

SYLLABUS: BIO K212 - ANATOMY & PHYSIOLOGY II

Three Rivers Community College (860) 886 - 0177

574 New London Turnpike

Norwich, Connecticut 06360

Spring Semester, Jan 19 - May 16, 2012

Instructor: Daryl Simmons

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Hours: **Mon & Wed 9:00 AM – 10:30 AM**, or by appointment.

Lecture:	CRN	10219,	Section	T1,	Day(s)	Mon. & Wed.,	Time	11:00AM – 12:25PM	Rm.	C101
Lab:	CRN	10220,	Section	T1A,	Day(s)	Mon.,	Time	1:00 PM – 4:00PM	Rm.	A219
Lab:	CRN	10221,	Section	T1B,	Day(s)	Wed.,	Time	1:00 PM – 4:00PM	Rm.	A219
Lecture:	CRN	10585,	Section	T3,	Day(s)	Tues. & Thurs.,	Time	12:30PM – 1:55PM	Rm.	B125
Lab:	CRN	10586,	Section	T3A,	Day(s)	Tues.,	Time	9:00AM – 12:00PM	Rm.	A219
Lab:	CRN	10224,	Section	T3B,	Day(s)	Thurs.,	Time	9:00AM – 12:00PM	Rm.	A219
Lecture:	CRN	11599,	Section	T5,	Day(s)	Tues.,	Time	6:00PM – 9:00PM	Rm.	D105
Lab:	CRN	11600,	Section	T5A,	Day(s)	Thurs.,	Time	6:00PM – 9:00PM	Rm.	A219

COURSE: BIO K212 - Anatomy & Physiology II is the second semester of a two semester sequence. Biology 211 - Anatomy & Physiology I must be taken and passed with a grade of "C" or better prior to this course. This is especially important if transferring to a four-year institution with a major requiring a full academic year of anatomy and physiology or if the student is enrolled in Three River's nursing program. BIO 212 presents the students with a lecture/laboratory study of endocrinology, reproduction, hematology, cardiovascular, respiratory, digestive, and excretory systems, and acid-base balance.

PREREQUISITE FOR THE COURSE Bio 211 with a grade of C or better.

CREDIT: 4 credit hours consisting of 3 contact hours of lecture and 3 hours of laboratory per week during the semester.

REQUIRED TEXTS:

Fundamentals of Anatomy and Physiology by Martini/Nath/Bartholomew, 9th ed., Benjamin-Cummings Publishers.

Outline of Cat Anatomy, by Stephen Gilbert, University of Washington Press

OR *Pictorial Anatomy of the Cat*, by Stephen Gilbert, University of Washington Press

OTHER REQUIRED MATERIALS: Dissecting kit and disposable non-latex gloves, and Full length lab coat with cuffs that is available online or from Alexander's Uniform; labcoat Landau 3178 full length.

ADDITIONAL REFERENCE TEXTS: (optional)

Applications Manual for Fundamentals of Anatomy and Physiology, by Martini, et al., Benjamin Cummings Publishers. (included free with the textbook)

A Photographic Atlas for the Anatomy & Physiology Laboratory, by K.M. Van De Graaff & J.L. Crawley, Morton Publishing Co. 6th ed.

Fundamentals of Anatomy and Physiology, The Study Guide, by Charles Seiger, Benjamin Cummings Publishers, 7th ed.

Outline of Cat Anatomy with Reference to Human, by Stephen Gilbert, Univ. of Washington Press 2000, ISBN: 0-295-97818-x

GENERAL COURSE OBJECTIVES:

1. Provide students with a transferable laboratory science to satisfy the science requirements of Three River's LAS or GS Associate Degree.
2. To fulfill pre-requisite and co-requisite anatomy and physiology requirements for Three River's Nursing program.
3. Provide students with an undergraduate level study of human body systems.
4. Provide students with a foundation for study of the medical, biological, or physical sciences.
5. Provide students with critical thinking and problem solving skills.
6. Demonstrate the biological sciences and how they relate to other disciplines.
7. Illustrate the interdependence of all life forms operating on natural laws with the physical environment.
8. Encourage not only awareness of the student's natural uniqueness but also their role as an interrelated biological organism of this planet.

CLASS ATTENDANCE:

Attendance of class is required and is noted.

Absences can be very detrimental due to the nature and volume of the material. An explanation of all absences is very much appreciated, especially if presented in advance when possible.

It is the student's responsibility to obtain materials and notes for any classes that they miss.

COLLEGE CLOSING: For weather related closings call the college at **(860) 886- 0177**

METHODS OF STUDENT EVALUATION; GRADING POLICIES

- A. The student's grade for the course represents their ability to master course objectives, attitude, rate of improvement, proficiency and knowledge of course material.
- B. Final course letter grades are determined by the total points accumulated. Students can estimate their progress toward a letter grade during the semester by using the table below after calculating their point percentage:

Table 1. Percentages of points accumulated by students and the corresponding letter grades.

Letter Grade*	Percentages for Letter Grade	
A	100	94
A-	93.999...	90
B+	89.999...	87
B	86.999...	84
B-	83.999...	80
C+	79.999...	77
C	76.999...	74
C-	73.999...	70
D+	69.999...	67
D	66.999...	64
D-	63.999...	60
F	59.999...	0

** The instructor reserves the right to use subjective evaluation, especially in cases where the final percentage score is on a borderline between grades*

C. Points are obtained by the following methods of evaluation and are shown tabulated below:

C. Points are obtained by the following methods of evaluation:

1. **Lecture (possible 670 points):**

- a. Major Exams (400 points): Four major exams worth 100 points each will be given. Each will evaluate the student's knowledge of the material given since the last major exam.
- b. Comprehensive Final Exam (200 points): A student who has achieved a 95% or higher on every test, every quiz (including dropped quizzes), every lab test, and every lab report, might be considered for exemption from the comprehensive final exam. Students will be confidentially notified by the instructor if they are exempt from the final exam.
- c. Weekly quizzes (70 points): Each week, quizzes worth 10 points will be given, on the previous week's lecture material. The best 7 quiz grades of approximately 10 quizzes, will be added to the student's points.

***Missed Quizzes cannot be made-up and count as the lowest scores to be dropped**

2. **Laboratory (possible 220 points):**

- a. Laboratory Practical exams (120 points):
 - (1) Laboratory Practical Exam 1 - 40 points, will be given on the identification of organs and tissues of the endocrine and digestive systems from the listed laboratory objectives
 - (2) Laboratory Practical Exam 2 – 40 points, will be given on the identification of the circulatory organs and tissues, and the heart from the listed laboratory objectives
 - (3) Laboratory Practical Exam 3 – 40 points, will be given over the

identification of the organs and tissues of the male and female reproductive systems, as listed on the laboratory objectives.

b. Lab reports and quizzes (100 points): The following written reports will be required:

- (1) renal regulation of osmolarity (25 points)
- (2) cardiovascular physiology (25 points)
- (3) pulmonary function (25 points)
- (4) reproduction (25 points)

D. Exam and quiz questions for lecture and/or laboratory material may consist of multiple choice, true/false, fill in the blank, matching, identification, or essay questions.

E. Absence on examination days:

STUDENTS ARE REQUIRED TO TAKE EXAMS AS SCHEDULED.

ANY MAKE-UP EXAMS WILL BE TAKEN ON THE SAME DAY AS THE COMPREHENSIVE FINAL EXAM

THERE ARE NO MAKE-UPS FOR MISSED QUIZZES

Laboratory Safety

Food, drink, and chewing gum are not permitted to be brought into the laboratory for any reason. Students are expected to wear appropriate attire which may require safety eyewear, laboratory gloves, and full length labcoat.

Procedure for Withdrawing from the Course(s):

A student who finds it necessary to discontinue a course must complete a withdrawal form obtained from the Registrar's Office. The student may need to have the instructor's or their advisor's signature in order to withdraw and receive a "W" grade for the course. **Students who do not withdraw but stop attending will be assigned a "F" grade**, signifying failure and no credit. F grades count as courses attempted and may adversely affect the good standing status of the student receiving the grade.

Academic Integrity at Three Rivers

Academic integrity is essential to a useful education. Failure to act with academic integrity severely limits a person's ability to succeed in the classroom and beyond. Furthermore, academic dishonesty erodes the legitimacy of every degree awarded by the College. In this class and in the course of your academic career, present only your own best work; clearly document the sources of the material you use from others; and act at all times with honor (p. 17, TRCC Student Handbook)

Academic Dishonesty shall in general mean conduct which has as its intent or effect the false representation of a student's academic performance, including but not limited to (a) cheating on an examination, (b) collaborating with others in work to be presented, contrary to the stated rules of the course, (c) plagiarizing, including the submission of others' ideas or papers (whether purchased, borrowed, or otherwise obtained) as one's own, (d) stealing or having unauthorized access to examination or course materials, (e) falsifying records of laboratory or other data,

(f) submitting, if contrary to the rules of a course, work previously presented in another course, and (g) knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

(Student Discipline Policy, section 2:10, Board of Trustees of Connecticut Community Colleges)

The **Professor** for this course has the **right to confront** a student if there is **suspicion of dishonesty** as described in the section titled *Definitions of Academic Dishonesty*, in the TRCC Student Handbook. Upon the outcome of that confrontation, the Professor has the **right to assign a 0 or F grade to that assignment/exam/evaluation or in severe cases, assign an F grade for the course.** In any case, the Academic Dean will be notified in writing of the incident and a record of the incident will be in file in the Academic Dean's Office. (See the TRCC Student Handbook)

Disabilities:

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact the Disabilities Counseling Services. To avoid any delay in the receipt of accommodations, you should contact the counselor as soon as possible. Please note that I cannot provide accommodations based upon disability until I have received an accommodation letter from the Disabilities Counselor. Your cooperation is appreciated.

Revisions to the Syllabus

The instructor reserves the right to revise the academic schedule, objectives, and/or topical outline contained in this syllabus

SPECIFIC OBJECTIVES FOR THE LECTURE PORTION OF THE COURSE

The following lecture- learning units are within corresponding folders within the Assignment Section of Course Compass. Additional learning aids are also within those folders such as: reading assignments, dates, testing, computer programs within the lab, on-line learning aids from the textbook publisher, class notes and handouts, Internet links, and practice exam questions.

I. Endocrinology: study of control by endocrine glands

Upon completion of a study of the endocrine system, the student should be able to correctly answer questions concerning the following:

A. Describe the basic overall makeup of the endocrine system.

1. List and describe methods of intercellular communication
2. Define the following:

exocrine gland	hormone
endocrine gland	tropic hormone
feedback regulation	target cells

3. Describe the chemical structure groups hormones may be divided into: amino acid derivatives, peptides, lipid derivatives.
4. Describe proposed mechanisms in which hormones initiate responses from target organ cells by discussing lipid solubility, receptor, G-protein, adenylyl cyclase, cyclic AMP, protein kinases, phospholipase C, Ca^{++} .
- *5. Define prostaglandins and leukotrienes.
6. List the names and locations of the major endocrine glands

B. Describe the anatomy and physiology of the pituitary gland.

1. Describe the anatomy of the pituitary and its relationship to the hypothalamus of the brain using the following terms:

adenohypophysis	infundibulum	posterior pituitary
anterior pituitary	median eminence	releasing and inhibiting factors
hypophyseal portal system	neurohypophysis	sella turcica

2. Describe the function and feedback control of the following adenohypophyseal hormones:

a. growth hormone (somatotropin)	c. prolactin (lactogenic hormone)
b. gonadotropic hormones:	d. thyroid stimulating hormone
1) follicular stimulating hormone	e. adrenocorticotrophic hormone
2) luteinizing hormone	*f. melanocyte stimulating hormone

3. In reference to growth hormone, define somatomedins, glucose-sparing effect, and diabetogenic effect.
4. Describe the function and feedback control (if any) of the following neurohypophyseal hormones:
 - a. oxytocin
 - b. anti-diuretic hormone (vasopressin)
 - c. Define: paraventricular and supraoptic nucleus, milk-let-down reflex, antidiuresis, osmoreceptors, and hypothalamic-hypophyseal nerve tract

***will not be covered in class**

5. Know the normal plasma osmolarity level in milliosmols per liter

- *6. Define:

Dwarfism	Diabetes insipidus	Cushing's disease
gigantism	acromegaly	

C. Describe the anatomy and physiology of the thyroid gland.

1. State the location of the gland.
2. Describe the anatomy of the gland by discussing:

Lateral lobes	Isthmus	Follicular and parafollicular cells
Pyramidal lobe	Follicles	

3. Discuss the functions and feedback control of thyroxine (T_4), triiodothyronine (T_3), and calcitonin.
- *4. Describe the chemical formation of T_3 and T_4 .
- *5. Define:

cretinism exophthalmos goiter Grave's disease (thyrotoxicosis)	hypo-hyperthyroidism myxedema protein-bound iodine (thyroxin-binding globulin)	thyroid storm thyroglobulin radioactive iodine uptake
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- D. Describe the anatomy and physiology of the parathyroid glands.
1. Discuss the function of the feedback regulation of parathormone.
 - *2. Define hypo-hyperparathyroidism, hypo-hypercalcemia and state the abnormalities that result.
 3. Know what the normal blood calcium ion concentration is.

E. Describe the adrenal (suprarenal) glands.

1. Describe the anatomy and physiology of the adrenal cortex.
 - a. Describe the location of the gland and state the cellular layers (zonas) from superficial to deep and list which hormone groups are secreted by each.
 - b. Describe the function and feedback regulation of aldosterone by describing the renin-angiotensin pathway.
 - c. Know the normal blood sodium and potassium ion level
 - d. State secretion site, function of, and control of natriuretic hormone.
 - e. List the three major glucocorticoids, stating which is most abundant.
 - f. List functions of and describe the feedback control of glucocorticoids. Be sure to relate stress and chronic inflammation to the above.
 - g. Define:

*hypo-hyponatremia *hypo-hyperkalemia *Addison's disease *Cushing's disease	*virilism *gynecomastia mineralcorticoid glucocorticoids	gluconeogenesis gonadocorticoids adrenocorticoids
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2. Describe the suprarenal medulla (adrenal medulla).
 - a. List the functions of epinephrine and norepinephrine.
 - b. Define glycogenolysis, chromaffin cells, and sympathomimetic.
 - c. Discuss the relationship between the adrenal medulla and the sympathetic nervous system.

***will not be covered in class**

H. Be able to discuss the endocrine functions of the Islets of Langerhans of the pancreas.

1. List the functions of insulin and glucagon and the type of cells that secrete them.
2. Describe the feedback control between insulin, glucagon, and blood glucose levels.
3. Be able to state what the normal blood glucose level is and the primary reason for its regulation.
4. Define:

Alpha & beta cells Diabetes mellitus II Glycogenesis Glycogenolysis Acidosis	Ketosis Acetic acid Acetoacetic acid Acetone Hyperinsulinism	Hypo & hyperglycemia Glucosuria Ketones Ketonuria Polyuria
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- F. Discuss the endocrine functions of the testes.
1. List the functions of testosterone and inhibin.
 2. Discuss the relationship of testosterone, FSH, and ICSH on spermatogenesis.
 3. Define spermatogenesis, spermatogonia, interstitial cells of Leydig, and sustentacular cells.
- G. Discuss the endocrine function of the ovaries.
1. List the functions and site of production of estrogens and inhibin.
 2. List the functions and site of production of progesterone.
- *H. Briefly describe the function of the hormone, melatonin, secreted by the pineal gland.
- *I. Describe the function of the hormones, leptin and resistin, secreted by adipose.
- *J. Describe the involvement of hormones with stress by discussing the alarm, resistance, and exhaustion phase.
- *K. Be aware of the affect of hormones on behavior.
- *L. Be aware pf the affects of hormones and athletic performance.

II. **Reproductive system:** Upon completion of a study of the reproductive system, the student should be able to correctly answer questions concerning the following:

- A. Describe the male reproductive system.
1. Briefly describe the descent of the testes by defining the inguinal canal, spermatic cord, tunica vaginalis, gubernaculum, and cryptorchidism.
 2. Define spermatic cord and be able to list its contents.
 3. Describe the function of the scrotum by defining dartos and cremaster muscles.
 4. Describe the structure and function of the testes and associated structures by defining:

tunica albuginea spermatogonia lobules testosterone interstitial cells of Leydig primary spermatocytes	sustentacular cells tunica vaginalis rete testes seminiferous tubules ICSH secondary spermatocytes	testes spermatogenesis spermatozoa FSH meiosis spermatids
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5. State parts and function of the epididymis, vas deferens, seminal vesicles, ejaculatory ducts, prostate gland, and bulbourethral glands.

***will not be covered in class**

4. Describe the anatomy of the penis and urethra by defining:

Prostatic urethra Membranous urethra Penile urethra	Corpora cavernosa Corpora spongiosum	Glans prepuce
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5. Describe the composition of semen.
- B. Describe the anatomy of the female reproductive system.
1. Describe the location and structure of the ovary.
 - a. Organize the ovary into its layers using the following terms:
tunica, albuginea, stroma (cortex and medulla).
 - b. Define oogenesis and differentiate between oogonium, primary oocyte,

secondary oocyte, ovum, first and second polar body.

- c. Define follicles and differentiate between primordial, primary, secondary (growing), tertiary (mature or Graafian) follicles, follicular cells (thecal and granulosa).
- d. Define ovulation and corona radiata
- e. Define corpus luteum and corpus albicans.
2. State the purpose and location of parts (infundibulum, fimbriae, ampulla, and isthmus) of the fallopian tubes.
3. Locate and define the following parts of the uterus:

Fundus Body Cervix isthmus	Internal cervical os External cervical os Cervical canal	Serosa Myometrium endometrium
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- *4. Define anteflexion and retroflexion
- *5. Briefly describe the overall structure of the vagina and define Bartholin's glands
- *C Briefly describe the support for the female reproductive tract by defining: ovarian ligament, suspensory ligament, broad ligament (divided into mesovarium, mesosalpinx), uterosacral ligament, and round ligament.
- D. Describe the female sexual cycle (menstrual).
 1. State the purpose of the cycle.
 2. List hormones involved in the regulation of the cycle.
 3. Relate pituitary hormones, feedback regulation, and causes to the cyclic changes in ovarian and uterine structures. (link with objectives 4 and 5 below)
 4. Describe the ovarian cycle by defining follicular phase, ovulation, luteal phase
 5. Describe the uterine cycle by defining the menses, proliferative and secretory phase.
 6. Describe the hormonal and structural changes in the cycle caused by fertilization. Describe the role of human chorionic gonadotropin.
- *7. Define: menstruation, menarche, and menopause.
- *E. Briefly describe fertilization and development by defining the following:

fertilization, gestation, trimesters, cleavage, implantation,	morula, blastocyst (with inner cell mass and trophoblast cells), gastrula (gastrulation),	germ layers (ectoderm, mesoderm, and endoderm), placenta, extraembryonic membranes, embryo, fetus
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- *F. Briefly describe the chorion, amnion, the basic structure of the placenta, and placental circulation.

***will not be covered in class**

III. **Cardiology:** study of the heart

Upon completion of a study of the heart, the student should be able to correctly answer questions concerning the following subject matter.

- A. Describe the general path of circulation.
 1. Define: heart, arteries, arterioles, capillaries, veinules, veins, systemic and pulmonary circulation.

*2. Compare the tissue structure of the different types of vessels.

B. Be able to describe the anatomy of the heart using the following terms:

mediastinum pericardium (parietal & visceral) epicardium myocardium endocardium right & left atria right & left ventricle interatrial septum right & left AV valves aortic & pulmonary semilunar valves coronary sinus	bicuspid & tricuspid valves mitral valve coronary arteries (and major branches) interventricular septum atrial-ventricular septum apex base	pulmonary trunk aorta vena cavae pulmonary arteries and veins foramen ovale ductus arteriosus fossa ovalis ligamentum arteriosum papillary muscle chordae tendinae
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C. Trace the path of blood through the heart, naming chambers, valves, and major vessels (aorta & vena cavae) of the systemic and pulmonary circulation.

D. Describe how the heart muscle itself received nourishment by being able to trace the path of blood through the coronary circulation. Be able to do this by diagramming the following vessels: left and right coronary artery, anterior and posterior descending arteries, circumflex and marginal arteries, coronary veins, and coronary sinus.

E. Discuss the electrophysiology of the heart.

1. Describe the electrical properties of cardiac muscle, using the following terms: working cells, pacemaker cells, automaticity, fast and slow channels, and plateau
2. Describe the location of conducting structures and trace the path of the electrical activity using the following terms:

SA Node Atrial myocardium AV node AV bundle (of HIS)	Rt & Lt bundle branches Purkinje system Ventricular myocardium	Resting and threshold potentials Refractory periods AV delay
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3. State why the SA node is the pacemaker.
4. State the purpose of the electrical conduction system described in objectives 2 and 3 above.
5. State why cardiac muscle will not go into tetanic contraction.
6. Define ectopic pacemaker. State what happens if the SA node is not the pacemaker and how the heart rate is affected by ectopic pacemakers.
7. Define heart block and ventricular escape.

***will not be covered in class**

*8. In reference to the ECG, define:

QRS interval QRS complex QT interval	t-wave p-r interval s-t segment	p-wave Einthoven's triangle Einthoven's standard of leads
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F. Describe the cardiac cycle and the pumping action of the heart.

1. Define systole and diastole.
2. Describe the pumping action of the atria and discuss the causes of the A, C, and

V waves on the atrial pressure curve.

3. Describe the pumping action of the ventricles using:

Period of isovolumetric relaxation	Period of ejection	Dicrotic notch
Period of isometric (isovolumetric contraction)	Period of rapid fill	Afterload

4. State the cause of valvular opening and closing.
5. List the names and causes of the four heart sounds.

G. Discuss cardiac volumes

1. Define: end diastolic volume and state its normal amounts
 - a. Define filling time, venous return and describe how they, along with the size of the heart affect end diastolic volume.
 - b. Define cardiac reserve.
 - c. Be able to calculate maximum heart rate, and relate it to filling time.
2. Define end diastolic volume and state its normal amounts.
3. Define stroke volume output and state its normal amounts
 - a. If given EDV and ESV, be able to calculate stroke volume.
 - b. Define preload, Starling's law, contractility, positive and negative inotropic agents, and afterload and describe how they affect stroke volume.
4. Define cardiac output and state its normal amounts.
5. If given stroke volume and heart rate, be able to calculate cardiac output.

H. Discuss mechanisms that control cardiac output.

1. Discuss factors that affect cardiac output by affecting venous return (intrinsic autoregulation flowchart)
2. Discuss reflex control by the autonomic nervous system using such terms as:

Parasympathetic stimulation	Cardioaccelerator	Tachycardia
Sympathetic stimulation	Cardioinhibitor	Bradycardia
Vagus nerves	Norepinephrine	Glossopharyngeal nerve
Great cardiac nerves	Acetylcholine	Carotid sinus
baroreceptors	chemoreceptors	Cardiac center

*G. Define the following:

Ischemia	Mitral valve prolapse	Congestive heart failure
Angina pectoris	Heart block	Valvular insufficiency
Myocardial infarction	Flutter	Valvular stenosis
Murmur	Premature ventricular contraction (PVC)	Fibrillation
Myocarditis	Endocarditis	Ballon angioplasty
Cardiac arrhythmias	Cardiac tamponade	Coronary thrombosis
electrocardiogram		

***will not be covered in class**

***IV. Anatomy of the Circulatory System:**

Upon completion of a study of the anatomy of the circulation system, the student should be able to correctly answer questions concerning the following subject matter.

A. State the origin, general location, and destination of the following major arteries:

aortic arch	left gastric	pericardial
ascending aorta	hepatic	bronchial
thoracic aorta	splenic	esophageal
abdominal aorta	superior mesenteric	renal

coronary brachiocephalic common carotid external carotid internal carotid subclavian vertebral intercostal phrenic celiac	inferior mesenteric suprarenal basilar Circle of Willis thyrocervical trunk internal thoracic axillary brachial ulnar radial	testicular or ovarian common iliac internal iliac external iliac femoral popliteal anterior tibial posterior tibial
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B. State the structures drained, general location, and destination of the following major veins:

cephalic external jugular internal jugular basilar ulnar radial axillary brachial subclavian pericardial azygos	brachiocephalic internal iliac anterior tibial posterior tibial great saphenous inferior mesenteric portal (hepatic) hepatic portal system superior mesenteric superior vena cava gastric and splenic	hepatic suprarenal renal testicular or ovarian inferior vena cava common iliac small saphenous popliteal femoral external iliac
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V. **Physiology of Circulation:**

Upon completion of a study of circulatory physiology, the student should be able to correctly answer questions concerning the following:

- A. Be able to describe the percentage of blood volume distribution within the different blood vessels.
- B. Discuss blood flow rates (perfusion) to different body structures at rest and at exercise.
 1. Correlate with metabolic rates and needs for oxygen and nutrients.
 2. Correlate with changing diameters of the blood vessels affecting perfusion rates.
- C. Describe the physical factors causing blood flow.
 1. State the importance of blood flow (perfusion).
 2. Describe the causes of blood flow.
 - a. Discuss the relationship of pressure gradients, elasticity of arteries and perfusion.
 - b. Describe the relationship of resistance to perfusion by discussing viscosity and tube geometry.

***will not be covered in class**

- D. Contrast blood flow in arteries, arterioles, capillaries, veinules, and veins according to resistance, construction, innervation, and velocity.
- E. Discuss arterial blood pressure.
 1. Define pulse and pulse pressure.
 2. Define and be able to calculate mean blood pressure.
 3. Derive an equation for mean arterial pressure from the equation for perfusion.

4. List factors that may alter arterial pressure by affecting cardiac output.
5. Discuss factors affecting blood volume.
6. Discuss factors which may affect arterial pressure by affecting peripheral resistance.
 - a. Describe the vasomotor reflex
 - b. Correlate blood volume and viscosity to blood pressure

VI. **Hematology:** study of blood

Upon completion of a study of blood, the student should be able to correctly answer questions concerning the following:

- *A. List and describe the major functions of blood.
- B. Discuss the composition and functions of the major components parts of blood.
 1. State the quantity and the percentage of body weight made up of blood.
 - a. Define and state normal hematocrit value.
 - b. Define hypo- and hypervolemia.
 2. Describe the shape, size, life span, normal RBC count, and functions of the erythrocytes.
 3. Describe the leukocytes.
 - a. State normal WBC and differential WBC count values.
 - b. Organize leukocytes into granulocytes verses agranulocytes.
 - c. Describe the anatomy, function, and site of production of neutrophils, eosinophils, basophil, monocytes, and lymphocytes.
 - d. List and describe the properties of WBC, such as amoeboid movement, margination, diapedesis, chemotaxis, phagocytosis.
 - e. In relation to WBCs, define the following:

PMN poly bands cytotoxic T-cells B, T, & NK-lymphocytes plasma cells	*histocompatibility antigen antibody juvs segs suppressor T-cells	*antigen-antibody complex memory T-cells *tissue typing helper T-cells fixed macrophages free macrophages
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4. State normal numbers, site of production, and function of the platelets.
5. Be able to describe plasma.
 - a. State the volume and percentage of blood composed of plasma.
 - b. List the major chemical components of plasma.
 - c. List, describe the function, and state production site of the major plasma proteins: albumen, globulins, and fibrinogen.
6. Describe hemoglobin.
 - a. State the normal quantity of hemoglobin.
 - b. Discuss the effect of age on hemoglobin production.
 - c. List different forms of hemoglobin.

***will not be covered in class**

- d. State the major functions of hemoglobin.
- e. Describe the chemical structure of the hemoglobin molecule.
- C. Describe the process of hematopoiesis.
 1. Discuss the mesoblastic, hepatic, and myeloid stage of hematopoiesis.

2. List and discuss the sequence of erythropoiesis using the following: stem cell, hemocytoblast, proerythroblasts, erythroblast, normoblast, and reticulocyte.
 3. List nutrients needed for adequate RBC formation and discuss the relationship between vitamin B12, intrinsic factor, and pernicious anemia.
 4. Describe the role of erythropoietin.
 5. In reference to iron metabolism, define: ferrous versus ferric iron, transferrin, apoferritin, ferritin, and hemosiderin.
- D. Describe the process involved in the destruction of old erythrocytes.
1. State the major organs where old RBCs are destroyed.
 2. Describe the sequence involved in the breakdown of hemoglobin using the following terms:

heme	bilirubin	stercobilin
globin	urobilinogen	liver
iron	urobilin	kidney
biliverdin	urochrome	jaundice

3. Describe the anatomy of the biliary tract.
- * E. Describe the processes that protect us from infection (immunity and inflammation).
1. Define immunity.
 2. Organize lymphocytes into their specific varieties and briefly state the function of each.
 3. List and know the basic location of lymphoid tissues such as: lymphoid nodules, tonsils, lymph nodes, thymus, and spleen.
 4. Describe nonspecific defenses against disease.
 - a. List physical barriers.
 - b. List and define varieties of phagocytes. Also define margination, diapedesis, chemotaxis, and adhesion. .
 - c. Describe inflammation.
 - (1) List the four local signs of inflammation.
 - (2) Describe the cells, chemicals, and steps involved in the inflammatory response.
 - (3) State the purpose (goals) of inflammation.
 - d. Briefly define other non-specific defenses such as: NK cells, complement, interferon, cytokines, fever, and pyrogens.
 5. Define the following forms of immunity: innate, active (natural and induced), passive (natural and induced).
 6. Briefly describe the process of immunity.
 - a. List and briefly describe the properties of immunity.
 - b. Briefly describe cell-mediated immunity by discussing T-cells (and their varieties), antigen presenting cells, and their interactions.
 - c. Briefly describe humoral immunity by discussing B-cells (and their varieties) and antibody.
 - d. List and briefly define the five classes of antibody (immunoglobulin).
 - e. List and briefly discuss how antibodies destroy antigen

***will not be covered in class**

- F. Discuss the processes involved in hemostasis.

1. Define hemostasis.
2. List factors that prevent coagulation.
3. Define vascular spasm and platelet plug.
4. Discuss the intrinsic and extrinsic pathway for clot formation using the following terms:

calcium prothrombin prothrombin activator (prothrombinase)	Thromboplastin clotting factors platelets	thrombin fibrinogen fibrin
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5. Define serum, thrombus, embolus, streptokinase, tissue plasminogen activator (TPA)

G. Define the following miscellaneous hematology terms:

hematocrit buffy coat RBC count polycythemia oligocythemia	anemia hypochromia hyperchromia WBC count leukocytosis	leukopenia diff count thrombocyte thrombocytopenia megakaryocyte
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VII. Respiratory System:

Upon completion of a study of the respiratory system, the student should be able to correctly answer questions concerning the following:

- A. State the functions of the respiratory system.
 - B. List and define phases of respiration.
 - *C. Describe the anatomy of the respiratory system.
 1. Describe the walls, contents, lining, and associated structures of the nasal cavities.
 2. Describe the location, boundaries, and lining of the pharynx.
 3. Describe the anatomy of the larynx.
 - a. List boundaries
 - b. List functions.
 - c. List and locate the cartilages of the larynx.
 4. Describe the overall anatomy of the lungs by discussing the root, hilus, surfaces, lobes, and segments.
 5. Describe the location, boundaries, and construction of the trachea.
 6. Describe the organization of the bronchial tree by defining and stating numbers of primary, secondary, and segmental bronchi.
 7. Describe the construction of the micro- airway tubes by defining: lobular, terminal, and respiratory bronchioles, alveolar duct, alveolar sac, and alveolus.
 8. Describe the micro-anatomy and the significance of the alveolar-capillary membrane.
 - D. Describe the physiology of pulmonary ventilation.
 1. List muscles used in normal and forced inspiration and expiration.
 - *2. Review the pleural cavity, fluid, and membranes.
- *will not be covered in class**
3. Define intrapleural, intra-alveolar , and ambient pressure.
 4. Discuss factors that maintain a partial vacuum intra-pleural pressure.
 - a. State the mechanism for gas absorption from the pleural cavity.
 - b. State causes of elastic recoil of the lungs.
 - c. Discuss the relationship between surfactant and surface tension.

5. Define compliance and airway resistance.
6. List sequence of events causing inspiration and expiration.
7. Define the various pulmonary volumes and capacities.
8. Define anatomical, alveolar and physiological dead space volume.
9. Define and be able to calculate minute respiratory and alveolar ventilation volume.
10. Describe the humoral and neural control of ventilation.
 - a. Describe the Hering-Breuer reflex.
 - b. Describe the effects of blood CO_2 , O_2 , and pH on neural control through peripheral and central chemoreceptors.
 - c. List the basic components of the respiratory center in the pons and medulla.
- E. Describe the physiology of gas exchange.
 1. Define Charles, Boyle's and Dalton's gas laws.
 2. List factors affecting diffusion of gases.
 3. Describe the composition of alveolar air and compare with atmospheric air.
 4. Describe the diffusion of oxygen and carbon dioxide across pulmonary and systemic capillary walls.
 5. State normal alveolar and venous pO_2 , and pCO_2 values.
 6. Know the normal "blood gas" concentration.
 7. Define venous admixture.
- F. Describe the physiology of gas transport by the blood.
 1. Discuss oxygen transport by reviewing oxyhemoglobin and by discussing the oxyhemoglobin dissociation curve and the effects of temperature and pH on it.
 2. Describe the Bohr effect.
 3. Define O_2 - hemoglobin saturation.
 - a. Know the normal " O_2 sats" for both arterial and venous blood.
 - b. If given an oxyhemoglobin dissociation curve and blood gas concentration, be able to determine O_2 sat level. If given the O_2 sat level, be able to determine the blood gas concentration (O_2).
 4. Briefly discuss oxygen transport in the dissolved state.
 5. Define carboxyhemoglobin
 6. Discuss carbon dioxide transport by:
 - a. review carbaminohemoglobin
 - b. List four methods of carbon dioxide transport and amounts carried by each.
 - c. Define carbonic anhydrase and the chloride-bicarbonate ion shift.

VIII. Digestive System:

Upon completion of a study of the digestive system, the student should be able to correctly answer questions concerning the following: (Much of this material will be linked with the dissection in lab)

- A. State the overall purpose of digestion.
- B. List the overall chemical breakdown processes for carbohydrates, lipids, protein, and nucleic acids.

***will not be covered in class**

- *C. Describe the overall anatomy of the G-I tract.
 1. List and state the purpose of the different types of teeth.
 2. State dentition of the deciduous and permanent teeth.
 3. State the location, drainage, and type of saliva produced by the parotid, submaxillary, and sublingual glands.

4. Define mastication (chewing) and list muscles of mastication (temporalis and masseter).
5. List and define the layers of the G-I tract wall as seen in cross section.
6. Describe the location, purpose, mucosa and muscularis makeup of the esophagus.
7. Define the following areas and parts of the stomach:

gastroesophageal junction fundus body chief cells	pyloric valve gastric glands -parietal cells pylorus	cardia rugae antrum -mucous cells curvatures (greater, lesser)
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8. Describe the overall anatomy of the small intestine.
 - a. Describe the course of the duodenum.
 - b. Define and locate the jejunum and ileum.
 - c. Contrast the mucosa of the small intestine segments by defining: villi, Brunner's glands, central lacteal, and Peyer's patches.
9. Describe the biliary system.
 - a. List the lobes of the liver.
 - b. List the major functions of the liver and gall bladder.
 - c. Describe the drainage of bile from the liver by locating and defining: hepatic cystic, common bile ducts; ampulla of Vater, and sphincter of Oddi.
 - d. Describe the overall location, parts, and drainage of the pancreas.
10. Describe the overall anatomy of the large intestine by defining and locating:

ileo-cecal valve splenic flexure descending colon appendix	ascending colon transverse colon cecum haustra	sigmoid colon hepatic flexure rectum
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11. Define the following:

mastication deglutition bolus chyme	greater omentum lesser omentum mesentery mesocolon	duodenal cap duodenojejunal flexure peritoneum
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- *D. Describe the overall physiology of the digestive system.

1. State the purpose of G-I tract secretions.
2. List the chemical secretions and digestive action of saliva.
3. Describe the digestive functions of the stomach.
 - a. Describe the chemical mechanism of hydrochloric acid secretion by the parietal cells of the stomach.

***will not be covered in class**

- b. Describe the chemical activation of pepsinogen into pepsin and the digestive function of it on protein molecules.
4. List the digestive secretions of the pancreas and the digestive actions of each.
5. Describe the effect of the hormone, cholecystokinin on the gall bladder.
6. State the purpose of bile.
7. List the digestive secretions of the small intestine and the digestive actions of each
8. Describe the basic absorption of nutrients.
9. State the digestive and absorption functions of the large intestine.
10. Describe basic movements of the G-I tract.

- a. Define segmentation and peristalsis.
- b. Define enterogastric reflex and defecation.
- c. Define gastrin and secretin.

IX. Excretory System:

Upon completion of a study of the excretory system, the student should be able to correctly answer questions concerning the following:

- A. List the functions of the excretory system.
- B. Locate and describe the fixation and shape of the kidneys.
- C. Describe the internal anatomy of the kidneys.
 - 1. Locate the following: capsule, hilus, cortex, medulla, pyramids, columns, calyx, and pelvis.
 - 2. Describe the structure of the nephron.
 - 3. Describe the blood supply to the kidneys and nephrons within.
- D. Describe the course of the ureters.
- E. Describe the overall anatomy of the urinary bladder by defining trigon, urethra, internal and external urethral sphincters.
- F. Describe the basic physiology of micturition.
- G. Describe the physiology of urine formation.
 - 1. Discuss the dynamics of glomerular filtration.
 - a. Define glomerular filtration.
 - b. State the cause of glomerular filtration.
 - c. State composition of glomerular filtrate.
 - d. State regulation of glomerular filtration rate and its effect on urine formation.
 - 2. Describe tubular reabsorption.
 - a. Define tubular reabsorption.
 - b. State the quantity of glomerular filtrate that is reabsorbed.
 - c. State which chemical substances are reabsorbed.
 - d. Describe the basic mechanism for the reabsorption of an ionic and a non-ionic chemical substance using NaCl and glucose as examples.
 - e. Describe the counter-current mechanism for producing a dilute or concentrated urine by discussing osmolarity changes associated with the loop of Henle and the mechanism of ADH.
 - f. Describe how the kidneys regulate the normal plasma concentration of sodium, potassium, and calcium ions through tubular reabsorption controlled by the hormones aldosterone and parathormone.

X. Acid-Base Regulation: Upon completion of a study of acid-base regulation, the student should be able to correctly answer questions concerning the following:

- A. State normal range for blood pH and extreme ranges for acidosis and alkalosis.
- B. List three defense mechanisms for controlling body fluid pH.
- C. List and discuss acid-base buffers within body fluids.
 - 1. Define buffer.
 - 2. Using the Henderson-Hasselbach equation, demonstrate the dynamics of the carbon dioxide-bicarbonate ion buffer system.
 - 3. List other chemical buffers within the body fluids and relate their buffering power compared to the carbon-dioxide-bicarbonate ion buffer system.
- D. Describe how the respiratory system regulates pH.
 - 1. Discuss effects of hydrogen ion concentration on alveolar ventilation and visa

versa.

2. Relate the buffering power of the respiratory system to that of chemical buffers of the body fluids.

E. Describe how the kidneys regulate pH.

1. Describe tubular secretion of hydrogen ions.

*F. Define and list causes of: respiratory acidosis, respiratory alkalosis, metabolic acidosis, and metabolic alkalosis.

***will not be covered in class**

SPECIFIC OBJECTIVES FOR THE LABORATORY PORTION OF THE COURSE

I. Renal Regulation of Osmolarity of Body Fluids Experiment Lab: The student will correctly complete a class experiment demonstrating how the kidneys regulate osmolarity of body fluids and complete a laboratory report describing the experiment and answering questions.

II. Internal Anatomy of the Cat: Upon completion of a dissection of the internal anatomy of the cat, the student should be able to correctly identify the following structures during a laboratory practical exam.

A. Chapter: "Digestive System/Respiratory System and other structures of the area"

1. lymph nodes
2. salivary glands and ducts
 - a. parotid gland
 - b. parotid duct
 - c. submaxillary gland
 - d. submaxillary duct
 - e. sublingual gland
3. teeth
 - a. incisors
 - b. canines
 - c. premolars
 - d. molars
4. tongue
 - a. papillae of tongue
 - b. frenulum of tongue
5. palate
 - a. hard palate
 - b. soft palate
6. larynx
 - a. thyroid cartilage
 - b. cricoid cartilage
 - c. epiglottic cartilage (epiglottis)
 - d. arytenoids cartilage
 - e. vocal cords
 - f. glottis
7. thyroid gland
8. trachea

9. bronchi
10. pleural cavity
11. mediastinum
12. pleura
 - a. parietal pleura
 - b. visceral pleura
13. lungs
 - a. anterior lobe
 - b. middle lobe
 - c. posterior lobe
 - d. hilus
 - e. root
 - f. mediastinal surface
 - g. diaphragmatic surface (base)
 - h. costal surface
 - i. apex
14. cerebellum
15. cerebrum
16. hypophysis (pituitary gland)
17. medulla
18. pons
19. nasal cavity
 - a. nasal conchae
 - b. internal (posterior) nares
20. pharynx
 - a. nasopharynx
 - eustachian tube opening
 - b. oropharynx
 - palatine tonsil
21. heart
22. pericardium
23. pericardial cavity
24. esophagus
25. diaphragm
 - a. central tendon
 - b. falciform ligament
 - c. round ligament
26. peritoneal cavity
27. peritoneum
 - a. parietal peritoneum
 - b. visceral peritoneum
 - c. greater omentum
 - gastrosplenic ligament
 - omental bursa
 - epiploic foramen
 - d. lesser omentum
 - gastrohepatic ligament
 - hepatoduodenal ligament
 - e. mesentery

- f. mesoduodenum
 - g. mesocolon
- 28. stomach
 - a. cardia
 - b. fundus
 - c. body
 - d. antrum
 - e. pylorus
 - f. greater curvature
 - g. lesser curvature
 - h. cardiac orifice
 - i. rugae
 - j. pyloric sphincter (valve)
- 29. small intestine
 - a. duodenum
 - b. jejunum
 - c. ileum
 - ileocecal sphincter (valve)
- 30. large intestine
 - a. cecum
 - b. ascending colon
 - c. transverse colon
 - d. descending colon
 - e. sigmoid colon (human)
 - f. rectum
- 31. liver
 - a. right medial lobe
 - b. right lateral lobe
 - c. left medial lobe
 - d. left lateral lobe
 - e. caudate lobe
- 32. pancreas
 - a. head
 - b. body
 - c. tail
 - d. pancreatic duct
- 33. gall bladder
- 34. biliary tract
 - a. hepatic ducts
 - b. cystic duct
 - c. common bile duct
 - d. ampulla of Vater

B. Chapter: "Urogenital System"

- 1. kidney
 - hilus
 - root
 - perinephric fat
- 2. adrenal gland

3. ureter
4. urinary bladder
5. urethra

MALE PARTS

6. scrotum
7. penis
8. spermatic cord
9. inguinal canal
 - a. internal inguinal ring
 - b. inguinal canal
 - c. external inguinal ring
10. testes
11. epididymus
12. vas deferens (ductus deferens)
13. prostate gland
14. bulbourethral glands

FEMALE PARTS

15. ovaries
16. fallopian tubes
 - a. abdominal ostium (infundibulum)
 - b. fimbriae
17. uterus
 - a. uterine horns
 - b. body of uterus
 - c. cervix
18. vagina
19. supporting peritoneum
 - a. round ligament
 - b. broad ligament
 - mesovarium
 - mesosalpinx
 - c. ovarian ligament

Chapter "The Circulatory System"

pulmonary artery
 pulmonary veins
 precava (superior vena cava)
 internal & external jugular veins
 intercostal veins
 internal mammary veins
 innominate veins (brachiocephalic)
 subclavian veins
 axillary veins
 brachial vein
 aorta
 - ascending aorta
 - aortic arch
 - thoracic aorta
 - abdominal aorta

gastrosplenic vein
 superior mesenteric vein
 hepatic portal vein
 brachial artery
 intercostal arteries
 celiac artery
 hepatic artery
 gastric artery
 splenic artery
 superior mesenteric artery
 renal arteries
 spermatic (testicular) or ovarian artery
 inferior mesenteric artery
 external iliac artery
 internal iliac vein

axillary artery	innominate artery (brachiocephalic)
postcava (inferior vena cava)	vertebral artery
ovarian or spermatic vein	hepatic vein
external iliac artery	femoral artery
left & right subclavian artery	femoral vein
left & right common carotid artery	popliteal artery
internal & external carotid artery	popliteal vein
internal mammary artery	

Chapter "Nervous System"

meninges	medulla
-dura mater	spinal cord
-arachnoid mater	facial nerve
-pia mater	cervical plexus
cerebrum	brachial plexus
gyrus	phrenic nerve
sulcus	vagus nerve
fissure	lumbosacral plexus
corpus callosum	femoral nerve
lateral ventricle	sciatic nerve
cerebellum	sympathetic ganglia (trunk)
pons	

III. **Anatomy of the Heart Lab:** Upon completion of a dissection of a heart, the student should be able to complete a lab practical exam.

A. Complete a dissection of a heart and be able to identify the following heart structures on a lab practical exam.

parietal pericardium	bicuspid valve
visceral pericardium	pulmonary valve
pericardial space	aortic valve
epicardium	interventricular septum
myocardium	superior and inferior vena cava
endocardium	aorta
right and left atria	pulmonary artery
right and left ventricles	pulmonary veins
tricuspid valve	coronary arteries
papillary muscles	chordae tendoneae

IV. Cardiovascular Physiology Lab:

Upon completion of a lab exercise, the student should be able to complete a lab report concerning the following:

- A. Record an electrocardiogram, and from the tracing, be able to:
 1. identify p, qrs, t-waves, and s-t segment
 2. determine the p-r interval
 3. determine the heart rate
- B. Record the pulse wave and on it identify the dicrotic notch.
- C. Listen to heart sounds, identifying S1 and S2 and the valves making the sound.
- D. Obtain a blood pressure

V. **Hematology Lab:** Upon completion of a laboratory study of blood, the student should be able to correctly answer questions concerning the following and have completed the following:

- A. The student is to complete the following complete blood count (CBC) tests:

wbc count	hemoglobin determination	rbc count
differential wbc count	hematocrit	
- B. The student is to determine blood glucose and cholesterol concentration, sedimentation rate (as a demonstration), blood type (ABO and Rh), O₂ sats, and calculate estimation of blood volume, total O₂ carrying capacity, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin content (MCHC).
- C. The student should be able to interpret results, define hematology terms given in this lab, and describe the basic methods used for analysis.

VI. **Anatomy of the Kidney Lab:**

- A. Upon completion of a dissection of a kidney, the student should be able to correctly identify the following:

renal capsule	cortex
renal artery	pyramid
renal vein	papillae
ureter	pelvis
hilus	calyx
- B. Perform a routine urine analysis composed of a basic physical, chemical, and microscopic exam.

VII. **Respiratory Physiology Lab:** Upon completion of gathering data from respiratory physiology experimentation, the student should be able to correctly complete a lab report containing the following:

- A. Data from the following pulmonary function tests using a spirometer:

tidal volume	daily pulmonary ventilation
expiratory reserve volume	maximal breathing capacity
inspiratory reserve volume	forced expiratory volume (1 sec.)
vital capacity	minute respiratory volume
- B. Data from exercises demonstrating neural and humoral control of pulmonary ventilation.
- C. Upon completion of the exercise, the student will also correctly answer examination questions concerning the following:
 1. Definitions of lung volumes and capacities.
 2. Neural and humoral control of respiration.
 3. Definitions of respiratory terms listed in the laboratory exercise.

COURSE OUTLINE: BIO 212 - HUMAN ANATOMY & PHYSIOLOGY II

- I. Endocrinology
 - A. Hormonal action and control
 - B. Hormones, function, control, structures, and disorders of endocrine glands
 - 1. Adenohypophysis
 - 2. Neurohypophysis
 - 3. Thyroid
 - 4. Parathyroid
 - 5. Adrenal cortex
 - 6. Adrenal medulla
 - 7. Testes
 - 8. Ovaries
 - 9. Pancreas
- II. Digestive system
 - A. Purpose and overview
 - B. Chemical hydrolysis of food
 - C. Anatomy of the G-I tract and accessory structures
 - D. Biliary system
 - E. G-I motility
 - F. Secretion and absorption
- III. Cardiology
 - A. General path of circulation
 - B. Anatomy of the heart
 - C. Path of blood flow through the heart
 - D. Electrophysiology
 - E. Pumping action and cardiac cycle
 - F. Control of cardiac output
- IV. Circulation
 - A. Major systemic arteries
 - B. Major systemic veins
 - C. Physiology of circulation
 - 1. Physics of blood flow
 - 2. Blood pressure
- V. Hematology
 - A. General functions and characteristics of blood
 - B. Formed elements
 - 1. Erythrocytes
 - a. characteristics; Lab values
 - b. hemoglobin
 - c. formation of
 - d. iron metabolism
 - e. destruction of
 - 2. Leukocytes
 - a. characteristics; Lab values

- b. role in immunity and inflammation
- 3. Platelets
- C. Plasma
- D. Hemostasis
- E. Immunity

VI. Respiratory system

- A. Functions and overview
- B. Anatomy of the airway
- C. Pulmonary ventilation
- D. Gas exchange
- E. Gas transport

VII. Excretory system

- A. Functions and overview
- B. Chemicals excreted
- C. Macro and microscopic anatomy of the kidneys
- D. Urinary tract
- E. Urine formation
- F. Renal regulation of fluid and electrolytes

VIII. Acid-Base Balance

- A. pH and normal ranges
- B. Regulatory mechanisms
 - 1. Acid-base buffers
 - 2. CO_2 - bicarbonate ion ratio
 - 3. Respiratory regulation
 - 4. Renal regulation
- C. Metabolic and respiratory acidosis/alkalosis

IX. Reproductive system

- A. Male reproductive system
- B. Female reproductive system
- C. Female reproductive cycle
- D. Fertilization and development

Spring Semester, 2012, Tentative Academic Schedule

Lecture: Monday - Wednesday

Week	Dates		Lecture Topics, Text Chapters
1	Jan 23	Jan 25	Course Introduction, Endocrinology: Chap. 18
2	Jan 30	Feb 1	Endocrinology: Supplements and Chap. 18
3	Feb 6	Feb 8	Digestive System: Chap. 24, 25
4	Feb 13	Feb 15	Digestive System: Chap. 24, 25
5	Feb 20	Feb 21	Exam 1 Cardiovascular (Circulatory) System: Heart Chap 19 - 21
6	Feb 27	Feb 29	Cardiovascular (Circulatory) System: Chap 19 - 21
7	Mar 5	Mar 7	Cardiovascular (Circulatory) System: Chap 19 - 21
8	Mar 13	Mar 15	Cardiovascular (Circulatory) System: Chap 19 - 21: Start Lymphatic System and Immunity: Chap 22
9	Mar 19	Mar 23	<i>Spring Break - No Classes</i>
10	Mar 26	Mar 28	Exam 2 Lymphatic System and Immunity: Chap 22
11	Apr 2	Apr 4	Respiratory System: Chap. 23
12	Apr 9	Apr 11	Urinary System: Chap. 26
13	Apr 16	Apr 20	Urinary System & Acid/Base Balance: Chap 26, 27
14	Apr 23	Apr 25	Exam 3 Reproductive System: Chap. 28, 29
15	Apr 30	May 2	Reproductive System: Chap. 28, 29
16	May 7	May 9	Reproductive System: Chap. 28, 29
17	May 14 (Monday)		Exam 4 Comprehensive Final Exam

Tentative Academic Schedule – Lab Room A219

Lab: Monday

Date	Topic
1. Jan 23	Lab Introduction & Endocrinology Lecture
2. Jan 30	Renal Regulation of Osmolarity – Urinalysis
3. Feb 6	*Cat dissection – Identification of Digestive System Organs
4. Feb 13	*Cat dissection – Identification of Digestive System Organs
5. Feb 20	Lab Practical 1: followed by *Hematology and Blood Analysis
6. Feb 27	*Cat dissection – Identification of major Blood Vessels
7. Mar 5	*Heart Dissection
8. Mar 13	Lab Practical 2: Heart and Blood Vessels
9. Mar 19	<i>Spring Break - No Classes</i>
10. Mar 26	ECG, Cardiovascular Physiology
11. Apr 2	Respiration, Spirometry
12. Apr 9	Reproduction
13. Apr 16	Lab Practical 3
14. Apr 23	
15. Apr 30	
16. May 7	

*dissection tools and safety glasses required; gloves recommended

Tentative Academic Schedule – Lab Room A219

Lab: Wednesday

Date	Topic
2. Jan 25	Lab Introduction & Endocrinology Lecture
2. Feb 1	Renal Regulation of Osmolarity – Urinalysis
3. Feb 8	*Cat dissection – Identification of Digestive System Organs
4. Feb 15	*Cat dissection – Identification of Digestive System Organs
5. Feb 21	Lab Practical 1: followed by *Hematology and Blood Analysis
6. Feb 29	*Cat dissection – Identification of major Blood Vessels
7. Mar 7	*Heart Dissection
8. Mar 15	Lab Practical 2: Heart and Blood Vessels
9. Mar 23	<i>Spring Break - No Classes</i>
10. Mar 28	ECG, Cardiovascular Physiology
11. Apr 4	Respiration, Spirometry
12. Apr 11	Reproduction
13. Apr 20	Lab Practical 3
14. Apr 25	
15. May 2	
16. May 9	

*dissection tools and safety glasses required; gloves recommended

Spring Semester, 2012, Tentative Academic Schedule

Lecture: Tuesday-Thursday

Week	Dates		Lecture Topics, Text Chapters
1	Jan 24	Jan 26	Course Introduction, Endocrinology: Chap. 18
2	Jan 31	No class	Endocrinology: Supplements and Chap. 18
3	Feb 7	Feb 9	Digestive System: Chap. 24, 25
4	Feb 14	Feb 16	Digestive System: Chap. 24, 25
5	Feb 21	Feb 23	Exam 1 Cardiovascular (Circulatory) System: Heart Chap 19 - 21
6	Feb 28	Mar 1	Cardiovascular (Circulatory) System: Chap 19 - 21
7	Mar 6	Mar 8	Cardiovascular (Circulatory) System: Chap 19 - 21
8	Mar 13	Mar 15	Cardiovascular (Circulatory) System: Chap 19 - 21: Start Lymphatic System and Immunity: Chap 22
9	Mar 19	Mar 23	<i>Spring Break - No Classes</i>
10	Mar 27	Mar 29	Exam 2 Lymphatic System and Immunity: Chap 22
11	Apr 3	Apr 5	Respiratory System: Chap. 23
12	Apr 10	Apr 12	Urinary System: Chap. 26
13	Apr 17	Apr 19	Urinary System & Acid/Base Balance: Chap 26, 27
14	Apr 24	Apr 26	Exam 3 Reproductive System: Chap. 28, 29
15	May 1	May 3	Reproductive System: Chap. 28, 29
16	May 8	May 10	Reproductive System: Chap. 28, 29
17	May 15 (Tuesday)		Exam 4 Comprehensive Final Exam

Tentative Academic Schedule – Lab Room A219

Lab: Tuesday

Date	Topic
3. Jan 24	Lab Introduction & Endocrinology Lecture
2. Jan 31	Renal Regulation of Osmolarity – Urinalysis
3. Feb 7	*Cat dissection – Identification of Digestive System Organs
4. Feb 14	*Cat dissection – Identification of Digestive System Organs
5. Feb 21	Lab Practical 1: followed by *Hematology and Blood Analysis
6. Feb 28	*Cat dissection – Identification of major Blood Vessels
7. Mar 6	*Heart Dissection
8. Mar 13	Lab Practical 2: Heart and Blood Vessels
9. Mar 19	<i>Spring Break - No Classes</i>
10. Mar 27	ECG, Cardiovascular Physiology
11. Apr 3	Respiration, Spirometry
12. Apr 10	Reproduction
13. Apr 17	Lab Practical 3
14. Apr 24	
15. May 1	
16. May 8	

*dissection tools and safety glasses required; gloves recommended

Tentative Academic Schedule – Lab Room A219

Lab: Thursday

Date	Topic
4. Jan 26 -	Lab Introduction & Endocrinology Lecture
2. Feb 9	Renal Regulation of Osmolarity – Urinalysis
3. Feb 16	*Cat dissection – Identification of Digestive System Organs
4. Feb 23	*Cat dissection – Identification of Digestive System Organs
5. Mar 1	Lab Practical 1: followed by *Hematology and Blood Analysis
6. Mar 8	*Cat dissection – Identification of major Blood Vessels
7. Mar 15	*Heart Dissection
8. Mar 23	Lab Practical 2: Heart and Blood Vessels
9. Mar 29	<i>Spring Break - No Classes</i>
10. Apr 5	ECG, Cardiovascular Physiology
11. Apr 12	Respiration, Spirometry
12. Apr 19	Reproduction
13. Apr 26	Lab Practical 3
14. May 3	
15. May 10	
16.	

*dissection tools and safety glasses required; gloves recommended

Spring Semester, 2012, Tentative Academic Schedule

Lecture: Tuesday Evening

Week	Dates		Lecture Topics, Text Chapters
1	Jan 24	Jan 26	Course Introduction, Endocrinology: Chap. 18
2	Jan 31	Feb 2	Endocrinology: Supplements and Chap. 18
3	Feb 7	Feb 9	Digestive System: Chap. 24, 25
4	Feb 14	Feb 16	Digestive System: Chap. 24, 25
5	Feb 21	Feb 23	Exam 1 Cardiovascular (Circulatory) System: Heart Chap 19 - 21
6	Feb 28	Mar 1	Cardiovascular (Circulatory) System: Chap 19 - 21
7	Mar 6	Mar 8	Cardiovascular (Circulatory) System: Chap 19 - 21
8	Mar 13	Mar 15	Cardiovascular (Circulatory) System: Chap 19 - 21: Start Lymphatic System and Immunity: Chap 22
9	Mar 19	Mar 23	<i>Spring Break - No Classes</i>
10	Mar 27	Mar 29	Exam 2 Lymphatic System and Immunity: Chap 22
11	Apr 3	Apr 5	Respiratory System: Chap. 23
12	Apr 10	Apr 12	Urinary System: Chap. 26
13	Apr 17	Apr 19	Urinary System & Acid/Base Balance: Chap 26, 27
14	Apr 24	Apr 26	Exam 3 Reproductive System: Chap. 28, 29
15	May 1	May 3	Reproductive System: Chap. 28, 29
16	May 8	May 10	Reproductive System: Chap. 28, 29
17	May 15 (Tuesday)		Exam 4 Comprehensive Final Exam

Tentative Academic Schedule – Lab Room A219

Lab: Thursday Evening

Date	Topic
5. Jan 26 -	Lab Introduction & Endocrinology Lecture
2. Feb 2	Renal Regulation of Osmolarity – Urinalysis
3. Feb 9	*Cat dissection – Identification of Digestive System Organs
4. Feb 16	*Cat dissection – Identification of Digestive System Organs
5. Feb 23	Lab Practical 1: followed by *Hematology and Blood Analysis
6. Mar 1	*Cat dissection – Identification of major Blood Vessels
7. Mar 8	*Heart Dissection
8. Mar 15	Lab Practical 2: Heart and Blood Vessels
9. Mar 23	<i>Spring Break - No Classes</i>
10. Mar 29	ECG, Cardiovascular Physiology
11. Apr 5	Respiration, Spirometry
12. Apr 12	Reproduction
13. Apr 19	Lab Practical 3
14. Apr 26	
15. May 3	
16. May 10	

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