HB
Human Body
Course Goals

Goals

1. Demonstrate knowledge of the gross anatomical structure and basic functions of the musculoskeletal system.
2. Demonstrate knowledge of the gross anatomical structure and basic functions of the peripheral nervous system.
3. Demonstrate knowledge of the gross anatomical structure and basic functions of the blood and lymphatic vascular systems.
4. Demonstrate knowledge of the gross anatomical structure and basic functions of the respiratory system.
5. Demonstrate knowledge of the gross anatomical structure and basic functions of the digestive system.
6. Demonstrate knowledge of the gross anatomical structure and basic functions of the female and male urogenital systems.
7. Demonstrate knowledge of the basic anatomical development of the extremities, back, body cavities and viscera, and head and neck.
8. Demonstrate knowledge of clinical reasoning as it applies to anatomy content and its application in physical exam and imaging.
9. Demonstrate familiarity with the course resources, procedures, and expectations of the students.

Spring 2019
Human Body
Session Learning Objectives

Abdomen Circulatory Flipped Classroom

1. Describe the origins, courses, and major branches and anastomoses of the abdominal aorta, celiac, superior and inferior mesenteric, renal and gonadal arteries.
2. Describe the origin and course of the inferior vena cava and its major tributaries.
3. Summarize the functional anatomy of the portal vein, the portal venous system, porto-caval anastomoses and their significance in portal hypertension.
4. Describe the anatomy of the lymph nodes draining the abdominal viscera and their significance in relation to metastatic spread.

Anatomy Imaging of the Extremities & Back Small Groups (Required)

1. On radiological images, identify the structures listed under "Radiology" in the Cadaver Dissection Guide: Chapter 2 (Back); Chapter 3 (Lower Extremities); and Chapter 4 (Upper Extremities).
2. Discuss the factors that affect the appearance of radiographs (xrays).
3. Describe standard image projections (AP, PA, lateral, axillary, oblique, external rotation, internal rotation) used in the back and extremities.
4. Describe imaging planes and orientation on radiographs, CT, and MRI.
5. Identify the patient's right/left and describe the various terms of relationship and comparison (anterior [ventral, palmar]/posterior [dorsal]; medial/lateral; superior [cranial]/inferior [caudal]; proximal/distal; superficial/deep) on imaging studies.
6. Describe the structure of long bones (diaphysis, metaphysis, epiphysis) and identify them on imaging studies.
7. Identify and describe the significance of normal soft tissue-fat interface and fat pads.
8. Identify and describe appendicular fractures and dislocations:
   a) Clavicle
   b) Glenohumeral
   c) Malleolar
   d) Radial head
   e) Scaphoid
   f) Colles
   g) Hip
   h) Femoral neck

Anatomy Imaging of the Head & Neck Small Groups (Required)

1. On radiological images, identify the structures listed under "Radiology" in the Cadaver Dissection Guide: Chapter 6 (Head and Neck).
2. Discuss how MRI, fluoroscopy and angiography images are obtained.
3. Discuss the factors that affect the appearance of MRI, fluoroscopy, and angiography.
4. Identify on cervical spine and neck xray:
   a. Anterior spinal line
   b. Posterior spinal line
   c. Spinolaminar line
   d. Prevertebral fat stripe
   e. Fractures
5. Describe and identify:
   a. Subdural hematoma
   b. Epidural hematoma
   c. Subarachnoid hemorrhage
   d. Intraparenchymal hemorrhage

Anatomy Imaging of the Trunk Small Groups (Required)

1. On radiological images, identify the structures listed under "Radiology" in the Cadaver Dissection Guide: Chapter 5 (Trunk).
2. Discuss how CT and ultrasound (US) images are obtained.
3. Discuss the factors that affect the appearance of CT and US images.
4. Distinguish between anterior and posterior ribs, and identify on a chest x-ray:
   a. Major and minor fissures
   b. Pleural line
   c. Lobes of the lung
   d. Trachea, carina, right and left main bronchii
   e. Costophrenic angles
5. Distinguish between supine and upright abdominal x-rays and identify the following:
   a. Liver
   b. Kidney
   c. Spleen
   d. Stomach
   e. Duodenum
   f. Large intestine and its named parts
   g. Small intestine

Anatomy Lesson II: Family Panel (Required; Not Recorded)

1. Develop a deeper understanding of the reasons that people become donors.
2. Develop an increased awareness of the impact and influence such a decision has on family members.
3. Consider how you or your family members would approach the issue of becoming a donor.

Anatomy Lessons I: Cadaver as First Teacher (Required)

1. Identify the values involved in approaching the cadaver as one of your "first teachers" in medical school.
2. Describe the role of culture in attitudes towards death and the use of cadavers.
3. Describe experiences with human dissection in the form of a narrative.
4. Share perspectives on the experience of human dissection with colleagues.
5. Identify the role of colleagues in providing support.

Autonomic Nervous System

1. Compare the effect of sympathetic vs parasympathetic stimulation on major organs.
2. Describe the general pattern of autonomic innervation of the major organs of the thorax, abdomen, and pelvis.
3. Describe the distribution and function of the sympathetic chains and thoracic splanchnic nerves.
4. List the pre-aortic (prevertebral) sympathetic ganglia. Describe their associated splanchnic nerves and relations, and distribution to organs.
5. Explain the role of the vagus nerve in supplying thoracic and abdominal viscera.
6. Compare visceral vs somatic sensation, and explain which stimuli elicit and which do not elicit conscious visceral pain.
7. Explain the mechanism of referred pain from T1-5 sympathetic afferents to the chest wall and relate it to the thoracic viscera.
8. Explain the nerve supply of the parietal and visceral peritoneum and the role of the visceral peritoneum in referred pain.
9. Compare somatic vs visceral sensations.

Circulatory System Overview

1. Compare pulmonary vs systemic circulation.
2. Describe the composition of blood vessels (tunica intima, tunica media, tunica adventitia) and at a gross morphological and functional level, compare the major types of arteries and veins.
3. Describe the composition and function of major mechanisms to assist in venous return: valves, accompanying veins, musculovenous pump.
4. Define anastomosis and retroflow; explain the flow of blood in collateral circulation.
5. Explain the general pattern of blood supply to muscles and joints.
6. Describe the general composition, function, and drainage pattern of the lymphatic system.

Cranial Nerves I-III

1. List the name, number and function (somatic sensory, special sensory, visceral sensory, somatic motor, visceral motor of the twelve cranial nerves.
2. Identify the cranial nerves on the surface of the brain and as they course through the skull, including associated bony passages.
3. Describe the course, associated bony passages and distribution of the major branches of the following cranial nerves: trigeminal divisions, facial, glossopharyngeal, vagus.
4. Describe the anatomy of the sensory and motor components of the trigeminal nerve, including how their integrity is tested clinically.
5. Describe the intracranial and intrapetrous course of the facial nerve and the relationships of its major branches to the middle ear in relation to damage of the nerve within the facial canal.
6. Explain the deviation of the tongue on protrusion following hypoglossal nerve injury.
7. Describe the afferent and efferent components of the pupillary light reflex, jaw jerk reflex, corneal blink reflex, gag reflex, visual field deficits, and how they are tested.
8. Describe the sympathetic innervation of the head and neck including the features and main causes of Horner's syndrome.
9. Describe the autonomic secretomotor innervation of the parotid, submandibular and sublingual salivary glands, and the lacrimal gland.

Dissection Lab Unit I (Required)

1. On each dissected cadaver, prosected cadaver, or cadaver specimen in the laboratory, identify the structures listed in the Unit 1 Structure ID List. The specific structures are also listed in bold in the Cadaver Dissection Guide.
2. Observe and describe the key anatomical relationships between the structures outlined in the Unit 1 Major Relationships List. The specific major relationships are also highlighted in the yellow boxes in the Cadaver Dissection Guide.
3. On individual bone specimens (natural or plastic) or an articulated skeleton, identify the bones and the bony features listed in the Unit 1 Bone Structure ID List.
4. On painted natural bone specimens, identify the muscle attachments for major muscles of the lower and upper extremities.
5. On radiological images, identify the structures listed under "Radiology" in the Back, Lower Extremity and Upper Extremity chapters of the Cadaver Dissection Guide, and identify the structures outlined in your Imaging: Back & Extremities small group session.
6. On cross-sectional images taken from the VHD, identify bones, muscles, organs and major vessels listed in the Structure ID and Bone ID lists for Unit 1: Back & Extremities.

Dissection Lab Unit II (Required)

1. On each dissected cadaver, prosected cadaver, or cadaver specimen in the laboratory, identify the structures listed in the Unit 2 Structure ID List. The specific structures are also listed in bold in the Cadaver Dissection Guide.
2. Observe and describe the key anatomical relationships between the structures outlined in the Unit 2 Major Relationships List. The specific major relationships are also highlighted in the yellow boxes in the Cadaver Dissection Guide.
3. On individual bone specimens (natural or plastic) or an articulated skeleton, identify the bones and the bony features listed in the Unit 2 Bone Structure ID List.
4. On painted natural bone specimens, identify the muscle attachments for major muscles of the trunk.
5. On radiological images, identify the structures listed under "Radiology" in the Thorax, Abdomen and Pelvis & Perineum chapters of the Cadaver Dissection Guide, and identify the structures outlined in your Imaging: Trunk small group session.
6. On cross-sectional images taken from the VHD, identify bones, muscles, organs and major vessels listed in the Structure ID and Bone ID lists for Unit 2: Trunk.

Dissection Lab Unit III (Required)

1. On each dissected cadaver, prosected cadaver, or cadaver specimen in the laboratory, identify the structures listed in the Unit 3 Structure ID List. The specific structures are also listed in bold in the Cadaver Dissection Guide.
2. Observe and describe the key anatomical relationships between the structures outlined in the Unit 3 Major Relationships List. The specific major relationships are also highlighted in the yellow boxes in the Cadaver Dissection Guide.
3. On individual bone specimens (natural or plastic) or an articulated skeleton, identify the bones and the bony features listed in the Unit 3 Bone Structure ID List.
4. On painted natural bone specimens, identify the muscle attachments for major muscles of the head and neck.
5. On radiological images, identify the structures listed under "Radiology" in the Head & Neck chapter of the Cadaver Dissection Guide, and identify the structures outlined in your Imaging: Head & Neck small group session.
6. On cross-sectional images taken from the VHD, identify bones, muscles, organs and major vessels listed in the Structure ID and Bone ID lists for Unit 3: Head & Neck.

Early Embryology I: Week 1-2 Post Fertilization

1. Contrast embryonic vs. fetal periods in terms of major developmental events that occur in each period.
2. Contrast gametogenesis between male and female in terms of timeframe, the transformation and the ultimate fate of the primordial germ cells.
3. Review the host of hormones involved in the regulation of ovarian and menstrual cycles.
4. Correlate the process of fertilization with: a. The timeline of ovarian and menstrual cycles, b. Location in female genital tract, c. Cellular and acelluar structures and steps involved, d. The process of the oocyte cell division, and e. The final product.
5. Appraise 3 abnormal genetic events that may result in congenital abnormalities.
6. Contrast nondisjunction at meiosis I, meiosis II and gamete mitosis.
7. Appraise daughter cells the 3 types of nondisjunction can produces and the possible congenital abnormalities that can result.
8. Given a common karyotype or a distinct phenotypic description of an individual with chromosomal anomalies, evaluate possible causes and the chromosomes involved.
9. Important terminologies to master:
   Oocyte, spermatozoa, follicles, follicular cells, granulosa cells, follicle stimulating hormone (FSH), luteinizing hormone (LH), estrogen, progesterone, human chorionic gonadotropin (hCG), acrosome, acrosome reaction, capacitation, ootid, pronucleus, zygote.
10. Summarize the development of the embryo from zygote to blastocyst.
11. Correlate the process of conceptus transformation from zygote to blastocyst with a. The location of the conceptus within the female reproductive tract, b. The timeline (days post fertilization (DPF)), c.The new cells, structures, spaces and areas that form, d. The morphology and potentiality of the new cells that form (including blastomeres, embryoblasts, trophoblast).
12. Correlate the developmental process of the conceptus at 6-7 DPF with the female ovarian and menstrual cycles and the consequent condition of the endometrium.
13. Correlate the four different population of cells that form in the conceptus at 7 DPF with their locations, functions, and structural derivatives.
14. Appraise various types of abnormal intrauterine and ectopic implantations in terms of symptoms and risks to the patient and the conceptus.
15. Correlate the process of conceptus implantation with a. The 2nd week's developmental timeline, b. The transformation and differentiation of the outer cell mass, c. The transformation and differentiation of the inner cell mass.
16. Also correlate the process of conceptus implantation with d. The new structures and spaces that form within the conceptus such as lacunae, amniotic membrane, yolk sac membrane, yolk sac, amniotic and chorionic cavities, extraembryonic ectoderm, mesoderm (parietal & visceral) and endoderm, connecting stalk, e. The potential and cause of false menstruation at 14 DPF.
17. Track the developmental lineages of the new populations of cells and structures that arise in the conceptus during the 2nd week of development.
18. Predict possible clinical sequelae of the following events a. Failed endometrial lining closure at 14 DPF, b. Failed uteroplacental circulation establishment, c. Degeneration of connecting stalk, d. Insufficient proliferation of cytotrophoblasts, e. Insufficient hCG production by the syncytiotrophoblasts, and f. Degeneration of corpus luteum around 12-14 DPF.

19. Important terminologies to master:
Zygote, blastomeres, morula, compaction, blastocyst, blastocele (blastocystic cavity), inner cell mass (embryoblast), outer cell mass (trophoblast), embryonic pole, abembryonic pole, endometrium, cytorophoblasts, syncytiotrophoblasts, epiblasts, and hypoblasts.

20. Other important terminologies to master: amniotic cavity, amniotic membrane, exocoelomic (Hauser/yolk sac) membrane, extraembryonic mesoderm (EEM), extraembryonic somatic mesoderm (EESM), extraembryonic splanchnic mesoderm (EESpM), extraembryonic (chorionic) cavity, connecting stalk, and lacunar stage.

Early Embryology II: Gastrulation (Week 3-4pf)

1. Compare the morphologies of the embryo proper at 12 DPF vs. 16 DPF.

2. List the cellular events that transform the embryo proper from a bilaminar germ disc to a trilaminar germ disc.

3. Correlate the process of gastrulation with a.The timeline (days post fertilization (DPF)), b. The new cell populations, structures, spaces and areas that form, c. The location and function of the new cell populations, structure, spaces and areas listed for 3b, d. The observable embryonic body axis establishment, e. The growth and changing morphology of the embryo proper.

4. List the structures, spaces and cell populations that derive from the epiblast which ingress through:
a. The primitive node
b. The cranial region of the primitive streak
c. The mid region of the primitive streak
d. The caudal region of the primitive streak.

5. List some of the major anatomical remnants, structures or organ systems that arise from the structures and cell populations listed for 4a-d.

6. Based on the anatomical organization of the trilaminar germ disc at 3rd week of development, predict the morphological transformation of the trilaminar germ disc that would form the adult anatomy.

7. Explain the role of primitive node and its cells in right and left axis formation.

8. Predict possible clinical sequelae of the following events:
a. Failed epithelial-to-mesenchymal transition
b. Immotile cilia in the primitive nodal cells
c. Premature degeneration of the primitive streak
d. Persistent primitive streak beyond 4th week in embryonic development
e. Failed primitive node formation
f. Failed notochord formation

9. Important terminologies to master:
Gastrula, primitive pit, primitive groove, epithelial-mesenchymal transition, dorsal, ventral, lateral, paraxial mesoderm, intermediate mesoderm, lateral plate mesoderm, intraembryonic coelom, oropharyngeal (buccopharyngeal) membrane, cloacal membrane, sarcococcygeal teratoma, sirenomelia.

Early Embryology III: Neurulation (Week 3-4)

1. Correlate the process of neurulation with a.The timeline (days post fertilization (DPF)), b. The new cell populations, structures, spaces and areas that form, c. The location and function of the new cell populations, structure, spaces and areas listed for 1b, d. The growth and changing morphology of the embryo prope.
2. Predict the outcomes of embryonic development as a result of:
   a. Insufficient or failed notochord formation
   b. Failed cranial neuropore closure
   c. Failed caudal neueropore closure
   d. Insufficient maternal dietary intake of folic acid
   e. Insufficient neural crest differentiation, proliferation or migration
3. Correlate the morphology of primitive streak during 3rd through 4th weeks of development with:
   a. Position and length/size within the embryo proper
   b. Function in embryonic development
   c. The consequence of its untimely (too early or too late) regression
4. Correlate the process of embryo folding with:
   a. The timeline (days post fertilization)
   b. Primary developmental events (or structures that form) that drive the folding
   c. Direction of embryo folding
   d. The changes in embryonic structural anatomy before and after folding
   e. The tube within a tube conformation of embryo
   f.The transformation of the amniotic cavity, yolk sac and chorionic cavity
5. Predict possible clinical sequelae of the following events:
   a. Incomplete lateral folding at the umbilicus
   b. Incomplete lateral folding caudal to umbilicus
   c. Incomplete lateral folding cranial to umbilicus
6. Important terminologies to master:
   Neuroectoderm, neural plate, neural folds, neural grooves, neural tube, neural canal, cranial & caudal neuropores, neural crest, neural tube defect (NTDs), anencephaly, spina bifida, septum transversum, cardiogenic area (cardiac primordium), somatopleure, splanchnopleure, gut tube, foregut, midgut, hindgut, vitelline (omphaloenteric) duct, and anterior body wall defects.

Embryology IV: MSK Development Overview

1. Identify specific embryonic germ layers and structures that give rise to the axial vs. appendicular skeletons in adult anatomy.
2. Correlate the process of somite formation with:
   a. The developmental timeline
   b. The location within the embryo
   c. Transformation into 3 subunits and their derivatives.
3. Correlate the process of resegmentation with:
   a. The growth of spinal nerves and their effects on sclerotomes, myotomes and dermatomes
   b. The sclerotome reorganization
   c. The outcomes of resegmentation in the axial skeleton.
4. Correlate the process of myotome division and migration with:
   a. The segmental innervation of epimeric vs. hypomeric myotome groups
   b. The formation of brachial and lumbosacral plexuses
5. Correlate the process of limb development with:
   a. The developmental time line
   b. The new cell populations, structures, and areas that form
   c. The role of reciprocal induction between the epithelial and mesenchymal tissues
   d. The sequence or stage of limb development
   e. The growth and changing morphology of the embryonic limb
6. Predict the possible clinical sequelae of the following events:
   a. Failed reciprocal induction during limb bud stage
   b. Premature degeneration of apical ectodermal ridge at week 5
   c. Failed apoptosis of apical ectodermal ridge cells at week 7
   d. Exposure to thalidomide during embryonic period
7. Correlate the segmental innervation of embryonic skin (dermis & epidermis) with:
   a. The concept of referred pain
   b. Herpes zoster (singles) presentation
   c. The distortion of the segmental dermatomes with limb development and upright posture
8. Important terminologies to master:
   Somites, somitomeres, epimeres, hypomeres, dorsal & ventral rami, motor & sensory nerve fibers, spinal (dorsal root) ganglia, deep back muscle groups, muscles of the body wall & limbs, Apical ectodermal ridge (AER), Undifferentiated (progress) zone, limb bud stage, paddle stage, ray stage, phocomedlia, amelia, syndactyly, polydactyly, intervertebral disc, annulus fibrosus, and nucleus pulposus.

Embryology of the Head and Neck I: Pharyngeal Arches

1. Describe the morphology of the head and neck regions of the embryo at week 3.
2. Correlate the process of pharyngeal arch formation with:
   a. Timeline
   b. Mechanism by which the arches/processes form
   c. Structures, tissues, germ layers and cells involved
   d. Cranial nerves (motor, sensory and special sensory) associated
3. Correlate the process of each pharyngeal arch differentiation with:
   a. The anatomic structural derivatives
   b. The neural crest derivatives
   c. The myotome derivatives
   d. The endodermal derivatives
   e. The distribution of motor, general sensory and special sensory nerve fibers
4. Predict the possible clinical sequelae of the following events:
   a. Insufficient neural crest cell proliferation/migration/differentiation in any pharyngeal arches (bilateral or unilateral)
   b. Aberrant elaboration/expansion/migration/closure of pharyngeal clefts or pouches
   c. Persistent cervical sinus remnant
5. Important terminologies to master:
   Stomodeum, oropharyngeal (buccopharyngeal) membrane, Meckel cartilage, Reichert cartilage, pharyngeal groove, pharyngeal pouch, tubotympanic recess, cervical cyst, cervical sinus, cervical fistula, ectopic parathyroids.

Embryology of the Head and Neck II: Tongue, Thyroid & Face

1. Describe the process of tongue development with:
   a. The timeline
   b. Pharyngeal arches, germ layers, and structures involved
   c. Motor, general sensory and special sensory innervations
   d. The developmental remnants visible in adult tongue
   e. Consequences of failed growth, fusion and the normal growth of the pharyngeal arches
2. Correlate the process of thyroid development with
   a. The timeline
   b. Germ layers, pharyngeal arch & tongue structures involved
   c. The anatomic pathway of growth
   d. Other pharyngeal arch structures or cell population that contribute to thyroid
   e. Consequences of failed regression of the thyroglossal duct, incomplete migration or downgrowth
3. Describe the primordial structures that comprise the embryonic face at week 3.
4. Correlate the process of face development with
   a. the timeline
   b. the structures, cells, depressions and germ layers involved
   c. The differential growth and fusion events of the various structures listed for 4b
   d. Adult anatomical structures that arise from the structures listed for 4b
5. Predict the possible clinical sequelae of the following events
   a. Failed fusion between right and left medial nasal prominences
   b. Failed fusion between the intermaxillary segment with the maxillary process
   c. Failed fusion between the lateral nasal prominence with the maxillary process
   d. Failed fusion between the maxillary and mandibular processes
   e. Failed fusion between right and left mandibular processes
   f. Failed downward growth and lengthening of the fused mandible (micronathia)
6. Important terminologies to master:
   Thyroid primordium, thyroglossal duct, foramen cecum, thyroglossal duct cyst, ectopic thyroid gland, lateral lingual swellings, copula, hypopharyngeal eminence, median sulcus of the tongue, terminal sulcus (sulcus terminalis), frontonasal prominence.
7. Additional terminologies to understand: maxillary prominences, mandibular prominences, nasal placodes, nasal pits, nasal sacs, medial and lateral nasal prominences, intermaxillary segment, nasolacrimal groove and duct, cleft lip, cleft palate, oblique (facial) cleft, Treacher Collins syndrome, Pierre Robin sequence, DiGeorge syndrome.

Embryology of the Head and Neck III: Nasal cavity, oral cavity and the palate

1. Correlate the process of nasal cavity formation with:
   a. Embryonic structures and germ layers involved
   b. Its expansion and eventual communication with the oral cavity via the primitive and definitive choanae
   c. The content of (anatomical structure present in) the nasal cavity at week 6 vs. week 10.
2. 2. Correlate the process of the complete palate formation with:
   a. The timeline
   b. Embryonic structures, pharyngeal arches and germ layers involved
   c. The adult derivatives of structures listed for 2b
   d. Consequences of failed fusion among the structures listed for 2b
   e. Possible cause of failed fusion events listed for 2d
3. Correlate the process of teeth development with:
   a. The timeline and stages of tooth development
   b. Embryonic germ layers and structures involved
   c. Specialized cells that derive from the germ layers listed for 3b
   d. Functions of the specialized cells listed for 3c in tooth formation
   e. The role of teeth growth in the transformation of the face
4. Predict the possible clinical sequelae of the following events:
   a. Failed perforation of oronasal epithelium
   b. Failed fusion between the intermaxillary segment and the palatal processes
   c. Failed fusion between right and left palatal processes
   d. Presence of tongue in the nasal cavity between week 6-9
   e. Failed reciprocal induction between the dental lamina and the neural crest mesenchyme
   f. Failed differentiation of odontoblasts
   g. Failed formation of the permanent tooth bud
5. Important terminologies to master:
   Nasal sacs, oronasal membrane, primary choana, primary palate, secondary palate, nasal septum, palatine shelves (palatal processes), primary vs. secondary palate, cleft lip, cleft palate, oblique (facial) cleft, dental lamina, dental bud, reciprocal induction, cap stage, inner & outer dental epithelium, dental papilla, bell stage, odontoblasts, dentin, ameoblasts, enamel, deciduous vs. permanent tooth buds.

Embryology of the Peritoneal Cavity (and Digestive System)

1. Describe the gut tube formation and its 3 segments during 4th week of embryonic development.
2. Contrast the ventral vs. dorsal mesenteries in terms of a. Structural and germ layer origins, b. Location within the embryo, c. The associated gut tube segments and d. Major arterial supply and regions of anatostomoses.
3. Correlate the morphological transformation of the foregut caudal to diaphragm with a. The structural and germ layer origin, b. The anatomic derivatives, c.The dilation and rotation of the stomach and d. Development of the liver, gall bladder and pancreas.
4. Correlate the morphological transformation of the foregut caudal to diaphragm with e. The consequence of stomach rotation on (i. the ventral and dorsal mesogastrium, and associated peritoneal cavity spaces, ii. the position of the duodenum, iii. the position of the pancreas and iv. the hepatobiliary and pancreatic ducts.
5. Correlate the morphological transformation of the midgut with a. The anatomic derivatives of the cranial & caudal arms, b. Anatomical relation to yolk sac and vitelline duct before and after physiological herniation, c. The physiological herniation, d. Rotation and sequential retraction of the midgut and e. The consequence of persistent vitelline duct remnant.
6. Correlate the morphological transformation of the hindgut with a.The anatomic derivatives, b. The process of cloaca septation and c.The process of patent anal canal formation and germ layers involved.
7. Predict possible clinical sequelae of the following events a. Failed interaction between the caudal end of the hindgut endoderm with the ectoderm, b. Incomplete septation of the cloaca, c.Insufficient integration of neural crests in the hindgut, d. Incomplete retraction of the midgut loop and e. Ruptured extraembryonic ectoderm (amniotic membrane) during physiologic herniation.
8. Know the following: Falciform ligament, lesser omentum, greater omentum, dorsal mesoduodenuml, dorsal mesogastrium, mesentery proper, mesocolon, lesser curvature, greater curvature, omental bursa (lesser sac), omental (epiploic) foramen, hepatic bud (diverticulum), ventral & dorsal pancreatic buds and ducts, cystic duct & bile duct, retroperitoneal, main & accessory pancreatic duct.
9. Know the following: Meckel diverticulum, enterocystoma (vitelline cyst), vitelline fistula, omphalocele, gastroschisisurogenital sinus, anal canal, Hirschsprung disease (congenital aganglionic megacolon), imperforate anus.

Embryology of the Thorax I-II

1. Contrast the shape and position of the intraembryonic coelom before and after embryo folding.
2. Correlate the process of intraembryonic coelom compartmentalization with the development of a.the heart, b. the lungs and c. the diaphragm.
3. Correlate the process of diaphragm development with:
   a. Specific structures that must fuse,
   b. The anatomic position of the structures listed for 3a at the time of fusion,
   c. Motor and sensory innervation and
   d. The consequence of incomplete closure (or fusion) of the structures listed for 3a.
4. Contrast the shape and position of the splanchnic lateral plate mesoderm (cardiogenic field) before and after embryo folding, and also with those of the intraembryonic coelom.
5. Correlate the process of primitive heart tube formation with a. The process of embryo folding (cranial and lateral), b. The structures and steps involved, c. The relative position within the intraembryonic coelom and d. The 3 pairs of veins and a pair of main arteries that are associated.
6. Correlate the process of primitive heart tube looping with a. The developmental timeline, b. The changes in the dorsal mesocardium, c. The change in the direction of the blood flow and d. Morphological changes in the four segments.
7. Correlate the process of heart septation with a. The structures that form and fuse to compartmentalize the heart (i. Atrioventricular septation, ii. Interatrial septation, iii. Interventricular septation and iv. Truncus arteriosus septation), b. The change in the direction of the blood flow and c.Structures put in place to ensure sufficient blood flows into the left side of the heart.
8. Predict the possible clinical sequelae of the following events a.Incomplete closure of TA septum with the IV septum, b. Uneven TA septation that results in overriding aorta and stenotic pulmonary trunk, c. Absent rotation of TA septum that results in aorta draining the right side of the heart and the pulmonary trunk draining the left side of the heart and d. Failed formation of foramen secundum.
9. Contrast the prenatal vs. postnatal fetal circulation.
10. Important terminologies to master: Primitive pericardial cavity, right and left pericardioperitoneal canals, septum transversum, pleuropericardial folds, pleuroperitonial folds, phrenic nerve, myotomes, congenital diaphragmatic hernia, pulmonary hypoplasia, cardiogenic field, endocardial tube, aortic arch, dorsal aorta, and dorsal mesocardium.
11. More terminologies to master:
    primitive atrium, primitive left ventricle, primitive right ventricle, truncus arteriosus, Endocardial cushions, AV septum, Muscular IV septum, Memberanous IV septum, TA (aorticopulmonary) septum, septum primum, foramen (osteum) primum, foramen (osteum) secundum, septum secundum and foramen ovale.
12. Know the following: Ductus arteriosus, ductus venosus, umbilical vein, umbilical arteries, ligamentum arteriosum, fossa ovalis, ligamentum venosum, round ligemantum (Teres), medial umbilical ligaments, Tetrology of Fallot, Transposition of the great vessels, somatopleure and planchnopleure.
13. Correlate the process of lung bud (respiratory diverticulum) formation with a. The developmental timeline, b. Structural and germ layer origin, c. Location in the embryo, d. Structures that form to divide the respiratory system from the digestive system and e. Possible consequences of inappropriate formation of structures listed for 1d.
14. Correlate the process of lung bud divisions and outgrowths that give rise to the lower respiratory tract with a. The number of main divisions that give rise to the lobes and bronchopulmonary segments on the right vs. left side and b. Relative position of the branching bronchial buds to the primitive pleural cavities (pericarioperitoneal canals).
15. Correlate the process of lung bud divisions and outgrowths that give rise to the lower respiratory tract with c. Germ layers that give rise to the parenchyma (lining and glandular epithelia) vs. stroma (supporting tissues such as cartilage, blood vessels, etc) and d. Possible consequences of inappropriate lung bud division or expansion.

16. Correlate the 4 stages (periods) of lung maturation with a. The developmental timeline, b. Parenchymal and stromal structures present at each stage, c. The chance of survival if the fetus is born at each stage and d. Medical interventions needed to support survival of the fetus born at each stage.
17. Describe the roles of fetal breathing movements and surfactants in respiratory system development and function.
18. Describe possible consequences of insufficient fetal breathing movements or surfactant production.
19. Terminologies to know: Tracheoesophageal ridges and septum, esophageal atresia, tracheoesophageal fistula, polyhydramnios, trachea, bronchus, bronchiole, terminal bronchiole, respiratory bronchiole, alveoli, cartilage, capillaries, endoderm, splanchnic lateral plate mesoderm, pseudoglandular stage, canalicular stage, terminal sac stage, alveolar stage, type I alveolar cells (penumocytes), type II alveolar cells (penumocytes).

Embryology of the Urogenital System

1. Review the formation and position of the intermediate mesoderm before and after embryonic folding relevant to embryonic coelom.
2. List anatomic structures that form from the intermediate mesoderm.
3. Correlate the process of urinary system development with a. The formation and functional timeline of the three sets of kidneys, b. The role of reciprocal induction in kidney formation, c. Key structures that form in each set of kidneys, d. The position of the three sets of kidneys and e. The formation and maturation of urogenital sinus.
4. Correlate the process of the permanent kidney development with a.The structures and germ layers involved and b. The positional and blood supply changes with ascent.
5. Predict possible clinical sequelae of the following events: a. Bilateral failure of pronephric duct formation, b. Unilateral or bilateral failure of permanent kidneys to ascend, c. Failed degeneration of the caudal renal artery during permanent kidney ascent and d. Fusion of the permanent kidneys at the caudal pole at week 5.
6. Contrast the reproductive anatomy of the embryo at week 5 vs. week 12 including: a. The morphology and location of the gonadal ridge, b. The morphology and location of the genital ducts and c. The morphology of the external genitalia.
7. Correlate the process of gonadal and genital ductal development and maturation with a.The structures, tissues, germ layers and cells involved, b. Key molecular factors (genes, proteins, hormones) that direct the differentiation of the gonads and the genital ducts and c. The adult derivatives of structures, tissues, germ layers and cells listed for 7a.
8. Contrast external genitalia differentiation in female vs. male embryo.
9. Predict possible clinical sequelae of the following events: a. Insufficient MIF secretion by Sertoli cells in 46:XY embryo, b. Absence of MIF receptor expression by the mullerian ductal cells in 46:XY embryo and c.Translocation and expression of SRY gene in 46:XX embryo.
10. Predict possible clinical sequelae of the following events: Elevated level of exogenous testosterone exposure in 46:XX embryo during 5-8th week of developmente. Failed reciprocal induction between caudal mullerian ducts and the endoderm of urogenital sinus in 46:XX embryof.Failed formation or spontaneous regression of mullerian ducts (bilateral or unilateral) in 46:XX embryog.Incomplete or failed fusion of mullerian ducts at the caudal end in 46:XX embryo.
11. Know the following: Urogenital ridge, nephrogenic ridge, gonadal (genital) ridge, primary retroperitoneal, pronephros, pronephric duct, mesonephros, mesonephric (Wolffian) duct, mesonephric tubules (nephrons), metanephros, ureteric bud, metanephric blastema, nephric vesicles/tubules/nephrons, unilateral or bilateral renal agenesis, oligohydramnios, paramesonephric (Mullerian) duct, ambisexual (bipotential/indifferent) phase.
12. Know the following: onadal cord cells, gonadal mesenchymal cells, primordial germ cells (PGCs), Sertoli cells, Leydig cells, Mullerian inhibiting factor/AntiMullerian factor/AntiMullerian hormone (MIF/AMF/AMH), seminiferous tubules, epididymis, vas deferens, trigone, ovarian follicular cells, ovarian stromal cells, sinusal tubercle, sinuvaginal bulb, vagina, genital tubercle, urogenital folds, labioscrotal folds, urethral plate.

Head and Neck Circulatory I-II Flipped Classroom

1. Describe the significance of blood supply to the scalp, particularly in relation to laceration injuries.
2. Describe the anatomy of the dural venous sinuses. Explain the entrance of cerebral veins into the superior sagittal sinus in relation to subdural hemorrhage. Explain how connections between sinuses and extracranial veins may permit intracranial infection.
3. Describe the blood supply of the brain, including the course and major branches of the internal carotid and vertebral arteries, and major anastomoses.
4. Describe the arteries that supply the lateral wall and nasal septum in relation to epistaxis.
5. Describe the course and major branches of the maxillary artery, including the course and intracranial relations of the middle meningeal artery and its significance in extradural hemorrhage.
6. Describe the blood supply of the thyroid and parathyroid glands.
7. Demonstrate the origin, course and major branches of the common, internal and external carotid arteries and locate the carotid pulse.
8. Demonstrate the positions of the external and internal jugular veins and the surface landmarks that are used when inserting a central venous line.
9. Describe the anatomy of the major groups of lymph nodes in the head and neck and the potential routes for the spread of infection and malignant disease.

Human Body Block Orientation

1. Describe the resources available for learning the block content.
2. Describe the assessment process and block grade.
3. Discuss the learning objectives and their role in the assessment process.
4. Demonstrate professional behavior by being punctual, responsible and courteous while attending and participating in lectures, lecture hall discussions, small group sessions and laboratories.
5. Give and receive constructive feedback on academic and professional performance including course and instructor evaluations.
6. Communicate effectively with fellow students and faculty in interactive learning activities.
7. Participate in the education of fellow students.
8. Demonstrate the ability to locate and learn anatomical and clinical knowledge not presented in a lecture setting.

Introduction to Anatomy Lab and Tour of Lab

1. Review and discuss student conduct in the dissection lab.
2. Demonstrate professional behavior by treating the cadavers and anatomical specimens with respect, dignity and the appropriate decorum.
3. Review and discuss the dissection lab safety rules.
4. Review and discuss the procedures for the dissection exercises.
5. Demonstrate professional behavior by being punctual and well prepared to participate fully in all scheduled dissection laboratories.
6. Communicate effectively with fellow students while teaching the content of dissection exercises.
7. Review and discuss dissection equipment and basic dissection technique.
8. Familiarize yourself with the physical arrangement of the dissection laboratory including the location of the humidor, safety equipment, computers, and shared dissection tools.
9. Meet the members of your dissection group.

Introduction to Clinical Anatomy

1. Define the scope of Clinical Anatomy.
2. Describe the application of anatomic principles to clinical decision making.
3. Recognize the importance of anatomical knowledge to procedural and non-procedural medical practice.
4. Define and demonstrate the following basic terms relative to the anatomical position.
5. Describe the following basic anatomical planes.
6. Define and demonstrate the basic terms used to describe movement.

Introduction to Imaging I

1. Describe the basic physical basis of diagnostic imaging modalities.
2. Describe patient safety concerns and practical limitations associated with specific imaging modalities.
3. Follow standard personnel safety protocols when working near imaging equipment.

Introduction to Imaging II

1. Describe a systematic approach to viewing radiographic images.
2. Describe and recognize standard image orientations, projections and conventions.
3. Describe anatomic relationships on radiographic images.
4. Use proper terminology for description of radiologic findings.
5. Discuss the appearance of 3D structures in 2D imaging studies.
6. Describe the 5 basic plain film densities and how they appear on radiographs.

Introduction to the VHD

1. Describe the organization and structure of the VH Dissector as a window into the Visible Human and your patient for the next four years. Discuss the different modes of anatomical presentation covering systemic, regional, cross sectional, and surface approaches.
2. Describe the basic methods for accessing structures in the VH Dissector and how they will be used in different situations. Discuss the use of Regional organization to best mimic the dissection laboratory, System hierarchy to parallel classroom presentations, Index and Search for immediate access to a specific structure and Cross Sections for an appreciation of clinical imaging.
3. Describe how to use lessons in the VH Dissector for learning. Discuss the lessons designed to accompany the Dissection Laboratory and the organization used for integration of skeletal, soft tissue, and visceral structures and clinical imaging.
4. Describe features in the VH Dissector for self-testing. Discuss the use of skin opacity for testing surface anatomy concepts and the use of identification labels for reinforcing structure identification. Discuss the hierarchy of both the Index of structure names and the System descriptions and how it can be used to review complete systems.

Lower Limb Circulatory System

1. Demonstrate the origin, course and branches of the major arteries that supply the gluteal region, hip, thigh, leg, ankle and foot. Explain the functional significance of anastomoses between branches of these arteries at the hip and knee.
2. Demonstrate the locations at which the femoral, popliteal, posterior tibial and dorsalis pedis arterial pulses can be palpated.
3. Demonstrate the course of the principal veins of the lower limb. Explain the role of the perforating veins between the superficial and deep veins and the function of the 'muscle pump' for venous return to the heart. Describe the surface landmarks for sites of venous access that can be used for 'cut-down' procedures in emergencies.
4. Describe the structures at risk from a fracture of the femoral neck or dislocation of the hip and explain the functional consequences of these injuries.
5. Describe the boundaries and contents of the femoral triangle with particular regard to arterial blood sampling and catheter placement.
6. Describe the lymphatic drainage of the lower limb and its relationship to infection and tumor spread.

Nervous System Overview

1. Define the terms grey matter vs. white matter, nucleus vs. ganglion and tract vs. nerve.
2. List the ways anatomist chunk the nervous system (structural division, functional divisions, developmental divisions, cellular divisions).
   i. Structural divisions: Define CNS vs. PNS and describe their distinguishing features. ii. Functional divisions: Define somatic vs. visceral (and autonomic), motor vs. sensory when used to describe parts of the body or the nervous system and iii. List the developmental divisions of the CNS and their distinguishing features.
3. Describe basic anatomy of the brain, brainstem, and cerebellum.
4. Define the neuroaxis. Describe how it serves as a foundation for anatomical directions in the nervous system.
5. Describe the following basic anatomical planes: axial / transverse / horizontal, sagittal and coronal.
6. Describe the concept of body mapping (motor nerve maps and dermatomes, homunculus on brain).
7. Describe the anatomy of a typical spinal nerve, including its origin from dorsal and ventral spinal roots, its main motor and cutaneous branches and any autonomic component.

Pelvis Circulatory Flipped Classroom

1. Describe the origin, course and relations of the ovarian, uterine, vaginal and testicular arteries.
2. Describe the origin, course, relations and major branches and anatomoses of the internal iliac arteries.
3. Describe the vascular supply of the penis, scrotum, the clitoris, vulva and vagina.
4. Explain the significance of the vascular supply of the testis in relation to torsion and varicocele and the lymphatic drainage in relation to tumor spread.
5. Describe the blood supply and venous drainage of the distal bowel; the supply from superior rectal (from inferior mesenteric), middle rectal (from internal iliac) and inferior rectal arteries (from internal pudendal to anal canal only), and porto-caval venous anastomoses. Explain the clinical significance of the blood supply and venous drainage of the distal bowel, e.g. in continence, haemorrhoids and anal fissures.
6. Describe the lymphatic drainage of the pelvic and perineal organs.

Regional Anatomy of the Abdomen I-II

1. Demonstrate the bony and cartilaginous landmarks visible or palpable on abdominal examination and explain their clinical significance.
2. Demonstrate the surface projections of the abdominal organs onto the four quadrants and nine descriptive regions of the abdomen.
3. Describe the anatomy, innervation and functions of the muscles of the anterior, lateral and posterior abdominal walls. Discuss their functional relationship with the thoracic and pelvic diaphragms and their roles in posture, ventilation and voiding of abdominal/ pelvic/ thoracic contents.
4. Describe the anatomy of the inguinal ligament and inguinal canal in the male and female. Explain the contents of the canal and how inguinal hernias develop, including the anatomy and clinical presentation of such hernias.
5. Demonstrate the surface projections of the liver, gallbladder, pancreas, spleen, kidneys, stomach, duodenum, jejunum, ileum. Describe the caecum, appendix, ascending, transverse, descending and sigmoid parts of the colon.
6. Describe the organization and clinical significance of the parietal and visceral peritoneum, the greater and lesser sacs, mesenteries and peritoneal 'ligaments'. Explain the significance of the attachments of the ascending and descending colon to the posterior abdominal wall.
7. Describe the functional anatomy of the small and large bowel mesenteries; their structure, location and their vascular, lymphatic and neural contents.
8. Describe the position and functional anatomy of the stomach, its position, parts, sphincters, vascular, lymphatic and nerve supply and key relations to other abdominal organs.
9. Describe the duodenum, its parts, position, secondary retroperitoneal attachment; vascular, lymphatic and nerve supply and key relations to other abdominal organs.
10. Describe the regions and positions of the small and large intestine and their vascular, lymphatic and nerve supply. Describe the anatomical variations in the position of the appendix and explain their significance in relation to appendicitis.
11. Describe the position and functional anatomy of the liver, its lobes, segments and their key anatomical relations. Explain the peritoneal reflections of the liver and its movement during ventilation.
12. Describe the position, functional anatomy and vasculature of the gallbladder and biliary tree; explain their relations in the abdomen and the clinical significance of inflammation of the biliary system and biliary (gall) stones.
13. Describe the position and form of the pancreas and its relations to other abdominal organs. Discuss the significance of these relations to pancreatitis and biliary stone disease.
14. Describe the position and functional anatomy of the kidneys and ureters. Demonstrate their relations to other abdominal and pelvic structures. Discuss the clinical significance of renal and ureteric anatomy in relation to urinary stones.
15. Describe the position and relations of the suprarenal (adrenal) glands and their functional anatomy.
16. Describe the anatomy of the spleen, including its position, blood supply, surface markings, relations and peritoneal attachments. Explain the significance of these relations in trauma, chronic infection and haematopoietic disorders.
17. Interpret basic anatomy on standard diagnostic images e.g. CT, MRI, X-ray and ultrasound of the abdomen and recognize common abnormalities.

Regional Anatomy of the Back

1. Describe the main anatomical features of typical and atypical vertebrae. Identify the atlas, axis, other cervical, thoracic, lumbar, sacral, and coccygeal vertebrae and recognize their characteristic features.
2. Describe morphology changes that occur in vertebrae with advancing age.
3. Describe the anatomy of intervertebral joints. Explain the role of intervertebral discs in weight-bearing, give examples of common disc lesions and how they may compress adjacent neurological structures.
4. Describe the regions and functions of the vertebral column. Describe the range of movement of the entire vertebral column and its individual regions. Explain the anatomical bases of common spinal injuries.
5. Identify the principal muscles, ligaments and surface features of the vertebral column in order to be able to perform an examination of the back. Discuss their functional roles in stability and movement of the vertebral column.
6. Explain how the spinal nerves exit the vertebral column and are numbered.
7. Describe the anatomical relations of the meninges to the spinal cord and dorsal and ventral nerve roots, particularly in relation to root compression and the placement of epidural and spinal injections. Describe the anatomy relevant to performing a lumbar puncture.
8. Interpret basic anatomy on standard diagnostic images, e.g. CT, MRI, X-ray, and ultrasound of the vertebral column.

Regional Anatomy of the Lower Limb I-II

1. Describe the osteology and surface landmarks of the pelvis, femur, tibia, fibula and foot. Demonstrate their palpable and imaging landmarks. Explain how the bones, joints and related structures are vulnerable to damage and what the consequences of such damage could be.
2. Outline the origin of the lumbosacral plexus and the formation of its major branches.
3. Describe the origin, course and function of the femoral, obturator, sciatic, tibial, common fibular (peroneal), sural and saphenous nerves and summarize the muscles and muscle groups that each supplies, as well as their sensory distribution.
4. Describe the anatomy of the gluteal region and the course of the sciatic nerve through it. Explain how to avoid damage to the sciatic nerve when giving intramuscular injections.
5. Describe the anatomy and movements of the hip joint. Summarize the muscles responsible for these movements, their innervation and attachments.
6. Describe the structures responsible for stability of the hip joint.
7. Describe the structures at risk from a fracture of the femoral neck or dislocation of the hip and explain the functional consequences of these injuries.
8. Describe the boundaries and contents of the femoral triangle.
9. Describe the anatomy and movements of the knee joint. Summarize the muscles responsible for these movements, their innervation and main attachments.
10. Identify the factors responsible for maintaining the stability of the knee joint. Describe the locking mechanism that occurs in full extension. Explain the anatomical basis of tests that assess the integrity of the cruciate ligaments.
11. Describe the boundaries and contents of the popliteal fossa.
12. Describe the close relations of the knee joint, including major bursae and explain which of these structures may be injured by trauma.
13. Describe the anatomy of the ankle and subtalar joints. Explain the movements of plantar flexion, dorsiflexion, inversion and eversion. Summarize the muscles responsible for these movements, their innervation and their attachments.
14. Describe the factors responsible for stability of the ankle joint, especially the lateral ligaments, and explain the anatomical basis of ‘sprain’ injuries.
15. Describe the arches of the foot and the bony, ligamentous and muscular factors that maintain them.
16. Describe the fascial compartments enclosing the major muscle groups and explain the functional importance of these compartments and their contents in relation to compartment syndrome.
17. Describe the anatomical bases (nerve root or peripheral nerve) for loss of movements and reflexes at the knee and ankle resulting from spinal injuries, disc lesions and common peripheral nerve injuries. Describe the dermatomes of the lower limb and perineum that can be used to assess spinal injuries.
18. Interpret basic anatomy on standard diagnostic images e.g. CT, MRI, X-ray and ultrasound of the lower limb and be able to recognize common abnormalities.

Regional Anatomy of the Neck I-II

1. Demonstrate the boundaries and subdivisions of the anterior and posterior triangles of the neck.
2. Describe the anatomy, function and innervation of the muscles of the posterior and anterior neck.
3. Describe the composition of the cervical plexus and its sensory and motor distributions.
4. In the posterior triangle, demonstrate the position of the spinal accessory nerve, the roots and trunks of the brachial plexus, the phrenic nerve, the external jugular vein and subclavian vessels in relation to penetrating neck trauma.
5. In the anterior triangle, demonstrate the position of the common, internal and external carotid arteries, the internal jugular vein and vagus nerve, the trachea, thyroid cartilage, larynx, thyroid and parathyroid glands. Explain their clinical significance in relation to carotid insufficiency, central venous line insertion and emergency airway management.
6. Describe the courses of the accessory, vagus and phrenic nerves in the neck.
7. Describe the anatomy of the major structures passing between the neck, and the thorax and the upper limb. Describe the boundaries of the interscalene space and the anatomical basis of thoracic outlet syndrome.
8. Interpret basic anatomy on standard diagnostic images, e.g. CT, MRI, X-ray and ultrasound of the neck and be able to recognize common abnormalities.

Regional Anatomy of the Orbit, Nose and Mouth I-II

1. Describe the anatomy of the eyelid, conjunctiva and lacrimal gland. Explain their importance for the maintenance of corneal integrity.
2. Describe the boundaries of the orbit, the internal anatomy of the eye and the location, actions and nerve supply of the intrinsic and extraocular muscles. Explain the consequences of injury to their nerve supply.
3. Describe the bones of the nasal cavity, in particular the major features of the lateral wall of the nasal cavity.
4. Name the paranasal sinuses. Describe their relationship to the nasal cavity and their sites of drainage through its lateral wall. Explain their innervation in relation to referred pain.
5. Describe the functional anatomy of the auricle, external auditory meatus, tympanic membrane, auditory ossicles and pharyngotympanic tube.
6. Describe the anatomy of the parotid, submandibular and sublingual salivary glands, the course of their ducts into the oral cavity.
7. Describe the boundaries and major features of the oral cavity and summarize its sensory innervation.
8. Describe the anatomy of the tongue, including its motor and sensory innervation and the role of its extrinsic and intrinsic muscles.
9. Describe the anatomy of the temporomandibular joint. Explain the movements that occur during mastication and describe the muscles involved and their innervation.

Regional Anatomy of the Pelvis and Perineum I-II

1. Describe the skeletal and ligamentous components of the pelvis, the anatomy of the pelvic inlet and outlet and recognize their normal orientation. Explain sexual differences in pelvic skeletal anatomy.
2. Demonstrate the palpable anatomical landmarks of the ilium, ischium and pubis.
3. Describe the anatomy and functional importance of the pelvic diaphragm, its midline raphe, perineal body, attachment points and the structures passing through it in males and females. Describe the clinical significance of the pelvic diaphragm, e.g. in relation to continence, prolapse and episiotomy.
4. Describe the anatomy of the bladder, its base and ureteric openings and its relationship to the overlying peritoneum. Explain how the position of the bladder changes with filling and during pregnancy.
5. Describe the anatomy of the urethra; explain the anatomy of its different parts in males and females in relation to continence and catheterization.
6. Describe the innervation of the bladder, its sphincters and the mechanism of micturition.
7. Describe the structure and course of the spermatic cord and ductus (vas) deferens.
8. Describe the anatomy and relations of the prostate gland and seminal vesicles. Describe the normal form of the prostate when examined per rectum and how this changes in relation to hypertrophy and malignancy.
9. Describe the anatomy and relations of the ovary, uterine tubes, uterus, cervix and vagina, including their peritoneal coverings. Describe the changes that occur in the uterus and cervix with pregnancy.
10. Describe the anatomy, relations and peritoneal coverings of the sigmoid colon, rectum and anal canal. Explain the functional anatomy of puborectalis, the anal sphincters and their role in fecal continence.
11. Describe the anatomy of the ischio-anal fossa and explain its clinical significance, e.g. in relation to abscesses and fissures.
12. Describe the anatomy of the scrotum, testis and epididymis and their normal features on clinical examination.
13. Describe the anatomy and nerve supply of the penis, scrotum, the clitoris, vulva and vagina.
14. Describe the innervation of and major structures and mechanisms involved in the erection of cavernous tissue in males and females and in emission and ejaculation in the male.
15. Explain the anatomy, boundaries and major contents of the superficial and deep perineal pouches.
16. Describe the origin, course and distribution of the pudendal nerves and the sites of pudendal nerve block.
17. Interpret basic anatomy on standard diagnostic images of the pelvis and perineum e.g. CT, MRI, X-ray and ultrasound and be able to recognize common abnormalities.

Regional Anatomy of the Pharynx and Larynx

1. Describe the anatomical arrangement of the lymphoid tissue in the pharyngeal and posterior nasal walls.
2. Describe the anatomy, function and innervation of the muscles of the pharynx and soft palate.
3. Describe the stages of swallowing and the functions of the muscles of the jaw, cheek, lips, tongue, soft palate, pharynx, larynx and esophagus, during swallowing.
4. Describe the basic development of the pharynx and larynx from infancy to maturity and how it affects the mechanics of swallowing and vocalization.
5. Describe the hyoid bone and cartilages of the larynx. Explain how these are linked together by the intrinsic and extrinsic laryngeal membranes.
6. Describe the intrinsic and extrinsic laryngeal muscles responsible for closing the laryngeal inlet and controlling vocal cord position and tension. Explain how these muscles function during phonation, laryngeal closure, cough/sneeze reflexes and regulation of intrathoracic pressure.
7. Describe the origin, course and functions of the motor and sensory nerve supply of the larynx and the functional consequences of their injury.
8. Describe the position and anatomy of the thyroid and parathyroid glands, and the significance of the courses of the laryngeal nerves.

Regional Anatomy of the Skull, Brain and Face

1. Describe the boundaries, walls and floors of the cranial fossae.
2. Describe the relationships between the structures of the brain and the anterior, middle and posterior cranial fossae.
3. Identify the bones, sutures, major features, and major foramina of the skull, both internally and externally, and list the structure(s) that each foramen transmits.
4. Describe the arrangement of the pia, arachnoid and dura mater within the cranial cavity and in relation to the brain. Describe the reflections of the dura mater and the formation of the venous sinuses.
5. Describe the anatomy of the individual layers of the scalp.
6. Describe the main muscles of the face and summarize their nerve supply and the consequences of injury to their nerve supply.
7. Interpret basic anatomy on standard diagnostic images, e.g. CT, MRI, X-ray and ultrasound of the head and be able to recognize common abnormalities.

Regional Anatomy of the Thorax I & II

1. Demonstrate the main anatomical features and surface landmarks of the thoracic vertebrae, ribs and sternum.
2. Describe the anatomy of the joints between the ribs, vertebrae, costal cartilages and sternum. Explain their contribution to the movements of ventilation.
3. Describe the anatomy of the intercostal muscles. Describe a neurovascular bundle in a typical intercostal space and outline the structures its components supply.
4. Describe the attachments and relations of the diaphragm. Explain the movements of the diaphragm (and subsequent movement of the thoracic cage), its motor and sensory innervation and pleural and peritoneal coverings.
5. Explain the movements involved in normal, vigorous and forced ventilation and describe the muscles responsible for these movements. Distinguish between true vs associated muscles of respiration.
6. Describe the boundaries of the thoracic inlet and outlet and the structures that pass through them and their relations.
7. Describe the arrangement and contents of the superior, anterior, middle and posterior parts of the mediastinum.
8. Summarize the anatomy of the tracheobronchial tree and bronchopulmonary segments and explain their functional and clinical significance.
9. Describe the structures in the hilum of the lung and their relationships to each other and to the mediastinum.
10. Demonstrate the surface markings of the heart and great vessels.
11. Describe the arrangement of the thoracic pleura and relationship to the lungs (including lobes & fissures) and their clinical significance.
12. Demonstrate the arrangement of the fibrous and serous layers of the pericardium and relate it to conditions such as cardiac tamponade and pericarditis.
13. Identify the major anatomical features of each chamber of the heart and explain their functional significance.
14. Describe the structure and position of the atrio-ventricular, pulmonary and aortic valves and describe their function in the prevention of reflux of blood during the cardiac cycle.
15. Describe the anatomical course of the spread of electrical excitation through the chambers of the heart.
16. Demonstrate the surface markings of the heart and the position and site of auscultation of its four major valves.
17. Describe the origin, course and distribution of the vagus and phrenic nerves.
18. Describe the course, major relations and neurovascular supply of the esophagus within the thorax.
19. Describe the anatomy of the breast including its neurovascular supply.
20. Interpret basic anatomy on standard diagnostic images e.g. CT, MRI, X-ray and ultrasound of the thorax.

Regional Anatomy of the Upper Limb I-II

1. Describe and demonstrate the main anatomical landmarks of the clavicle, scapula, humerus, radius and ulna. Identify the bones of the wrist and hand and their relative positions, identify those bones that are commonly injured, e.g. scaphoid.
2. Describe the neurovascular structures lying in close relation to the bones and joints of the upper limb which are at risk of injury following fracture or dislocation. Predict what the functional effects of such injury might be.
3. Describe the anatomy of the brachial plexus from its origin in the neck to its terminal branches. Recognize brachial plexus injuries and explain their clinical presentation.
4. Describe the origin, course and function of the axillary, radial, musculocutaneous, median and ulnar nerves in the upper limb.
5. Name the major muscles and muscle groups that the axillary, radial, musculocutaneous, median and ulnar nerves supply, together with their sensory distribution. Predict the consequences of injury to these nerves.
6. Describe the anatomy of the pectoral girdle, explain the movements of the pectoral girdle; identify the muscles and joints responsible for these movements. Name the main attachments and nerve supply of these muscles.
7. Describe the factors that contribute to the movement and stability of the gleno-humeral joint and explain the functional and clinical consequences of its dislocation.
8. Describe the boundaries and contents of the axilla, including the major vessels and relevant parts of the brachial plexus.
9. Describe the anatomy of the elbow joint. Demonstrate the movements of flexion and extension. Identify the muscles responsible for these movements. Name the main attachments and nerve supply of these muscles.
10. Describe the anatomy of the radio-ulnar joints. Explain the movements of supination and pronation; identify the muscles responsible for these movements, name the main attachments and describe the nerve supply of these muscles.
11. Describe the anatomy of the wrist. Describe and demonstrate movements at the wrist joints and name and identify the muscle groups responsible for the movements. Describe the relative positions of the tendons, vessels and nerves in the region of the wrist in relation to injuries.
12. Name and demonstrate the movements of the fingers and thumb. Describe the position, function and nerve supply of the muscles and tendons involved in these movements, differentiating between those in the forearm and those intrinsic to the hand.
13. Describe the main types of grip (power, precision and hook) and the role of the muscles and nerves involved in executing them.
14. Describe the position and function of the retinacula of the wrist and the tendon sheaths of the wrist and hand in order to explain carpal tunnel syndrome and the spread of infection in tendon sheaths.
15. Describe the anatomical basis of assessment of: cutaneous sensation in the dermatomes of the upper limb, motor function, and tendon reflexes in the upper limb.
16. Describe the fascial compartments enclosing the major muscle groups of the upper limb; explain the functional and clinical importance of those compartments and their contents.
17. Interpret basic anatomy on standard diagnostic images, e.g. CT, MRI, X-ray and ultrasound of the upper limb and recognize common abnormalities.

SOAR Sessions (Session 7 is Required; 8 & 9 are Optional)

1. Review select block content from classroom and lab activities in all units.
2. Correlate block content (including cadaver structures) with medical imaging and physical exam maneuvers.
3. Apply block content (including cadaver structures) to surgical and procedural clinical cases and vignettes.
4. Correlate embryology with the adult anatomy in the cadaver lab.

SOAR Sessions 1-2 (Required)

1. Review select block content from classroom and lab activities in all units.
2. Correlate block content (including cadaver structures) with medical imaging and physical exam manoeuvres.
3. Apply block content (including cadaver structures) to surgical and procedural clinical cases and vignettes.
4. Correlate embryology with the adult anatomy in the cadaver lab.

SOAR Sessions 3-4 (Required)

1. Review select block content from classroom and lab activities in all units.
2. Correlate block content (including cadaver structures) with medical imaging and physical exam maneuvers.
3. Apply block content (including cadaver structures) to surgical and procedural clinical cases and vignettes.
4. Correlate embryology with the adult anatomy in the cadaver lab.

SOAR Sessions 5-6 (Required)

1. Review select block content from classroom and lab activities in all units.
2. Correlate block content (including cadaver structures) with medical imaging and physical exam maneuvers.
3. Apply block content (including cadaver structures) to surgical and procedural clinical cases and vignettes.
4. Correlate embryology with the adult anatomy in the cadaver lab.

Strategies for Success

1. Reflect on the process of learning.
2. Define metacognition, describe its three key steps, and explain its role in learning.
3. Describe six evidence-based strategies for effective learning, and provide examples of how you can use each strategy to help you learn block content: retrieval practice, spaced practice, dual coding, interleaving, concrete examples, elaboration.

Terminology and Systems Introduction

1. Define and demonstrate the following basic terms relative to the anatomical position: medial, median, lateral, proximal, distal, superior, inferior, deep, superficial, palmar, plantar, anterior / ventral, posterior / dorsal, cephalic / cranial, rostral / caudal, ipsilateral / contralateral.
2. Describe the following basic anatomical planes: axial / transverse / horizontal, sagittal and coronal.
3. Define axial vs appendicular skeleton, epiphysis vs diaphysis, epiphyseal line, medullary cavity.
4. At a gross morphological and functional level, compare the classes of joints: synovial, fibrous, cartilaginous
5. Explain the general composition and nerve supply of a synovial joint, and compare the movements permitted at major types of synovial joints: plane, hinge, saddle, condyloid, ball & socket, pivot.
6. Review the bone and bony feature identification list.
7. Compare the location, composition, type of activity, and general pattern of nerve supply for each muscle type: skeletal, cardiac, smooth.
8. Compare the types of muscle contractions: reflexive, tonic, isometric, concentric, eccentric.
9. Define and demonstrate the basic terms used to describe movement: flexion, extension, lateral flexion, pronation, supination, abduction, adduction (radial / ulnar / deviation), medial / internal and lateral / external rotation, inversion, eversion, plantar flexion, dorsiflexion, protraction, retraction and circumduction.
10. At a gross morphological level, describe the composition and relative position of the epidermis, dermis, subcutaneous tissue, superficial fascia, deep and investing fascia. Define intermuscular septum and fascial compartment.

Thorax Circulatory Flipped Classroom I-II

1. Describe the origin, course and main branches and anastomoses of the left and right coronary arteries and discuss the functional consequences of their obstruction in conditions such as ischemic heart disease.
2. Describe the blood supply, and venous and lymphatic drainage of the lungs.
3. Describe the course of the ascending aorta, the arch of the aorta and the descending thoracic aorta. Name their major branches, key anastomoses, and the structures they supply.
4. Describe the origins, courses and relationships of the brachiocephalic veins, inferior and superior venae cavae and the azygos venous system.
5. Describe the course and major relations of the thoracic duct. Explain the lymph drainage within the thorax and its clinical significance.
6. Explain the lymphatic drainage of the breast and its clinical relevance to metastatic spread.

Upper Limb Circulatory System

1. Describe the origin, course and distribution of the major arteries and their branches that supply the shoulder, arm, forearm and hand in relation to common sites of injury. Explain the importance of anastomoses between the branches. Identify those sites where neurovascular structures are at particular risk of damage from musculoskeletal injuries.
2. Demonstrate the sites at which pulses of the brachial, radial and ulnar arteries may be located.
3. Describe the course of the main veins of the upper limb and contrast the functions of the deep and superficial veins. Identify the common sites of venous access and describe their key anatomical relations.
4. Describe the anatomy of the axillary lymph nodes and explain their importance in the lymphatic drainage of the breast and skin of the trunk and upper limb and in the spread of tumors.