

Biology 224 - ANATOMY & PHYSIOLOGY II
LECTURE & LABORATORY COURSE OBJECTIVES

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The Biol 224 lecture exam and laboratory exam objectives are split into 2 sections – the lecture objectives, followed by the laboratory objectives. However there is obviously considerable overlap between the two and it is impossible to separate them fully.

Before each exam review both the lecture and lab objectives for the relevant sections. Some laboratory objectives may appear on the lecture exams and some lecture objectives may appear on the laboratory exams.

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MATERIAL TO BE COVERED ON LECTURE TESTS (ALSO SEE LAB OBJECTIVES)

CHAPTER 18: THE HEART

1. Be able to describe the following about the heart:

- size
- location
- valves
- great vessels
- path of the blood through the heart to the to lungs
- path of the blood through the heart to the to systemic circulation

2. Name the coverings of the heart.

3. Know the following functions of the valves of the heart.

- when and why the valves open and close
- what keeps certain valves from being forced to open backwards
- what a heart murmur is

4. Trace route of blood moving through the heart, starting with the inferior and superior vena cava and exiting through the aortic arch. List all valves, chambers, and vessels involved.

5. Describe the operation of the cardiac conduction system by identifying system parts and locations and the proper action sequence for one normal cardiac cycle. Also know:

- pacemaker areas of the heart
- reasons for heart block
- role of gap junctions

6. Draw a diagram of the normal electrocardiogram. Name the individual waves and indicate what each represents in terms of electrical and mechanical activity of the heart.

7. Define and know the equation that relates:

Cardiac output
Stroke volume
Heart Rate

8. Define and know these factors and how they affect Stroke Volume:

End diastolic volume
venous return
End systolic volume
Heart Rate
Heart Contractility
Afterload
Preload

9. Explain the role of the sympathetic and parasympathetic (autonomic) nervous system on heart rate and contractility.

10. Know the role of potassium in regulating heart function.

11. Know the definitions of these clinical descriptions of heart function.

Fibrillation
Defibrillation
Tachycardia
Bradycardia
Coronary or Heart Attack
Angina
Systole
Diastole
Congestive Heart Failure
Dilated myopathy
Pulmonary congestion

12. Know the long term effect that increased blood pressure (afterload) has on the heart.

CHAPTER 19: BLOOD VESSELS

1. Know:

the three layers of arteries and veins
how the layers differ between arteries and veins
lumen
vaso vasorum
endothelial cells

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secretions of endothelial cells
types of arteries
elastic
muscular
arterioles
terminal
metarterioles
thoroughfare
capillaries
continuous
fenestrated
sinusoidal
true
precapillary sphincter
postcapillary venules
venules
venous valves
anastomoses
veins
arterial
arteriovenous

2. Define, know approximate values for and how to calculate (when appropriate)

these terms
systolic pressure
diastolic pressure
pulse
sphygmomanometer
sounds of Korotkoff
pulse pressure
mean arterial pressure
hypotension
orthostatic hypotension
hypertension
primary or essential hypertension
secondary hypertension
chronic hypertension

3. Compare

blood pressure of aorta
with blood pressure of capillaries (why it is so low)
with blood pressure of veins

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4. Know the equations relating:

BP (blood pressure), BF (blood flow) and R (resistance).

Blood Pressure (BP) = CO (cardiac output) X peripheral resistance (PR).

CO (cardiac output), R, BP, and BP

SV (stroke volume), HR (heart rate), R, BP, and BF

5. Know how blood pressure (BP) is affected by the following factors

blood flow (BF)

resistance (R)

blood viscosity

length of blood vessels

diameter of blood vessels

blood volume (BV)

heart rate

arterial elasticity

cardiac output

stroke volume (SV)

preload

afterload

contractility

sympathetic stimulation

parasympathetic stimulation

6. Know the neural controls of short term blood pressure regulation, including:

Chemoreceptors

Baroreceptors

Higher brain centers

Hormones

antidiuretic hormone (ADH)

epinephrine

norepinephrine

atrial natriuretic factor

angiotensin II

endothelium derived relaxing factor (EDFR) = Nitric Oxide

endothelium derived constricting factor (EDCF) = endothelin

effects of alcohol

7. Know these mechanism of long term regulation of blood pressure.

renin-angiotensin mechanism

aldosterone

antidiuretic hormone (ADH)

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the relationship between [Na] plasma , [H₂O] plasma , BV, and BP.

8. Know the following mechanisms of autoregulation:

short term autoregulation
metabolic controls
myogenic controls
long term autoregulation

9. Name three medical problems caused by hypertension.

10. Know the exercise induced changes in blood flow to skeletal muscle, brain, skin, lungs, kidney and heart.

11. Define circulatory shock and explain the homeostatic mechanisms that compensate for it. Know these types of shock:

hypovolumic shock
vascular shock
cardiogenic shock
orthostatic shock

12. Know the three factors aiding venous return.

13. Describe and contrast the fluid compartments of the body: ICF (plasma and interstitial fluid) versus ECF.

14. Describe the typical capillary bed and explain the factors at work within it that allow for the movement of nutrients in and out of the capillary bed. Know the role of the following factors.

Hydrostatic pressure = HP
Hydrostatic pressure of capillary = HP_c
Hydrostatic pressure of interstitial fluid = HP_{if}
Osmotic pressure = OP
Osmotic pressure of capillary = OP_c
Osmotic pressure of interstitial fluid = OP_{if}

15. Describe the relationships between edema and each of the following:

blood hydrostatic pressure
capillary permeability
lymphatic drainage
blood osmotic pressure
interstitial osmotic pressure

CHAPTER 22: RESPIRATORY SYSTEM

1. Be able to identify the following components of the respiratory system:

primary bronchi
secondary bronchi
tertiary bronchi
bronchioles
terminal bronchioles
respiratory bronchioles
alveolar ducts
alveolar sacs
alveoli
respiratory zone
conducting zone
Type I cells
Type II cells
pulmonary arteries
bronchial arteries
lung compliance
alveolar surface tension
spirometer
anatomical dead space
alveolar dead space
total dead space
alveolar ventilation
respiratory resistance
nonrespiratory air movements
hyperbaric oxygen
ventilation
perfusion
oxyhemoglobin
deoxyhemoglobin
carbaminohemoglobin
hypoxia
anemic hypoxia
ischemic hypoxia
histotoxic hypoxia
hypoxemic hypoxia
hyperventilation
hypocapnia
hypoventilation

2. Describe the protective mechanisms of the respiratory system.

3. Describe the structure and function of the lungs. Name the pleural membranes.

4. Know and understand how these laws are related to respiration

Boyle's Law

Dalton 's Law of Partial Pressure (be able to calculate a partial pressure)

Henry's Law

5. Given a gas mixture over a liquid, describe the effects of increasing and decreasing the partial pressures of that gas on the amount of dissolved gas in the liquid.

6. Be able to define inspiration and expiration (quiet and forced).

7. Be able to define and know the factors responsible for atmospheric pressure, intrapulmonary pressure, intrapleural pressure, and transpleural pressure. Know the vital roles these pressures play in inspiration and expiration.

8. Define external respiration and explain the factors that play important roles during external respiration. Define internal respiration and the factors that play an important role in internal respiration.

9. Differentiate between the partial pressures of O₂ and CO₂ of the atmosphere, the alveoli, venous blood, arterial blood and the interstitial space.

10. Understand ventilation-perfusion coupling.

11. Know the four respiratory volumes:

Tidal volume

Inspiratory reserve volume

Expiratory reserve volume

Residual volume

12. Know the four respiratory capacities:

Total lung capacity

Vital capacity

Inspiratory capacity

Functional Residual Capacity

13. Describe the actions of the following stimuli upon the bronchi:

sympathetic stimuli

epinephrine

parasympathetic stimuli

acetylcholine

histamine

14. Trace the pathway of oxygen traveling from the atmosphere to the cells of the a tissue bed of the body.

15. Describe the ways in which oxygen is transported in the blood.

16. What is the oxygen-hemoglobin dissociation curve. Draw this curve and label the x axis and the y axis.

17. How do the following factors affect the oxygen-hemoglobin dissociation curve and how do they affect the delivery of oxygen to the tissues?

BPG

P CO₂

pH

Temperature

18. Describe the three ways in which carbon dioxide is transported in the blood.

19. Write (and memorize) the chemical equation which describes how carbon dioxide combines with water to become dissolved in the blood.

20. Describe the general mechanism of buffers and explain the major buffers found in the blood. How can you use this equation to describe how CO₂ buffers acid in the blood?

21. What is the normal pH of the blood; what is its physiological range

22. Disregarding any buffer action, describe the effect of increasing blood P CO₂ on blood pH; of decreasing blood P CO₂

23. What is the main chemical that affects the rate and depth of breathing?

24. How do P CO₂ , P O₂ , and pH affect the rate and depth of breathing?

25. Describe and give one reason for the development of

respiratory acidosis

respiratory alkalosis

metabolic acidosis

metabolic alkalosis.

26. Describe the neural controls of respiration.

27. Identify and state the location of respiratory control centers of the central nervous system.

28. Describe the location of respiratory stretch receptors and their role in the Hering-Breuer Reflex.

29. Describe the location and action of respiratory chemoreceptors.

30. Describe the characteristic of the following respiratory patterns:

eupnea

apnea

dyspnea

hyperpnea

chronic pulmonary diseases

obstructive emphysema

chronic bronchitis

tuberculosis

lung cancer (squamous cell, adenocarcinoma, small cell carcinoma)

CHAPTER 16: THE ENDOCRINE SYSTEM

1. Distinguish between an endocrine gland and an exocrine gland.

2. Explain the differences between how the endocrine system and the nervous system control body functions.

3. What are the three ways hormones are stimulated to be released (humoral, neural and hormonal)? What are the different chemical classifications of hormones? What are tropic hormones?

4. List the major endocrine organs, and describe their locations in the body.

5. Know the role of the following events in controlling target cell activation:

[hormone] blood

half life

factors controlling [hormone] blood

receptor affinity

upregulation of receptors

downregulation of receptors

6. Understand the following mechanisms hormones use to cause changes in their target cells to achieve their desired results.

Changes in membrane permeability

Changes in protein synthesis

Changes in enzyme synthesis

Changes in secretion
Mitosis

7. Know the pathways of these second messenger systems that are used by hormones to communicate with their target cells.

Plasma membrane receptors

cAMP

cGMP

PIP-Ca⁺⁺ mediated mechanism

Intracellular receptors

8. What are protein kinases? How are they used to change cell activity?

9. Define a prostaglandin and explain how it is related to hormonal control.

10. Define negative feedback and give an example of how hormones act in this manner.

11. Define positive feedback and give an example of how hormones act in this manner.

12. Describe the structural and functional relationships between the hypothalamus and the pituitary gland. What is the hypothalamic-hypophyseal tract? What is the hypophyseal portal system?

13. Identify the hormones produced by the anterior pituitary gland and state their functions and mode of control.

14. Identify the hormones of the posterior pituitary gland and state their functions and mode of control. Why is the hypothalamus considered a neuroendocrine gland?

15. Explain the mechanism by which releasing factors control secretions of the anterior pituitary. Know the hypothalamic-pituitary relationship for and function of:

TRH-TSH-TH

GHRH, GHIH-GH-Somatostatin

CRH-ACTH--Mineralocorticoids (aldosterone)

Glucocorticoids

Gonadocorticoids

GnRh-FSH, LH-Estrogen

Progesterone

Testosterone

PRH, PIH-Prolactin

16. Describe the function of the following glands:

anterior pituitary

posterior pituitary

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hypothalamus
thyroid
parathyroid
thymus
pineal
testes
ovary
pancreas
placenta
adrenal

17. Describe the origin, target, mechanism of release, and function/s of the following hormones:

growth hormone
thyroid stimulating hormone
adrenocorticotrophic hormone
follicle stimulating hormone
luteinizing hormone
prolactin
oxytocin
antidiuretic hormone
thyroxin
calcitonin
parathyroid hormone
insulin
glucagon
noradrenaline
adrenaline
cortisol
aldosterone
estrogen
progesterone
testosterone
melatonin
thymosin
glucocorticoids
atrial natriuretic factor (ANF)
erythropoietin
cholecalciferol
GI hormones
Gastrin
Serotonin
Intestinal gastrin
Secretin

18. What are the different types of hormone receptors? How does their location vary with chemical classification of the hormone that binds to them?

19. State the relationship of the adrenal medulla to the autonomic nervous system.

20. Describe and correlate the clinical symptoms of diabetes mellitus with the pathophysiology of this disease. What are the two causes of diabetes mellitus? What are the two types of diabetes mellitus and how do they differ?

21. Describe how the following conditions are related to specific hormones:

Pituitary dwarfism

Addison's Disease

Gigantism

Grave's Disease

Cretinism

Acromegaly

Exothalamic goiter

Cushing's Syndrome

Hypersecretion of prolactin

Diabetogenic effect of GH

Progeria

22. What are the four different ways aldosterone is controlled? What is the effect of hyperaldosteronism?

23. Know the significance of or be able to define:

Follicles

Thyroglobulin

Colloid

Myxedema

Simple Goiter

T3

T4

Symptoms of hyperthyroidism

Parafollicular or C cells

Know the effects of calcitonin (note - see also page 189)

Know the location, function of parathyroid glands

Know the location, function of the chief cells of the stomach (see pages 900-901)

Know the 3 ways PTH controls [Ca] blood (see p. 625)

Know the symptoms of hyperparathyroidism

CHAPTER 25: THE URINARY SYSTEM

1. List the organs of the urinary system and state the general function of each as well as the functions of the system as a whole.
2. Describe the gross anatomy of the kidney.
3. Trace the blood supply through the kidney.
4. Describe the anatomy of a nephron.
5. Identify which parts of the nephron are responsible for filtration, reabsorption, and secretion, and describe the role played by each in urine formation.
6. Discuss the role of each of the following during filtration:

Filtration membrane

Net filtration pressure

blood (glomerular) hydrostatic pressure

capsular hydrostatic pressure

blood (glomerular) osmotic pressure

GFR

Control of filtration

Renal autoregulation

Tubuloglomerular feedback mechanism

JG apparatus

Renin-angiotensin mechanism

Sympathetic nervous system

aldosterone

7. Discuss the role of the following during the process of reabsorption.

How does water move inside the nephron?

How does water move as solution is hypertonic inside the nephron?

How does water move as solution is hypotonic inside the nephron?

Active tubular reabsorption

Transport maximum TM

Passive tubular reabsorption

Obligatory water reabsorption

Solvent drag

Reabsorption properties of proximal convoluted tubule

Reabsorption properties of Loop of Henle

Reabsorption properties of distal collecting tubule

Reabsorption properties of collecting duct

8. Understand and be able to discuss the role of the secretion. What are the reasons for secretion? What substances are secreted?

9. Explain how the countercurrent mechanism operates and its functional importance to the kidney. Include in your discussion know:

How water and NaCl move during this mechanism

The area permeable to water

The area permeable to NaCl

The area permeable to urea

How dilute urine is formed

How concentrated urine is formed

The role of the vasa recta

The mechanism that maintains the medullary osmotic gradient

10. Describe the normal physical and chemical properties of urine (include color, odor and pH). What is the difference between plasma, glomerular filtrate and urine?

11. Describe the basic difference between plasma, glomerular filtrate, and urine.

12. Describe how the kidney regulates body pH.

13. State how urine is moved from the kidney out of the body and include involvement of the autonomic nervous system.

14. Describe the structure and function of the ureters.

15. Describe the structure and function of the urinary bladder.

16. Describe the structure and function of the urethra.

17. Define micturition and describe the micturition reflex.

18. Compare the structure of the urethra in the male and female and the clinical significance.

CHAPTER 26: FLUID, ELECTROLYTE, AND ACID-BASE BALANCE

1. Compare and contrast:

ECF

Plasma

Interstitial fluid

ICF

Electrolytes

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Nonelectrolytes

Major cations of the ECF and ICF

Composition of ECF and ICF

2. Know and understand the factors that determine fluid shifts in the body between

Plasma and interstitial fluid

Interstitial fluid and intracellular fluid

understand the H/K shift

3. Define the following terms:

acid

base

buffer system

electrolyte

solution

solute

solvent

hypotonic

hypertonic

isotonic

osmotic pressure

oncotic pressure

hydrostatic pressure

tonicity

ion

milliequivalent

molarity

molality

normality

osmolality

4. Write two equations that i) represent the formation of acidic solutions and ii) represent the formation of basic solutions.

5. Differentiate between the chemical reactions of a strong acid, a weak acid, a strong base, and a weak base.

6. Describe the mechanisms which regulate water intake, retention and loss. What is the difference between sensible and insensible water loss? What is the thirst mechanism?

7. Describe what happens to the osmotic pressure within a fluid compartment when
fluid volume is increased
fluid volume is decreased
solutes are increased

solutes are decreased

8. Outline the importance and method of regulation of each of the following electrolytes:

Sodium

Why is it important to control [Na] blood?

Role of aldosterone

Role of the baroreceptor reflex

Pressure diuresis

ADH

ANF

Estrogen

Progesterone

Chloride

Why important?

How regulated?

Potassium

Why is it important to control [K] blood?

Role of principle cells

Role of intercalated cells

Role of aldosterone

Calcium

Why is it important to control [Ca] blood?

Role of calcitonin

Role of parathyroid hormone

Phosphate

Why important?

How regulated?

Magnesium.

Why is it important to control [Mg] blood?

9. Describe the physiological effects of

Hyponatremia

Hypernatremia

Hypokalemia

Hyperkalemia

Hypocalcemia

Hypercalcemia.

10. Explain the factors involved in fluid movement between the interstitial space and the intracellular space.

11. What is the physiological pH range of acidosis and alkalosis:

How does the respiratory system regulate pH?

Why does respiratory acidosis occur?

Why does respiratory alkalosis occur?

How does the renal system regulate acid base?

Why does metabolic acidosis occur?

Why does metabolic alkalosis occur?

12. Explain how the following buffer systems help to maintain the pH of body fluids:

carbonic acid-bicarbonate

what is alkaline reserve?

sodium dihydrogen phosphate/sodium monohydrogen phosphate

hemoglobin-oxyhemoglobin/ protein.

13. State the principal physiological effects of acidosis and alkalosis upon respiration, cardiac function and the nervous system. Explain how these system work together to maintain pH.

14. Compare and contrast:

Dehydration

Water intoxication

Edema

What is the role of the lymphatics in edema?

CHAPTER 17: BLOOD

1 . Identify and state the function of the components of blood including:

formed elements of the blood

and plasma

2 . List the components of plasma and serum and state the function of each; know why proteins are so important in plasma.

3. Know the volume of blood in men and women, what is a hematocrit, how is it calculated.

4. Describe the characteristics/function of the following as they relate to RBC production:

size of RBC

shape of RBC

hemoglobin characteristics

breakdown products of hemoglobin

hematopoiesis

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erythropoiesis
erythropoietin
location of erythropoietin production
ultimate stimulus for erythropoietin production
negative feedback mechanism of erythropoietin production
vitamin B 12
folic acid
intrinsic factor
iron
amino acids.

5. Describe the chemical events of clot formation;

hemostasis
three steps of hemostasis
vascular spasm
platelet plug formation
coagulation
intrinsic vs extrinsic pathways
common pathway (know steps)

6. List the classes, structural characteristics, and function of leukocytes:

neutrophils
lymphocytes
T lymphocytes
B lymphocytes
monocytes
eosinophils
basophils

7. Describe the structure and function of platelets and from what cell type they originated.

8. Differentiate between a thrombus and an embolus as to their formation and location in the body.

9. Understand balance between clot formation and inhibition and be able to explain:

fibrinolysis
tissue plasminogen activator
conversion of plasminogen to plasmin

10. Describe the ABO and Rh blood groups. Explain the basis of transfusion reactions. Include:

antigens of A, B, AB, and O types

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antibodies of A, B, AB, and O types
universal donors
universal recipients
erythroblastosis fetalis

11. Describe the embryonic and fetal sites of erythrocyte and leukocyte production.
Describe the adult sites of erythrocyte and leukocyte production.

12. Define:

diapedesis
colony stimulating factor
leukemia
leukopenia

13. Know the causes of these blood disorders:

hemophilia A
hemophilia B
anemias
acute hemorrhagic
chronic hemorrhagic
aplastic
nutritional
pernicious
thalassemia
sickle cell anemia
polycythemia
bone marrow cancer
blood doping
secondary polycythemia

CHAPTER 20: LYMPHATIC SYSTEM

1. Describe the structure and distribution of lymphatic vessels and describe their functions;
know volume of lymph collected per day; direction lymph travels.

2. Be able to trace the convergence of lymphatic vessels from lymphatic capillaries to the
junction of the internal jugular and subclavian vein.

3. Know these components of lymphatic system

valves
lacteals
chyle

layers of lymphatic vessels

tunica intima

tunica media

tunica adventitia

lymphoid tissue types

lymphoid cell types

T lymphocytes

B lymphocytes

macrophages

dendritic cells

reticular cells

4. List the similarities and differences between lymphatic vessels and veins.

5. Describe the function and location of the thymus, spleen, tonsils, Peyer's patches and Mucosa Associated Lymphatic Tissue (MALT).

6. Also know:

where T and B cells are located in lymph nodes

the type of lymphocyte found in thymus

what is immunocompetency, when does it occur

the function of crypts

7. Describe the mechanisms that control the movement of lymph.

8. Define:

lymphangitis

lymphedema

CHAPTER 21: IMMUNE SYSTEM

1. Differentiate between specific and non-specific defense mechanisms.

2. Differentiate between the first line of defense and the second line of defense.

3. List non-specific defense mechanisms, including mechanical barriers, chemical barriers, chemical barriers, and inflammatory response.

4. Understand the events and processes of inflammation and healing.

5. Know the functions of:

B lymphocytes

T lymphocytes

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macrophages
monocytes
Kupffer cells
neutrophils
eosinophils
phagocytes (phagosomes)
natural killer cells

6. Describe how a fever is produced and how it helps protect the body against invading pathogens.

7. Compare and contrast the origin, maturation process and function of B and T lymphocytes.

8. Describe the role of macrophages in immune response.

9. Explain what an antigen is and how it affects the immune system. What are antigenic determinants? What is a hapten? Know what are complement proteins.

10. Know the types of antigen presenting cells, know what they do and know the location of:

macrophages
activated B lymphocytes
Langerhan's cells
Major Histocompatibility Complex Proteins (MHC proteins)

11. Describe and differentiate between humoral and cell-mediated immunity. Know the definitions of:

humoral
antigen challenge
receptor mediated endocytosis
clonal selection
plasma cells
memory cells
primary response
secondary response
cell-mediated
helper T lymphocytes
cytotoxic T lymphocytes
suppressor T lymphocytes

12. Compare and contrast active and passive immunity.

13. Differentiate between natural and artificial immunity. When considering these, also differentiate between active and passive immunity. Under what circumstances does immunological memory develop?
14. Explain the function of and classes of antibodies. What are monoclonal antibodies?
15. Describe the immune response. Relate this to immunodeficiencies, autoimmune diseases and hypersensitivities, including:

SCID (Severe Combined Immunodeficiency Disease)

HIV

allergies

anaphylaxis

16. Describe the inflammatory response.

17. Define:

margination

diapedesis

pus

abscess

infectious granulomas

interferon

immunogenicity

reactivity

CHAPTER 27: THE REPRODUCTIVE SYSTEM

General Function

1. State the general functions of the human reproductive system.
2. State what is meant by primary and secondary male and female sexual characteristics.
3. Describe the difference between primary and secondary sex organs.
4. Define meiosis. Compare and contrast meiosis and mitosis. How many chromosomes are present in human? In human gametes?

Male Reproductive System

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1. Name the parts of the male reproductive system and describe the general functions of each.
2. Describe the embryonic tissue from which testes develop.
3. Describe the structure of testes, and explain the importance of their location in the scrotum.
4. Describe the location, structure, and function of the accessory organs of the male reproduction system.
5. Outline the events of spermatogenesis and include:
 - Spermatogenic cells
 - Spermatogonia
 - Adluminal compartment
 - Basal compartment
 - Type A cells
 - Type B cells
 - Primary spermatocyte
 - Secondary spermatocyte
 - Spermatids
 - Spermatozoa
 - Sustenticular cells (Sertoli cells)
6. Describe the formation of sperm in the testes.
7. Trace the path followed by sperm cells from their site of formation to the outside of the body, explain the changes that occur along this path.
8. Describe the structure of the penis and explain in sequence how its function to produce an erection. What tissues are primarily responsible? What is the role of the sympathetic and parasympathetic nervous system in this response?
9. Know the effects of testosterone on the male reproductive organs and on other body organs.
10. Describe the phases of the male sexual response.
11. Explain how hormones control the activities of the male reproductive organs and how they are related to the development of the male secondary sexual characteristics. I include:
 - GnRH
 - FSH
 - LH
 - Androgen binding protein

Testosterone

Inhibin

Dihydroxytestosterone

12. Describe the composition, pH, volume, and normal sperm density a normal ejaculate of semen. What are some of the specific functions of the components?

Female Reproductive System and Embryology

1. Name the parts of the female reproductive system and describe the general function of each.

2. Describe the location, structure, and function of the ovaries.

3. Discuss the structure and function of the mammary glands.

4. Describe the process of oogenesis and compare it to spermatogenesis. Include:

Oogonia

Primary oocyte

First polar body

Secondary oocyte

Second polar body

Ovum

5. Describe the phases of the ovarian cycle and relate them to events of oogenesis. Include the following

Follicular phase

Ovulation

Luteal phase

Primordial follicle

Primary follicle (what stage of meiosis?)

Secondary follicle

Vesicular follicle

Corpus luteum

Corpus albicans

Ovulated oocyte (what stage of meiosis?)

6. Describe how hormones control the activities of the female reproductive system and how they are related to the development of female secondary sexual characteristics. Include the following

GnRH

FSH

LH

Cell types responsive to FSH, LH

Estrogen role

Progesterone role

LH surge

How LH surge is stimulated

How cycle repeats itself

How the cycle is turned off

7. Describe the hormonal regulation of the ovarian and menstrual cycles.
8. Discuss the physiological effects of estrogen and progesterone both on the female reproductive organs and on other body organs.
9. Identify hormones produced by cells of maturing follicles and the hormones produced by the cells of the corpus luteum.
10. Describe the events and hormonal changes that occur in menopause.
11. Describe commonly used methods of contraception and state the effectiveness of each.
12. Discuss common STD's in regard to causes, mode of transmission, prevention, and treatment.
13. What is the normal pH and flora of the vagina? How do these conditions protect the reproductive organs?
14. Define:
Dysmenorrhea
Endometriosis
Amenorrhea
15. Trace the path of an ovum from the ovary to the uterus.
16. Briefly discuss the development of the reproductive system in the embryo from five weeks to nine weeks.

CHAPTER 28: PREGNANCY AND HUMAN DEVELOPMENT

1. Describe the hormonal changes that occur during pregnancy and their anatomical and physiological effects upon the female body.
2. Describe the events of fertilization and implantation, including sperm capacitation, acrosomal reaction, corona radiata, and zona pellucida.

3. Explain the process, stages and product of cleavage.
4. Name and describe the formation, location, and function of the embryonic and extraembryonic tissues.
5. Identify tissues and structures derived from the ectoderm, mesoderm, and endoderm.
6. What is the relationship between the blastocyst, the corpus luteum, and human chorionic gonadotropin? What hormones are produced by the placenta?
7. Describe the major events of the fetal stage of development.
8. Explain how labor is initiated and describe the three stages of labor.
9. What is the role of oxytocin?
10. Define:
Fertilization
Pregnancy
Conceptus
Gestation period
Morula
Preembryo
Embryo
Fetus
Infant
Vertex presentation
Breech presentation
Dystocia
Apgar score
Teratogens
11. What is the stimulus for lactation? What is colostrum? What are the advantages of breast milk?

CHAPTER 29: HEREDITY

1. Define allele.
2. Differentiate between genotype and phenotype.
3. Describe the events that lead to genetic variability of gametes.
4. Describe dominant-recessive inheritance.
5. Describe the mechanism of sex-linked inheritance.
6. Differentiate between the events which would produce fraternal and identical twins.

7. Predict expected genotype and phenotype given parental information.

CHAPTERS 23 & 24: THE DIGESTIVE SYSTEM & NUTRITION

1. Identify the organs of the alimentary canal in sequence and state the general function of each.

2. Define these digestive systems activities and know the location of their occurrences:

Ingestion

Propulsion

Peristalsis

Segmentation

Chewing

Swallowing

Mechanical digestion

Chemical digestion

Absorption

Defecation

3. Know the layers of the alimentary canal and the makeup of each layer

Mucosa

Lamina propria

MALT

Muscularis externa

Submucosa

serosa

4. Know how the following affect the mechanical and chemical processes of digestion, digestive glands and the movement of food.

Stretch of the organ wall

Osmolarity

pH

5. What are the locations and functions of the submucosal nerve plexus and the myenteric nerve plexus?

6. What are the roles of the sympathetic and parasympathetic nervous systems on the GI tract?

7. What is the short reflex pathway? What is the long reflex pathway?

8. What is the role of the hepatic portal system?

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9. For the following cells of the stomach, know what they secrete and how these secretions are controlled.

Mucous neck cells
Parietal cells
Chief cells
Enteroendocrine cells

10. Describe these phases of gastric secretion:

Cephalic phase
Gastric phase
Intestinal phase

11. Describe gastric motility in terms of

The response to stomach filling
Gastric contractile activity
Regulation of gastric emptying

12. Give the composition and function of the following and state where they come from.

Saliva
Gastric juice
H ions
Alkaline tide
Intestinal juice
Bile
Pancreatic juice

13. How do the following three factors affect HCl secretion? Where do they come from and what do they do?

ACh
Gastrin
Histamine

14. What are the basic digestive functions of the following

Small intestine
Large intestine
Liver
Pancreas
Gall bladder

15. List the six major nutrient categories. Note the importance of each, dietary sources, and the principal cellular uses of each.

16. Describe the location and function of the salivary glands.
17. Describe the structures of a typical tooth and state the function of each.
18. Compare and contrast the function of incisors, cuspids, premolars, and molars.
19. Describe the function of hormones produced by the small intestine.
20. Define jaundice and describe different types.
21. Describe the regulation of the defecation reflex.
22. Define metabolism. Explain how catabolism and anabolism differ. Explain the metabolic fate of carbohydrates, proteins, and lipids once they have been absorbed.
23. Describe the role of the colon in vitamin formation.
24. What is enzymatic hydrolysis?
25. What is the role of the following enzymes in carbohydrate digestion?

Salivary amylase
Pancreatic amylase
Dextrinase
Glycoamylase
Maltase
Sucrase
Lactase

26. What is the role of the following enzymes in protein digestion?

Pepsin
Trypsin
Chymotrypsin
Carboxypeptidase
Aminopeptidase
Dipeptidase

27. What is the role of the following in lipid digestion?

Lipases
Bile salts
Emulsion

28. What is the role of the following enzymes in nucleic acid digestion?

Pancreatic nucleases
Nucleosidases

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Phosphatases

29. Describe the absorptive processes for

Carbohydrates

Proteins

Nucleic acids

Vitamins

Fat soluble

Water soluble

Vitamin B 12

Lipids

Micelles

Chylomicrons

Lipoprotein lipase

Electrolytes

Na

Ca

Role of PTH

Role of vitamin D

Iron

Ferritin

HCO₃⁻

Vitamin K, know how it is related to water absorption

30. Define and state the cause of these following GI disorders

Peritonitis

Gastric ulcers

What is cimetidine?

Malabsorption

Lactose Intolerance

Biology 224 - ANATOMY & PHYSIOLOGY II
LABORATORY COURSE OBJECTIVES

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The Biol 224 lecture exam and laboratory exam objectives are split into 2 sections – the lecture objectives, followed by the laboratory objectives. However there is obviously considerable overlap between the two and it is impossible to separate them fully.

Before each exam review both the lecture and lab objectives for the relevant sections. Some laboratory objectives may appear on the lecture exams and some lecture objectives may appear on the laboratory exams.

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MATERIAL TO BE COVERED ON LAB TESTS (ALSO SEE LECTURE OBJECTIVES)

HEART

Use your textbook, lab manual and the Anatomy Coloring Book as references.

1. From diagrams, models, slides, and the cadaver be able to identify the following HEART structures:

fibrous pericardium
parietal pericardium
visceral pericardium
myocardium
endocardium
tricuspid valve
bicuspid valve
right atrium
left atrium
right ventricle
left ventricle
pulmonary artery
pulmonary veins
chordae tendineae
trabeculae carneae
papillary muscles
pectinate muscles
anterior interventricular artery
aorta
aortic arch
pulmonary semilunar valve
aortic semilunar valve
superior vena cava
inferior vena cava
coronary arteries

cardiac veins
coronary sinus

BLOOD VESSELS

Use your textbook, lab manual and the Anatomy Coloring Book as references.

1. Know the three layers of a blood vessel and the major tissue components of each layer.
2. What is the center of a blood vessel called?
3. What are the structural differences between arteries and veins?
4. Trace the path of blood through pulmonary circulation.
5. Trace the path of blood through hepatic circulation.
6. Be able to identify on the cadaver, models or diagrams the following arteries and veins.

Arteries:

aorta

arch of the aorta

thoracic aorta

abdominal aorta

axillary

basilar

brachial

celiac

common carotid (left and right)

common iliac

Circle of Willis (consists of the internal carotid artery, the basilar artery, anterior cerebral artery, the posterior cerebral artery, the anterior communicating artery & the posterior communicating artery)

external carotid

external iliac

femoral

inferior mesenteric

brachiocephalic (on the right side)

internal iliac

internal carotid

left coronary

popliteal

pulmonary

radial

renal

right coronary

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spermatic (also known as the testicular or gonadal or ovarian).

splenic

subclavian

suprarenal

superior mesenteric

ulnar

ovarian (see spermatic above)

vertebral

internal carotid

posterior tibial

anterior tibial

hepatic

Veins:

anterior tibial

posterior tibial

peroneal (fibular)

axillary

azygous

basilic

brachial

right brachiocephalic

cephalic

common iliac

coronary sinus

external iliac

external jugular

femoral

great saphenous

hepatic

inferior mesenteric

inferior vena cava

internal iliac

left brachiocephalic

median cubital

popliteal

hepatic portal

pulmonary

right coronary (this is also known as the small cardiac vein)

splenic

right and left subclavian

superior mesenteric

superior sagittal sinus

superior vena cava

radial

ulnar

gonadal (same as ovarian in females and spermatic or testicular in males)

hemizygous

RESPIRATORY SYSTEM

Use your textbook, lab manual and the Anatomy Coloring Book as references.

1. From diagrams, models, slides, and the cadaver be able to identify the following structures:

hard palate

soft palate

pharynx

epiglottis

glottis

vocal cords

trachea

conchae (turbinate) - superior, middle, inferior

lungs

superior lobe

middle lobe

inferior lobe

visceral pleura

parietal pleura

diaphragm

bronchi

primary

secondary

tertiary

bronchioles

alveolus

nasal bones

perpendicular plate of ethmoid

sinuses

frontal

maxillary

ethmoid

sphenoid

hyoid bone

larynx

thyroid cartilage

cricoid cartilage

ENDOCRINE SYSTEM - be able to identify the following structures on charts, models, slides, cadavers, and specimens.

1. I identify all of the following endocrine glands on charts, models, slides, cadavers, and specimens.

anterior pituitary

posterior pituitary

hypothalamus

pineal

thyroid

parathyroid

thymus

testes

ovary (with primordial follicle, primary follicle, secondary follicle, corpus luteum and corpus albicans)

pancreas

placenta

adrenal

2. I identify histological preparations of the following endocrine glands:

pancreas

islets of Langerhans

acinar cells

pituitary (anterior & posterior lobes)

adrenal glands

capsule

zona glomerulosa

zona fasciculata

zona reticularis

medulla

thyroid

follicle cells

colloid

parafollicular cells

3. Be able to name the hormones produced by all of the structures listed above in parts 1 and 2.

URINARY SYSTEM - be able to identify the following structures on charts, models, slides, cadavers, and specimens.

renal vein

renal artery

afferent arteriole

efferent arteriole

interlobar artery
interlobar vein
interlobular artery
interlobular vein
arcuate artery
arcuate vein
kidney
ureter
papillae
renal pyramid
medulla
cortex
peritubular capillary bed
renal column
nephron
glomerulus
podocytes
pedicles
Bowman's capsule (glomerular capsule) which consists of the parietal surface (simple squamous epithelium)
loop of Henle
proximal convoluted tubule
distal convoluted tubule
ascending limb
descending limb
urinary bladder
urethra
renal pelvis
minor calyx
major calyx
collecting ducts
collecting tubules
vasa recta
renal capsule

BLOOD

Use your textbook, lab manual and the Anatomy Coloring Book as references.

1. Know how to:

Type ABO blood types.

Type blood for Rh factor.

Make and calculate a hematocrit.

2. Know the approximate percentages of a normal hematocrit.

3. Be able to identify the 5 types of leukocytes.

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4. Know what a complete blood count is.
5. Know the definition of anemias, polycythemias, leukocytosis, leukopenia.
6. Know a natural anticoagulant.
7. Know how the different conditions which affect RBC count.
8. Know the normal blood volume.
9. Know the functions of the formed elements of blood.

LYMPHATIC SYSTEM

Use your textbook, lab manual and the Anatomy Coloring Book as references.

1. Know the location of the following lymphatic structures

lymph nodes

spleen

tonsils

palatine

pharyngeal

tubal

inguinal

Peyer's patches

crypts of tonsils

mucosa-associated lymphatic tissue (MALT)

lacteals

2. Know the following parts of the lymphatic system

lymphatic capillaries

mini-valves

lymphatic collecting vessels

lymphatic trunks

lumbar

bronchomediastinal

intestinal

subclavian

jugular

lymphatic collecting ducts

right lymphatic ducts

thoracic duct

3. Know the following layers of lymphatic vessels, trunks, ducts

tunica intima

tunica media

tunica adventitia

right subclavian vein

left subclavian vein

internal jugular vein

cisterna chyli

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cervical lymph nodes
axillary lymph nodes
inguinal lymph nodes

4. Know the following structures of the lymph node.

afferent lymph vessels
efferent lymph vessels
hilus
germinal center
cortex
medulla
locations of B and T lymphocytes
capsule
medullary sinus
subcapsular sinus - space underneath the capsule
valves
trabeculae

5. Know how lymph circulates, where it returns to the cardiovascular system.

6. Know the components of lymph.

REPRODUCTIVE SYSTEMS, PREGNANCY & HUMAN DEVELOPMENT - be able to identify the following structures on charts, models, slides, cadavers, and specimens.

In the Male:

urinary bladder
urethra
scrotum
testis
epididymis
ductus deferens
seminal vesicle
ejaculatory duct
bulbourethral gland
prostate gland
penis
spermatic cord
lobule
glans penis
prepuce
seminiferous tubules
cells of Leydig (also known as interstitial cells)
rete testis
spermatogonia
Adluminal compartment

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Basal compartment
primary spermatocyte
secondary spermatocyte
spermatid
spermatozoa
Sertoli cells
corpus cavernosum
corpus spongiosum
ureter

In the Female:

urinary bladder
ureter
urethra
ovary
uterine tube
fimbria
uterus
fundus
body
cervix
vagina
mons pubis
labia majora
clitoris
labia minora
suspensory ligament
ovarian ligament
round ligament
broad ligament
ovarian follicles
primordial follicle
primary follicle
secondary follicle
Graafian follicle
antrum
granulosa cells
secondary oocyte
zona pellucida
corpus luteum
corona radiata
corpus albicans
perimetrium
myometrium
endometrium

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stratum basalis
stratum functionalis
breast
nipple
areola
lactiferous sinus
lactiferous duct
glandular lobe

Be able to identify:

Fertilization
Conceptus
Gestation period
Morula
Preembryo
Embryo
Fetus
Infant

DIGESTIVE SYSTEM - be able to identify the following structures on charts, models, slides, cadavers, and specimens.

oral cavity
teeth
crown
neck
root
enamel
dentin
pulp cavity
pulp
gingiva
cementum
periodontal ligament (membrane)
incisors
cuspids (canines)
bi-cuspids
molars
tongue
salivary glands
parotid
sublingual
submandibular
palate
hard
soft

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uvula

pharynx

tonsils (including the palatine, pharyngeal and lingual tonsils)

Mucosa

Lamina propria

MALT (Mucosa Associated Lymphatic Tissue)

Muscularis externa (circular and longitudinal muscle layers plus the oblique layer in the stomach)

Submucosa

serosa

myenteric nervous system

submucosal nerve plexus

serosal nerve plexus

esophagus

stomach

cardiac sphincter

fundus

body

antrum

pylorus

pyloric sphincter

intestinal villi

small intestine

duodenum

jejunum

ileum

large intestine

taenia coli

haustra

ileocecal valve

cecum

ascending colon

transverse colon

descending colon

sigmoid colon

anal canal

rectum

anus

appendix

liver

gallbladder

hepatic duct

cystic duct

common bile duct

spleen

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pancreas

pancreatic duct

sphincter of Oddi (also known as the hepatopancreatic ampulla/ampulla of Vater/hepatoduodenal ampulla)

peritoneum (visceral & parietal surfaces)

greater omentum

lesser omentum

liver

lobules

hepatocytes

a portal triad (consisting of a portal arteriole, a portal venule and a bile duct)

central vein

sinusoids

falciform ligament

mesocolon

common hepatic artery

hepatic artery proper

celiac trunk

superior and inferior mesenteric artery

hepatic veins

Hepatic portal vein

Hepatic portal system