Semmelweis University
Department of Anatomy, Histology and Embryology
2021/2022

Faculty of Medicine
1st year

MACROSCOPIC ANATOMY AND EMBRYOLOGY I HANDBOOK

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Macroscopic Anatomy and Embryology I

TEACHING DEPARTMENT:

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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 of Human Anatomy (thorax, pelvis, hand, foot, skull, heart, chapters of the visceral organs, central nervous system, organs of special senses, topographical anatomy) together with relevant chapters of Human development.

Aims of the practical sessions in the dissecting room: Based on the weekly programs (see separate), students will both observe prosected cadaver specimens (bones, joints, muscles, viscera, brain) and perform dissections on parts of, or on an entire, enbalmed cadaver.
Students are supervised by the lab instructors. Bones, joints, muscles and peripheral nervous system will be primarily taught in the dissecting room.

LECTURES: First semester: 1x 45 min; second semester: 2x 45 min.
PRACTICAL CLASSES: First semester: 6x 45 min; second semester: 7x 45 min.
ECTS CREDITS: Altogether 16 (first semester: 7; second semester: 9).
MIDTERM TESTS: Oral (*or written*)

ACCEPTENCE OF THE SEMESTER:
Active participation in dissection room sessions is obligatory for every student. Students should attend at least 75% of the scheduled hours, including the midterm tests, to gain a signature proving the validity of the semester. Absences are therefore limited in **25%**. Attendance will be recorded in the dissection room classes.
Midterm absences should be made up for on selected retake dates.

TYPE OF EXAMS: oral and written
First semester: semifinal examination, second semester: final exam
Semifinal and final examinations consist of written and oral (practical and theoretical) parts
1. Written pretest (e-learning module – access to SeKA account is obligatory)
2. Macroscopic Anatomy (identification of structures on true anatomical specimens) including relevent theoretical/embryological questions

COURSE DESCRIPTION
Macroscopic Anatomy and Embryology I.
Lectures and dissection classes
Subject matter: Macroscopy and clinically oriented anatomy of the parts of the musculoskeletal system, i.e. osteology, arthrology and myology, together with the vascular and nervous supply of the limbs and the trunk. Skull. Cavities, muscles of the Head & Neck region. General Embryology and the development of the locomotor system.
Credits: 7
Prerequisite: none

EM I. Macroscopic Anatomy and Embryology I.

Weeks	Lectures ***EM 1-6, 13, 14, 16 Wed 11.50-12.35*** ***EM 7-12, 15, 17-20 Thu 12.45-13.30***	Lecturer 1-6	Lecturer 7-12	Dissection classes *(90 minutes)* ***EM 1-6*** *Tue 8.00, Wed 12.45, Fri 10.00* ***EM 7-12*** *Mon12.00, Tue 10.00, Thur 11.00* ***EM 13-17*** *Tue 8.00, Wed 12.45, Fri 10.00* ***EM 18-22*** *Mon 10.00, Wed 14.30, Fri 12.30*
Week 1 09. 6-10.	1. General introduction, terminology	*Székely*	*Székely*	General introduction to practical work in the dissection room, tools and rules Upper limb, bones
Week 2 09. 13-17.	2. Joints and movements of the shoulder and shoulder girdle	*Alpár*	*Katz*	Upper limb Bones and joints. Dissection of the muscles, vessels and nerves
Week 3 09. 20-24.	3. Joints and movements of the elbow and the hand	*Kozsurek*	*Dóra*	Upper limb Bones and joints. Dissection of the muscles, vessels and nerves
Week 4 09.27 - 10. 1.	4. Pelvis. Joints and movements of the hip	*Kocsis*	*Csáki*	Upper limb Dissection of the muscles, vessels and nerves
Week 5 10. 4-8.	5. Joints and movements of the knee	*Alpár*	*Alpár*	Lower limb, bones and joints Dissection of joints of the lower limb
Week 6 10. 11-15.	6. Joints and movements of the foot	*Alpár*	*Altdorfer*	Lower limb Dissection of the muscles, vessels and nerves Cadaver and free limb dissection
Week 7 10. 18-22.	7. Composition of thorax, diaphragm	*Barna*	*Szél*	Lower limb and pelvis Dissection of the muscles, vessels and nerves Cadaver and free limb dissection **<u>1. Midterm test (oral)</u>:** **Upper and lower limbs including the girdles.**
Week 8 10. 25-29.	8. Composition of the abdominal wall. Inguinal and femoral canals	*Barna*	*Horváth*	Dissection of the superficial regions of the trunk (cadaver). Demonstration of the components of the body wall on prosected specimens
Week 9 11. 1-5. ***Nov. 1 National Holiday***	9. Composition and movements of the vertebral column. Muscles of the nape and the back.	*Zsiros*	*Csáki*	Dissection of the superficial regions of the trunk (cadaver). Demonstration of the components of the body wall on prosected specimens ***No dissection classes on Monday (EM 7-12, 18-20)***
Week 10 11. 8-12.	10. Gametes, fertilization, cleavage	*Székely*	*Székely*	Dissection of the trunk (cadaver). Demonstration of the components of the body wall on prosected specimens Bones of the skull. Internal and external skull bases
Week 11 11.15-19.	11. Implantation, structure of the placenta, placentar circulation. Fetal membranes	*Hanics*	*Nagy*	Internal and external skull bases Bones of the facial skeleton, mandible. Orbit, nasal cavity, pterygopalatine fossa Head and neck specimens Muscles, fasciae and movements of the neck.
Week 12 11. 22-26	12. Gastrulation, formation and derivatives of germinal layers	*Kálmán*	*Nagy*	Head and neck specimens Topography of the superficial regions Temporomandibular joint Muscles of mastication and facial expression **<u>2. Midterm test (oral)</u>** **Bones, joints, muscles, fasciae, vessels and nerves of the trunk and neck. Skull, TMJ, muscles of mastication, muscles of facial expression**
Week 13 11.29-12.3.	13. Folding of the embryo, neurulation. Body axes, cranio-caudal and dorsoventral differentiation.	*Kálmán*	*Szél*	Embryology consultations Revision Cadaver dissection Demonstration of the cavities on prosected specimen
Week 14 12. 6-10.	14. Development of the skull, vertebral column and the limbs	*Adorján*	*Nemeskéri*	Embryology consultations Revision, cadaver dissection Demonstration of the cavities on prosected specimen

EM I.

Macroscopic Anatomy and Embryology I.

Subject matter of the 1st semester

Macroscopy and clinically oriented anatomy of the parts of the musculoskeletal system

- osteology
- arthrology
- myology
- vascular and nervous supply of the limbs and the trunk
- muscles, fasciae, vessels and nerves of the head&neck region

Skull (viscerocranium, neurocranium).

General Embryology
Development of the skull, trunk and limbs.

Test I. (oral, obligatory to attend)

Topics: Gross anatomy of the upper and lower limbs together with their girdles (bones, joints, muscles, fasciae, nerves and vessels)
Date: 7th week TBA

Test II. (oral, obligatory to attend)

Topics: Bones, joints, muscles and fasciae of the trunk, vertebal coloumn, body wall
Neck muscles, cervical fasciae
Bones, spaces and connections of the skull, temporomandibular joint, muscles of mastication and facial expression
Date: 12th week TBA

Semifinal examination

Topics: Subject matter of the semester

1) **Written 'e-learning type' pretest**

2) **Practical examination including theoretical questions** (oral examination)
Gross anatomy of the musculoskeletal system including the skull together with embryological relevances.

EM I. Announcements

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

Semester acceptance (i.e. signature): active participation in dissection room lab sessions (**including mid-term tests**) 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. Attendance (but not a successful passing of the midterm) is obligatory at the two mid-term tests. Students absent from the mid-term test should reattend at a given timepoint or their semester will not be accepted. The midterms are held in the dissection room, and composed of identification of several structures on the specimen togethre with theoretical questions related to the subject.

Cadaver preparation / dissection work – every student is required to produce a fully dissected specimen during the 1st or the 2nd semester to prove excellence and to be exempted from the dissection part of the final examination. The specimen will be evaluated by a departmental jury (TBA).

Semifinal examinations

Written pretest (Macroscopical Anatomy and Embryology questions)

Qral (practical) examination - identification and full description of the morphological features of

body parts including theoretical/developmental relevances.

Exemptions - if the average of the two midterm marks is at least 4.00, students are offered to be exempted from the oral (dissection) part of the semifinal examination with the following marks: good (4) - if the midterm results are 4+4 or 3+5; excellent (5)- if the midterm results are 4+5 or 5+5. These students only need to take the written part of the semifinal examination.

Please note that only marks from the first, official, attempt are counted in, marks earned at the retake midterm are not considered. Furthermore, the result of the first attempt cannot be improved by taking the retake midterm.

Students may request an oral examination to replace the written theoretical part for the 2nd or 3rd retakes of the semifinal examination. The request will have to be submitted in writing with the Course Director 48 hours prior to the date of the examination.

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, 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 to protect one's clothing from contacting the cadaver specimen. 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 from the lab instructor. Students can leave the sessions only with the approval of the lab instructor.

It is strictly prohibited to make recordings 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.

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.

WORK / ENVIRONMENTAL PROTOCOL AND INFECTION CONTROL

GENERAL RULES

1. Please keep a **1.5 -2 m social distance** towards everybody.
2. Do not touch, or come into close contact with, other people (e.g., no handshakes).
3. Frequently wash your hands using soap and warm water.
4. Sanitise your hand frequently.
5. Do not touch your face or eye.
6. It is **STRICTLY FORBIDDEN** to consume food, drinks or chewing gum **anywhere** on the premises of the department (including lecture halls, dissection rooms, histology laboratories or on the hallways, staircases.
7. Use paper tissues in case you cough or sneeze and dispose of them immediately in the designated bins.

SPECIFIC RULES CONCERNING THE HISTOLOGY LABORATORIES

1. Use hand sanitizers upon entering.
2. You may clean the surfaces with wet towels before you start using them.
3. Food and drinks are **strictly forbidden** on the premises of the department.

SPECIFIC RULES CONCERNING THE DISSECTION ROOMS

1. Lab coats (buttoned up) must be worn in the dissecting room at all time.
2. Use hand sanitizers upon entering. Rubber gloves are provided for dissection.
3. Loose/long hair must be tied back before dissection.
4. Food and drinks are **strictly forbidden** on the premises of the department.
5. Only books, sketch, or notebooks, atlases and dissection tools (as well as ID, cards, phones etc) to be used during the dissection classes are allowed in the labs. All other items should be left in the lockers.
6. Have your own padlock on you to lock your stuff and/or clothes in the lockers
7. No valuable items should be left in the lockers, the department does not bear the responsibility for lost items/valuables.
8. Scalpels, blades and tweezers will have to be carried in a tightly closed and hard box. Please make sure that nobody is harmed when working with the sharp and pointed tools.
9. Accidents must be reported to the teacher first and wounds will be dressed with the help of the dissection room assistants.
10. Lab coats and rubber gloves are to be worn in the dissection room units only! Do not step out (not even for using the washroom) from the dissection unit while still wearing a lab coat.
11. It is strictly forbidden to take bones or other anatomical specimens or samples etc. from the dissecting room.
12. Dry and wet samples must be treated separately. Please wash the gloves during dissection before you start handling bones or dry /plastinated specimen.

13. There is a bell ringing 5 minutes before the end of the practical classes. Then all cadaver specimens will have to be properly wrapped and put away in their bags or boxes.
14. Dissection leftovers should be discarded in the special containers and the trays should be left clean and dry.
15. Dissection tools should be properly washed.
16. Disposable scalpels/blades could be disposed of **in special yellow/red containers designed for sharps and hazardous material**. Gloves must be discarded in labelled bins only, but NEVER in communal/paper waste!
17. The dissection unit may only be left following a thorough handwash using a disinfectant soap.
18. Please make sure that you leave the dissecting room quickly to provide time for the personnel to clean the surfaces between classes.

FIRE SAFETY PROTOCOL

Please make sure to adhere to the rules of fire safety regulation with full compliance, paying special attention to the following:

1. The use of naked light or smoking is **STRICTLY PROHIBITED** on the premises of the Department, including the building and the yard.
2. In case of fire, a loud fire alarm signal is to ring throughout the building. In case of a fire drill, the building must be left organized, with the guidance of the teacher/instructor of the group, using the exits as quick as possible. Escape routes are illustrated on every floor.
3. The use of elevators is STRICTLY PROHIBITED during a fire drill.
4. Every lecture room has 3 accessible entrances/exits. Students usually enter and leave through the lower single entrance under normal circumstances. When necessary, i.e. in case of fire, the upper 2 doors could also be opened using the keys kept in the fire cassettes next to the doors.
5. All fire cases or signs/ suspicion of a possible fire should be reported to the teacher of the group.
6. No electrical devices should be plugged in a connector different from the designated ones. Only electrical devices in an intact and perfect condition should be used.

LIST OF TEXTBOOKS

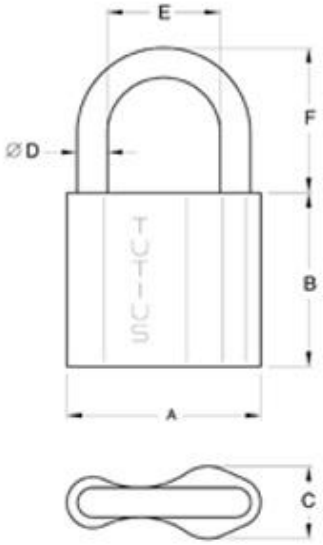
Sobotta Atlas of Human Anatomy (Package), 15th English ed. Musculoskeletal system, internal organs, head, neck, neuroanatomy, By Waschke & Paulsen, ISBN-13: 9780702052507 2013
Gray's Anatomy for students with STUDENT CONSULT Online Access, 3rd Edition by R. Drake, A. W. Vogl, A. Mitchel, Elsevier; 2014; 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.
Fitzgerald's Clinical Neuroanatomy and Neuroscience, 7th Edition, Elsevier, 2015.

Recommended textbooks

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.
KL Moore–AF Dalley: Clinically Oriented Anatomy. 4th ed. Lippincott William and Wilkins, 1999.
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: 9780702030864
Functional Anatomy Anatomy, Histology and Embryology for medical and dental students by M. Réthelyi and J. Szentágothai, Medicina, 2018.

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

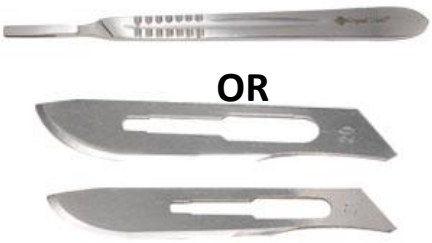
PADLOCK SIZE: 6 mm



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

DISSECTION ROOM TOOLS

SCALPEL

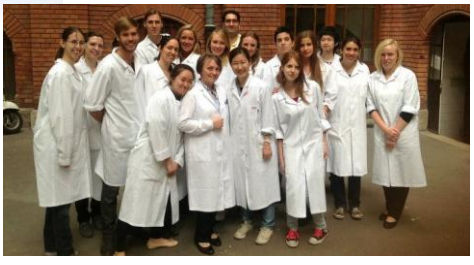


OR

A PAIR OF ANATOMICAL FORCEPS

RUBBER GLOVES

PROTECTIVE CLOTHING (LABCOAT)



GOGGLES

TOPICS OF THE SEMIFINAL EXAMINATION

Macroscopic Anatomy And Embryology I.

Musculoskeletal Anatomy

General osteology, classification of bones
Continuous connections of bones. Classification of joints; components, movements and mechanisms
General myology
Structure of the vertebral column, the gross anatomy of the muscles acting upon it
Movements and muscles of the head&neck (atlantooccipital and atlantoaxial joints)
Joints of the shoulder girdle, the gross anatomy of the muscles acting upon them
Shoulder joint, the gross anatomy of the muscles acting upon it
Axillary fossa, quadrangular and triangular spaces
Muscle compartments and cross section of the arm
Elbow joint, the gross anatomy of the muscles acting upon it. Cubital fossa
Muscles and cross section of the forearm
Structure and movements of the radiocarpal joint, gross anatomy of the muscles acting upon it
Osteofibrous spaces and muscle compartments of the hand, tendinous sheaths
Carpometacarpal, metacarpophalangeal and interphalangeal joints of the thumb and fingers, the gross anatomy of the muscles concerned with the movements
Osteofibrous structure of the thoracic cage (bones, joints, ligaments, movements)
Thoracic muscles
Diaphragm
Muscles and spaces of the abdominal wall, rectus sheath
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)
Inguinal canal, femoral canal
Subinguinal hiatus, vascular and muscular compartments; adductor canal, femoral canal
Hip joint and the gross anatomy of the muscles concerned with the movements
Osteofibrous compartments, muscles and cross section of the thigh
Knee joint and the gross anatomy of the muscles concerned with the movements. Popliteal fossa
Osteofibrous compartments, muscles and the cross section of the leg
Ankle joint together with the gross anatomy of the muscles acting upon it
Subtalar and talocalcaneonavicular joints, the muscles acting upon them
Osteofibrous compartments and structure of the foot, arches of the foot
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)
Temporomandibular joint and the gross anatomy of the muscles of mastication
Superficial muscles of the neck, muscle triangles
Deep muscles of the neck and the laminae of the cervical fascia
Muscles of facial expression

Further topics with relevence to the musculoskeletal system

Lymphatic drainage of the thoracic wall including the mamma
Dorsal branches of the spinal nerves, intercostal nerves
Cervical plexus, brachial plexus, lumbar plexus, sacral plexus.
Innervation of limbs
Innervation of the trunk
Cutaneous innervation
Axillary artery and branches. Arteries and veins of the arm, forearm, and hand
Arteries and veins of the lower limb
Lymph nodes and lymphatic drainage of the upper and lower limbs

General Embryology and development of the musculoskeletal system

Spermatogenesis, spermiogenesis
Oogenesis
Fertilization, cleavage of the zygote
Blastocyst formation; the bilaminar embryonic disc
Implantation
Formation of body axes, parts of the early embryo (yolk sac, amnion, chorion, body stalk)
Gastrulation
Formation of the intraembryonic mesoderm; the notochord
Neurulation (neural tube and neural crest)
Derivatives of ectoderm, endoderm and mesoderm
Folding of the embryo
The structure and function of the placenta
Development of the fetal membranes (chorion and amnion), umbilical cord
Twin formation
Membranous and cartilaginous neurocranium and viscerocranium
Development of the limbs and vertebral column
Development of the muscular system