HAP Spring Semester Final Study Guide 2010

\*Study guides are intended to aide in preparation for tests. They may not list every item that will be tested on, some items on them may not be tested on, and they are subject to change.

This final will cover all information from 2nd semester. You may have a 5x8 notecard, both sides, typed is ok. The final will consist of 200 multiple choice/matching/true or false (1pt each).

**Lab Practical- NO CATS WILL BE USED FOR THE LAB PRACTICAL!!!**

All pictures will be from the following websites:

* Muscular System- [Great Cat Muscle page 1](http://www.bio.psu.edu/people/faculty/strauss/anatomy/musc/muscular.htm) (all views except neck)
* Circulatory System- [Heart Pictures with Answers](http://fp.dl.kent.edu/hyork/cshhrt1.htm), [Cat Circulatory System](http://www.bio.psu.edu/people/faculty/strauss/anatomy/circ/circulat.htm) (Cranial arteries and veins and Caudal arteries and veins)
* Respiratory System- [Cat Respiratory system photos](http://www.dccc.edu/departments/biology/virtuals/VCAT/Framework/VCAT/CATBOX/respiratory.html)
* Digestive System- [Cat Digestive System Photos](http://bio.bd.psu.edu/cat/Digestive_System/index.htm)

**Matching (Human Diagrams)**

All pictures will be from your coloring book or from pictures posted online

* Muscular System- pages 58, 61, 65, 69, 71, 73, 75, 85, 87, 89, 91, 93 and 95
* Nervous System- [Central Nervous System Structures Power Point](file:///W:\2-%20HAP\Power%20points\Nervous%20System%20Structures.ppt)
* Circulatory System- 171, 173, 175, 189
* Respiratory System- 237, 243
* Digestive System- 217, 225, 227, 229

**Topics by Unit**

**The Muscular System** (Anatomy) SEE [MUSCLE LIST](file:///W:\2-%20HAP\Dissection\Muscle%20Dissection%20Instructions%20and%20List%20with%20Colors.htm)!!!!!

* Know actions and locations (cat and/or human, see [muscle list](file:///W:\2-%20HAP\Dissection\Muscle%20Dissection%20Instructions%20and%20List%20with%20Colors.htm)) of all listed muscles
* Know origin and insertion of select muscles (human, see [muscle list](file:///W:\2-%20HAP\Dissection\Muscle%20Dissection%20Instructions%20and%20List%20with%20Colors.htm))
* Helpful links: [Muscle List](file:///W:\2-%20HAP\Dissection\Muscle%20Dissection%20Instructions%20and%20List%20with%20Colors.htm), [Cat muscle link (1)](http://www.bio.psu.edu/people/faculty/strauss/anatomy/musc/muscular.htm), [Good Human site with Actions, Origins and Insertions](http://www.ptcentral.com/muscles/), [Good Human Diagrams](http://www.meddean.luc.edu/lumen/MedEd/GrossAnatomy/dissector/mml/mmlregn.htm), [Interactive Human muscle site](http://www.getbodysmart.com/ap/muscularsystem/menu/menu.html), [Another great interactive human muscle site](http://www.meddean.luc.edu/lumen/MedEd/GrossAnatomy/dissector/muscles/muscles.html)
* Materials covering this information: Ch 10 pages 330-334, 367-379, 344-355, 335-343, 356-362, 2nd part Ch 10 reading questions, 3rd part Ch 10 reading questions, 4th part Ch 10 reading questions, 5th part Ch 10 reading questions, Coloring pages 88-95, 68-77, 58-61, 64-65, 84-87, Human posters and diagrams, cat dissection ([muscle list](file:///W:\2-%20HAP\Dissection\Muscle%20Dissection%20Instructions%20and%20List%20with%20Colors.htm)), Quiz 9, Quiz 10, Unit Test

**The Nervous System**

**Nervous System Basics and Neurophysiology (Ch 11 up to synapse)**

* Function of nervous system
* Divisions of the Human Nervous system (figure 11.2)- basic functions of each
  + CNS- Brain and Spinal Cord
    - Brain: voluntary movement, interpretation, sensory integration, consciousness, cognition
    - Spinal cord: conduction of afferent and efferent nerves, reflex center
  + PNS- 12 pairs of cranial nerves and 32 pairs of spinal nerves, ganglia provides communication lines between CNS and body’s muscles, glands and sensory receptors
    - Sensory
    - Motor
      * Somatic
      * Autonomic
        + Sympathetic and parasympathetic
* Histology
  + Neurons- functions, characteristics (longevity, amitotic, high metabolic rate)
    - Cell bodies- function- nuclei vs ganglia
    - Extenstions- tracts vs nerves
      * Dendrites- function
      * Axons- function- axon hillock, axon collaterals, terminal branches, axon terminal (boutons, synaptic knobs)
    - Structural classification of neurons- uni, bi and multipolar
    - Functional classification of neurons- sensory (afferent), inter (association) and motor (efferent)
  + Glial Cells (6)
    - CNS (4)- function of each- astrocyte, microglia, ependymal cells, oligodendrocytes
    - PNS (2)- function of each- satellite cells, Schwann cells
  + Myelin sheath- structure (appearance and composition) and function
    - Nodes of Ranveir
    - Gray matter vs White matter
* Neurophysiology
  + Voltage (potential energy, resting potential), current and resistance (cell membrane)
  + Ion channels- chemically (ligand)-gated, voltage-gated, mechanically-gated, leaky
    - Electrochemical gradients- flow to opposite charge/lower concentrations
  + Resting potential characteristics and ion concentrations
  + Depolarizations
    - Na+ rushes in to dendrite or cell body local depolarization, if threshold stimulus is applied, starts a positive feedback loop (change of charge causes voltage gated Na+ channels nearby to open)
  + Repolarization
    - Happening to section of neuron behind the depolarization, slower K+ gates remain open as Na+ close, ends the positive feedback loop, brings back towards resting potential
      * Absolute refractory period
  + Hyperpolarizations
    - K+ gates remain open, cell overshoots the resting potential
      * Refractory period
    - ATP pumps must be used to return to original resting potential
  + Graded Potentials
    - Decrease in magnitude with distance, charge lost due to leaky channels
    - Receptor potential
    - Postsynaptic potential
  + Action Potentials
    - Started by graded potential
    - Threshold stimulus and “all-or-none”
    - Axon hillock
    - Propagation
    - All-or-None
  + Refractory period vs absolute refractory period
  + Stimulus intensity- increase in stimulus= increase in frequency, NOT AMPLITUDE, of impulse
  + Conduction velocity: 2 factors- width of axon, degree of myelination
  + Continuous conduction
  + Salutatory conduction
  + Multiple scleorsis
* Materials covering this information: Ch 11 pages 388-408, 1st part Ch 11 reading questions, 2nd part Ch 11 reading questions, Quiz 11, Unit Test

Helpful links: [Resting Potential](http://bcs.whfreeman.com/thelifewire/content/chp44/4401s.swf), [Action Potential](http://www.tvdsb.on.ca/westmin/science/sbioac/homeo/action.htm), [Action Potential 2](http://bcs.whfreeman.com/thelifewire/content/chp44/4402s.swf), [Action Potential 3](http://www.psych.ualberta.ca/~ITL/ap/ap.htm), [Channel gating during an action potential](http://www.blackwellpublishing.com/matthews/channel.html), [Animated Neurotransmission](http://www.brainexplorer.org/neurological_control/Neurological_Neurotransmission.shtml)

**Central Nervous System** SEE [Guided notes for Ch 12](file:///W:\2-%20HAP\Study%20Guides\Ch%2012%20Guided%20notes.htm)

* Materials that covered this information: Ch 12 pages 431-456 (no embryonic development), Coloring pages 112-113, 116-121, 122-127, Brain Cap Activity, Ch 12 Review Questions, Quiz 12, Unit Test
* Helpful Links: [Central Nervous System Structures Power Point](file:///W:\2-%20HAP\Power%20points\Nervous%20System%20Structures.ppt), [Human Brain Anatomy & Functions](http://biology.about.com/library/organs/brain/blbrain.htm), [Online Brain dissection](http://www.exploratorium.edu/memory/braindissection/index.html)

**Peripheral Nervous System** SEE [Guided notes for Ch 13](file:///W:\2-%20HAP\Study%20Guides\Ch%2013%20Guided%20notes.htm)

* Materials that covered this information: Ch 13 pages, 491-492, 498-510, 519, 521-526, Coloring pages 128-133, Ch 13 Review Questions, Reflex Lab, Unit Test
* Helpful Links: [Cranial Nerves Tutorial](http://www.gwc.maricopa.edu/class/bio201/cn/cranial.htm), [Cranial nerve testing](http://faculty.washington.edu/chudler/cranial.html)

**The Circulatory, Lymphatic and Immune Systems**

**The Heart**

* Heart Facts
  + Size, Location- Mediastinum, Orientation, Function
* Heart Anatomy- Know the Functions of each of these words/parts

         Coverings: Pericardium, Pericardial cavity

         Layers of Heart wall: Epidcardium, Myocardium, Endocardium

         Chambers and associated great vessels: R and L ventricles, R and  L atria

         Superior and inferior vena cava, pulmonary veins, aorta, pulmonary trunk (R and L arteries)

         Pectinate muscles

         Trabeculae carneae

         Papillary muscles

         Chordae tendineae

         Atrioventricular valves (AV valves)

o        Tricuspid and Mitrial (bicuspid)

         Semilunar valves (SL valves)

o        Aortic and Pulmonary

* Cardiac Muscle

         Microscopic anatomy (striation (dif.s from skeletal), nucleus, mitochondria,  T tubules and sarcoplasmic reticulum)

* Circulation

         Know all three circulation loops including the route the blood takes and where it is O2 rich vs O2 poor (see vocab above in heart anatomy)

         pulmonary circulation

         systemic circulation

         coronary circulation

         coronary arteries, capillaries, cardiac veins and coronary sinus

* Heart physiology

         Mechanism and events of contraction (similarities and differences to skeletal muscle)

         Gap junctions

         Intrinsic conduction system- Autorhythmic cells

o        Sinoatrial node (SA node) (\*pacemaker)

o        Atrioventricular node (AV node)

o        Bundle of His (atrioventricular bundle)- R and L branches

o        Purkinje fibers

         Heart sounds

         Mechanical events- systole, diastole, cardiac cycle

         Cardiac output- stoke volume

* Heart disorders and Effects of Aging

         Angina pectoris

         Myocardial infarction (heart attack)

         Atherosclerosis

         Congestive heart failure

         Arrhythmias

         Heart block and “pacemakers”

* Helpful Links: [Heart Pictures with Answers](http://fp.dl.kent.edu/hyork/cshhrt1.htm), [Slide-by-slide heart dissection](http://www.nku.edu/~dempseyd/heart%203%20labeled_files/frame.htm), [Practice Lab Practical](http://www.gwc.maricopa.edu/class/bio202/cyberheart/hartint0.htm)
* Materials that covered this information: Ch 18, Ch 18 Reading Questions, Heart Diagram, Coloring pages 169-173, Sheep Heart Dissection, Quiz 13, Unit Test

**Blood vessels**

* Overview of Blood vessel structure and function

         Arteries, veins and capillaries

         blood vessel walls

o        tunica intima structure/function

o        tunica media structure/function

         vasoconstriction and vasodilation

o        tunica externa structure/function

* Arterial system

         elastic/conducting arteries structure/function

         muscular/distributing arteries structure/function

         arterioles structure/function

         capillaries structure/function

* Venous system

         venules structure/function

         veins structure/function

* Physiology of circulation

         blood flow

         blood pressure

         resistance (viscosity, blood vessel length, blood vessel diameter)

         RELATIONSHIP between flow, pressure and resistance

         systemic blood pressure

o        arterial blood pressure (ave healthy person, pulse pressure), capillary blood pressure, venous blood pressure

* Maintaining blood pressure
  + factors that make it vary (CO, V, R, venous return, hormonal and neural controls)
  + vasomotor center
    - baroreceptors, chemoreceptors, brain cortex and hypothalamus effects
  + circulatory shock
* Major/Specific Blood Vessels
  + arteries- coronary arteries, pulmonary trunk and arteries, aorta, descending thoracic aorta, descending abdominal aorta, brachiocephalic, R and L subclavian, R and L common carotid, R and L axillary, R and L brachial, R and L renal, R and L external iliac, R and L internal iliac, R and L femoral, R and L saphenous
    - **difference between brachiocephalic trunk in bipeds and quadripeds!**
  + veins, superior and inferior vena cava (pre and postcava), pulmonary veins, R and L brachiocephalic, R and L subclavian, R and L axillary, R and L jugular, R and L external jugular, R and L adrenolumbar, R and L renal, Common iliac, R and L external iliac,  R and L femoral, R and L great saphenous
* Helpful Links: [Cat Circulatory System](http://www.bio.psu.edu/people/faculty/strauss/anatomy/circ/circulat.htm), [Cat Blood Vessels of Upper Body](http://www2.ivcc.edu/caley/108/lab_images/neckthorax.htm), [Cat Blood Vessels of Abdominal Cavity](http://www2.ivcc.edu/caley/108/lab_images/abaorta.html), [Cat Hepatic Portal System](http://www2.ivcc.edu/caley/108/lab_images/portal.html)
* Materials that covered this information: Ch 19, Ch 19 Reading Questions, Coloring pages 174-175 and 188-189, Cat Dissection, Quiz 13, Unit Test

**Blood**

* basic characteristics- ph, temp, color, density, viscosity, volume in human body, connective tissue
* functions- distribution, regulation, protection
* composition- plasma & formed elements
  + hematocrit, buffy coat
  + plasma- water, salts (Na+, etc), proteins
    - albumin, globulins, fibrinogen
  + formed elements- blood cells
    - hematopoiesis and hematopoietic stem cell
    - erthrocytes- rbcs- mature form
      * hemoglobin
      * blood doping
      * anemia
    - leukocytes- wbcs- Never Let Monkeys Eat Bananas
      * granulocytes
        + neutrophils, eosinophils, basophils
      * agranulocytes
        + lymphocytes (B and T cells)
        + monocytes
      * platelets
    - hematopoiesis
* hemostasis- vascular spasm, platelet plug, coagulation
  + serotonin, prothrombin, thrombin, fibrinogen
  + thrombus, embolus and embolism
* blood types
  + agglutinogens
  + agglutinins
  + ABO Rh system

**Lymphatic System**

         Lymph

         Lymphatic vessels

* + Collecting vessels
  + Trunks
  + Ducts- R and thoracic

         Lymphocytes

         Lymph nodes

         Spleen, thymus gland and tonsils

**Immune System**

         Disease

         Pathogen

         Vector

         Leukocytes

* + phagocytes and lymphocytes
    - B and T cells

         Nonspecific Defense

* + 1st line of defense
    - skin, sweat, mucus, bacteria
  + 2nd line of defense- inflammatory response
    - histamine, basophils, mast cell,s pyrogens
  + Natural killer cells
  + Interferons

         Specific Defense

* + 3rd line of defense- immune response
  + antigen
  + charcteristics
  + humoral immunity
    - B cells, plasma cells, antibodies
  + cell-mediated immunity
    - helper, cytotoxic and suppressor T cells

         Acquired immunity

* + Permanent immunity
    - 1st and 2nd immune response
  + Active immunity
  + Passive immunity

         Allergies

* + Allergens, asthma, anaphylactic shock

         Autoimmune disease

         AIDS

* + HIV, T4, retroviruses

         Suppressing the immune system

         ELISA assays

* Materials that covered this information: Ch 17, parts of Ch 20 and 21, Blood Worksheet, Immune Lab, Blood Typing Activity, Unit Test

**The Respiratory and Digestive Systems**

**Respiratory System**

* Respiration vs Cellular Respiration vs Breathing
* Function of the Respiratory System
* 4 processes of respiration (pulmonary ventilation, external respiration, transport of respiratory gasses, internal respiration)
  + only 1st 2 are functions of the respiratory system alone
* Respiratory zone
* Conducting zone
* Anatomy- location and function of each of the following:
  + Nose- external vs internal (nasal cavity), nostrils, nasal septum, hard and soft palate, nasal conchae
    - Bones and cartilages that make up above list
    - Olfactory and respiratory mucosa
    - Pseudostratified ciliated columnar epithelium (goblet cells)
  + Paranasal sinuses
    - Bones they are located in
  + Pharynx- throat- nasopharynx, oropharynx, laryngopharynx
    - Uvula
    - Pseudostratified ciliated columnar vs Stratified squamous epithelium
  + Larynx- voice box
    - Hyaline cartilages- Thyroid cartilage, cricoid cartilage, arytenoids, cuneiform and corniculate cartilages
    - Elastic cartilage- epigolottis
    - Vocal ligaments and vocal folds (true vocal cords)
    - glottis
  + Trachea- windpipe
    - Pseudostratified ciliated columnar epithelium (goblet cells)
  + Bronchi and Bronchial Tree
    - 1°- R and L
    - 2°- 3 to R, 2 to L (1 to each lobe)
    - 3°, etc
    - Bronchiole, terminal bronchiole
    - Support structure changes (cartilage)
    - Epithelium type changes (Pseudostratified ciliated columnar epithelium to cuboidal)
    - Amount of smooth muscle changes
  + Alveoli (respiratory zone)
    - Alveolar ducts and alveolar sac
    - Respiratory membrane
    - Alveolar pores and macrophages
  + Lungs
    - Thoracic cavity
    - Root, apex, costal surface, base, hilum, cardiac notch
    - Lobes (R v L, also size!)
    - Lobules
    - Blood supply (pulmonary and bronchial)
    - Innervation (sympathetic and parasympathetic motor and visceral sensory, pulmonary plexus)
    - Each in a pleural cavity, connected to the mediastinum by root (vascular and bronchial attachments)
    - Pleurae- parietal and visceral
      * Pleural fluid
* Mechanics of Breathing
  + Pulmonary ventilation, inspiration and expiration
  + Atmospheric pressure
  + Intrapulmonary pressure, intrapleural pressure
    - Opposing forces (tendency to recoil and surface tension of alveolar surface)
  + Boyle’s Law
  + Inspiration- quiet vs forced
    - Diaphragm, external intercostals, accessory muscles (neck- scalenes, sternocleidomastoid, and chest- pectoralis minor, and back- erector spinae)
  + Expiration- quiet vs forced
    - Passive vs active
    - Abdominal muscles (oblique and transverse), internal intercostals
  + Physical factors influencing pulmonary ventilation- airway resistance, alveolar surface tension, lung compliance
  + Respiratory Volumes- tidal, inspiratory reserve, expiratory reserve, residual
  + Respiratory Capacities- inspiratory, functional residual, vital and total lung
  + Dead space- anatomical, alveolar and total
  + Alveolar ventilation
* Gas Exchange
  + Dalton’s Law
  + Henry’s Law
  + Composition of Alveolar Gas and why it’s different
  + External Respiration- 3 factors
    - Partial Pressure Gradients and Gas Solubilities
    - Coupling of Alveolar Ventilation and Pulmonary blood flow
    - Structure of the Respiratory Membrane
  + Internal Respiration
* Transport of Respiratory Gasses
  + O2- %s by hemoglobin and dissolved in plasma
  + Hemoglobin- structure, how many O2 can it carry?
    - Oxyhemoglobin and deoxyhemoglobin
    - Affect of PO2, temp, blood pH and PCO2 on binding/releasing O2
  + CO2- plasma, hemoglobin (carboaminohemoglobin), and bicarbonate ions
    - PCO2, differences at tissues and alveoli
* Control of Respiration
  + Neural
    - Medulla- respiratory centers, phrenic nerve
    - Pons
  + Factors Affecting Breathing Rate and Depth
    - Respiratory centers
    - Chemical factors
      * Chemoreceptors in aortic arch and carotids
      * PCO2- most powerful respiratory stimulant
        + Release of H+
      * PO2
      * pH (H+)
    - Higher Control Centers
      * Limbic system and hypothalamus
        + Emotions
        + temperature
      * Cortical centers
        + Voluntary and limited
      * Pulmonary irritants
        + Vagus nerve and constriction of passageways, coughs, sneezes
      * Inflation reflex
        + Stretch receptors and vagus nerve
* Helpful Links: [Cat Respiratory system photos](http://www.dccc.edu/departments/biology/virtuals/VCAT/Framework/VCAT/CATBOX/respiratory.html)
* Materials that covered this information: Ch 22, Respiratory System Worksheet Part 1, Respiratory System Worksheet Part 1, Coloring pages 236-237 and 242-243, Quiz 14

**Digestive System**

* Function
* Nutrients (Vitamins, Minerals, Carbohydrates, Proteins, Fats (& Water))
* Energy (Calorie)
* Alimentary Canal or GI (Gastrointestinal) tract or gut
  + What is it?
  + Mouth- oral orifice, oropharynx, palate, uvula, tongue, taste buds, teeth, and salivary glands
  + Pharynx- oro and laryngo
  + Esophagus- cardiac sphincter
  + Stomach- chyme, cardiac region, fundus, body, pyloric region, greater and lesser curvatures, pyloric sphincter
    - Emetic center and reverse peristalsis
  + Small Intestine- ileocecal valve, duodenum, jejunum, ileum, bile and pancreatic ducts, plicae circularis, villi and microvilli
  + Large Intestine- cecum (appendix), colon (ascending, transverse, descending, rectum), anal canal, anus, internal and external sphincters
* Accessory Organs
  + What are they?
  + Salivary glands- submandibular and sublingual, saliva (water, amylase, and lysozyme)
  + Gastric glands- gastric juice, mucus, hormones, HCl, pepsin
  + Liver- right, left, caudate and quadrate lobes, common hepatic duct, bile, bilirubin
  + Gallbladder- bile, cystic duct
  + Pancreas- pancreatic juice (bicarbonate, trypsin, amylase, lipase), pancreatic duct
* 6 processes (ingestion, propulsion, peristalsis, mechanical digestion (mastication, churning and segmentation), chemical digestion (hydrolysis- carbohydrate, protein and lipid), absorption (nutrients and water), defecation)
  + Which process(es) take place in each organ of the digestive system?
  + Which nutrients are broken down and/or absorbed in what organ?
* Regulatory mechanisms
  + Mechanical and chemical stimuli
  + Extrinisic and intrinsic
* Peritoneum (parietal, visceral and mesentery)
* Tunics (mucosa, submucosa, muscularis externa and serosa)
* Helpful Links: Digestive System- [Cat Digestive System Photos](http://bio.bd.psu.edu/cat/Digestive_System/index.htm)
* Materials that covered this information: Ch 23, Digestive System Worksheet, Coloring pages 216-217, 224-229, (also 230-233 though not assigned and pictures will not appear on test) , Quiz 15