Semmelweis University
Department of Anatomy, Histology and Embryology

Faculty of Dentistry
1st year 1st semester

MACROSCOPIC ANATOMY AND EMBRYOLOGY I HANDBOOK
September 2025

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Macroscopic Anatomy and Embryology for Dentistry students

TEACHING DEPARTMENT:

SEMMELWEIS UNIVERSITY
Department of Anatomy, Histology and Embryology
Budapest, Tűzoltó utca 58. (closed for reconstruction works)
H-1094 Budapest
http://semmelweis.hu/anatomia

Departmental offices are found in the City Corner Building, Üllői út 25.

Macroscopic Anatomy **Lectures** are held in the EOK Building (Szentgyörgyi and Hevesi lecture halls)

Macroscopic Anatomy **dissection classes** are held in the container units at Tűzoltó u. 58.

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 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.
Embryology describes the intrautrine development of a human embryo/fetus and introduces the development of the organ systems.

LECTURES: First semester: 1x 45 min; second semester: 3x 45 min.
PRACTICAL CLASSES: First semester: 5 x 45 min; second semester: 5 x 45 min.
ECTS CREDITS: Altogether 14 (first semester: 6; second semester: 8).
MIDTERM TESTS: Oral
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 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. Successful passing of at least one of the midterm tests.

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 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 (viscerocranium, neurocranium). Cavities, muscles of the head & neck region. Macroscopy of the brain and spinal cord, membranes (dura, arachnoid and pia mater). General Embryology describes the intrautrine development of a human embryo/fetus and introduces the development of the locomotor system.
Credits: 6 **Prerequisite:** none

Academic Year 2025/2026
Faculty of Dentistry

ED I. Macroscopic Anatomy and Embryology I.

Weeks	Lectures *Wednesday 14.30 -15.15 Szentgyörgyi lecture room*	Lecturers	Dissection room classes (containers) *Mondays 16.00-17.45 and Thursdays 13.00-15.00*
Week 1 09. 8-12.	1. The role of anatomy in the medical curriculum. Terminology. General arthrology and myology	Gerber	General introduction to practical work in the dissection room, tools and rules. Anatomical planes and directions Bones of the upper limb and the girdle, shoulder joint
Week 2 09. 15-19.	2. Clinical anatomy of the upper limb	Lendvai	Muscles of the upper limb/girdle. Dissection Elbow joint
Week 3 09. 22-26.	3. Clinical anatomy of the lower limb	Shahbazi	Muscles of the elbow joint Joints and muscles of the hand
Week 4 09. 29 – 10.03.	4. Gametes, fertilization, cleavage, blastulation	Székely	Dissection of the muscles, vessels and nerves of the upper limb (branches of the axillary a+v, brachial plexus) Lower girdle, pelvis, hip joint, bones of the lower limb
Week 5 10. 06 – 10.	5. Implantation, structure of the placenta, placentar circulation. Fetal membranes	Tóth	Lower limb, knee joint + muscles. Bones, joints and ligaments of the foot Femoral artery, veins of the lower limb Cadaver and free limb dissection
Week 6 10. 13-18.	6. Gastrulation, formation and derivatives of germinal layers. Folding of the embryo. Body axes, cranio-caudal and dorsoventral differentiation.	Kozsurek	Sacral plexus, lumbar plexus Cadaver and free limb dissection **Midterm test 1 (oral, obligatory)** **Upper and lower limbs**
Week 7 10. 20-24. ***Oct. 23-24 are National Holidays***	7. Components, muscles, joints, ligaments and movements of the vertebral column. Ribs, components and movements of the thorax. Diaphragm	Rácz	Bones, joints, ligaments and muscles of the vertebral column Muscles of the trunk, components of the body wall, rectus sheath, hernia canals, Diaphragm Bones and spaces of the skull ***No dissection class on Thursday***
Week 8 10. 27 - 10.31.	8. Components of the abdominal wall. Rectus sheath. Subinguinal hiatus. Inguinal canal. Adductor and femoral canals	Vereczki	Internal and external skull bases Development of the skull Embryology consultation
Week 9 11. 3-7.	9. Bony framework of the skull: spaces of the viscerocranium.	Shahbazi	Bones and spaces of the skull Facial skeleton, mandible. Orbit, nasal cavity, pterygopalatine fossa Embryology consultation
Week 10 11. 10-14.	10. Introduction to the study of the nervous system. General organization of the central and peripheral nervous systems. Macroscopy of the telencephalon, diencephalon.	Székely	Dissection of the brain, dural spaces Morphology of the brain. Blood supply, meninges, sinuses. Extra- and intracerebral CSF spaces, ventricles.
Week 11 11. 17-21.	11. Blood supply to the brain. Meninges, CSF, ventricles	Papp online	Morphology of the brain. Blood supply, meninges, sinuses. Extra- and intracerebral CSF spaces, ventricles.
Week 12 11. 24-28.	12. Macroscopy of the brain stem, cerebellum and spinal cord.	Gerber	Dissection of the brain Morphology of the spinal cord
Week 13 12. 1–5.	13. Neurulation. Development of the central nervous system, brain vesicles.	Kozsurek	Dissection of the brain, frontal sections **Midterm test 2 (oral, obligatory)** **Skull, morphology of the CNS, macroscopy of the trunk**
Week 14 12.8-12.	14. Development of the skull, vertebral column and the limbs	Gerber	Revision, embryology consultation

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 (except for the muscles of mastication, facial expression and neck muscles)
- vascular* and nervous supply of the limbs and the trunk
  *(*arteries starting from the brachial or femoral arteries)*

Skull (viscerocranium, neurocranium).

Macroscopy of the brain and spinal cord

- blood supply
- meninges (dura, arachnoid and pia mater).

General Embryology

ANNOUNCEMENTS

Semester acceptance (i.e. signature):

1. Active participation in dissection room lab sessions is obligatory. Students should attend at least **75% of the scheduled hours**, including the obligatory midterm tests, to gain a signature proving the validity of the semester. Absences are therefore limited in **25%**.
2. At least one of the two midterm tests should **be successful (with at least a mark 2**).

MIDTERM TESTS

During the semester, both practical and theoretical knowledge will regularly be evaluated. Anatomy midterms are held as **oral/practical tests**. The test will include both identification of several structures on the specimen and theoretical questions related to the subject. The results of all tests will appear on the personal achievement cards.

Midterm tests are obligatory tests, they can only be done on the day specified previously, and they cannot be upgraded. Attendance at, and the **passing of at least one of the midterm** tests is obligatory. Missed and unsuccessful midterms will have to be made up for / retaken during the following weeks (TBA).

Midterm I.

Date: 6th week (Thursday class)
Topics: Gross anatomy of the limbs, together with their girdles
Bones, joints, muscles and fasciae, action, innervation, blood supply

Midterm II.

Date: 13th week (Thursday class)
Topics: Skull, bones and spaces
Macroscopy and development of the brain and spinal cord
Muscles of the trunk (body wall); Diaphragm

- Students earning a **4 or a 5 in the officially timed midterm tests may request an exemption** from the relevant practical part of the semifinal examination in case the mark was **earned on the official midterm date (retakes will not be counted in). Please note, that exemptions can only be earned in the following two topics:**
    1. limbs (1st midterm)
    2. muscles of the trunk, diaphragm (2nd midterm)

Every student will have to be examined from the topics of the head&neck region (skull, CNS)

SEMIFINAL EXAMINATION

Topics: Subject matter of the 1st semester

Semifinal examinations are composed of the following parts:

1. **written pretest** (e-learning type; moodle)
2. **oral examination** – every student irrespective of the result of the written test is going to sit for an oral examination, which is composed of practical questions in Macroscopy to prove sufficient knowledge in the identification and full description of morphological features of relevant body *parts (skull; macroscopy of the CNS, and, **unless exempted**, limbs; muscles of the body wall, diaphragm)*

   Please note, that relevant theoretical and Embryology questions may arise during the practical examination parts.

Cadaver dissection *– every students is required to produce a fully dissected specimen during the 1st or the 2nd semester to prove excellence and **be exempted from the dissection part of the final examination**. The specimen will be evaluated by a departmental jury. Only those students may register for a final examination who have finished their preparatory work and it was approved by the departmental committee.*

RULES AND REGULATIONS IN THE DISSECTING ROOM

Dissection room classes are held in the container units located next to the Anatomy building in Tűzoltó utca.

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. The **white lab coats** should be worn while in the dissection room, to protect one's clothing from contacting the cadaver specimen.

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.

Only the members of the study group can participate in the sessions, visitors are not invited. Students can leave the sessions only with the approval of the lab instructor.

No photos, recordings or videos are to be made in the dissection room. Students not complying with the rules will be noted and a disciplinary procedure will be followed.

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 a lab instructor.

Furthermore IT IS STRICTLY FORBIDDEN TO eat, drink, to chew a gum, or to use music devices.
Bags and coats are stored separate from the labcoats inside the container unit.
SMOKING IS STRICTLY FORBIDDEN on the premises.
Please, remember to keep your valuables always on you. The department takes no responsibility for lost items.

WORK / ENVIRONMENTAL PROTOCOL AND INFECTION CONTROL

GENERAL RULES

1. Frequently wash your hands using soap and warm water.
2. Sanitise your hand frequently.
3. Do not touch your face or eye.
4. 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).
5. Use paper tissues in case you cough or sneeze and dispose of them immediately in the designated bins.

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.
6. No valuable items should be left around, the department does not bear responsibility for lost items/valuables.
7. 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.
8. Accidents must be reported to the teacher first and wounds will be dressed with the help of the dissection room assistants.
9. 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.
10. It is strictly forbidden to take out bones or other anatomical specimens or samples etc. from the dissecting room.
11. Dry and wet samples must be treated separately. Please wash the gloves during dissection before you start handling bones or dry /plastinated specimen.
12. 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.
13. Dissection leftovers should be discarded in the special containers and the trays should be left clean and dry.
14. Dissection tools should be properly washed.
15. Disposable scalpels/blades could be disposed of **in special yellow/red containers designed for sharps and hazardous material**. Gloves must be discarded in the pedal bins only, but NEVER in communal/paper waste!
16. The dissection unit may only be left following a thorough handwash using a disinfectant soap.
17. 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

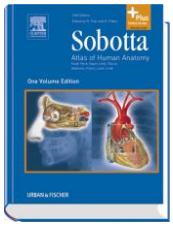
Please make sure to adhere to the rules of fire safety regulation with full compliance, paying special attention to the following:

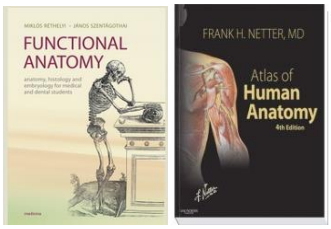
1. The use of naked light or smoking is **STRICTLY PROHIBITED** on the premises of the Department, including the building and the yard.
2. In case of fire, a loud fire alarm signal is to ring throughout the building. In case of a fire drill, the building must be left organized, with the guidance of the teacher/instructor of the group, using the exits as quick as possible. Escape routes are illustrated on every floor.
3. All fire cases or signs/ suspicion of a possible fire should be reported to the teacher of the group.
4. 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.

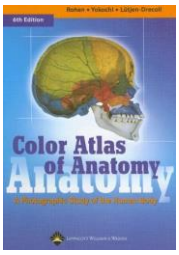
LIST OF TEXTBOOKS

Sobotta's 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
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
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.
Oral Anatomy, Histology and Embryology, 4th Edition, by B. Berkovitz Paperback with STUDENT CONSULT Online Access and e-book ISBN: 9780723434115 Copyright: 2009
McMinn's Color Atlas of Head and Neck Anatomy, by Logan, Reynolds, Rice & Hutchings, 5th Edition, Elsevier 2016
Functional Anatomy, Histology and Embryology for medical and dental students by M. Réthelyi and J. Szentágothai, Medicina, 2018.
The Developing Human – Clinically Oriented Embryology, 10th ed. by KL Moore, TVN Persaud and M Torchia, Saunders, 2015; ISBN 9780323313384

Illustrated Dental Embryology, Histology, and Anatomy, 3rd Edition by Mary Bath-Balogh ISBN: 9781437717303, 2011.
Netter's Head and Neck Anatomy for Dentistry, 3rd Edition, Elsevier, 2016.
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
Neuroanatomy An Illustrated Colour Text, 4th Edition by Crossman & Neary Publication Date: 13/04/2010 ISBN-13: 9780702030864
Langmann's Medical Embryology, 13th Edition by TW Sadler, Wolters Kluwer, ISBN 9781469897806, 2014
Further study aids:
To be downloaded from the homepage of the Department of Anatomy, Histology and Embryology (http://semmelweis.hu/anatomia) or from Moodle.







DISSECTION ROOM TOOLS

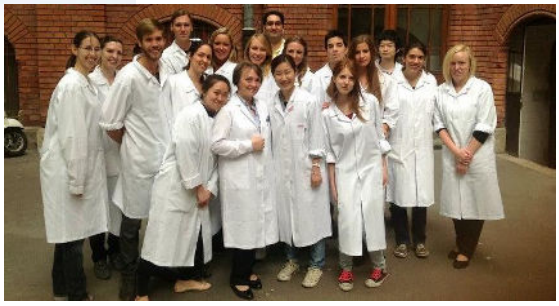
SCALPEL

OR

A PAIR OF ANATOMICAL FORCEPS

RUBBER GLOVES

PROTECTIVE CLOTHING (LABCOAT)



GOGGLES

GENERAL OUTLINE OF THE SEMIFINAL EXAMINATIONS
in

MACROSCOPIC ANATOMY AND EMBRYOLOGY I (*new curriculum*)

Semifinal examinations will start ***as seen in neptun***
in the Histology Laboratories (written part) then continue with the dissection part

REGISTRATION ISSUES

Registration has to be done in neptun according to the Study and Examination Policy. Registration closes 24/23 hours before the actual examination time announced in neptun.

Absences – no-show at the semifinal examination reduces the remaining examination possibilities and Students will have to pay a missed examination fee via neptun.
In case of health problems, students will have to present a **doctor's note within 3 working days** to be evaluated by the Head of Department. If accepted, the number of the student's examination possibilities will not be reduced.

On the day of the examination, leave your bags in a locker and gather in front of the Histology lab 10 minutes before starting time. Please make sure you have the following items on you:

ID card/student card (you may not start the examination **without** it**)**
SeKA login details *(*memorize or write them down on a small piece of paper*) **
a pair of anatomical forceps for the Macroscopy part
in case of a retake exam – proof of payment *(except for the 1st retake)*

*Students who cannot login /forgot their password will be considered as „absent" (see above) and have to sit for the examination on a different day

Phones and smart watches have to be stored elsewhere during examinations. Neither pens+papers may be with you during the written part. You cannot take notes or talk to your peers during the examination. Students found to use such items or breaking the aforementioned rules will be immediately suspended, the case recorded and the examination is terminated with a fail (1).

For safety reasons you may keep your valuables (money, cards, IDs, etc) on you, however „large" items, such as phones (switched off), tablets (switched off) and pencil cases will be collected upon entering the examination room.

No chewing gum, no food, no drinks are allowed while on the premises

PARTS OF THE SEMIFINAL EXAMINATION

WRITTEN PART – Histology laboratory **(Students may not leave the room during the test)**
The test is composed of 40 simple / multiple choice questions including Embryology (20%)
Writing time: 40 minutes
Passing rate: 50% (below 50% =fail, 50% =satisfactory, 65% =average, 75% =good, 85% =excellent

Following the completion of the test Students may view their results, however, neither questions may be asked nor notes may be taken during this time. Students may not leave the room before the inspection time expires.
IRRESPECTIVE of the result of the written test, students may continue with an oral examination.

Students failing the examination in a subsequent practical part may be exempted from the written test during the retake examination ***ONLY*** if they gained a good (4), or excellent (5), result from the written test. These tudents should present themselves at 13.00 on the day of the retake examination at the Lenhossék lecture room.

MACROSCOPY PART

This part is held in the Lenhossék Lecture Hall. Rubber gloves and labcoats are provided by the department. Here the Students are examined on prosections in the following topics:

- Upper and lower limbs
- Trunk (thorax and abdomen including the inguinal canal)
- Head and neck (including the skull)

Further questions, other than the identification of the presented specimens, may arise, e.g. discussing theoretical or embryological relevances. Students may be asked to produce schematic drawings of certain regions as part of the examination.

EXEMPTIONS – see above

MARKING SYSTEM

The examination finishes in the Lecture Hall, where Students are given a mark calculated from the all results.

- If one part of the **practical** examination results in fail (1), the entire examination is terminated with a fail (1).
- In case the result of one of the parts is **1/2**, the overall result of the examination CANNOT be better than a pass (2). This mark can only be earned once during the examination.
- **Students failing the examination, may repeat the exam once „free", every further attempt will be charged for.** The total number of examination seats is set (200% of the number of students in a given course), therefore the number of examination seats will not be increased*.
- **Retake of a successful examination -** students unhappy with the result of the examination may apply in writing with the Course Director, to retry the examination. They will be registered by the Course Director in neptun. ***Please note, that such a retake examination does not necessarily result in a better mark.***
- **Technical problems** concerning registration or deregistration via the neptun system are beyond the scope of the Department, Students should seek help from the neptun group of the Secretariat.
- The Registrar of the English Secretariat is not entitled to register or deregister students with the only exception of using the 4th chance upon getting the Dean's permission.

If neither of the attempts is successful, Students may postpone the remaining examination chances to the following semester end as a ***CV exam***

TOPICS OF THE SEMIFINAL EXAMINATION

Musculoskeletal Anatomy

General osteology, classification of bones
Continuous connections of bones. Components and classification of joints
General myology
Structure and movements of the vertebral column, the gross anatomy of the muscles acting upon it
Movements and muscles of the head&neck (atlantooccipital and atlantoaxial joints)
Osteofibrous structure of the thoracic cage (bones, joints, ligaments, movements)
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
Muscles and cross section of the arm
Muscles and cross section of the forearm
Elbow joint, the gross anatomy of the muscles acting upon it
Cubital fossa
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
Muscles, joints and movements of the fingers
Composition of the pelvis (bones, ligaments and membranes)
Hip joint and the gross anatomy of the muscles concerned with the movements
External and internal muscles of the hip, supra- and infrapiriform hiatuses.
Osteofibrous compartments, muscles and of the thigh
Knee joint and the gross anatomy of the muscles concerned with the movements. Popliteal fossa
Subinguinal hiatus, vascular and muscular compartments; adductor canal, femoral canal
Osteofibrous spaces and muscle compartments and cross section of the leg (crus)
Ankle joint together with the gross anatomy of the muscles acting upon it
Subtalar and talocalcaneonavicular joints, the muscles acting upon them
Structure of the foot, arches of the foot
Diaphragm
Muscles and spaces of the abdominal wall, rectus sheath
Inguinal canal, femoral canal
Pelvic floor (muscles); urogenital diaphragm, perineal muscles
Components and connections of the anterior, middle and posterior cranial fossae.
External skull base, connections
Walls and connections of the orbit
Walls and connections of the nasal cavity
Oral cavity, temporal and infratemporal fossae
Walls and connections of the pterygopalatine fossa

Macroscopy of the nervous system

Blood supply to the brain, meninges, CSF
Hemispheres, lateral ventricles, diencephalon, the 3rd ventricle
Brain stem, cerebellum, the 4th ventricle, spinal cord
Frontal sections of the brain
Dorsal branches of the spinal nerves, intercostal nerves
Cervical plexus
Brachial plexus
Lumbar plexus
Sacral plexus

General Embryology

Gametes and fertilization
Cleavage of the zygote
Blastocyst formation; the bilaminar embryonic disc
Implantation
Major parts of the early embryo (primary and secondary yolk sacs, amnion, chorion, chorionic cavity, 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
Development of the fetal membranes (chorion and amnion)
The umbilical cord
Placenta (structure and formation)
Twin formation
Development of the skull
Development of the vertebral column and limbs
Development of the musculoskeletal sy