

## PHASE ONE PROPOSAL

### Total Hours and Time Brainstorming

- (17 weeks x 5 days x 4 hours) + (17 wk x 1 afternoon/wk x 4 hr/afternoon) = 408 hours

### PHILOSOPHY

- Medical students become proficient in the skills necessary to function in a role similar to a medical assistant
- Medical students gain a strong foundation of the medical sciences, clinical medicine and medical arts to foster success in Phase 2 and encourage life-long-learning

### Phase 1 Schedule Overview:

Week 1 & 2: Intro to Everything

Week 3 & 4: Cardiovascular System

Week 5: Respiratory System

Week 6 - 8: Abdominal Overview

Week 9 & 10: Pelvis and Perineum Overview

Week 11: Lymphatic and Endocrine Overview

Week 12 – 14: Head and Neck Overview

Week 15 & 16: Limbs Overview

Week 17: Synthesis and assessment

### Weekly schedule template for Phase I:

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Medical sciences	Communication and ethics (MA)	Clinical skills demo (CM, MA, MS)	Clinical correlations (CM MA, MS)
9AM	Test review (Intro narratives)				
10AM	Med sciences	Small groups (Med sciences)	Med sciences		Integrated-graduated-challenges: clinical, arts, sciences
11AM					
Lunch					
1-4PM		Cadaver dissection			
Student Homework					

	Physical diagnosis physicians in attendance/teaching
--	--

\*All presentations require and incentivize active participation by students.

\*Presentations on Tues through Friday require student preparation.

\*Presentations on Monday do not require student preparation.

\*\*Synthesis problems require student preparation.

\*\*Synthesis problems are prepared and presented collaboratively by groups of the week's faculty.

\*\*Synthesis problems utilize expertise and involve faculty from prior weeks.

**Potential textbooks**

Harrisons Medicine	Essential cell biology	Physiology text (Netter, Gagong?)
Robbins pathology	Anatomy atlas (Netter)	Dissection guide
Pharmacology	Anatomy textbook (GAFS)	Immunology
Genetics	Embryology?	Microbiology

## Goals of Phase I

- define common medical terms
- describe normal human structure and function
- demonstrate ability to communicate appropriately with patients and medical colleagues
- demonstrate ability to perform and record a complete history and physical examination
- demonstrate ability to perform follow up examinations and record information in a progress note
- demonstrate understanding of basic ethical principles and narrative medicine
- demonstrate understanding of basic principles of epidemiology, biostatistics, study design, and literature review
- demonstrate understanding of the social and cultural context of illness and disease
- define and exhibit appropriate professional behavior

**Comment [RA1]:** In places, the structure-driven approach described here appears to make linking structure to function awkward.

For instance, the oral cavity is separated from and comes after the esophagus and remainder of the digestive system, so mastication, swallowing, salivary secretions, etc. if they are to be mentioned at all, will be out of a reasonable functional sequence. Similarly, the respiratory system doesn't begin with the nose. This is always a problem, of course, but some of these dislocations may cause problems.

In some cases, the gross anatomy is out of synch with the physical exam, some examples are noted on p. 23.

There is also a lot of anatomical detail specified. It might be necessary to back off of some of that to allow space for function.

**Comment [sm12]:** Suggestions from amy and susan

**Orientation week**

We propose that the CIC get a full day during orientation to go over the new curriculum

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM		Orientation	Orientation	CIC (microscope, clickers, overview of new curriculum)	White coat ceremony
9AM					
10AM					
11AM					
Lunch					
1-4PM				Introduction to cadaver (assign and introduce students to their cadaver, wrapp body, lockers, lab rules, cleaning, dissection instructions, etc...) MA1	

**Medical Arts**

- 1) Discuss the significance of the cadaver as the first patient (clinicians introduce students to cadavers)

**01 TOPIC: Introduction to Medicine (week: 1)**

**Comment [sm13]:** BE SURE to introduce CORE PRINCIPLES of all of the basic sciences – biochemistry, physiology, pharm, etc...

(Aug 24-28, 2009)

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Spaces (DM)		Communication and ethics (MA1-4)	Clinical skills demo (CM1-4) (MA2)	Clinical correlations (CM?) (MA5-6) (MS?)
9AM	Membranes -Lipid bilayer -Diffusion is slow -Channels/pumps	Connective tissue proper (RA)			
10AM	Epithelium	Microscope lab -Epithelium -Connective tissue proper	-Osmosis -Membrane potential (MM)		Integrated-graduated-challenges: clinical, arts, sciences
11AM					
Lunch					
1-4PM		Cadaver dissection of superficial and deep back			
Student Home-work	Histology video on epithelium and CT WebCT quiz on epithelium and CT Use spaces as a vehicle to teach organelles Read dissection on back (CM ?)	(MA1-4)	(CM1-4) (MA2)	(CM?)	

**Clinical Medicine**

- 1) Demonstrate understanding of the basic components of a history and physical exam:
  - a) Chief complaint, history of present illness, past medical history, family history, social history, medications, allergies, review of systems, physical exam, laboratory data, assessment, plan
- 2) Define differences between disease and illness
- 3) Discuss different imaging modalities commonly used in clinical practice (Xrays, MRI, CT, ultrasound, etc)
- 4) Discuss different therapeutic strategies employed in clinical practice with particular attention to the following: Pharmaceuticals: how they are administered, how they treat diseases and how they can be harmful
- 5) Discuss the infrastructure through which medical care is provided?

**Medical Arts**

- 1) Identify the importance of trust and partnership in the Doctor-Patient relationship
- 2) Discuss the Cultural History of Medicine (Hippocrates, introduction of professionalism and medicine as a culture, including discussions from the students of why they have come into medicine/identity development and establishing connections among the students, their ideals and missions – ideal for small group discussions, etc...)

- 3) Demonstrate understanding of patient confidentiality
- 4) Describe the significance of student narratives as they have come to medicine
- 5) Discuss “how do we actually know what we know” – introduction to analytic and critical thinking principles and life long learning
- 6) Discuss the importance and value of the Art of Observation in medical practice

**Comment [sml4]:** Introduction of the scholarship element of the training program

**Comment [sml5]:** Possibly too time intensive – take out and put later?

## Medical Sciences

Gross Anatomy, Histology, Physiology, Pharmacology, Immunology, Microbiology, Biochemistry, Physical Diagnosis, Radiology, Humanities, Bioethics, and Science of Medicine

### 1) Hierarchical organization of the human body

- a) Review the major organ systems, organs, tissues, cells, organelles and molecules

### 2) Cell and Molecular Biology

- a) Describe the central dogma of biology, identifying the roles of DNA, RNA and proteins.
- b) Recognize the importance of chromatin structure for gene regulation.
- c) Identify the 20 amino acids involved in protein synthesis and the major post-translational modifications affecting them.
- d) Describe how the amino acid sequence dictates the folded structure of a protein, and therefore its function.
- e) Match major structural proteins with their functions.
- f) Describe in general terms how enzymes catalyze reactions in the body.
- g) Explain the relevance of  $V_{max}$ ,  $K_{cat}$  and  $K_M$  to enzyme-catalyzed reactions and the function of enzyme inhibitors.
- h) Identify cellular organelles and describe their functions
- i) Describe the cytoskeletal structure of the cell
- j) Outline the mechanism of protein secretion
- k) Identify the key components of the cell membrane

**Comment [DM6]:** 03/09/09. Janet would like to move this topic to MCC. Replace with 6-8 hours of metabolism between weeks 3-8

**Comment [sml7]:** Physiology content experts: ADD broad introduction to action potentials, ion channels, etc.

**Comment [sml8]:** a) Suggestions from Janet: Enzyme kinetics will need an hour of its own, as it is conceptually difficult for many students. If it can't fit in week 1, it could probably fit in later.

### 3) Histology

- a) Outline the four basic tissues of the body (epithelial, connective, muscle and nervous)
- b) Name and identify the characteristics of the nine types of epithelium
- c) Relate the structural organization of epithelial cells to the roles of epithelia
- d) Define polarity of epithelial cells and list structural surface specialization and functions of these specializations for each domain (apical and baso-lateral)
- e) Describe the cell adhesion molecules and junctional complexes that stabilize epithelial cells and allow them to communicate
- f) Describe how the structural features of epithelial cells serve the basic functions of protection, transport, and secretion provided by epithelial tissues
- g) Classify glands according to their morphology, mode of secretion and functional type
- h) Define and compare the characteristics of the various types of generalized connective tissue
- i) Relate the structural organization of loose, dense irregular and dense regular connective tissues to their function.
- j) Describe the cells found in generalized connective tissue and their functions
- k) Describe the components of the extracellular matrix (fibers and ground substance), their function and how they contribute to the function of connective tissue
- l) Formulate the sequential stages of collagen synthesis and factors that may affect its structure or function
- m) Explain the structural differences among red, white, and intermediate skeletal muscle fibers

**Comment [DM9]:** Introduction to Nutrition ... either right at the beginning or perhaps into the abdomen unit?  
What is normal?  
Looking “adipose”  
Metabolic rate vs. weight vs. body weight vs. Discuss foods in general  
BOD POD sometime during Phase I  
4-5 hours in Phase I ... Nutrient absorption, body composition, healthy diet, maintaining a healthy weight, vitamins, essential fatty acids, minerals,  
CHECK ON WEB CT

- n) Explain the metabolic differences among red, white, and intermediate skeletal muscle fibers.
- o) Compare and contrast the role of glycogen in muscle compared to liver.
- p) Identify skeletal muscle as the major site of insulin-dependent glucose uptake from blood.
- q) Explain how lactic acid formed in muscle is converted back to glucose in the liver during exercise.
- r) Identify muscle protein as a major source of amino acid substrates for glucose synthesis in the liver and kidney during fasting and starvation.
- s) Contrast the histological characteristics between skeletal muscle with cardiac and smooth muscle.
- t) Describe the basic organization of a skeletal muscle from gross to microscopic
- u) List and discuss some key structures in the muscle fiber; describe the organization and components of the sarcomere; define Motor Unit
- v) Discuss stages of skeletal muscle contraction and relaxation including:
  - i) Neuromuscular junction signal transmission
  - ii) Excitation – Contraction coupling
  - iii) Cross-bridge cycle – sliding filament theory
  - iv) Discuss how cross-bridges generate force
- w) Discuss the effect of motor unit size and recruitment, muscle length and diameter and frequency of stimulation has on influencing force generation
- x) List factors promoting muscle growth or atrophy
- y) Describe the structure and role of muscle proprioceptors (muscle spindle, Golgi tendon organ)

**Comment [sml10]:** Suggestion from Janet

**Comment [RA11]:** Any pharmacology being considered?

**Comment [sml12]:** AMY: Do you want to include ultrastructure?

**Comment [sml13]:** Deletion suggestion from Janet (below)

**01 TOPIC: Introduction to Medicine (week: 2)**

(Aug 31-Sept 4, 2009)

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Action potential (MM)	Communication and ethics (MA1-2)	Clinical skills demo (CM1-6) (MA5)	Clinical correlations (CM?) (MA3-5) (MS?)
9AM	Test review				
	Intro narratives (MA3)				
10AM	CNS	Microscope lab -Nervous tissue -Muscle tissue	Muscle tissue		Integrated-graduated-challenges: clinical, arts, sciences
11AM	PNS ANS (DM)		Signaling (JL)		
<b>Lunch</b>					
1-4PM		Cadaver dissection of vertebral column and spinal cord			
Student Home-work	Histology video on NT and MT Web CT test on NT and MT (CM ?)	(MA1-2)	(CM1-6) (MA5)	(CM?) (MA5)	

**Clinical Medicine**

- 1) Define differences between illness and disease
- 2) Describe overview of Epic EMR and record sample data
- 3) Demonstrate ability to elicit a chief complaint
- 4) Demonstrate ability to recognize the psychosocial impact of disease on patients' lives
- 5) Recite and organize the major components of a complete history and physical
- 6) Define and recite constitutional elements of the Review of Systems (ROS)

**Comment [sml14]:** I think this should go MUCH later, i.e. right before they venture into clinics when the knowledge of the EMR is most fresh and likely to be reinforced

**Comment [AC15]:** MUCH later. If they learn it this early, they'll forget it by the time they need it.

**Medical Arts**

- 1) Discuss the significance of patients' narratives in building relations of trust and discuss representative forms of illness narratives
- 2) Discuss the clinical relationship between doctor-patient in the context of: Truthfulness, Trust, Good Communication
- 3) Define public health and major contributions of public health to the health of the population
- 4) Describe the difference between causation and association
- 5) Discuss basic principles of epidemiology

**Comment [sml16]:** Definitely keep this here

**Comment [DM17]:** Where should we put this?

**Medical Sciences**

**1) Back and Vertebral Column**

- a) Name and identify the landmark structures of the bones of the vertebral column
- b) List the contents of the vertebral and intervertebral foramen/canal
- c) List the contents of the transverse foramen of the cervical vertebrae
- d) List the joints and ligaments of the vertebral column

- e) Name the different curvatures of the vertebral column and the anatomical cause of each
- f) Name the muscles in each layer of the back and their actions
- g) Explain an intervertebral disc herniation from an anatomical perspective
- h) Identify the boundaries of the suboccipital triangle and its contents

## 2) Introduction to the basic gross and microanatomical features of the Nervous System

- a) Compare and contrast the central and peripheral nervous systems, autonomic and somatic nervous systems gray and white matter, nuclei and ganglia, and nerves and tracts
- b) Relate the following structures of a neuron to neuronal functions: dendrite, axon, axon hillock, soma, synapse, node of Ranvier
- c) Identify the following structures on a neuron: dendrite, axon, axon hillock, soma, satellite cells, Schwann cells, Node of Ranvier and synaptic cleft
- d) Describe the structure, function, and locations of glial cells, CNS: astrocytes, oligodendrocytes, microglia, and radial glia; PNS: Schwann cells
- e) Describe the location and typical functions of unipolar, bipolar and multipolar neurons

## 3) Neurophysiology

- a) Define voltage-gated and ligand-gated ion channel, equilibrium potential, membrane potential, graded potential, action potential, membrane capacitance, passive propagation, active propagation, saltatory conduction, and synapse
- b) Explain how the normal distribution and relative permeabilities of ions ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ , and  $\text{Cl}^-$ ) across the cell membrane create a resting membrane potential; describe the driving force that causes net flux of ions across the membrane
- c) Describe the ionic basis of action and graded potentials
- d) Describe the structural features, benefits and diameter of myelinated axons and influence on conduction velocity
- e) Apply knowledge of the ionic basis of resting, graded and action potentials to explain saltatory conduction in myelinated axons
- f) Outline the sequence of events that occur during chemical neurotransmission

**Comment [sml18]:** Physiology content experts: this is a great way to discuss common "excitable" cells in each system, not just neuro. COULD BE broadened to include even pharm, other cells and their ion channels, membrane potentials, (heart, endocrine, renal, gi...)

Consider inserting objectives below here:  
 1.e.g. Discuss the molecular and biophysical mechanisms involved in the formation of a resting membrane potential  
 2. Describe how ionic movement produces electrical signals  
 3. Discuss the significance of ionic equilibrium potential  
 4. List the equilibrium potentials for sodium, potassium, calcium and chloride  
 5. Identify the ion with the most variable equilibrium potential and discuss the mechanisms underlying the variations across cells.  
 6. Compare and contrast the mechanisms involved in the graded vs. action potential formation  
 7. Explain how the common electrolyte disorders involving sodium, potassium, chloride and calcium will affect basic neural function  
 Explain how the common electrolyte disorders involving sodium, potassium, chloride and calcium will affect synaptic communication

## 4) Peripheral Nervous System (PNS)

- a) Describe the connective tissue organization in the PNS including endoneurium, perineurium and epineurium
- b) Differentiate between dorsal and ventral roots, dorsal root ganglion, dorsal and ventral ramus
- c) **Autonomic Nervous System (ANS)**
  - i) Compare and contrast the divisions of the ANS based on CNS origin, length of preganglionic and postganglionic neurons and neurotransmitters and receptors at the ganglionic and target organ synapse
    - (1) List the sensory input of the ANS, and major CNS control centers
    - (2) Describe the functional effects on human body systems of normal and abnormal ANS activity

## 5) Central Nervous System (CNS) (Spinal Cord)

- a) Describe the arterial supply and venous drainage of the spinal cord
- b) Describe the anatomy of the spinal cord
- c) Describe the meningeal layers of the spinal cord

**03 TOPIC: CARDIOVASCULAR SYSTEM (week: 3, 4)**

**(Sept 7-11, 2009)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	<b>LABOR DAY</b>	Test	Communication and ethics (MA1-3)	Clinical skills demo (heart, vessels) (CM 1-7) (MA6A) - Sci of med - History taking - Phys Exam	Clinical correlations
9AM		Review Test			
		Intro narratives (MA?)			
10AM		Basics of circulatory system Heart (chambers, valves, coronary circ) (DM)	Heart sounds Electrophysiology		Integrated-graduated-challenges: clinical, arts, sciences
11AM					
Lunch					
1-4PM		Cadaver dissection of anterior thoracic wall and heart			
Student Home-work		MA1-3 CD Rom on Heart Sounds	(CM 1-4,6,7) (MA6A)	(CM5 Recording medical note)	

**(Sept 14-18, 2009)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Posterior mediastinum (DM)	Communication and ethics (MA4-7)	Clinical skills demo (vitals, JVP, and heart) (CM8-12) (MA6B,C) - Sci of med - History taking - Phys Exam	Clinical correlations
9AM	Test review	Cardiac pump (MM)			
	Intro narratives (MA5)				
10AM	Blood (RA)	Histology lab (aa, vv, blood) (EKG lab, clinical lab.) (CM 9-12)	Introduction to metabolism (glucose in blood ...) (JL)		Integrated-graduated-challenges: clinical, arts, sciences
11AM	Blood pressure (MM)		Signaling (ANS regulation) (MM)		
Lunch					
1-4PM		Cadaver dissection of posterior mediastinum			
Student Home-work	Histology video on vessels (CM 9-12)	(MA4-7)	(CM8-12) (MA6B,C)	(CM6 Recording medical note)	

**Comment [DM19]:** Introduce the "Doe" family tree; global narratives

**Clinical Medicine (pending edits from community clinics)**

- 1) Elicit and record a CC, HPI and past medical history (PMH) (including illnesses, hospitalizations, surgeries) for adult and pediatric patients
- 2) Elicit a focused HPI relevant to cardiovascular complaints for adult and pediatric patients
- 3) Recite and define elements of the cardiovascular ROS
- 4) Perform and describe normal findings for adult and pediatric patients with regard to the following:
  - a) Cardiovascular exam
  - b) Relevant vital signs (heart rate, blood pressure)
    - i) Demonstrate appropriate technique in obtaining

- (1) Heart Rate
- (2) Blood Pressure
- ii) Define normal blood pressure in adults and children
- iii) Describe and demonstrate how to obtain orthostatic vital signs
- iv) Describe the rationale and significance of obtaining blood pressure in the bilateral upper extremities and lower extremity in children
- v) Discuss how blood pressure varies in children based on age and height of the patient
- 5) Record findings from a normal cardiovascular history and physical exam
- 6) Describe the timing and causes of the four heart sounds
- 7) Describe how heart murmurs differ from normal sounds, specifically addressing the following for all murmurs:
  - a) Timing of murmurs – systole or diastole
  - b) Duration of the murmur
  - c) Grade – scale 1-6
  - d) Transmission
  - e) Shape – crescendo-decrescendo (ejection type), decrescendo, blowing (regurgitant)
- 8) Recognize that there are a number of congenital malformations of the heart which affect children
- 9) Recognize a normal EKG in an adult
- 10) Demonstrate understanding that normal EKG findings in children vary based on the age of the patient
- 11) Describe approach to reading a plain chest radiograph in adults and children and be able to:
  - a. Describe the appearance of the cardiac silhouette as it relates to the major chambers of the heart
  - b. Identify the location major vessels (aorta, intercostal arteries, pulmonary arteries) and identify the normal appearance of these vessels on CXR
  - c. Identify the hila and describe the contents of the hilar area on a normal CXR
- 12) Describe the utility of the following laboratory tests: Troponin I, CK, CKMB, CBC, Coagulation studies (PT/PTT/INR)
- 13) Demonstrate ability to perform venipuncture

**Comment [sm120]:** Maybe this should all go in the circulation/respiration section, but my argument against that is I think it's too long to wait to introduce them to murmurs and how to think about them as they will encounter them frequently in the clinics

**Comment [sm121]:** Comment from AMY: would it be helpful to have a complementary objective to #9 like Name 5 common congenital heart malformations and recognize possible clinical presentations (really basic-like cyanosis, resp. distress)

**Comment [sm122]:** Comment from AMY: consider including more components of thrombophilia workup, Factor V Leiden etc.

**Comment [DM23]:** Move to Phase II

### Medical Arts

- 1) Describe the physician's role in eliciting a patient's story
- 2) Identify physician behaviors which promote and prohibit patients' abilities to tell their stories
- 3) Discuss the significance of patient's narrative in building relations of trust
- 4) Identify legal and ethical boundaries of the responsibility or obligation to provide treatment
- 5) Discuss historical and contemporary examples of abuses of medical research with particular focus on:
  - a) The legacy of the Tuskegee syphilis experiment
  - b) Individual rights and moral tension between the duty of care and the individual and interests of others
- 6) Define and discuss elementary concepts of biostatistics, including
  - a) Calculate and comprehend sensitivity, specificity, NNT, PPV, NPV, relative risk, odds ratios, incidence rates, confidence intervals, prevalence rates, and mortality rates
  - b) Recognize types of data and calculate measures of central tendency and variance.
  - c) Construct and interpret data in tables and graphs.
- 7) Review and discuss landmark cases in bioethics (i.e., documentary film, "Please Let Me Die")
- 8) Review and discuss landmark cases in bioethics, including the "Baby Doe" case

**Comment [sm124]:** Incorporating clinical med faculty, pharm, etc.

**Comment [sm125]:** In the context of cholera and introducing professional virtues, moral responsibility, and role modeling and the introduction of technology (microscope) and lab development

**Comment [sm126]:** A bit premature, may be better served later – move to later?

**Comment [sm127]:** Move to later

## Medical Sciences

### 1) Heart

- a) Describe the microscopic structure and function of each of the three layers of the heart wall
- b) Identify and describe the functions of the chambers of the heart
- c) Describe the basic functional anatomy of the atrioventricular and semilunar valves, and how they operate
- d) Discuss the significance of the fossa ovalis
- e) List the major branches of the right and left coronary arteries and the general region they supply
  - i) Differentiate between left and right dominant coronary circulation and identify which is most common
- f) Contrast the sympathetic and parasympathetic innervation of the heart and summarize the components of the conduction system
  - i) Explain the anatomical cause of referred pain
- g) Identify the great vessels that feed or drain the heart (SVC, IVC, pulmonary arteries and veins, aortic arch and its branches)
- h) Trace the pathway of blood through the heart
- i) Cardiac cycle
  - i) Sketch the temporal relationship between an action potential in a cardiac muscle cell and the resulting contraction (twitch) of that cell; explain why cardiac muscle cells cannot remain in a state of sustained contraction
  - ii) State the steps in excitation-contraction coupling in cardiac muscle; outline the sequence of events that occurs between the initiation of an action potential in a cardiac muscle cell and the resulting contraction and then relaxation of that cell; explain calcium's role the control of contraction and relaxation of cardiac muscle
  - iii) Describe the timing and events of the cardiac cycle; describe normal heart sounds and explain how heart murmurs differ from normal sounds
  - iv) Draw the pressure, volume, heart sound, and ECG changes in the cardiac cycle; identify the intervals of isovolumic contraction, rapid ejection, reduced ejection, isovolumic relaxation, rapid ventricular filling, reduced ventricular filling and atrial contraction
  - v) Identify the various phases of ventricular systole and diastole; contrast the relationship between pressure and flow into and out of the left ventricles during each phase of the cardiac cycle
  - vi) Summarize the concept of mean systemic pressure, its normal value, and how various factors determine its value
- j) Heart sounds
  - i) Explain the properties of sound and auditory perception that form the basis of auscultation
  - ii) State the changes in velocity and viscosity that favor the formation of turbulence
  - iii) Describe the timing and causes of the four heart sounds
  - iv) Describe the expected auscultation sounds that define mitral stenosis, mitral insufficiency, aortic stenosis, and aortic insufficiency and how each affects the cardiac cycle, left ventricle oxygen needs and coronary blood flow

**Comment [sml28]:** AMY: I would again, like with the bronchi and lungs, add objectives about identifying the morphologic determinants of what makes a left and right atrium and ventricle, and understanding the concept that they are determined by morphology and not by what side of the body they are on. This is important both for situs abnormalities and for prognosis in congenital heart disease, where the morphologic right ventricle is not able to function long term as a left ventricle. I would revisit this in Circ/Resp, but introduce the basic concept that there are morphologic determinants of "sidedness" early.

**Comment [sml29]:** Physiology content experts 2/4/2009: generally takes about 17 hr to cover CV system (which includes cellular/smooth muscle/electrophysiology) in great detail, so maybe this could be covered in less time if done so in a broad sense (like 5 hrs? so this would not include basic electrophysiology/action potentials, etc) – the current objectives that are here do reflect what is currently covered early in the current curriculum

### 2) Vessels

- a) Describe the three layers that typically form the wall of a blood vessel, and state the function of each
- b) Define vasoconstriction and vasodilation
- c) Compare and contrast the structure and function of arteries, arterioles, capillaries, venules and veins

- d) Define blood flow, blood pressure, and resistance and explain the relationships between these factors
  - e) List and explain factors that influence blood pressure, and describe how blood pressure is regulated
    - i) Define hypertension and discuss its symptoms and consequences
  - f) Describe the organization of the adult circulatory system and explain how the systemic and pulmonary circulations are linked physically and physiologically
  - g) Explain how the physical properties of the circulation (vessels size, wall thickness, wall composition, compliance, elastic recoil, and blood viscosity) affect movement of blood and delivery of nutrients
  - h) Describe the structure, function and typical locations for the three types of capillaries (continuous, fenestrated and sinusoidal); outline factors involved in capillary dynamics
  - i) Name and give location for the major arteries and veins in the systemic circulation
- 3) Blood
- a) Describe the composition and functions of blood
  - b) Describe the functions of red and white blood cells and platelets
  - c) Describe the ABO and Rh blood groups and the basis of blood transfusion reactions
  - d) Demonstrate understanding of the importance of blood testing as a diagnostic tool
- 4) Blood and metabolism
- a) Describe the process of glycolysis.
  - b) Compare and contrast aerobic and anaerobic glycolysis.
  - c) Identify conditions likely to lead to lactic acidosis.
  - d) Describe the functions of the pentose phosphate pathway and its importance for red blood cell stability.
- 5) Lymphatic system
- a) Describe the lymphatics, and their critical functions including fat absorption, interstitial fluid reabsorption and clearing large proteins from the interstitial spaces
  - b) Explain how edema develops in response to venous obstruction, lymphatic obstruction, increased capillary permeability, heart failure, tissue injury or allergic reaction
- 6) Posterior mediastinum
- a) Describe the function of the thoracic sympathetic trunk, greater, lesser and least splanchnic nerves
  - b) List the branches of the thoracic aorta
  - c) Describe the course and function of the thoracic duct
  - d) Describe the course of the azygos system of veins (azygos, hemiazygos and accessory hemiazygos)
  - e) Identify the anatomical relationships of the esophagus to other thoracic structures
  - f) List the three diaphragmatic apertures, what vertebral level they are located and the contents that travel through them

**Comment [sm130]:** AMY: what kind of blood testing- type and cross, something else?

**04 TOPIC: RESPIRATION (week: 5)**

**Comment [sm131]:** Physiology content experts can we rename and combine topics 2&3 (weeks 3, 4,5) and lump altogether as "CHEST"/"thoracic cavity"

(Sept 21-25, 2009)

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Respiratory physiology (MM)	Communication and ethics (arts&clinical) (CM5 Dev. stages) (MA2,4 Communication) (Patient demo?) MA3	Clinical skills demo (CM1-4)  - Sci of med (MA5 Study design) - History taking (CM1-4) - Phys Exam (CM1-9)	Clinical correlations (put after Int-grad-challenges) (include Monday morning questions "what was the doctors reasoning when reaching the dx?") (MA1,3)
9AM	Test review  Intro narratives (air pollution, TB in Russian cells) (MA1,3)	Biochem I (oxygen) (JL)			
10AM	Structure of respiratory system (DM)	Small groups (HSEB 1700) (microscope, clinical lab) (CM11 radiographs) (CM10 spirometry, ABG) (radiographs)	Biochem II (carbondioxide) (JL)		Integrated-graduated-challenges: clinical, arts, sciences
11AM			Respiratory physiology (MM)		
Lunch					
1-4PM		Cadaver dissection of posterior thoracic wall and lungs			
Student Home-work	Histology video on respiratory system	MA3	(CM7 Chest deformities) (CM8 Breath sounds) (CM9 maneuvers)	(CM6 Recording medical note)	

**Comment [DM32]:** In Phase 2 (second year) potentially have students create a CPC.

**Clinical Medicine**

- 1) Elicit and record a chief complaint (CC) and history of present illness (HPI) for adult and pediatric patients
- 2) Elicit a focused HPI relevant to respiratory complaints for adult and pediatric patients
- 3) Recite and define elements of the respiratory ROS
- 4) Perform and describe normal findings for adult and pediatric patients with regard to the following:
  - a) Respiratory exam
  - b) Relevant vital signs: respiratory rate, oxygen saturation
- 5) Describe general differences in the approach to examining patients of different ages and developmental stages with particular attention to the following:
  - a) infant
  - b) toddler
  - c) young child
  - d) adolescent
  - e) geriatric patients
- 6) Record findings from respiratory history and exam in a medical note
- 7) Describe normal configuration of the chest wall and differentiate it from (HW)
  - a) Pectus carinatum
  - b) Pectus excavatum

- 8) Describe normal breath sounds (alveolar and bronchial) and be able to define and describe adventitious sounds (HW):
- Wheezing
  - Rhonchi
  - Rales
  - Stridor
  - Pleural friction rub
- 9) Describe and perform maneuvers to identify pulmonary consolidation, specifically
- Egophony
  - Whisper pectoriloquy
  - Tactile fremitus
- 10) Describe the utility of the following laboratory tests:
- Arterial Blood Gas (ABG)
  - Pulmonary function studies/spirometry
- 11) Describe a general approach to reading plain chest radiographs in children and adults and
- Describe the appearance of the lungs, pleura and pulmonary vascularity on a normal CXR
  - Identify the location of the major lobes of the lungs on a normal CXR

**Comment [sml33]:** Comment from amy: Consider adding the following more anatomic pathology-oriented laboratory tests: bronchoalveolar lavage, pulmonary brushings etc. - sml - I think that's perfect for phase II and may be too detailed for phase I

**Comment [AC34]:** Unless a substantial amount of time is going to be spent here on the physiology relevant to spirometry findings, this absolutely should be moved.

### Medical Arts

- Describe historical and global examples of public health contributions to the health of populations (e.g. global perspective of TB impact on global health -- ? devon hale)
- Identify the ethical and legal importance of good verbal and written communication skills
- Identify the features of ethical decision making including the four principles of bioethics and the theories of bioethics (Respect for Autonomy, Beneficence, Non-maleficence, Justice)
- Discuss how effective communication between doctors and patients differ across cultures, socioeconomic and religious backgrounds
- Define the types of study design and list the strengths and weaknesses of each

### Medical Sciences

- Thoracic wall
  - Name and identify bony landmarks of the anterior thoracic wall
  - Identify and describe the three layers of intercostal muscles
  - List the contents of the costal groove
  - Explain the movements of the ribs to facilitate thoracic expansion
  - Discuss clinical relevance of the level of the sternal angle
  - Describe the boundaries and contents of the thoracic inlet and outlet
  - Outline arterial sources and venous drainage sites for the anterior and posterior intercostal arteries and veins
  - Summarize the arterial supply, venous and lymphatic drainage of the breast
- Pleura
  - Describe the connective tissue and mesothelial components of the pleura and their functions
  - Differentiate between parietal and visceral pleura and contrast their arterial, venous, lymphatic and nervous supply
  - Explain the functional significance of the partial vacuum that exists in the intrapleural space
  - Describe how pleural reflections and recesses are created in the pleural cavity
  - Compare rib levels for the termination of the inferior border of the lung versus the inferior border of the parietal pleura

**Comment [sml35]:** Physiology content experts – takes approx 9 hr to cover all of the material in physiology of the respiratory system; MISSING – neural control of respiratory system

- 3) Lung structure
  - a) Identify the different surfaces of the lungs, lobes, fissures
  - b) Contrast hilar surfaces in right and left lungs
  - c) List the systemic and pulmonary vascular supply to the lungs
- 4) Bronchial tree
  - a) Identify the vertebral level at which the trachea bifurcates; describe why the right bronchus is more susceptible to aspiration than the left bronchus
  - b) Identify the organs forming the respiratory passageway(s) in descending order until the alveoli are reached; distinguish between conducting and respiratory structures
  - c) Describe the cellular components of respiratory epithelium and their function
  - d) Describe the progression of cartilage, smooth muscle, CT glands, goblet cells, and cilia through the trachea and bronchial tree
  - e) Describe the structure and function of Clara cells, alveoli, interalveolar septum, type I and II pneumocytes, dust cells, pulmonary surfactant and the blood-air barrier
  - f) Contrast the effect that sympathetic and parasympathetic innervation have on the bronchial tree
- 5) Mechanics of breathing
  - a) Relate Boyle's law to the events of inspiration and expiration
  - b) Explain the relative roles of respiratory muscles and lung elasticity in effecting volume changes that result in air to flow into and out of the lungs
  - c) Describe the attachments and functions of the diaphragm
- 6) Alveolar ventilation
  - a) Recognize normal alveolar, arterial and mixed venous blood gas values for P<sub>O2</sub>, sa<sub>O2</sub>, PCO<sub>2</sub>, HC<sub>CO3</sub> and pH
  - b) Identify a normal spirogram
  - c) Define the following terms: anatomic dead space, physiologic dead space, alveolar ventilation, compliance, surface tension, surfactants
  - d) Diagram normal lung volume, tracheal pressure, alveolar pressure, and pleural pressure during a normal quiet breathing cycle
- 7) Gas transport
  - a) Define percent hemoglobin saturation, oxygen tension, oxygen content as they pertain to blood saline
  - b) Draw and label an oxyhemoglobin dissociation curve (hemoglobin oxygen equilibrium curve), showing the amount of dissolved oxygen and the relationships between oxygen partial pressure, hemoglobin saturation, and blood oxygen content
  - c) List the forms in which carbon dioxide is carried in the blood; identify the percentage of total CO<sub>2</sub> transported as each form
  - d) Define respiratory acidosis and alkalosis
  - e) Explain how allosteric effectors alter hemoglobin structure to optimize O<sub>2</sub> transport.
- 8) O<sub>2</sub> utilization and CO<sub>2</sub> production
  - a) Describe ATP synthesis is based on carbon oxidation.
  - b) Identify how the majority of oxygen we breathe is utilized in the electron transport chain.
  - c) Describe how, where and why most of our CO<sub>2</sub> is produced.
  - d) Explain the relationship between Respiration Quotient (RQ; VCO<sub>2</sub>/VO<sub>2</sub>) and oxidation of carbohydrates vs. fats.
- 9) Pulmonary circulation
  - a) Contrast the systemic and pulmonary circulations in regard to pressures, resistance to blood flow, and response to hypoxia, HPV response
  - b) Describe the major functions of the bronchial circulation

**Comment [sm136]:** Comment from AMY: The goal about trachea/mainstem bronchial anatomy is fine. I suggest adding a separate goal that the student will explain the difference in branching patterns between the morphologic right and left bronchus (eparterial vs. hyparterial), and recognize that a bronchus is designated as right or left based on morphologic features rather than what side of the body it is on.

**Comment [sm137]:** Comment from AMY: I am guessing you are still deciding how much to include before including specific objectives in objective format for the cadaver dissection of the anterior chest wall and lungs, like in the later units, where there are a lot of gross anatomy detailed objectives?

**04 TOPIC: ABDOMEN (weeks: 6, 7, 8)**

**(Sept 28-Oct 2, 2009)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Food composition (nut)	Communication and ethics (chicken soup...) (MA4)	Clinical skills demo (abdomen and rectal exam)  (CM1-4) (MA?)	Glycolysis
9AM	Test review  Intro narratives (MA)	Secretions (phys)	Communication and ethics (MA4) Mentor groups		
10AM	Overview of abdomen (gut tube layers)		Histology lab  Dietary analysis		Carbohydrate and protein dig
11AM	Motility (phys)		Embryology GI		
<b>Lunch</b>					
1-4PM		Cadaver dissection of ant abd wall, inguinal canal and GI overview			
Student Home-work	Histology video on ? (CM ?)	(MA?)	(CM1-4) (MA?)	(CM5)	

**(Oct 5-9, 2009)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Insulin, glycogen, gluconeogenesis (Fructose – no regulation)	Communication and ethics (MA3)	Clinical skills demo (abdomen and rectal exam) (CM6-8) (MA?)	Clinical correlations (CM?) (MA?) (MS?)
9AM	Test review  Intro narratives (MA3)				
10AM	Blood and lymph of GI	Histol lab and lecture (liver, pancreas, duodenum)	AA catabolism and urea cycle		Integrated-graduated-challenges: clinical, arts, sciences
11AM	Lipid digestion and absorption		Nutrition protein/lipid (fat soluble vitamins)		
<b>Lunch</b>					
1-4PM		Cadaver dissection of GI			
Student Home-work	Histology video on ? (CM 9-10)	(MA?)	(CM6-8) (MA?)	(CM?)	

(Oct 12-16, 2009)

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Regulation	Communication and ethics (MA1-2)	Clinical skills Assessment (CM 9) MA5-6	8-9AM Adipose tissue  Clinical correlations (CM?) (MA?) (MS?)
9AM	Test review  Intro narratives (MA1-2)	Gross			
10AM	ANS gut	Histo lecture and lab	Fat synthesis and fructose		Integrated-graduated-challenges: clinical, arts, sciences
11AM	Fat oxidation/ketones		Nutrition fat-soluble vitamins, essential fatty acids		
<b>Lunch</b>					
1-4PM		Cadaver dissection of post abd wall			
Student Home-work	Histology video on ? (CM ?)	(MA?)	(CM study weeks 1-8)	(CM?)	

**Clinical Medicine**

- 1) Elicit and record a CC, HPI, PMH, social history (SH) and family history (FH) for adult and pediatric patients
- 2) Elicit a focused HPI relevant to common abdominal complaints for adult and pediatric patients
- 3) Recite and define elements of the gastrointestinal ROS
- 4) Perform and describe normal findings for adult and pediatric patients with regard to the following:
  - a) Abdominal exam
  - b) Examination of the back for costovertebral angle tenderness (CVAT)
  - c) Rectal exam (in adult patients, and when indicated in pediatric patients)
  - d) Relevant vital signs and growth parameters:
    - i) Weight and Height
    - ii) Define body mass index (BMI) and demonstrate how to calculate BMI
    - iii) Demonstrate how to measure and plot growth parameters on growth charts for pediatric patients which include height, weight and head circumference
    - iv) Describe the origin of growth charts and the limitations of growth charts for different ethnic groups and special populations
- 5) Record findings from an abdominal and rectal exam
- 6) Describe normal abdominal sounds and differentiate them from the following:
  - a) Hyperactive bowel sounds
  - b) Hypoactive bowel sounds
- 7) Define ascites, describe maneuvers to detect ascites on abdominal exam, and discuss the limitations of these maneuvers in correctly identifying the presence of intra-abdominal fluid
- 8) Define peritonitis and describe maneuvers to elicit findings of peritonitis on physical exam

- 9) Describe a general approach to reading plain abdominal radiographs and abdominal CT scans in children and adults and
  - a) Describe the appearance of the normal abdominal gas pattern and differentiate it from obstruction
  - b) Describe the appearance of constipation on plain abdominal radiographs
  - c) Describe the appearance and significance of free intraperitoneal air on flat plate, upright and cross table lateral plain abdominal radiographs
  - d) Identify all of the major organs seen on CT scans of the abdomen and pelvis
- 10) Describe the utility of the following laboratory tests:
  - a) Liver function tests (LFTs)
    - i) AST, ALT, albumin, total protein, bilirubin: total, direct and indirect
  - b) Basic Metabolic Profile (BMP): Na, K, Cl, HCO<sub>3</sub>, BUN, Cr, Glucose, Ca
  - b) Peritoneal fluid analysis (cell count, chemistry, cytology)
  - c) Pancreatic enzymes (amylase, lipase)
  - d) Fasting lipid profile
  - e) Identify the significance of obtaining coagulation tests (PT/INR) as a means of interpreting liver function
  - f) Fecal occult blood testing

### **Medical Arts**

- 1) Discuss practical difficulties with truth-telling in medicine identifying inter/intra professional conflicts and other barriers to good communication.
- 2) Discuss the legal and ethical importance of cultural, gender, inter-generational, religious and racial sensitivity
- 3) Discuss the impact of sanitation practices on public/global health
- 4) Describe and discuss tools to care for ourselves, our values, and our colleagues as health-care professionals
- 5) Demonstrate ability to:
  1. Construct a null hypothesis and alternative hypothesis when given a clinical question
- 6) Perform hypothesis testing and determine statistical significance

**Comment [sml38]:** In the context of HIV/AIDS epidemic

**Comment [sml39]:** Including examples of cholera, malaria, typhoid mary, yellow fever

### **Medical Sciences**

- 1) Anterior abdominal wall
  - a) Identify the anatomical boundaries, planes, regions and quadrants of the anterior abdominal wall and their clinical relevance
  - b) Describe the surface landmarks including McBurney's point, projection of underlying viscera, dermatomes, referred pain and landmarks used in physical diagnosis
  - c) Identify the layers of the anterior abdominal wall, the blood supply, muscles, lymphatic drainage, innervation, function
  - d) Identify how the anterior abdominal musculature aids in breathing, raising internal pressure for vomiting, defecation, parturition etc.
  - e) Describe the inguinal canal in the male and female; identify the walls, contents, inguinal rings, inguinal triangle, direct and indirect hernias
  - f) List the contents of the spermatic cord
    - i) Describe the arterial and nerve supply and the venous and lymphatic drainage of the testes, and scrotum
- 2) Gastrointestinal (GI) tract
  - a) Peritoneum

- i) Differentiate between the visceral and parietal peritoneum and contrast their blood supply and innervation
  - ii) Identify the greater and lesser sacs, omenta, peritoneal and hepatoduodenal ligaments, intraperitoneal and retroperitoneal organs
- b) GI tract overview
- i) Describe the overall function of the digestive system and differentiate between organs of the GI tract and accessory digestive organs
    - (1) Contrast the arterial supply, venous drainage, lymphatic drainage and autonomic regulation of the foregut, midgut, hindgut and large intestines
    - (2) List the four sites of portal-caval anastomoses and discuss the clinical relevance
  - ii) Describe the tissue composition of the four layers of the GI tract and the functions of each layer; compare and contrast regional differences found in these layers
- c) Esophagus
- i) Contrast the histological structure, arterial supply, venous and lymphatic drainage and innervation of the upper and lower esophagus including the cardiac sphincter
  - ii) Describe the clinical significance of gastric reflux, heartburn, hiatal hernia, esophageal fistula, vagotomy
  - iii) Describe peristalsis
- d) Stomach
- i) List the arterial supply, innervation, venous and lymphatic drainage of the stomach
  - ii) Identify the distinguishing features of the gastroesophageal junction, cardia, fundus, body, and pylorus
  - iii) Describe the storage function, digestion and motility of the stomach
  - iv) Explain the functional importance of parietal and chief cells in the mucosa
  - v) Describe the mechanism of gastric acid production and the regulation of H<sup>+</sup>-K<sup>+</sup>ATPase and its clinical significance in gastritis, gastric ulcers and duodenal ulcers
  - vi) Explain the role of mucosal protection (mucosal barrier) against the corrosive secretion products
- e) Small intestine
- i) Duodenum
    - (1) Describe the parts of the duodenum, the vertebral level at which they lie and the anatomical relationships of other adjacent structures and its clinical significance (superior mesenteric artery syndrome, suspensory ligament of Trietz as a surgical landmark)
    - (2) List the arterial supply, innervation, venous and lymphatic drainage of the duodenum
    - (3) Identify the location of the major duodenal papilla and its function
  - ii) Jejunum and ileum
    - (1) Contrast the histoanatomical differences between the duodenum, jejunum and ileum; small and large intestines
    - (2) Explain the role of microvilli in absorption and describe the process of absorption of digested foodstuffs that occur in the small intestine
    - (3) Compare and contrast the digestion, absorption and distribution of proteins, lipids and carbohydrates.
- f) Pancreas
- i) Describe the anatomical relationships to adjacent structures, vertebral level, duct systems, innervation, blood supply and venous drainage of the pancreas
  - ii) Describe the histological structure of the pancreatic acini and duct system

- iii) List the major pancreatic enzymes involved in chemical digestion, name the foodstuffs on which they act, and name the end products of protein, fat, carbohydrate, and nucleic acid digestion
  - iv) Describe the digestive process by pancreatic secretion and brush border enzymes and the consequence of brush-border enzyme deficiencies
  - v) Contrast mucosal transport of monosaccharides, amino acids and peptides with long chain fat absorption and formation of chylomicrons
  - vi) Describe the mechanism by which chyme is neutralized in the duodenum, and the role cystic fibrosis transmembrane conductance regulator (CFTR) in the pancreatic duct system
  - vii) Describe the control of pancreatic secretion (secretin, CCK, vagovagal reflexes)
  - viii) Explain how zymogens are activated in the small intestine
- g) Liver and Gallbladder
- i) Describe the surfaces, lobes, arterial supply, venous and lymphatic drainage, peritoneal attachments, and anatomical relationships of the liver to adjacent structures
  - ii) Identify the effects of portal hypertension on the portal-caval system
  - iii) Describe the branches of the biliary tree starting from the hepatic ducts to its endpoint at the duodenal papilla
  - iv) Describe the microscopic structure and blood supply of the liver and how this is related to the appearance and severity of pathology in the liver
  - v) Discuss the role of hepatocyte organelles in the function of the liver
  - vi) Describe the structure and function and location of Kupffer cells and space of Disse
  - vii) Identify the components of the portal triad at the gross level (porta hepatis) and microscopic level (within the liver parenchyma)
  - viii) Describe the differences between periportal and centrilobular liver parenchymal cells
  - ix) List the functions of the gallbladder and describe the histology
  - x) Describe the location, vascular supply, venous and lymphatic drainage of the gallbladder
  - xi) Describe the relationship of the gall bladder to the liver, the synthesis and components of bile and the role of bile salts in digestion; explain the concentrating capabilities of the gall bladder; explain the signals that lead to release of bile into the duodenum
  - xii) Describe the cellular mechanism for the hepatic uptake, conjugation and secretion of bile salts and bilirubin
  - xiii) Recognize the properties of the micelles, their ability to carry and ferry fats and allow the final stages of fat digestion and hepatic recirculation of bile salts
  - xiv) Identify the parasympathetic and sympathetic innervation of the liver
  - xv) Describe the role of liver metabolism in the fed state.
  - xvi) Describe the role of liver metabolism in the fasted state.
  - xvii) Describe the stages of bile pigment metabolism, where they occur and the mechanisms involved with particular reference to the lyses of the RBC and release of hemoglobin; the formation of bilirubin and urobilinogens. Understand the basis for the appearance of pigments in the blood, urine and stools
  - xviii) Explain the different causes of jaundice
  - xix) Explain the basis of Liver Function Tests and the plasma markers of liver parenchymal cell damage; identify the tests used to determine levels of bilirubin and differentiating forms of jaundice
- h) Spleen
- i) Describe the function, location, relationship to adjacent structures, the surfaces, peritoneal attachments, arterial supply, and venous of the spleen
- i) Large intestine

**Comment [sm140]:** AMY: Consider specifically asking students to list common causes of jaundice in infants, since they are so different that those see in older patients

- i) Describe the cecum, appendix, ascending colon, hepatic flexure, transverse colon, splenic flexure, descending colon, sigmoid colon, rectum and anus
- ii) Describe the histological structure of the appendix, colon and rectum
- iii) List the major functions of the colon and describe the regulation of defecation
- iv) Describe the absorption of water, electrolyte, calcium and vitamins (B12?)
- v) Contrast the upper and lower halves of the anal canal based upon arterial supply, venous drainage, innervation and epithelium
- vi) Describe what structures can be palpated on a rectal exam (male and female)
- vii) Explain the pathophysiology of diarrhea, constipation, and intestinal gas
- viii) Describe the function of the ileocecal sphincter
- j) Digestion regulation
  - i) Describe the histoanatomical characteristics of the enteric nervous system, and the location of the myenteric and submucosal plexus
  - ii) Explain the sympathetic and parasympathetic modulation of the enteric nervous system
  - iii) Identify the cell types and anatomical location of the endocrine cells secreting gastrin, secretin, CCK, GIP and motilin
  - iv) Identify the celiac, aorticorenal, superior mesenteric and inferior mesenteric ganglia and plexuses; identify the superior hypogastric, hypogastric and inferior hypogastric plexuses
  - v) Identify the influence of sympathetics (greater, lesser, least, lumbar, and sacral splanchnic nerves) and parasympathetics (CN X and sacral splanchnics)

**Comment [AC41]:** I think we have all of this in Repro and metabolism. This is pretty high level of detail compared to lots of the other stuff.

**05 TOPIC: PELVIS AND PERINEUM (weeks: 9, 10)**

**(Oct 19-23, 2009)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Regulation (MM)	Communication and ethics (MA1)	Clinical skills demo (CM1-8) (MA2)	Clinical correlations (CM?) (MA?) (MS?)
9AM	Test review	Physiology (MM) (acid-base)			
	Intro narratives (MA?)				
10AM	Introduction to Nephrology (RA, MM)	Microscope - kidney, ureter, bladder (CM ?)	Gross - Pelvis and ischioanal fossa		Integrated-graduated-challenges: clinical, arts, sciences
11AM			Homeostasis (MM)		
<b>Lunch</b>					
1-4PM		Cadaver dissection of pelvis and ischioanal fossa			
Student Home-work	Histology video on ? (CM ?)	(MA?)	(CM1-8) (MA?)	(CM9)	

**(Oct 26-30, 2009)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Male Repro	Communication and ethics (MA1 cont...)	Clinical skills demo (CM10-11) (MA3)	Clinical correlations (CM?) (MA?) (MS?) (Topic ... how to get pregnant)
9AM	Test review				
	Intro narratives (MA?)				
10AM	Female repro	Microscope on repro (CM ?)	Feedback loops using menstrual cycle		Integrated-graduated-challenges: clinical, arts, sciences
11AM					
<b>Lunch</b>					
1-4PM		Cadaver dissection of ?			
Student Home-work	Histology video on ? (CM ?)	(MA?)	(CM10-11) (MA?)	(CM9)	

**Clinical Medicine (pending edits from community clinics)**

- 1) Elicit and record a CC, HPI, PMH, SH, FH and sexual history for adult and pediatric patients
- 2) Elicit a focused HPI relevant to common pelvic and genitourinary complaints for adult and pediatric patients
- 3) Describe the components and importance of a sexual history
- 4) Recite and define elements of the genitourinary ROS

- 5) Perform and describe normal findings of the following:
  - a) Pelvic exam including speculum and bimanual exams
  - b) bimanual exams
  - c) Testicular exam
  - d) Prostate exam
  - e) Breast exam
- 6) Describe age related changes which commonly affect the vagina, uterus, breast, prostate
- 7) Perform the pelvic (speculum and bimanual), testicular, prostate, and breast exams with respect for patient modesty
- 8) Perform an examination to detect an inguinal hernia
- 9) Record findings from the pelvic (speculum and bimanual), testicular, prostate, breast exams
- 10) Locate and describe the normal appearance of the following on pelvic CT scan:
  - a) uterus
  - b) fallopian tubes
  - c) ovaries
  - d) prostate
- 11) Describe the utility, how to perform, recognize normal values and accurately record results of the following:
  - a) pap smear
  - b) wet mounts
  - c) KOH preparations
  - d) Pregnancy test
  - e) PSA
  - f) Dipstick Urinalysis and urine microscopy

**Comment [sch42]:** Did we decide to include this in phase 1 or not? I was thinking the group or Larry Reimer thought this was too soon and phase 2 was more appropriate. However if we can do it using SPs, phase 1 may be a good place for it.

**Comment [sml43]:** AMY: add HPV typing to pap smear , it may be a reflexive test and some argue that in the future, it may come before pap cytology

### Medical Arts

- 1) Define and discuss the practice of confidentiality and good clinical practice including the following:
  - a) Professional information, privacy and respect for autonomy
  - b) Patient and family: potential moral and legal tensions
  - c) Disclosure of information: public versus private interests
  - d) Compulsory and discretionary disclosure of confidential information: professional legal requirements
    - i) Discuss ethical limits of paternalism towards patients.
    - ii) Discuss the following public health topics: control over reproduction, role of women in societies as determinants of health, and impact of abstinence-only education versus comprehensive sexual education on disease rates.
- 2) Define different research study designs, list the strengths and weaknesses of each type, specifically
  - a) cohort, case control and cross sectional studies
- 3) Describe and evaluate clinical investigations, specifically addressing case reports, case series, uncontrolled observations and controlled clinical trials

### Medical Sciences

- 1) **Posterior abdominal wall**
  - a) Identify muscles of the posterior abdominal wall, their innervation and action
  - b) List the branches of the lumbar nerve plexus, their spinal cord plexus levels and innervation
  - c) Name the branches of the abdominal aorta and IVC
    - i) Contrast the termination of the right gonadal vein with the left gonadal vein
  - d) Name the different abdominal autonomic nerve plexuses

- i) Describe the source of sympathetic and parasympathetic neurons for each abdominal plexus
- e) Urinary system
  - i) Contrast the vertebral level of the left kidney with the right and layers of fat and fascia
  - ii) Describe the anatomical relationships of the ureters throughout their course to the bladder
  - iii) Describe the location, vertebral level, blood supply and innervation of the adrenal glands
  - iv) Identify the and define the following kidney features: cortex, medulla, renal columns, pyramids, major and minor calyces, medullary rays
  - v) Describe the structure and function of the component parts of a nephron: renal corpuscle, PCT, loop of Henle (thick and thin), DCT, collecting ducts, juxtaglomerular apparatus
    - (1) Describe in sequence the tubular segments through which filtrate flows after it is formed at Bowman's capsule to when it enters the renal pelvis; identify each structure as being located in the renal cortex or renal medulla; based on the glomerulus location and the length of the loop of Henle, distinguish between cortical and juxtamedullary nephrons
    - (2) Describe in sequence the blood vessels through which blood flows when passing from the renal artery to the renal vein, including the glomerular blood vessels, peritubular capillaries, and the vasa recta
    - (3) Explain the clearance principle, glomerular filtration rate
    - (4) Distinguish between the use of inulin and creatinine clearances as measure of the glomerular filtration rate
    - (5) Describe the myogenic and tubuloglomerular feedback mechanisms that mediate the autoregulation of renal plasma flow and glomerular filtration rate
    - (6) Predict the effect in renal blood flow and glomerular filtration rate caused by increased: 1) sympathetic innervation, 2) synthesis of angiotensin II, 3) release of atrial natriuretic peptide, 4) prostaglandin formation and 5) nitric oxide formation
    - (7) Describe the contribution of the major nephron segments to the reabsorption of the filtered load of solute and water; describe the cellular mechanisms for the transport of sodium, chloride, potassium,  $\text{HCO}_3^-$ , calcium, phosphate, organic solutes (glucose, amino acids, urea) and water by the major tubular segments
  - vi) Explain how aldosterone and ADH regulate kidney function
  - vii) Describe the renal vasculature from interlobar to vasa recta
  - viii) In histological section distinguish between the ureter, urinary bladder and urethra
  - ix) Describe the cellular characteristics of a transporting epithelium
  - x) Describe the structure of the basal lamina in the glomerulus
  - xi) Urine
    - (1) Describe the role of the ascending limb of the loop of Henle in producing a high renal interstitial fluid osmolality
    - (2) Beginning with the loop of Henle, contrast the tubular fluid and interstitial fluid osmolality changes that allow either a dilute or a concentrated urine to be produced and excreted
    - (3) Describe the factors that regulate  $\text{K}^+$ ,  $\text{Na}^+$ ,  $\text{Ca}^{2+}$ /phosphate and acid base balance

2)

### 3) Puberty

- a) Define puberty and explain its physiological basis
- b) Demonstrate understanding of sex hormone production, distribution, target(s), effects and feedback control
- c) Describe the development of the secondary sexual characteristics in the male and the female and identify the hormones involved

#### 4) Male Reproductive System

- a) Recognize and describe the gross and histological components and function of the testis, epididymis, vas deferens, prostate gland, seminal vesicles, **bulbourethral gland**, urethra and penis
- b) Describe the organization of the testis, seminiferous tubules, Leydig cell, Sertoli cells
- c) Describe the blood-testis barrier and the development of sperm
- d) Describe the cell biology of meiosis and relate it to the histology of the seminiferous tubules
- e) Define the terms spermatogenesis and spermiogenesis and describe histologically the major steps in each
- f) Trace the pathway of spermatozoa from the testis through the duct system and discuss the histological structure (including apical specializations of the epithelium) of this system to the movement of the immature sperm
- g) Explain the importance of erectile tissue to the structure and function of the penis; describe the anatomical basis for erection and ejaculation
- h) Outline the autonomic innervation of the male reproductive system
- i) Describe the components of the perineum including fascial layers and muscles
- j) Describe the hormonal products of the Sertoli and Leydig cells, their biosynthesis, release, fate, and target(s)
- k) Recognize the components in an ejaculate, where they are produced and the functional significance of each
- l) Explain contraceptive approaches based on the male reproductive system
- m) Describe the impact of aging on the male reproductive system

#### 5) Female Reproductive System

- a) Recognize and describe the gross and histological components and function of the female reproductive system
- b) Describe the physiology and stages of ovulation; describe the development of a primordial follicle to a mature Graafian follicle; compare and contrast atretic follicles, corpus luteum, and corpus albicans
- c) Illustrate the different phases of the menstrual cycle and describe changes in the ovaries, uterine tubes, and uterus
- d) Describe the cell biology of meiosis and fertilization and relate it to the histology and anatomy of the ovaries and the oviduct
- e) Describe the uterine vasculature and relationships to the ureter
- f) Outline the autonomic innervation of the female reproductive system
- g) Describe the components of the perineum including fascial layers and muscles
- h) Define oogenesis and define its stages
- i) Describe the specific uterine changes that occur during the reproductive cycle, their determinants and their functional significance.
- j) Describe the actions of estrogen and progesterone in the female
- k) Explain current contraceptive approaches based on the female reproductive system
- l) Explain the impact of aging on the female reproductive system and the basis and expression of menopause
- m) Name the predominant phases in the life of a normal female in terms of the reproductive system
- n) Recognize the importance of the following features in the reproductive process
  - i) Indicate the site of fertilization within the female reproductive tract and the fate of the zygote
  - ii) Explain the process of implantation and the formation of the placenta.

- iii) Identify the hormonal products that characterize pregnancy: their source, biosynthesis, and functional role.
- iv) Identify the factors implicated in parturition and the three stages of labor
- v) Describe the female breast during puberty, mature woman (pregnant and non-pregnant), during lactation and post menopause
- vi) Recognize the hormonal basis of lactation, and the processes involved
- vii) Identify the components of mother's milk, and their functional significance: immediately after birth; and after lactation has been fully established

**Comment [sml44]:** AMY: This strikes me as a lot of detail. Maybe they can handle it.

**06 TOPIC: LYMPHATIC AND ENDOCRINE SYSTEMS (week: 11)**

**(Nov 2-6, 2009)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	Immunology (JW)	Communication and ethics (MA1-3)	Clinical skills demo (CM1-8,12) (MA?)	Clinical correlations (CM?) (MA?) (MS?)
9AM	Test review Intro narratives (MA?)	Lymph histo (RA)			
10AM	Endocrine rev (thyroid)	Microscope lab (endocrine glands, lymph nodes, spleen, thymus) (CM 11)	Endo review (insulin)	Integrated-graduated-challenges: clinical, arts, sciences	
11AM	Immunology (JW)		Neck gross (DM)		
Lunch					
1-4PM		Cadaver dissection of neck			
Student Home-work	Histology video on ? (CM ?)	(MA?)	(CM1-8,12) (MA?)	(CM9-10)	

**Comment [DM45]:** Instruct the students to construct a table for the endocrine system including the following: endocrine glands, hormones secreted, stimulus for secretion, end targets, function(s) and feedback mechanisms

**Medical Arts**

- 1) Describe types of bias and differentiate random from systematic bias
- 2) Define validity, reliability, bias, confounding, pretest probability, skewed data, sampling distribution, and inclusion and exclusion criteria
- 3) Identify literature resources and demonstrate understanding of the basics of literature review
- 4) Discuss basic principles of health care economics
- 5) Discuss the virtues in the practice of good medicine with emphasis on the following:
  - a) Significance of honesty, courage, prudence and facilitative attitudes

**Clinical Medicine**

- 1) Elicit and record a CC, HPI, PMH, SH, FH, sexual and reproductive history, as well as medication list and allergies for adult and pediatric patients
  - a) Demonstrate ability to identify all prescription, over the counter and complementary medications patients utilize including:
    - i) Drug name
    - ii) Dose
    - iii) Frequency of administration
    - iv) Compliance
- 2) Elicit a focused HPI relevant to common endocrinologic, reproductive and developmental problems for adult and pediatric patients
- 3) Describe the components and importance of the reproductive and developmental history (specifically onset of puberty and progression through adrenarche, thelarche, pubarche, menarche) for males and females
- 4) Demonstrate ability to elicit patient information/history with sensitivity to patients' gender and understanding of how patients' stage of development affects communication
- 5) Compare and contrast typical timing and progression of puberty in boys and girls with particular attention to thelarche, pubarche, menarche as well as social development
- 6) Describe characteristics of normal adolescent behavior and social development with specific attention to details of early, mid and late adolescence

- 7) Recite and define elements of the endocrine and lymphatics ROS
- 8) Perform and describe normal findings for adult and pediatric patients with regard to the following:
  - a) Tanner staging for boys and girls
  - b) Thyroid exam
  - c) Throat exam
  - d) Examination of all of the lymph node chains, specifically:
    - i) Demonstrate proper technique in performing an examination of all lymph node chains in the neck, axillary, inguinal, and epitrochlear regions
  - e) Examine the limbs for edema
- 9) Record findings from the endocrine, lymphatic and reproductive exams in adults and children
- 10) Record findings from tanner staging of pediatric patients
- 11) Describe the utility and recognize normal values on the following laboratory/radiographic tests:
  - a) CBC with differential
  - b) TSH
  - c) Free T4
  - d) Hemoglobin A1c
  - e) PTH
  - f) Total and Ionized Calcium
  - g) DEXA scan
- 12) Locate and describe the normal appearance of the following on CT scans:
  - a) adrenal glands
  - b) ovaries
  - c) testicles
  - d) spleen
  - e) Thyroid
  - f) Thymus
  - g) Pituitary gland

**Comment [sml46]:** AMY: This would be a GREAT place to add objectives about the usefulness of fine needle aspiration, since it is often helpful for both thyroid lesions and peripheral lymphadenopathy. You can obtain material for cytology, culture, flow cytometry etc. and often spare the patient an open biopsy.

**Comment [sml47]:** Move to phase II?

**Comment [AC48]:** I agree with idea to move.

### Medical Arts

- 1) Describe types of bias and differentiate random from systematic bias
- 2) Define validity, reliability, bias, confounding, pretest probability, skewed data, sampling distribution, and inclusion and exclusion criteria
- 3) Identify literature resources and demonstrate understanding of the basics of literature review

### Medical Sciences

#### 1) Immune System Overview

- a) Describe the differences between innate and adaptive immunity
- b) Explain how the innate immune system accomplishes self versus non-self recognition
- c) Describe how antigens are recognized and an immune response mounted.
- d) Understand the roles that cells, and organs play in the immune response after the initial response to an infection
- e) Explain the key aspects of the acquired (antigen specific) immune response
- f) Explain why clonal selection of B and T cells is considered a key component of adaptive immune response
- g) Compare and contrast B and T cells
- h) Explain the role of the MHC molecule in adaptive immunity
- i) Explain immunological memory, its importance in the adaptive immune response

## 2) Lymphatic System

- a) Describe and list the primary and secondary lymphoid tissue
- b) List the different types of lymphocytes by their functional classification
- c) Define primary nodule, secondary nodule, and germinal center
- d) Explain the function and structure of lymph nodes
- e) Draw the overall structure and function of the thymus
- f) Describe the structure and function of the **spleen** (include cell types found in white and red pulp)
- g) Define PALS
- h) Contrast the structure and function of the spleen and lymph node

## 3) Endocrine System

- a) Overview
  - i) Compare the endocrine and nervous systems in terms of communication methods, chemical messengers, specificity of action on effector cells/organs, speed of response, and duration of action
  - ii) Classify hormones based on chemical structure and explain the properties in terms of synthesis, storage, secretion, transport, receptor site and mechanism of action
- b) Pituitary gland
  - i) Describe the gross and histological structure of the pituitary gland
  - ii) List the hormones of the pituitary gland and describe the function(s) of each
- c) Thyroid and Parathyroid glands
  - i) Describe the gross and histological structure of the thyroid gland
  - ii) List the hormones of the thyroid gland and describe the function(s) of each
- d) Pancreas
  - i) Describe the gross and histological structure of the pancreas
  - ii) List the hormones of the pancreas and describe the function(s) of each
- e) Adrenal gland
  - i) Describe the gross and histological structure of the adrenal gland
- f) List the hormones of the adrenal gland and describe the function(s) of each

**Comment [AC49]:** This looks PERFECT based upon the background that we want for the students as they enter Repro and Metabolism!

**07 TOPIC: HEAD AND NECK (weeks: 12, 13, 14)**

**(Nov 9-13, 2009)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	GA2	Communication and ethics (MA2)	Rotation 1. Clinical skills demo (CM1-6)  Rotation 2. (MA5)	Clinical correlations (CM?) (MA?) (MS?)
9AM	Test review  Intro narratives (MA1)	ANS phys 1 (MM)  Osteology of skull and radiology overview of the head and neck			
10AM	GA1		Pharm 2  ANS Phys 2 (MM)	Integrated-graduated-challenges: clinical, arts, sciences	
11AM	Pharm 1				
<b>Lunch</b>					
1-4PM		Cadaver dissection of ? (CM11-12)			
Student Home-work	Histology video on ? (CM ?)	(MA2)	(CM1-6) (MA5)	(CM5-6)	

**(Nov 16-20)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	GA 4	Communication and ethics (MA3a)	Clinical skills demo (CM7-9)	Clinical correlations (CM?) (MA?) (MS?)
9AM	Test review  Intro narratives (MA1)	Somatic sensation (MM)  Physiology lab on EMG and EOG (conduction velocity)			
10AM	GA3		Reflexes (MM)  Pharm 4	Integrated-graduated-challenges: clinical, arts, sciences	
11AM	Pharm 3				
<b>Lunch</b>					
1-4PM		Cadaver dissection of ? (CM11-12)			
Student Home-work	Histology video on ? (CM ?)	(MA3a)	(CM7-9) (MA?)	(CM?)	

**(Nov 23-27)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	GA6	Communication and ethics (MA3b)	<b>Thanksgiving</b>	<b>Thanksgiving</b>
9AM	Test review	Pharm 6			
	Intro narratives (MA1)				
10AM	GA5	Special senses (Large class activity) - Frequency hearing tests - Ishahara tests (color blindness), blind spot	Pharm 7-8? Integrated sessions? Sensory for physiology		
11AM	Pharm 5				
<b>Lunch</b>					
1-4PM		Cadaver dissection of ? (CM11-12)			
Student Home-work	Histology video on ? (CM ?)	(MA3b)	(CM1-13) (MA4)		

**Clinical Medicine**

- 1) Elicit and record a CC, HPI, PMH, SH, FH, sexual and reproductive history, medication list, allergies for adult and pediatric patients
- 2) Elicit a focused HPI relevant to common head/eyes/ears/nose/throat (HEENT) and neurologic complaints for adult and pediatric patients
- 3) Recite and define elements of the HEENT and neurologic ROS
- 4) Perform and record normal findings for adult and pediatric patients with regard to the following:
  - a) Neurologic exam
  - b) Head/Scalp exam
  - c) Ophthalmologic/fundoscopy exam
  - d) Examination of the external and middle ear
  - e) Examination of the external nose, nasopharynx and sinuses
  - f) Examination of the oropharynx, tongue, mucus membranes and teeth
- 5) Identify and recite components of a complete mental status exam (MSE), mini mental status exam (MMSE) and the mini cog
- 6) Accurately score and record findings from normal MSE, MMSE and the mini cog
- 7) Identify and describe normal infant reflexes and describe timing when primitive reflexes are extinguished, with specific attention to the following:
  - a) Moro reflex
  - b) Fencer
  - c) Palmar grasp
  - d) Plantar grasp
  - e) Rooting reflex
  - f) Babinski reflex
- 8) Discuss the timing of the closure of the anterior and posterior fontanelles in infants

**Comment [DM50]:** Move to life cycles?

- 9) Discuss the timing of the development of the various sinus cavities in children
- 10) Locate and describe the normal appearance of the sinuses (maxillary, sphenoid, ethmoid, paranasal) on CT scan
- 11) Discuss principle differences in MRI and CT particularly in the context of imaging the brain, contrast agents used and utility of each imaging modality for brain imaging
- 12) Locate and describe the normal appearance of the adult brain on CT and MRI with particular attention to:
  - a) Ventricles, cerebrum, cerebellum, brainstem, optic chiasm
- 13) Describe the utility of the following laboratory tests:
  - a) Rapid Strep Test
  - b) Monospot
  - c) Throat Culture
  - d) Cerebrospinal fluid analysis (cell count, differential, glucose, protein, gram stain and culture)

**Comment [sm151]:** AMY: I would add that cytologic examination can be helpful in CSF analysis.

### Medical Arts

- 1) Discuss historical and contemporary examples of abuses of medical research with particular focus on:
  - a) The legacy of the Tuskegee syphilis experiment
  - b) Individual rights and moral tension between the duty of care and the individual and interests of others
- 2) Discuss the virtues in the practice of good medicine with emphasis on the following:
  - i) Significance of honesty, courage, prudence and facilitative attitudes
- 3) Discuss basic principles of health care economics
  - a) Universal health care
  - b) Work force composition and impact on cost and quality of care
- 4) Read and evaluate papers on diagnostic studies and cases control studies
- 5) Discuss how patients with mental illness are cared for in our health care system, and compare and contrast local and global perspectives

### Medical Sciences

- 1) **Pharmacology (7 hours)**
  - a) Introduction to Pharmacology (1 hour)
  - b) Pharmacokinetics
    - i) Absorption, distribution, excretion (1 hour)
    - ii) Metabolism (1 hour)
  - c) Pharmacodynamics
    - i) Overview of pharmacodynamics (1 hour)
    - ii) Clinical Pharmacokinetics and Pharmacodynamics (4 hours small group/team learning activities)
- 2) **Gross content**
  - a) Meninges, dural venous sinus, brain and blood supply
  - b) Cranial nerve overview
  - c) Orbit
  - d) Ear
  - e) Nasal cavity, paranasal sinuses, oral cavity, pharynx
  - f) Scalp and superficial face
- 3) **Neck**
  - a) Differentiate between the superficial and deep fascial layers of the neck including the structures that each layer encloses; define retropharyngeal space
  - b) Name the origin and insertion of the sternocleidomastoid muscle.

- c) Identify the boundaries of the posterior triangle and main contents within
- d) Identify the roots of the brachial plexus and their relationship to the scalene muscles in the neck
- e) List the cutaneous and motor branches of the cervical plexus of nerves, their spinal nerve origin and general distribution
- f) Describe the course and anatomical relationships of the phrenic nerve and CN XI
- g) Contrast the origin of the right subclavian artery to the left subclavian artery
- h) List the branches of the subclavian artery based on its three divisions and describe the course and their general region of blood supply
- i) Describe the course of the right and left external jugular vein and list its tributaries
- j) Describe the course of the subclavian vein and its relationship to nearby structures throughout its course.
- k) Describe the location of the superficial and deep lymph nodes of the neck
- l) Identify the boundaries of the anterior triangle and smaller triangles
- m) List the origin, insertion and innervation of the infrahyoid and suprahyoid muscles
- n) Name the contents of the carotid sheath and their anatomical relationship to one another
- o) Describe the course of the common carotid artery from its origin to its bifurcation
- p) Describe the location of the carotid sinus and body and their general function
- q) List the branches of the external carotid artery and their general region of blood supply
- r) Describe the course of the internal carotid artery
- s) Describe the basic structural anatomy of the thyroid gland and list the anatomical relationships to other nearby structures in the neck.
- t) Describe the arterial supply, and venous drainage of the thyroid gland
- u) Identify the general location of the parathyroid glands on the thyroid gland
- v) List the arterial supply, venous and lymphatic drainage of the parathyroid gland
- w) Identify the branches of CN's IX and X within the neck and describe their general site of innervation

#### 4) Superficial Face

- a) Identify the bones and bone landmarks of the skull and sutures of the skull
- b) Identify the openings of the skull and the structures that pass through these openings
- c) Explain how the sutures of the neonate can facilitate vaginal delivery
- d) Identify the muscles of facial expression and identify the course of CN VII starting from the brainstem
- e) List motor branches of CN VII
- f) List the branches of the 3 divisions of the trigeminal nerve and indicate whether they are motor or sensory in function
- g) Name the arteries that supply the face, where they originate and their course from the origin
- h) Name the veins draining the face and their course to either the internal or external jugular vein
- i) Describe the lymphatic drainage of the face

#### 5) Scalp and Internal Skull

- 6) List the layers of the scalp including cutaneous innervation, arterial supply and venous drainage
- 7) Explain the clinical significance of having valveless veins in the face and skull
- 8) Identify the 3 meningeal layers surrounding the brain
- 9) Identify the arterial supply to the meninges and what general area of the meninges they supply

#### 10) Eye and Orbit

- 11) Identify the bones of the orbit and their specific landmarks including foramina of the orbit and the contents traveling through

- 12) Describe the various components of the eyelid and their function
- 13) Summarize the structures of the lacrimal apparatus and the general flow of secretions from the start to endpoint
- 14) Describe the autonomic nervous control of lacrimation and the course of the nerve fibers from their origin to the lacrimal gland
- 15) Identify and describe the anatomical components of the eye and their general function
- 16) Describe some of the basic structures seen with funduscopy
- 17) Name the cranial nerve responsible for supplying sensation to the cornea
- 18) Name the extraocular muscles, their innervation and individual action
- 19) Explain the method to test the isolated function of each extraocular muscle
- 20) Summarize the functions that cranial nerves 2-7 have on the eyes and describe the effects of damage to each nerve on the function of the eye
- 21) Describe the arterial supply and venous drainage of the eye

## **22) Ear**

- a) Identify structures of the external, middle and inner ear
- b) List the sensory innervation to the external ear and what general region each nerve supplies
- c) List the lymphatic drainage of the ear
- d) Identify and describe the different parts of the tympanic membrane
- e) Name the muscle which acts of the tympanic membrane, its location, innervation and function
- f) Contrast the blood supply and innervation of the outer surface of the tympanic membrane versus the inner surface
- g) Name the two sites with which the middle ear communicates and through which structures
- h) Identify the boundaries of the middle ear cavity and all structures related to these boundaries
- i) Describe the anatomy and course of the auditory tube and muscles that act on the auditory tube
- j) Explain why infants are often more susceptible to middle ear infections than adults
- k) Identify the middle ear ossicles and which ear structures they connect
- l) Name the muscle that acts on the stapedius, its innervation and function
- m) Describe the location and components of the tympanic nerve plexus
- n) Identify the various bony and membranous components of the inner ear
- o) Differentiate between the vestibular structures of the inner ear and the cochlear (auditory) structures
- p) Describe the course of the vestibulocochlear nerve (CB VII) from the brainstem to the inner ear
- q) Describe the course and branches of the facial nerve as it passes through the inner ear

## **23) Parotid & adjacent Regions**

- a) Describe the general location of the parotid gland relative to other structures of the face
- b) Describe the course of the parotid duct from its origin at the parotid gland to its opening in the mouth
- c) Describe the autonomic innervation and the course of the nerves to the parotid gland
- d) Identify the boundaries of the temporal region and contents within it
- e) Identify the boundaries of the infratemporal region and the contents within it
- f) Name the articulating surfaces of the temporomandibular joint and supporting ligaments
- g) Identify the muscles of mastication, their action and nerve supply
- h) List the sensory and motor branches of the mandibular division of the trigeminal nerve (CN V) and what general region the sensory branches supply
- i) List the major branches of the maxillary artery, their course and general region of supply

## **24) Nasal Cavity and Palate**

- a) Name the bones and cartilage from form the external part of the nose and nasal septum
- b) Identify the superior, middle and inferior meatus in the nasal cavity
- c) Name and identify the paranasal sinuses and where they drain in the nasal cavity
- d) Identify the arterial supply of the nasal cavity and from which artery they originate
- e) Describe the sensory innervation to the nasal cavity and from which nerve they originate
- f) List the muscles that act on the palate and their innervation
- g) List the structures that pass through incisive foramen, greater and lesser palatine canals and what they innervate
- h) List the arterial supply and venous drainage of the palate
- i) Name the boundaries, openings into and out and structures transmitted through these openings of the pterygopalatine fossa

### 25) Oral Cavity

- a) Describe the location of the deep lingual artery, vein and nerve and the clinical significance of these vessels
- b) Identify the sulcus terminalis of the tongue and its anatomical significance
- c) List the muscles of the tongue
- d) Describe the sensory and motor innervation of the tongue including the special sensory innervation (taste)
- e) Describe the course of the hypoglossal nerve (CN XII) starting from the medulla to the endpoint at the tongue
- f) Name the arterial supply, venous drainage and lymphatic drainage of the tongue
- g) Identify the submandibular gland and its anatomical relationships
- h) Describe the course of the submandibular duct from the submandibular gland to its opening in the floor of the mouth and its relationship to the lingual nerve during its course
- i) Discuss the autonomic nerve fibers that travel in the submandibular ganglion and the structures they innervate

### 26) Pharynx

- a) Name and identify the prevertebral muscles
- b) Identify the 3 cervical sympathetic ganglia and at what vertebral level they are found
- c) List the 3 divisions of the pharynx
- d) Describe the location of the palatine tonsils, as well as the arterial supply and venous drainage
- e) Name the muscles of the pharynx and their innervation
- f) Name the nerves that contribute to the pharyngeal plexus
- g) List the arterial supply, venous and lymphatic drainage of the pharynx

### 27) Larynx

- 28) Identify and describe the paired and unpaired cartilages of the larynx
- 29) List the structures that pass through the thyrohyoid membrane
- 30) Differentiate between true and false vocal cords
- 31) Define the rima epiglottis
- 32) Describe all of the motor and sensory branches of the vagus nerve that innervate the larynx
- 33) Name the nerve that supplies the cricothyroid muscle and the nerve that innervates the rest of the intrinsic laryngeal muscles
- 34) List the blood supply, venous and lymphatic drainage of the larynx

**08 TOPIC: LIMBS (weeks: 15, 16)**

**(Nov 30-Dec 4)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	GA2	Communication and ethics (MA1-2)	Clinical skills demo (CM1-5) (MA?)	Clinical correlations Cadaver lab
9AM	Test review	GA3			
	Intro narratives (MA1-2)				
10AM	GA1	Small groups Microscope – bone, cartilage (CM 6)	Bone (RA)		Cadaver dissection
11AM	Cartilage (RA)		Calcium homeostasis (JL)		
<b>Lunch</b>					
1-4PM		Cadaver dissections for UL and LL (CM 6)			
<b>Student Home-work</b>	Histology video on ? (CM ?)	(MA1-2)	(CM1-5) (MA?)	(CM4)	

**(Dec 7-11)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	GA5	Communication and ethics (MA3-5)	Clinical skills demo (CM?) (MA6)	Clinical correlations Cadaver lab
9AM	Test review	Skin (RA)			
	Intro narratives (MA3-5)				
10AM	GA4	Small groups Microscope –skeletal m, skin (CM 5) (CM 6)	Nutrition hour (JL)		Cadaver lab
11AM	Skeletal muscle physiology I (MM)				
<b>Lunch</b>					
1-4PM		Cadaver dissections (CM6)			
<b>Student Home-work</b>	Histology video on ? (CM ?)	(MA3-5)	(CM?) (MA6)	(CM?)	

**Clinical Medicine (pending edits from community clinics)**

- 1) Elicit and record a CC, HPI, PMH, SH, FH, sexual and reproductive history, medication list, allergies and complete physical examination for adult and pediatric patients
- 2) Elicit a focused HPI relevant to common musculoskeletal and dermatologic complaints for adult and pediatric patients
- 3) Recite and define elements of the musculoskeletal and dermatologic ROS

- 4) Perform and record normal findings for adult and pediatric patients with regard to the following:
  - a) Skin exam
  - b) Examination of muscles, joints and bones (ROM)
  - c) Neurologic exam of the extremities including reflexes, motor and sensory
- 5) Describe, perform and record results for timed Get up and go in geriatric patients
- 6) Describe the utility of the following laboratory tests:
  - a) Uric acid
  - b) ANA
  - c) Rheumatoid Factor
  - d) CK, AST, ALT
- 7) Demonstrate a systematic approach to evaluating plain films of long bones, vertebrae, joints in adults and children

### **Medical Arts**

- 1) Discuss preventive health care recommendations for life style as it pertains to diet and exercise
- 2) Discuss general concepts of addiction
- 3) Discuss patient narrative experiences of pain and skin disorders
- 4) Discuss the prevalence of pain syndromes in our society
- 5) Identify dilemmas in treating pain and discuss the epidemic of pain prescription deaths in Utah and nationwide
- 6) Read and evaluate papers on cohort studies and controlled clinical trial

### **Medical Sciences**

#### **1) Tissues**

- a) Skeletal muscle, cartilage, bone, adipose and skin

#### **2) Body composition**

- a) Describe the changes in body composition with age
- b) Be able to assess your own body composition
- c) Biology of adipose tissue

#### **3) Limb overview**

- a) Skin lines
- b) Rule of nines (burns)
- c) Dermatomes versus cutaneous fields
- d) Referred pain

#### **4) Shoulder**

- a) Name and identify the bony landmarks on the scapula and clavicle
- b) Describe the classification, articular surfaces, associated ligaments and movements that occur in the sternoclavicular, acromioclavicular and glenohumeral joints
- c) Name and identify the bursae associated with the glenohumeral joint
- d) Identify and describe the innervation, location, and action of the muscles of the shoulder
- e) Identify the parts and branches of the brachial plexus associated with the shoulder
- f) Outline the subclavian arterial branches and describe scapular anastomoses

#### **5) Axilla**

- a) Name and identify the bony landmarks on the humerus
- b) Name and identify the muscles that attach the upper limb to the trunk
- c) Describe the boundaries and contents of the axilla
- d) Name and identify the branches of the axillary artery and venous tributaries

- e) Identify the different groups of the axillary lymph nodes and describe the drainage routes
- f) Identify the parts and branches of the brachial plexus associated with the axilla
- g) Name and identify the muscles of brachium
- h) Identify superficial and deep veins, arteries, nerves and fascia of the brachium
- i) Describe the arterial supply of the brachium

**6) Forearm**

- a) Name and identify the bony landmarks on the ulna and the radius
- b) Describe and identify the boundaries and contents of the cubital fossa
- c) Describe the anastomosis around the elbow joint
- d) Describe and identify the attachments and contents of the flexor retinaculum
- e) Describe the arterial supply and venous drainage of the antebrachium
- f) Describe the lymphatics of the antebrachium
- g) Describe the derivation, location and function of the median, radial and ulnar nerves in the antebrachium.
- h) Identify the origin, insertion, action, innervation and location of the extensor muscles in the forearm
- i) Describe the neurovascular relationships of the elbow and wrist joints

**7) Hand**

- a) Name and identify the bony landmarks on the carpals, metacarpals and phalanges
- b) Describe the location and function of the palmar spaces, flexor sheaths and extensor expansion
- c) Identify action, innervation and location of the muscles of the hand
- d) Describe the location and contents of the anatomical snuffbox
- e) Describe the arterial supply, venous drainage the hand and lymphatics of the hand
- f) Describe the motor and sensory nerve supply to the hand

**8) Gluteal**

- a) Name and identify the bony landmarks on the pelvic bones
- b) Name and identify the muscles of the gluteal region
- c) Describe the location and function of the iliotibial tract (band)
- d) Identify the location and function of the nerves, arteries, veins and lymphatics in the gluteal region
- e) Describe the trochanteric and cruciate anastomoses

**9) Hip**

- a) Describe the classification, articular surfaces, ligaments and movements that occur at the hip joint
- b) Describe the structural relationships of muscles to the hip joint

**10) Anterior and Medial Thigh**

- a) Identify and describe the innervation, location and action of the muscles of the anterior and medial thigh
- b) Describe and identify contents of the femoral triangle, sheath and canal
- c) Describe the boundaries and contents of the adductor canal
- d) Describe the derivation, location and function of the saphenous veins and nerve

**11) Posterior Thigh**

- a) Name and identify the bony landmarks on the femur
- b) Describe the location and function of the fascia of the thigh (fascia lata)
- c) Identify and describe the innervation, location, and action of the muscles of the posterior thigh
- d) Identify the location and function of the arteries and veins in the posterior thigh
- e) Identify the location and function of the nerves in the posterior thigh
- f) Describe the lymphatic drainage of the thigh

**12) Anterior and Lateral Leg**

- 13) Name and identify the bony landmarks on the tibia and fibula
- 14) Describe the location and function of the fascia of the leg (crural fascia)
- 15) Identify the muscular compartments of the leg
- 16) Identify the origin, insertion, action, innervation of the muscle groups in the anterior and lateral compartments of the leg
- 17) Describe the location and branches of the common, superficial and deep peroneal nerves
- 18) Identify the location and function of the arteries and veins in the anterior leg
- 19) Identify the origin, insertion, action, innervation of the muscles on the dorsum of the foot
- 20) Describe the arterial supply, venous drainage and lymphatics of the dorsum of the foot
- 21) Describe the cutaneous innervation to the skin on the dorsum of the foot
- 22) Describe the classification, articular surfaces, associated ligaments, movements and bursae at the knee joint
- 23) Describe the location and function of the menisci of the knee joint

**24) Posterior Leg and Plantar Surface of the Foot**

- 25) Describe the boundaries and contents of the popliteal fossa
- 26) Identify the origin, insertion, action, innervation of the muscle groups in the posterior compartment of the leg
- 27) Describe and identify the attachments and contents of the flexor retinaculum
- 28) Describe the location and branches of the tibial nerve, arteries, veins and lymphatics in the posterior leg
- 29) Describe the classification, articular surfaces, associated ligaments and movements that occur in the tibiofibular joints (superior and inferior)
- 30) Describe the four muscular layers of the foot and their relationship with the neurovascular bundles
- 31) Describe the nerves, arteries, veins and lymphatics of the plantar surface of the foot
- 32) Describe the classification, articular surfaces, associated ligaments and movements that occur in the ankle (talocrural), subtalar and transverse tarsal joints
- 33) Identify the arches of the foot

**Week 17. Review week**

**(Dec 14-18)**

	Monday	Tuesday	Wednesday	Thursday	Friday
8AM	Test	OSCE	OSCE	OSCE	Lecture exam (computer based)
9AM	Test review				
10AM					
11AM					
Lunch					
1-4PM				Cadaver lab practicum	

**Clinical Medicine**

1. Demonstrate HIPAA certification (? Will we do this or will the student be on his/her own to do this?)
2. Demonstrate BLS certification (? Will we do this or will the student be on his/her own to do this?)
3. Demonstrate ability to access, navigate Epic EMR and record a complete history, physical examination, sample laboratory and radiographic data into EPIC

**Comment [AC52]:** Didn't we have this back at Week 1?

**Comment [sml53R52]:** Indeed, trying to figure out where it should go; I think later, i.e. here

**Comment [DM54]:** Move to Phase I for the first week

**Medical Arts**

- 1) Discuss medical research and vulnerable groups addressing ethical and legal boundaries of informed and proxy consent

**Comment [AC55]:** Much more appropriate placement than at the beginning.

**Comment [DM56]:** Find a home somewhere in Phase I?

Homeostasis. Discussing the integration/disregulation of the organ systems (heart, kidney, lungs).

- Thermoregulation
- Ions
- pH
- Volume (dehydration, hypotension, hypertension, ...)

## Learning Objectives Mapping to the Core Competencies

1. Patient Care:
  - a. Demonstrate technical proficiency appropriate for a medical assistant in the outpatient primary care clinical setting, to include: ***(Others pending from Jean Tealey/Robbie Loomis, Medical Assist trainers with the U of U Community Clinics)***
    1. Obtain vital signs (ht, wt, bp, pulse, resp, BMI)
    2. List the elements of a medical history
    3. Obtain a basic History of Present Illness
    4. Obtain a Past Medical History, including
      - Allergies
      - Medicines
      - Illnesses
      - Surgeries
      - Hospitalizations
    5. Obtain a Social History
    6. Obtain a Family History
    7. Obtain a Review of Systems
    8. Perform and articulate a basic normal physical exam on patients of all ages
    9. Access and use the clinic's EMR
    10. Discuss issues of patient confidentiality
    11. Demonstrate HIPAA certification
    12. Demonstrate Basic Life Support (BLS) Certification
2. Medical Knowledge: (from transform com document – electronic)
  - a. Describe and solve basic problems pertaining to the normal structure and function of the human body on a macro and micro level
  - b. Explain and apply basic concepts of Anatomy, Physiology, Histology, Biochemistry, Immunology, Pathology, Therapeutics, Human behavior, and Physical diagnosis.
  - c. Pronounce, spell, and define common medical terminology
  - d. Describe the path of a common medication from entry into the body, through absorption, efficacy, and elimination, including all steps and locations along the way.
3. Practice Based Learning and Improvement:
  - a. Describe the health status of Americans within global and historical contexts
  - b. List key determinants of health for human populations globally and historically
  - c. Describe ethical impacts of managed care
  - d. Describe key factors impacting the cost of health care
  - e. Utilize basic clinical tools of the science of medicine, including:
    1. Define the types of study design and list the strengths and weaknesses of each
    2. Calculate and comprehend sensitivity, specificity, NNT, PPV, NPV, relative risk, odds ratios, incidence rates, confidence intervals, prevalence rates, and mortality rates.
    3. Describe statistical significance, the difference between causation and association, null and alternative hypothesis, and evidence based medicine.
    4. Describe types of bias and differentiate random from systematic bias
    5. Define validity, reliability, bias, confounding, pretest probability, skewed data, sampling distribution, and inclusion and exclusion criteria.

6. Describe the unique denominators of disease prevalence that make different diagnostic approaches appropriate in the primary care and subspecialty settings.
4. Interpersonal Skills and Communication:
  - a. Describe the difference between the biomedical concepts of disease and illness
  - b. Elicit and present a patient's history in a manner which captures the patient's Narrative of their health issue
  - c. Establish rapport with patients of all cultures and races in the clinical setting
  - d. Describe family and cultural factors, including socioeconomic status, ethnicity, and gender, impacting patients
5. Professionalism:
  - a. Define the four key principles of Bioethics
  - b. Demonstrate respect for patient confidentiality in all interactions
  - c. Exhibit professional dress and conduct
  - d. Demonstrate basic habits of self care for medical professionals
6. Systems-Based Practice:
  - a. Describe the roles of the medical assistant and primary care physician in the outpatient clinical setting.
  - b. Describe the processes an individual patient moves through in a visit to the outpatient primary care clinic.
  - c. Enter information appropriately into the electronic medical record.
  - d. Order tests and treatments accurately and efficiently in the electronic medical record.

## **OTHER STUFF TO CONSIDER FOR PHASE I**

### **Medical Sciences**

- Pathology (lecture topics suggested by Fred Clayton)
  - 2 hours - instruction in blood drawing by ARUP senior blood drawers. Currently happens early in 2nd year. This would give them a quickly acquired and widely needed clinical skill.
  - 1-2 hours - instruction in interpretation of common lab values, particularly the chemistry screening panel and CBC. This now occurs in the second year, with blood drawing lab.
  - 1-2 hours - basics of pathology. What a pathologist does, basics of tissue submission, frozen sections, surgical pathology, FNA /cytology, autopsy, clinical lab. Just an hour of really basic histology from you might be appropriate too.
  - Other possibilities: brief introduction to transfusions / blood banking (currently early in 2nd year - they could be very dangerous on the wards without this knowledge), brief introductions to inflammation, coagulation, and tumors (currently late in 1st year).
- Microbiology (Larry Reimer)
- Human behavior (Jan Terpstra)
- Public health (Christy Peruczniak)

**Comment [AC57]:** If we're putting venipuncture in Phase 1, let's make it as useful of a learning experience as possible. So, yes!

**Comment [RA58]:** What's planned for this?

### **Clinical Medicine**

- Pediatric and geriatric thread to be considered throughout Phase I and Phase II

### **Documents and groups accounting:**

#### **The following groups and documents have been utilized in preparing this outline:**

Transformation Curriculum Implementation Draft  
Humanities proposal (Tess Jones, Armand Antamarria)  
Science in Medicine Syllabus and faculty  
Physical Diagnosis Syllabus and faculty  
Pharmacology proposal (in part – need to review)  
MA and OCA curriculum from the U of Utah Community Clinics  
Public Health fourth year rotation, and faculty (Christy Peruczniak)

### **C. Teaching Methods**

- New knowledge attainment will occur primarily outside of the classroom.
- Classroom time will be mainly devoted to application of information and formative assessment of content mastery.
- Students will prepare for sessions by reading and completing modules assigned before learning sessions.
- Learning presentations by faculty will efficiently highlight complex and essential concepts, and then focus on challenging students to apply this information to patient-cases or other problem-oriented scenarios as appropriate.

### **D. Student Activities**

### **E. Student Responsibilities**

### **F. Supervising Physician Responsibilities**

### **G. Schedule and Conferences**

### **H. Contacts**

## **I. Evaluations**

**Comment [sml59]:** Will be written later

### **Formative Evaluation, Phase 1**

Throughout phase one, students will be randomly selected during presentation to address problems, which they should be able to solve if they prepared appropriately for the session. This will serve as formative evaluation for all students and maintain engagement. A non-presenting faculty member will rate these presentations from the back of the room. Students will have multiple opportunities to earn points from randomly selected problem solving during presentations throughout phase 1.

Each Monday during phase one, examinations will occur using whatever format is appropriate, to assess student competencies built during the prior week inclusive of all competencies utilized thus far in the curriculum.

### **Summative Evaluation, Phase 1**

At the end of phase one, a more thorough set of evaluations will occur.

## **J. Supervision**

## **K. Clinical Resources/Suggested Reading List**

**Comment [sml60]:** To be written later