and nervous). Completing the gross anatomy with the detailed presentation of the fine structure of the organs, including the ultrastructural details as well as the molecular arrangement. 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 (general embryology). Presentation of the development of the organs and functional systems parallel with the gross anatomical and histological lectures including the frequently occurring malformations.

Aims of the practical sessions in the dissecting room: Based on the weekly programs the students study the preparations (bones, joints, muscles, viscera, brain) and dissect (parts of or an entire cadaver). They are aided by the lab instructors. Bones, joints, muscles and peripheral nervous system will be taught primarily in the dissecting room.

Aims of the practical sessions in the histology room: Facilitate the understanding of the basic tissues (epithelial, connective, muscle and nervous) and the fine structure of the organs through the observation and interpretation of histological specimens.

Discussion of the more complicated chapters of the embryology is presented on small group discussions connected to the practical sessions in the dissecting room.

The knowledge of the students will be checked by mid-term tests.

Lectures: first semester: 3x 45 min; second semester: 3x 45 min; third semester: 3x 45 min; fourth semester: 1x 45 min.

Topics of the lectures:

First semester: Gross anatomy of the bones, joints and muscles, basic cytology, basic histology, basic embryology, development of the skull, spine and limbs.

Second semester: Heart and vessels, lymphatic organs, viscera and body cavities; integrated gross anatomy, cytology, histology and embryology.

Third semester: Central and peripheral nervous system, organs of special senses, endocrine organs; integrated gross anatomy, cytology, histology and embryology.

Fourth semester: Topographical anatomy of the head, neck and body cavities (thorax, abdomen, pelvis), cross sectional anatomy.

Practical course

First semester: 6x 45 min; second semester: 6x 45 min;

third semester: 4x 45 min; fourth semester: 2x 45 min;

First semester: Gross anatomy of the bones, joints and muscles, basic cytology, basic histology, basic embryology, development of the skull, spine and limbs.

Second semester: Heart and vessels, lymphatic organs, viscera, topography of body cavities; integrated gross anatomy, cytology, histology and embryology. Topographical anatomy of the body cavities.

Third semester: Central and peripheral nervous system, organs of special senses, endocrine organs; integrated gross anatomy, cytology, histology and embryology. Topographical anatomy of the dorsal regions of limbs and the trunk, including spinal cord.

Fourth semester: Topographical anatomy of the head, neck and body cavities (thorax, abdomen, pelvis), cross sectional anatomy. Review of the subjects taught and studied during the four semesters.

Type of exams: first semester: semifinal; second semester: semifinal; third semester: semifinal; fourth semester: final exam from the subjects of the four semesters..

ECTS credits: four semesters together: 27 (first semester: 8; second semester: 9; third semester: 7; fourth semester: 3)

EM I ANNOUNCEMENTS

Evaluation is made using a five-grade scale (1-5).

Semester acceptance (i.e. signature): active participation in lectures, dissection room and histology lab sessions is obligatory. Students should attend at least 75% of the scheduled hours to gain a signature proving the validity of the semester. Absences are therefore limited in **25%**.

Midterm examinations: During the semester, both practical and theoretical knowledge will regularly be evaluated. The midterm tests are obligatory and cannot be done at a different time, neither can they be retaken. The anatomy and histology mid-terms may be oral or written exams. **Anatomy** mid-terms include both identification of several structures on the specimen and theoretical questions related to the subject. **Histology** midterms include the identification of a certain number of structures in slides, as well as, theoretical questions related to general embryology. The results of all tests will appear on the personal achievement cards. Absence will be recorded as 0 (zero) and calculated accordingly in the average of midterm tests.

A semester practical mark is calculated from the midterm marks together with the personal achievement mark given by the group instructor. This practical mark will be counted into the semifinal examination and will be written on the personal achievement cards.

Obligatory dissection work – every student is required to produce a fully dissected specimen during the 1st, 2nd or 3rd semester to be exempted from the dissection part of the final examination. The specimen will be evaluated by a departmental jury.

Semifinal examinations are composed of the following parts:

1. written pretest,
2. oral examination composed of practical and theoretical questions in Macroscopy and Histology i.e., identification and full description of the morphological features of the relevant body parts and; identification/description of two histological specimen. Please note, that relevant theoretical/embryological question may too arise during the practical examination parts.

Notebooks are suggested to be regularly used in **histology lab sessions** in order to prepare schematic drawings of the histological specimen in order to aid the identification of structures.

*N.B. – In case, neither the first nor the repeated takes of a semifinal exam have been successful and so the exam has to be postponed to the following exam period (i.e. 'CV' exam), only those students will be allowed to go for a **joint course registration**, parallel to continuing their studies whose average score of the midterm tests is equal, or higher than 3.00.*

RULES AND REGULATIONS IN THE DISSECTING ROOM

IT IS STRICTLY FORBIDDEN TO eat, drink, to chew a gum, or to use music devices / phones. Bags and coats should ALWAYS be left in the lockers PRIOR TO entering the dissecting room. The lockers will have to be locked using your OWN padlocks. Please, remember to keep your valuables always on you, or lock them in the lockers. The department takes no responsibility for lost items.

Students are expected to be prepared for the practical work.

Everybody is supposed to behave in the dissecting room conforming to the spirit of the site. Loud speech, out-of-place jokes and any kind of behaviour, disregarding the dignity of human corpses, should strictly be avoided.

Students should take care of the 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 strictly advise you to wear closed toed shoes and clothing covering the legs**. In the end of the class, lab coats should be emptied and left in order on the coat hangers. The department is not responsible for valuables left in the dissecting room.

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.

Photos of the black board drawings can only be made with the agreement of the lab instructor.

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 (with the exception of special workdays appearing in the schedule). 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!**

EM I.

Subject matter of the 1st semester

I. Anatomy:

1. Locomotor system:

- a) bones (osteology)
- b) joints (arthrology)
- c) skeletal muscles (myology)

2. Vessels of the upper and lower limbs

- a) branches of the brachial artery and tributaries to the brachial vein
- b) branches of the femoral artery and tributaries to the femoral vein

3. Large nerves of the limbs.

II. Basic tissues (epithelia, connective and supporting tissues, skeletal, smooth and cardiac muscle types, elements of the peripheral nervous system)

III. Human development

1. Embryonic period: from germ cells to the formation of the embryo
2. Placenta and fetal membranes
3. Development of organs system: Formation of the locomotor system

Placenta and fetal membranes

Test I.

Topics: Anatomy of the upper limb (oral)

Date: 5th study week, 2nd class of the week

Test II.

Topics: Epithelial, connective and supporting tissues together with general embryology (written 'e-learning type' test)

Date: 11th study week

Semifinal examination (oral and written examination)

Topics: Subject matter of the semester

- 1) Written 'e-learning type' pretest
- 2) Histology (2 digital slides)
- 3) Anatomy (identification of structures on true anatomical specimens including relevant theoretical questions)

Academic year 2018/ 2019 Faculty of Medicine EM I. Groups 1-8

Week	Lectures <i>Mon 8.00 - 9.40 and Fri 12.25 - 13.10</i>	Practical sessions	
		Dissection room <i>Grs 1-2-3-4-5 Mo & We Grs 6-7-8 Tue & Fri</i>	Histology laboratory <i>Friday</i>
Week 1 Sept 10-14	1. The role of anatomy, histology and embryology in the medical curriculum. Terminology 2. The cell, cellular membrane, endoplasmic reticulum 3. Cell nucleus, mitochondrium, peroxyosome	General introduction to practical work in the dissection room, tools and rules Upper limb Bones	Light and electron microscopical techniques, the principles of practical histology classes
Week 2. Sep 17-21	4. Adhesion molecules, intercellular connections, epithelial cells 5. Types of epithelia. Glandular epithelium 6. The cellular framework, microtubules, IM filaments, actin microfilaments	Upper limb Bones and joints	Simple epithelia Stratified epithelia I.
Week 3. Sept 24-28	7. Exocytosis, Golgi apparatus, vesicular transport, sorting. Endocytosis, cellular organelles. Apoptosis 8. General arthrology and myology. Joints , muscles and movements of the shoulder and the upper girdle 9. Muscles and actions of the elbow joint	Upper limb Dissection of the muscles, vessels and nerves of the flexor side	Stratified epithelia II. Glandular epithelium
Week 4. Oct 1-5	10. Joints, muscles and actions of the wrist and the hand 11. Connective tissue cells 12. Connective tissue fibres, types and formation. Extracellular matrix	Upper limb Dissection of the muscles, vessels and nerves of the flexor and extensor sides	Connective tissue I. Cells
Week 5. Oct 8-13 <i>Saturday is a workday (Monday schedule)</i>	13. The principles of cell division, differentiation. Cell cycle, mitosis, meiosis 14. Supporting tissues (cartilage, bone) 15. Ossification, bone remodelling 16. Components, muscles, joints and ligaments of the vertebral column. Intervertebral, atlantooccipital and atlantoaxial joints 17. Ribs, components and movements of the thorax. Abdominal muscles, rectus sheath	1. Upper limb Dissection of the muscles, vessels and nerves of the extensor side, dissection of joints 2. Midterm test 1 Upper limb Bones and muscles of the trunk.	Connective tissue II. Fibrous elements
Week 6. Oct 15-19	18. Muscles, fasciae and movements of the neck. Back muscles, occipital muscles 19. Bones, joints, construction of the pelvis. 20. Muscles and actions of the hip joint	Bones and muscles of the trunk. Demonstration of the muscles of the neck, back and abdomen.	Connective tissue III. Connective tissue types
Week 7. Oct 22-26	October 22-23. are holidays 21. Muscles and actions of the knee joint	Lower limb and pelvis Dissection of joints of the lower limb	Supporting tissues Cartilage, bone
Week 8. Oct 29 – Nov 2	22. Subinguinal hiatus. Inguinal canal. Adductor and femoral canals 23. Muscles and joints of the foot. Architecture of the foot November 1-2 are holidays	Lower limb Dissection of the muscles, vessels and nerves of the dorsal side	November 1-2 are holidays
Week 9. Nov 5-10 <i>Saturday is a workday (Friday schedule)</i>	24. Blood. Corpuscular elements. Red bone marrow, erythropoiesis, Formation of leukocytes 25. Muscle tissue 26. Gametes, fertilization, cleavage and blastulation 27. Implantation, bilaminar embryo. Fetal membranes, umbilical cord. Structure of the placenta, placental circulation	Lower limb Dissection of the muscles, vessels and nerves of the dorsal side Dissection of the muscles, vessels and nerves	Types of ossification Blood and red bone marrow
Week 10. Nov 12-16	28. Molecular basis for gastrulation. Formation, differentiation and derivatives of the germinal layers. 29. Neurulation, folding of the embryo. Body axes, left-right lateralization, asymmetry. 30. Formation of the primary tissues. Homeobox genes, stem cells	Lower limb Dissection of the muscles, vessels and nerves of the ventral side	Smooth, skeletal and cardiac muscle types Revision
Week 11. Nov 19-23	31. Histology of vessels. 32. Bony framework of the skull. Sphenoid and ethmoid 33. Temporal bone. Internal and external skull base	Lower limb Dissection of the muscles, vessels and nerves of the ventral side	Midterm test 2: Epithelia, connective and supporting tissue. General embryology
Week 12. Nov 26-30	34. Facial skeleton. Orbit, nasal cavity 35. Skull. Infratemporal and pterygopalatine fossae 36. Nervous tissue. Glial cells	Bones of the skull Internal and external skull bases	Vessels: arteries, veins, arterioles, venules, capillaries.
Week 13. Dec 3-7	37. Temporomandibular joint, muscles of mastication; muscles of facial expression 38. Development of the skull, fontanelles. 39. Development of the limbs and the vertebral column together with the trunk	Bones of the facial skeleton, mandible. Orbit, nasal cavity, pterygopalatine fossa Temporomandibular joint	Nervous tissue
Week 14. Dec 10-14	40. Developmental malformations 41. <i>Clinical anatomy of the musculoskeletal system</i> 42. Clinical anatomy of the musculoskeletal system	Muscles of mastication and facial expression	Placenta, umbilical cord Revision

Academic year 2018/ 2019 Faculty of Medicine EM I. Groups 9-17

Week	Lectures <i>Mon 10.00 -11.40 and Wed 13.45 – 14.30</i>	Practical sessions	
		Dissection room <i>Grs 9-10-11-12-13 Mo & Thu Grs 14-15-16-17 Mo & Fri</i>	Histology laboratory <i>Grs 9-12 Fri; Grs 14-15 Mo; Grs 13,16-17 Tue;</i>
Week 1 Sept 10-14	1. The role of anatomy, histology and embryology in the medical curriculum. Terminology 2. The cell, cellular membrane, endoplasmic reticulum 3. Cell nucleus, mitochondrium, peroxysome	General introduction to practical work in the dissection room, tools and rules Upper limb Bones	Light and electron microscopical techniques, the principles of practical histology classes
Week 2. Sep 17-21	4. Adhesion molecules, intercellular connections, epithelial cells 5. Types of epithelia. Glandular epithelium 6. The cellular framework, microtubules, IM filaments, actin microfilaments	Upper limb Bones and joints	Simple epithelia Stratified epithelia I.
Week 3. Sept 24-28	7. Exocytosis, Golgi apparatus, , vesicular transport, sorting. Endocytosis, cellular organelles. Apoptosis 8. General arthrology and myology. Joints , muscles and movements of the shoulder and the upper girdle 9. Muscles and actions of the elbow joint	Upper limb Dissection of the muscles, vessels and nerves of the flexor side	Stratified epithelia II. Glandular epithelium
Week 4. Oct 1-5	10. Joints, muscles and actions of the wrist and the hand 11. Connective tissue cells 12. Connective tissue fibres, types and formation. Extracellular matrix	Upper limb Dissection of the muscles, vessels and nerves of the flexor and extensor sides	Connective tissue I. Cells
Week 5. Oct 8-13 <i>Saturday is a workday (Monday schedule)</i>	13. The principles of cell division, differentiation. Cell cycle, mitosis, meiosis 14. Supporting tissues (cartilage, bone) 15. Ossification, bone remodelling 16. Components, muscles, joints and ligaments of the vertebral column. Intervertebral, atlantooccipital and atlantoaxial joints 17. Ribs, components and movements of the thorax. Abdominal muscles, rectus sheath.	1. Upper limb Dissection of the muscles, vessels and nerves of the extensor side, dissection of joints 2. Midterm test 1 Upper limb Bones and muscles of the trunk	Connective tissue II. Fibrous elements Saturday class for Grs 13-17 only Connective tissue III. Connective tissue types
Week 6. Oct 15-19	18. Muscles, fasciae and movements of the neck. Back muscles, occipital muscles 19. Bones, joints, construction of the pelvis. 20. Muscles and actions of the hip joint	Bones and muscles of the trunk. Demonstration of the muscles of the neck, back and abdomen.	Grs 9-12 Connective tissue III. Connective tissue types Grs 13-17 Supporting tissues Cartilage, bone
Week 7. Oct 22-26	October 22-23. are holidays 21. Muscles and actions of the knee joint	October 22-23. are holidays Lower limb and pelvis Dissection of joints	No class for Grs 13-17 Supporting tissues Cartilage, bone
Week 8. Oct 29 – Nov 2	22. Subinguinal hiatus. Inguinal canal. Adductor and femoral canals 23. Muscles and joints of the foot. Architecture of the foot 24. Blood. Corpuscular elements. Red bone marrow, erythropoiesis, Formation of leukocytes	Lower limb Dissection of the muscles, vessels and nerves of the dorsal side November 1-2 are holidays	November 1-2 are holidays No class for Grs 9-12 Types of ossification
Week 9. Nov 5-10 <i>Saturday is a workday (Friday schedule)</i>	25. Muscle tissue 26. Gametes, fertilization, cleavage and blastulation 27. Implantation, bilaminar embryo. Fetal membranes, umbilical cord. Structure of the placenta, placental circulation	Lower limb Dissection of the muscles, vessels and nerves of the dorsal side	Grs 9-12 Types of ossification Grs 13-17 Blood and red bone marrow Grs 9-12 Blood & red bone marrow
Week 10. Nov 12-16	28. Molecular basis for gastrulation. Formation, differentiation and derivatives of the germinal layers. 29. Neurulation, folding of the embryo. Body axes, left-right lateralization, asymmetry. 30. Formation of the primary tissues. Homeobox genes, stem cells	Lower limb Dissection of the muscles, vessels and nerves of the ventral side	Smooth, skeletal and cardiac muscle types Revision
Week 11. Nov 19-23	31. Histology of vessels. 32. Bony framework of the skull. Sphenoid and ethmoid 33. Temporal bone. Internal and external skull base	Lower limb Dissection of the muscles, vessels and nerves of the ventral side	Midterm test 2: Epithelia, connective and supporting tissue. General embryology
Week 12. Nov 26-30	34. Facial skeleton. Orbit, nasal cavity 35. Skull. Infratemporal and pterygopalatine fossae 36. Nervous tissue. Glial cells	Bones of the skull Internal and external skull bases	Vessels: arteries, veins, arterioles, venules, capillaries.
Week 13. Dec 3-7	37. Temporomandibular joint, muscles of mastication; muscles of facial expression 38. Development of the skull, fontanelles. 39. Development of the limbs and the vertebral column together with the trunk	Bones of the facial skeleton, mandible. Orbit, nasal cavity, pterygopalatine fossa Temporomandibular joint	Nervous tissue
Week 14. Dec 10-14	40. Developmental malformations 41. <i>Clinical anatomy of the musculoskeletal system</i> 42. Clinical anatomy of the musculoskeletal system	Muscles of mastication and facial expression	Placenta, umbilical cord Revision

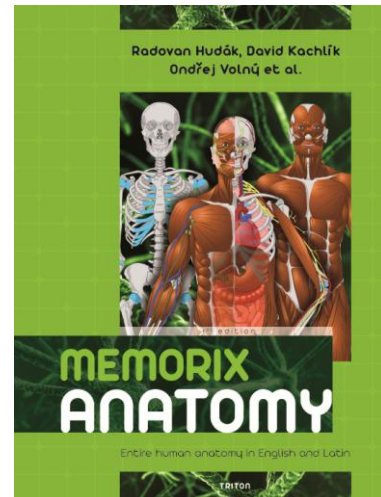
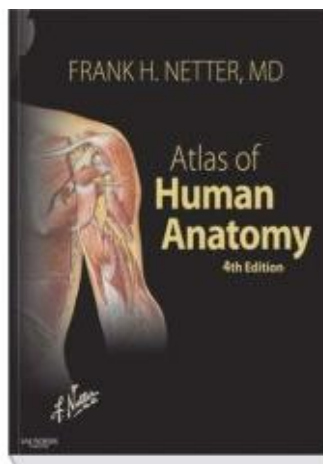
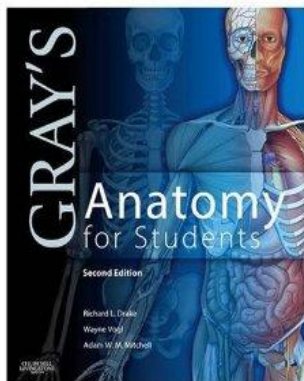
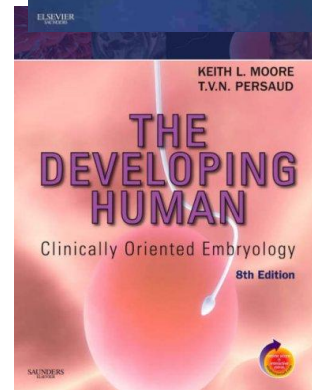
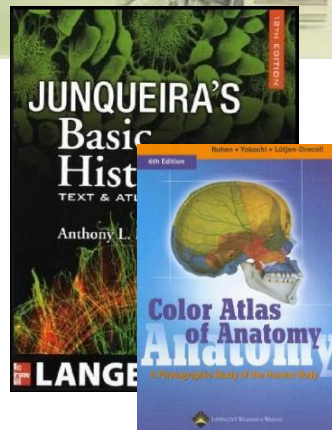
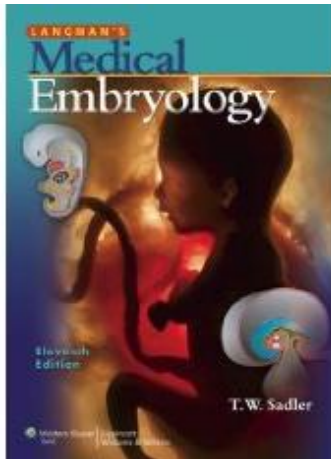
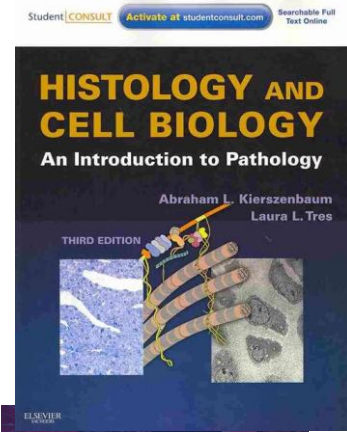
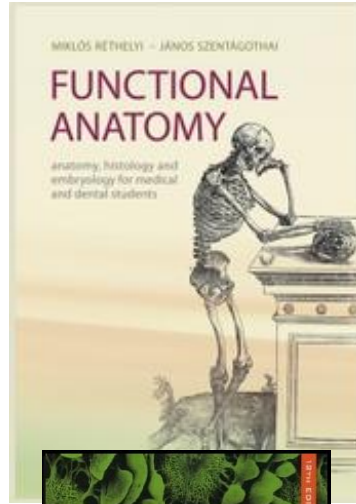
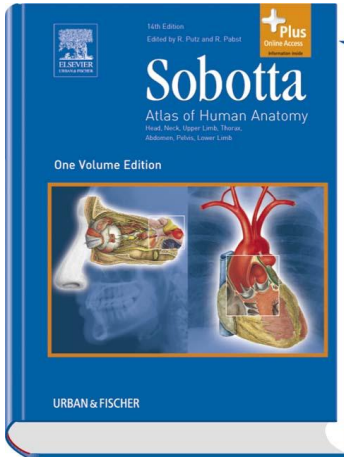
Academic year 2018/ 2019

EM I Histological specimens

Week	<p><i>Groups 1-2-3-4-5-6 Friday 10. 00-11.30; Groups 7-8-9-10-11-12 Friday 14.00-15.30; Group 13 Tuesday 9.50-11.20; Groups 14-15 Monday 12.00-13.30; Group 16 Tuesday 15.45-17.15 Group 17 Tuesday 9.50-11.20</i></p>
<p>Week 1 Sept 10-14</p>	<p>Introduction to Histology 3. Biliary vesicle: fundus & neck (human, hematoxylin eosin) 40. Lymph node (rat, semithin, toluidine blue) 57. Trachea (human, HE)</p>
<p>Week 2. Sep 17-21</p>	<p>8. Urinary vesicle (monkey, HE) 5. Esophagus: upper and middle portions (human, HE) 6. Plantar skin (human, HE) 7. Penis (human, Verhoeff's stain)</p>
<p>Week 3. Sept 24-28</p>	<p>99. Ileum (human, HE) 39. Eyelid (human, HE) 52. Submandibular gland (human, HE) 148. Axillary skin (human, HE) 11. Hairy skin (HE)</p>
<p>Week 4. Oct 1-5</p>	<p>12. Umbilical cord of a newborn (human, HE) 40. Lymph node (rat, semithin, toluidine blue) 6. Plantar skin (human, HE) 57. Trachea (human, HE)</p>
<p>Week 5. Oct 8-13</p> <p><i>Saturday is a workday (Monday schedule)</i></p>	<p>All groups 73. Liver (human, silver nitrate impregnation) 21. Aorta (orcein) 6. Plantar skin (human, HE) 87. Vagina (human, trichrome)</p> <p>----- Groups 13-14-15-16-17 have a make up class for October 22-23. 18. Tendon (human, HE) 6. Plantar skin (human, HE) 84. Uterus (human, HE) 12. Umbilical cord of a newborn (human, HE)</p>
<p>Week 6. Oct 15-19</p>	<p>Groups 1-2-3-4-5-6-7-8-9-10-11-12 18. Tendon (human, HE) 6. Plantar skin (human, HE) 84. Uterus (human, HE) 12. Umbilical cord of a newborn (human, HE)</p> <p>Groups 13-14-15-16-17 57. Hyalin cartilage, trachea (human, HE) 24. Hyalin cartilage (human costal cartilage, toluidine blue) 35. Meniscus (human, HE) 98. Auricule (human, Verhoeff's stain) 27. Ground section of a long bone (human ulna, cross section, unstained) 25. Compact bone (cross section, Schmorl's picrothionin stain) 26. Compact bone (longitudinal section, Schmorl's stain) 2. Trabecular bone (body of vertebra, HE)</p>
<p>Week 7. Oct 22-26</p> <p>October 22-23. are National holidays</p>	<p>Groups 13-14-15-16-17 have no class due to the National Holiday</p> <p>Groups 1-2-3-4-5-6-7-8-9-10-11-12 57. Hyalin cartilage, trachea (human, HE), 24. Hyalin cartilage (human costal cartilage, toluidine blue) 35. Meniscus (human, HE) 98. Auricule (human, Verhoeff's stain) 27. Ground section of a long bone (human ulna, cross section, unstained) 25. Compact bone (cross section, Schmorl's picrothionin stain) 26. Compact bone (longitudinal section, Schmorl's stain) 2. Trabecular bone (body of vertebra, HE)</p>
<p>Week 8. Oct 29 – Nov 2</p> <p>November 1-2 are National holidays</p>	<p>Groups 13-14-15-16-17 28. Intramembranous ossification (Week 17 human fetus, transverse section of developing facial cranium, HE) 31. Endochondral ossification (Week 17 human fetus, longitudinal section of developing foot, HE)</p> <p>Groups 1-2-3-4-5-6-7-8-9-10-11-12 have no class due to the National Holiday</p>
<p>Week 9. Nov 5-10</p> <p><i>Saturday is a workday (Friday schedule)</i></p>	<p>Groups 1-2-3-4-5-6-7-8-9-10-11-12 28. Intramembranous ossification (Week 17 human fetus, transverse section of developing facial cranium, HE) 31. Endochondral ossification (Week 17 human fetus, longitudinal section of developing foot, HE)</p> <p>Groups 13-14-15-16-17 37. Blood smear (May-Grünwald-Giemsa =MGG) 2. Body of vertebra containing red bone marrow (human, HE)</p> <p>Groups 1-2-3-4-5-6-7-8-9-10-11-12 have a make up class for November 1-2 37. Blood smear (May-Grünwald-Giemsa =MGG) 2. Body of vertebra containing red bone marrow (human, HE)</p>
<p>Week 10. Nov 12-16</p>	<p>99. Ileum (human, HE) 33. Skeletal muscle (Chicago Blue or iron hematoxylin) 41. Cardiac muscle (human, HE)</p>
<p>Week 11. Nov 19-23</p>	<p>MIDTERM TEST (epithelial, connective and supportive tissues AND general embryology)</p>
<p>Week 12. Nov 26-30</p>	<p>91. Large artery of elastic type (aorta, human, HE) 21a. Large artery of elastic type (aorta, human, resorcin fuchsin), 21b. Artery of elastic type (aorta, human, Movat pentachrom) 19. Medium size artery and vein (HE), 38. Medium size artery and vein (Movat), 109. Pancreas (rat, semithin, toluidine blue), 153a+b. Glomus organ (fingertip, toe, HE), 154. Vessel, pericyte (abdominal wall, HE)</p>
<p>Week 13. Dec 3-7</p>	<p>101. Non-human spinal cord (Luxol fast blue and Niss's stain) 22. Cerebral cortex (pre- and postcentralis gyrus, human, Nissl's stain) 96. Cerebellar cortex (human and/or cat; neurofilament immunocytochemistry) 100. Cerebral cortex, central sulcus (non-human ape, GFAP immunocytochemistry and H background stain) 88. Peripheral nerve (cross and longitudinal sections of the sciatic nerve, human, HE)</p>
<p>Week 14. Dec 10-14</p>	<p>12. Umbilical cord of a newborn (human, HE) 86. Immature placenta (week 6 pregnancy, human, HE) 85a. Mature (born) placenta (human, HE), 85b. Mature (born) placenta (human, cytokeratin IHC)</p>

RECOMMENDED BOOKS

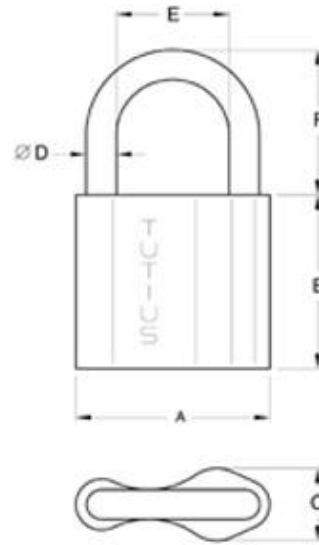
(see the complete list in the Calendar or the Departmental Homepage)



During dissection classes keep your belongings in the lockers and lock them with your padlock!

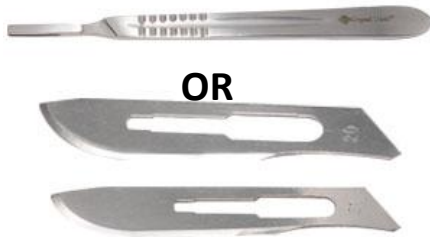
PADLOCK SIZE: 6 mm

Please, remember to keep your valuables always on you, or lock them in the lockers since the department takes no responsibility for lost items.



DISSECTION ROOM TOO

SCALPEL



A PAIR OF ANATOMICAL FORCEPS



RUBBER GLOVES



**PROTECTIVE CLOTHING
(LABCOAT)**

GOGGLES



Semester-end and examination announcements

During the last week of the semester all our students will be informed of their **dissection room mark** and whether they have gained a **signature** for the present semester. The **signature** will be inscribed in neptun only. Please note, that only those students may register for a semifinal examination whose semester is accepted (i.e., have not been refused the signature).

Dissection room marks are individually considered for each student by their group instructor, and will be calculated on the basis of the midterm marks together with personal progress, diligence, behaviour presented during the practical classes.

All midterm marks, together with the dissection room mark, will be written on the personal achievement card. The dissection room mark will be counted in the result of the semifinal examination.

Semifinal examinations will be held only Tuesdays and Thursdays during the 7 weeks of the examination period..

N.B. The last changes concerning **registration/deregistration** from a date maybe done via the NEPTUN system **48 hours prior** to the selected day.

The exams will start at 13.00

Parts of the semifinal examination

- 1) **E.learning type written test** (Anatomy, Histology and Embryology – 60% will have to be passed for a successful written test)
- 2) **Histology of the basic tissues** - 2 slides (oral)
- 3) **Dissection room examination** – prosections (oral)

Please, leave your belonging in a locker (histology floor) and gather in front of the Histology laboratory at least 15 minutes before the examination starts. Please, remember to have your

- ID
- histology note book
- pair of forceps on you.

In case of an unsuccessful examination, the 1st retake will be free of charge, while for a **second repeated exam** you will need to pay a fee ahead of the examination and present a proof of it upon entering the examination room.

*In case neither the first, nor the repeated, takes of a semifinal exam have been successful and so the exam will have to be postponed to the following exam period (as a 'CV' exam), only those students will be allowed to **jointly** register in neptun for a **CV ana1 course**, parallel to registering for the **regular ana2 course** (i.e. continuing with their studies) **whose average score of the midterm tests is equal, or higher than 3.00.***

TOPICS OF THE SEMIFINAL EXAM

Academic year 2016/2017 First semester

EM I.

Histology (for both 8 and 9 credit courses)

Description of 2 histological slides **with the help of a microscope**

Further theoretical issues related to the inspected slide

Concept of basic tissues	Differentiation of granulocytes,
Definition and classification of epithelial tissue	lymphocytes and monocytes
Simple epithelia	Histology of cartilage
Stratified epithelia	Histology of the bone tissue
Membrane specializations of epithelia	Intramembranous ossification
Glandular epithelia	Endochondral ossification
Cells of connective tissue	Growth and remodeling of bone
Ground substance and fibres of connective tissue	Smooth muscle and myoepithelial cells
Types of connective tissue	Skeletal muscle tissue
Umbilical cord and placenta	Cardiac muscle tissue
Blood and the formed elements of blood	Histology of the peripheral nervous system (sensory and autonomic ganglia)
Histology of the bone marrow, maturation of erythrocytes and platelets	Supporting cells in the peripheral nervous system
	Nerve fibers, myelin sheath
	Motor end-plate

Anatomy (for both 8 and 9 credit courses)

General osteology, classification of bones
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)
Bones of the axial and appendicular skeleton
Vertebrae, ribs, sternum
Bones of the girdles and limbs
General arthrology
Fibrous and cartilaginous joints
Components of the synovial joints
Classification of synovial joints; movements and mechanisms
Structure of the vertebral column, the gross anatomy of the muscles acting upon it
Movements and muscles of the head (atlantooccipital and atlantoaxial joints)

Joints of the shoulder girdle, the gross anatomy of the muscles acting upon them
The shoulder joint, the gross anatomy of the muscles acting upon it
The elbow joint, the gross anatomy of the muscles acting upon it
Structure and movements of the wrist (radiocarpal) joint,
the gross anatomy of the muscles acting upon it
Metacarpophalangeal and interphalangeal joints, the gross anatomy of
the muscles concerned with the movements
Carpometacarpal, metacarpophalangeal and interphalangeal joints of the thumb,
the gross anatomy of the muscles concerned with the movements
The hip joint and the gross anatomy of the muscles concerned with the movements
The knee joint and the gross anatomy of the muscles concerned with the movements
The ankle joint together with the gross anatomy of the muscles acting upon it
The subtalar and talocalcaneonavicular joints, the muscles acting upon them
The temporomandibular joint and the gross anatomy of the muscles acting on it
Architecture and classification of bones
Structure and actions of somatic muscles
Osteofibrous structure of the thoracic cage (bones, joints, ligaments, movements)
Muscles and movements of the thorax
Muscles of the back and nape (occipital region)
The axilla, the quadrangular and triangular spaces
The cubital fossa
Muscles and cross section of the arm
Muscles and cross section of the forearm
Osteofibrous spaces and muscle compartments of the hand, tendinous sheaths
Composition of the pelvis (bones, ligaments and membranes)
Muscles of the buttock, the posterior abdominal wall and the pelvis (external and internal muscles
of the hip)
Osteofibrous compartments, muscles and cross section of the thigh
Popliteal fossa
Subinguinal hiatus, vascular and muscular compartments; adductor canal, femoral canal
Osteofibrous compartments, muscles and the cross section of the leg
Structure of the foot, arches of the foot
Osteofibrous compartments of the foot, tendinous sheaths
Muscles of mastication
Superficial muscles of the neck and the muscle triangles
Deep muscles of the neck and the laminae of the cervical fascia
Muscles of facial expression

Embryology (for both 8 and 9 credit courses)

Spermatogenesis, spermiogenesis
Oogenesis
Fertilization, cleavage of the zygote
Blastocyst formation; the bilaminar embryonic disc
Implantation
Formation of the intraembryonic mesoderm; the notochord
Neurulation (neural tube and neural crest)

Differentiation of the intraembryonic mesoderm; formation and derivatives of the somites
Derivatives of the intermediate mesoderm
Lateral plate mesoderm and its derivatives
Folding of the embryo
Development of the primitive cardiovascular system, the fetal circulation
The structure and function of the placenta
Development of the fetal membranes (chorion and amnion) and the umbilical cord
Periods of embryonic / fetal life
Twin formation
Development of the limbs
Development of the vertebral column
Development of the skull
Development of the skeletal muscular system

CELL BIOLOGY TOPIC LIST

ONLY FOR OLD CURRICULUM (9 credit course) STUDENTS

General histological procedures (fixation, dehydration, embedding, cutting, rehydration, staining etc.)
Different staining methods (chemical staining, impregnation, enzyme histochemistry, immunohistochemistry)
Light and electron microscopy of cells or tissues
The general structure of eukaryotic cells
Biological membranes: structure, membrane proteins, membrane domains, glycocalyx
Functions of cell membrane, membrane transport
Structure and functions of cell nucleus.
Chromosomes, karyogram, sex chromosomes, sex chromatin
Structure, types and role of RNA, transcription
Structure and function of ribosomes, translation
Structure and function of the rough and smooth endoplasmic reticula
Structure, function of the Golgi apparatus, protein sorting
Protein secretion, exocytosis
Vesicular transport
Cytoskeleton in general
Microtubules: structure, formation and degradation, regulating factors, associated motorproteins
Structure and function of the centrosome (cytocenter), function of microtubules
Structure and role of kinocilia and the primary (sensory) cilium
Structure, regulation and associated proteins of microfilaments.
Functions of microfilaments, significance in cell trafficking processes
Intermediate filaments: structure, function, associated proteins, appearance in different cell types
Adhesion molecules (cell-cell, cell-ECM adhesion)
Cell adhesion structures

The general concept of epithelial tissue, cell polarity, membrane domains, structures that increase the surface

Structure and function of the membrana basalis as well as of the lamina basalis

Mitotic cell division

Cell cycle phases and regulation

Phagocytosis. Intracellular digestion

Lysosomes, synthesis of lysosomal enzymes, their transport pathways, functions, lysosomal diseases.

Pinocytosis. Endosome. Transcytosis.

Apoptosis, autophagy and necrosis. Differentiation, stem cells

Meiotic cell division

Morphology, function and localization of mitochondria

Mitochondrial genome, endosymbiotic theory

Peroxisome