

Regional Human Anatomy (HBA 461/561/540): Course Objectives

This is a 5-credit course that consists of 1-hour lectures followed by 3-hour labs. It is organized into three **modules** (see syllabus):

- Module I: Thorax and abdomen—12 lectures, 36 hours of lab
- Module II: Head and neck—11 lectures, 33 hours of lab
- Module III: Limbs—10 lectures, 30 hours of lab

General Organization

In **lecture**, major anatomical topics are covered, but students are additionally responsible for readings in the textbook (*Core Concepts in Anatomy*) as well as for material provided to them in handouts or as files posted on the class web page. PDFs of all PowerPoint presentations are made available to the students prior to lectures on the class web page.

For the **laboratories**, the students are organized in groups of five or six and perform whole-body dissections following instructions found in *Grant's Anatomy Lab*, a customized online dissector. During dissections, students are assisted by faculty, graduate, and medical student teaching assistants. X-rays, CT scans, and MRI images are made available in lab as well as on the class web page, and identification of major structures is required. A list of essential structures is posted for each module for self-study. The teaching staff assists in case of questions. During dissection of the thorax and abdomen, students are asked to identify abnormalities and pathologies in the body that they dissect. Students are responsible for all dissected structures, not only from their own dissections, but also in cadavers dissected by others, the listed structures on X-rays and scans, and all bones of the human skeleton and their major topography.

Groups of two to three students each share a **bone box** with the bones of one half of a human skeleton. These boxes are signed out by students at the beginning of the course, and they are allowed to take them home for the duration of the course.

Each module has a short **quiz** roughly at the mid-point and a major **examination** at the end. Quizzes consist of a written part (with ~15 multiple choice questions), and a laboratory part (with ~ 25 IDs) in which structures that are marked on cadavers, X-rays, and bones must be identified. Quizzes do not count toward students' grades. Exams count for 100 points each (50 points for the written portion and 50 points for the lab portion). The format for exams is like that for quizzes. Final course grades are based on cumulative percentages from the three exams. Quiz and exam answer keys are posted immediately after the tests. Students are allowed to take the written exam questions with them. A photocopy of the Scantron sheet with their answers for the written part and their lab exam is handed back to them immediately after grading (usually the next day). Students are encouraged to follow up on errors.

Course information is available on a course **web site** at the following address:

<https://medicine.stonybrookmedicine.edu/anatomy/people/facultypage/kley/kleylab1/course>

This web site lists the faculty and student assistants teaching in the class, their office locations, and office hours. Students also have access to the course objectives on this site, exams from previous years (complete with keys), a photographic atlas of the anatomy of the central nervous system (developed specifically for this class), a collection of radiological images (developed specifically for this class), copies of all handouts, and links to selected anatomy web pages. Also posted on the web site is the syllabus, schedules of special review sessions, and quiz and exam keys and scores (anonymously) as soon as available.

The **grading policy** for the class is as follows:

HBA 561/540: A = 90%, B = 80%, C = 70 %, D = 60%

HBA 461: A = 85%, B = 75%, C = 65%, D = 55%

If a curve is applied, it is to the students' advantage; i.e., standards for grades are never raised, but they may be lowered.

Instructional Objectives

Module I

General:

1. Understand the anatomical position.
2. Know anatomical terms identifying orientation planes and directions.
3. Be familiar with basic techniques of anatomical dissection.
4. Understand the organization of the peripheral nervous system and distinguish between somatic and visceral components as well as motor and sensory components.
5. Know the relationships of the peripheral nervous system and the central nervous system.
6. Understand the concept of segmental innervation and be familiar with dermatomes and referred pain.
7. Locate structures on X-rays, CT scans, and MRI scans following the lists provided in the lab.

Back:

1. Know and identify all parts of the vertebral column and the regional differences between vertebrae.
2. Know and identify the muscles of the back, including the superficial shoulder muscles and the intrinsic muscles that move the vertebral column.
3. Know and identify the origin and insertion of each of these muscles.
4. Know and identify their innervation and blood supply.
5. Understand the action of the muscles of the back.

6. Know and identify the spinal cord, the meninges, and cerebrospinal fluid space.
7. Be familiar with the basic arrangement of gray and white matter in the spinal cord.
8. Know and identify spinal nerves, their roots and major branches, and spinal ganglia.
9. Be able to locate spinal nerves and their components and the cone of the spinal cord relative to vertebral landmarks.
10. Recognize the location for a lumbar spinal tap.

Thorax:

1. Know and identify the muscular and skeletal components of the thoracic wall.
2. Know and be able to locate the blood supply and innervation of the thoracic wall.
3. Understand the mechanics of breathing and know and identify muscles of respiration.
4. Know and identify the lobes of the lungs and understand their segmental anatomy.
5. Know and identify the blood supply and innervation of the lungs.
6. Know and identify the two layers of pleura, the pleural cavity, and the pleural recesses.
7. Know and identify the structures of the mediastinum and be able to assign them to subdivisions of this space.
8. Know and identify the parts of the heart, including the great vessels.
9. Know and identify the four chambers and the valves of the heart.
10. Know and identify the layers of the walls of the heart and the pericardial sac.
11. Know and locate the coronary vessels and their branches.
12. Understand the innervation of the heart.
13. Be familiar with the surface anatomy of the heart and the lungs/pleural cavities.
14. Know and identify remnants of fetal heart structures.
15. Understand the fetal blood circulation.

Abdomen

1. Know and identify the muscular and skeletal components of the abdominal wall.
2. Know and locate the blood supply and innervation of the abdominal wall.
3. Know and identify the inguinal canal and its contents in females and males.

4. Be able to distinguish between different types of inguinal herniae.
5. Understand the embryological development of the gut and how it relates to postnatal peritoneal compartments.
6. Know and identify the subdivisions of the gut on the basis of position and gross macroscopic differences.
7. Know and identify the blood supply and innervation of the gut.
8. Understand the venous drainage of the gut and its anastomoses with the veins in the body wall.
9. On a gross anatomical level, know and identify all other organs in the abdominal cavity.
10. Know the peritoneal relationships of these abdominal organs.
11. Know and locate their blood supply and understand their innervation.
12. Be familiar with the relationships between surface landmarks and underlying abdominal contents.
13. Know and identify the passageways between the thoracic and abdominal cavities.

Pelvis and perineum

1. Know the anatomy of the bony pelvis.
2. Be familiar with sex differences in pelvic shape.
3. Know and identify the soft tissue components of the pelvic walls.
4. Know and identify the blood supply and innervation of the pelvic walls.
5. Know and identify all pelvic organs in both the male and female body.
6. Understand and explore the spatial and peritoneal relationships of organs in the pelvic cavity in both the female and male body.
7. Know and identify the blood supply and innervation of pelvic structures in both the female and male body.
8. Be familiar with the embryonic development of the male and female urogenital system.
9. Know and identify the major blood vessels and nerves of the lower limb that traverse the pelvis.
10. Know and identify the walls and contents of the perineum.
11. Know and identify the external genitalia in the male and female.

12. Be aware of homologies between male and female genitalia.
13. Know and identify the blood supply of the external genitalia.
14. Understand the dual innervation of the genitalia by somatic and visceral nerves.

Module II

Head

1. Know and identify the bones of the cranium and their topography using the skull in your bone box.
2. Be able to identify these on X-rays and in CT and MRI scans.
3. Become familiar with the isolated cranial bones using a Beauchene skull provided during labs.
4. Know the bones forming the walls of the orbit, the neurocranium, and the nasal and the oral cavities.
5. Be able to identify them in the walls around these spaces.
6. Know and identify the sensory innervation of the skin overlying the face, and of the scalp.
7. Know and identify the blood supply of the face and scalp.
8. Know and identify the muscles of mastication and of facial expression.
9. Know and locate their blood supply and innervation.
10. Know and identify all structures in the cranial cavity.
11. Know and identify the exits and entrances of cranial nerves and blood vessels.
12. Understand the spatial relationships between skeletal components and soft tissue contents of the neurocranium.
13. Locate the meninges and trace the venous sinuses.
14. Be familiar with the various types of intracranial hemorrhages caused by head injuries.
15. Be aware of the connections between blood vessels in the cranial cavity, the orbit, and the face and their clinical relevance.
16. Know and identify all structures in the orbit.
17. Understand the actions and the functions of the muscles moving the eyeball.
18. Know and identify the macroscopic components of the middle and inner ear.

19. Appreciate the connection between the middle ear and the pharynx.
20. Understand the basic functions of the ear and eye as they relate to gross anatomical structures.
21. Know and identify the structures in the walls of the nasal and oral cavities and the pharynx.
22. Know and identify their blood supply and innervation.
23. In a hemisection of the head identify structures in the nasal and oral cavities and the pharynx, including paranasal sinuses and their connections to the nasal cavity.
24. Be familiar with the classes of teeth in the infant and adult.
25. Understand the visceral innervation of structures in the head.

Brain

1. Know and identify the major parts of the brain and their blood supply.
2. Understand the basic organization of gray and white matter in the brain.
3. Know and identify the 12 cranial nerves as they exit and enter the brain.
4. Using instructions and figures provided in the manual, locate deep structures of the brain in median sagittal, frontal, and horizontal sections.
5. Know the functional relationships of parts of the brain and be familiar with functional subsystems.
6. Be familiar with the symptoms of major cortical lesions.

Neck

1. Know and identify the muscles and organs of the neck.
2. Know and trace their blood supply and innervation.
3. Know and identify the sensory innervation of the skin of the neck.
4. Know and locate the cervical plexus and its branches.
5. Know and identify the skeleton and muscles of the larynx and pharynx in deep dissections.
6. Know and identify the blood supply of the larynx and pharynx.
7. Be familiar with the functions of the larynx and pharynx in phonation and swallowing.
8. Understand the compartments and fascial planes of the neck.

9. Know and identify the nerves and blood vessels that traverse the neck on their way to the head, the thorax, and the upper limbs.

Module III

General

1. Understand the different joint types, their movements, and the principal axes around which these movements take place.
2. Understand the difference between muscle function and muscle action and know how to derive muscle actions from the position of muscles relative to joint axes.
3. Be able to identify all skeletal elements of the limbs and their major topography on X-rays provided in the lab.

Upper limb

1. Be familiar with the development of the upper limb in terms of phylogeny and embryology.
2. Know the compartments in the upper limb.
3. Know and identify all skeletal elements and their topography.
4. Understand the organization of the brachial plexus and know and identify its subdivisions and branches.
5. Know and identify the sensory nerves of the upper limb.
6. Know and identify the superficial veins and appreciate their variability (by comparison of several bodies).
7. Know and identify all muscles of the upper limb.
8. Know their origins and insertions.
9. Know and identify the blood supply and innervation of the muscles of the upper limb.
10. Understand the actions of the muscles of the upper limb.
11. Know and identify the walls and contents of the carpal tunnel, including the synovial sheaths of the long flexor tendons.
12. Know and identify the extensor assembly and the flexor insertions in the fingers, and also the specialized musculature of the thumb.
13. Understand the action of extrinsic and intrinsic muscles in movements of the fingers and thumb.

14. Know and understand major nerve injuries and syndromes (such as carpal tunnel syndrome) and their symptoms.

15. Know and identify major joint ligaments at the shoulder, elbow, and wrist joints and understand their function in restraining movements at these joints.

16. Understand the “rotator cuff” muscles in their role as flexible ligaments of the shoulder.

17. Be familiar with major joint injuries, including shoulder separation and shoulder dislocation, as they relate to gross anatomical structures.

Lower limb

1. Be familiar with the development of the lower limb in terms of phylogeny and embryology.

2. Know the compartments in the lower limb.

3. Know and identify all skeletal elements and their topography.

4. Understand the organization of the lumbosacral plexus and know and identify its branches.

5. Know and identify the sensory nerves of the lower limb.

6. Know and identify the two major superficial veins of the lower limb and appreciate the clinical consequences of their connections with the deep veins.

7. Know the site used for intramuscular injection in the gluteal region.

8. Know and identify all muscles of the upper limb.

9. Know their origins and insertions.

10. Know and identify the blood supply and innervation of the muscles of the lower limb.

11. Understand the actions of the muscles of the lower limb.

12. Know and identify major ligaments at the hip, knee, ankle, subtalar, and transverse talar joints.

13. Understand the functions of the ligaments in restraining and guiding movements at these joints.

14. Be familiar with major joint injuries of the knee and ankle as they relate to gross anatomical structures.

15. Appreciate the architecture of the foot, including its arch system, and identify the ligaments and muscles supporting it.

16. Understand the mechanics of gait and know the gait anomalies due to major nerve injuries.