

SYLLABUS

QUARTER: SPRING 2009

NAME OF COURSE: RENAL PULMONARY PHYSIOPATHOLOGY (PH/PA 225)

LENGTH OF COURSE: 4 units, 44 hours (4 hrs lecture/week)

COURSE DESCRIPTION:

This course explores the functions of urinary and respiratory systems and their interrelationship with a variety of body systems and with each other.

Pathologies such as emphysema, asthma, uremia and acidosis, are explored.

PREREQUISITES: Anat 219, Phys 122

COURSE OFFERED BY: Physiology/Pathology Department
Suzanne Ray, MS Dept. Chair

COURSE INSTRUCTOR: [Stephen James D.C.](#)
Email: sjames@lifewest.edu
Voicemail: 780-4500 x 2270
Room: 171

OFFICE HOURS: Tues 9:50-10:40, Wed 10:50-11:40 & 1:00-3:00

REQUIRED TEXT: Renal Pulmonary Phys/Path Notes by Dr. Muwafaqu Alasad & Dr. Stephen James

REFERENCE TEXTS: Textbook of Medical Physiology by Guyton and Hall
Pulmonary Pathophysiology by JB West
Pathology Illustrated by Govan, Macfarlane, Callender
Pathophysiology of Disease by McPhee et al
Anatomy Coloring Book, Physiology Coloring Book

MATERIALS: Handouts

METHOD OF INSTRUCTION: Lecture/discussion, overhead projectors, videos

ATTENDANCE: Instructors are required to record student attendance. Roll can be taken at any time during the class period. The instructor may call names, pass a roll sheet, use submitted classroom assignments, or observe the students. If the instructor calls roll, a student who is not present when his or her name is called is absent. If the instructor uses a roll sheet, students have 15 minutes to sign in.

If a student arrives after attendance has been taken but within the first 15 minutes of the start of the class session, the student must see the instructor at the end of the class hour to request that his or her absence be changed to a tardy. Three tardies attendance constitute one hour of absence. Failure to notify the instructor will result in the absence mark remaining on the attendance sheet. This cannot be changed later. **No additional assignments can be used to compensate for absences except as outlined in the college course overlap policy.**

If a student leaves after attendance has been taken, the instructor can change the attendance record to indicate an absence for the class period. Any request to leave class early must be approved by the instructor before the class session.

A student who misses more than 10% of the class hours will be over-cut from the class. If the student presents documentation to the dean verifying a documented emergency or other excusable reason that prevented attendance for 15% of the class hours, the dean may permit him or her to continue attending the class. In determining whether or not to permit a student to continue attending a class, the dean will consider the student's overall attendance record and academic standing. Under no circumstances, regardless of any personal situation, will a student who misses 20% of the class hours receive course credit. Excused absences still count toward total absences, they only may entitle a student to make-up assignments and examinations.

A student is responsible for keeping track of his or her own attendance and absences. Instructors may but are not required to provide courtesy notices indicating that a student is approaching or has reached over-cut status.

Documented emergencies include hospitalization, accidents, or death in the family. Undocumented illness, not "feeling well," weddings, events, extended vacations or school holidays, non-school scheduled seminars, etc., are not considered excusable reasons for missing class.

GRADES:

There will be a 50 pt quiz, 100 pt mid-term exam, and 100 pt final exam. Questions will include primarily multiple choice. Grades will be assigned according to the following scale: [out of 250 pts]

A = 4.0	90-100%	C = 2.0	70-79%
B = 3.0	80-89%	D = 1.0	60-69% >student must repeat course
		F = 0.0	0-59%

In order to maintain satisfactory academic progress, a student must maintain a 2.0 or better in every course. Any grade less than a C must be remedied by repeating the class. Any student receiving less than 70% in any mid-term is encouraged to sign up for tutoring through the Deans Office

MAKE UP EXAMS:

Exams may not be missed without a good, documented reason. If an exam is missed, the student must go immediately to the Student Services office, and pick up a make-form. The signatures on this form are binding. If the make-up exam is not done within one week, the student will be given grade of zero for exam, unless there is continued documentation to show good reason.

SPECIAL TESTING:

It is the **student's responsibility** to notify the instructor **one week** in advance if special testing is required. All paperwork with appropriate signatures must be completed and turned in **one week** prior to the exam. Once arrangements have been made they may not be changed without the instructor's approval.

All work submitted to the instructor must be done independently by the student,

unless the instructor authorizes group collaboration.

EXTRA CREDIT: None

OVERLAP CLASSES AND MID-TERM EXAMS:

Students may not miss a quiz or exam due to an overlap. It is the student's responsibility to arrange his/her schedule to be present on the day of the exam. There will be no rescheduled or make-up exams given due to overlaps.

COURSE OBJECTIVES:

The student will be able to gain knowledge of the basic physiology and common pathologies of both the lungs and kidneys and their interrelationship with the functions of the entire body. Diagnostic testing methods will be presented and their application to the clinical setting will be discussed.

SCHEDULE OF LECTURE AND EXAMS:

Week 1	Intro – <u>Respiratory Physiology</u>
Week 2	Respiratory Physiology
Week 3	<i>Quiz</i> start <u>Respiratory Pathology</u>
Week 4	Respiratory Pathology
Week 5	Respiratory Pathology
Week 6	<i>Midterm</i> start <u>Renal Physiology</u>
Week 7	Renal Physiology
Week 8	start <u>Renal Pathology</u>
Week 9	Renal Pathology
Week 10	Renal Pathology
Week 11	<i>Final Exam</i>

Pulmonary PhysPath - Learning Objectives:

Know these anatomical structures at the start of the respiratory passageway:

NASOPHARYNX	OROPHARYNX	LARYNGOPHARYNX
EPIGLOTTIS	LARYNX	VOCAL FOLDS
ESOPHAGUS	TRACHEAL CARTILAGE	THYROID GLAND
THYROID CARTILAGE (C4)	CRICOTHYROID LIGAMENT	CRICOID CARTILAGE (C5)

Know these major anatomical structures found within the thoracic cavity:

DIAPHRAGM	PHRENIC NERVES	LEFT AND RIGHT LUNGS
multiple PLEURA	INTRAPLEURAL and EXTRA PLEURAL SPACES	
LUNG OBLIQUE FISSURES	TRANSVERSE/HORIZONTAL FISSURE	
SUPERIOR/UPPER LOBES	MIDDLE LOBE	INFERIOR/LOWER LOBES
CUPULA [dome]	LINGULA [lower L lobe]	COSTAL CARTILAGES

Know these specific anatomical structures found within each lung:

PRIMARY, SECONDARY/LOBAR, and TERTIARY/SEGMENTAL BRONCHI		
BRONCHO-PULMONARY SEGMENTS (Right Side 3, 2, 5 Left Side 5, 5)		
BRONCHIAL TREE	BRONCHIOLES	CARTILAGE
TERMINAL BRONCHIOLE	RESPIRATORY BRONCHIOLE	ACINI vs ALVEOLI
ALVEOLAR DUCT	ALVEOLAR SAC	ALVEOLAR ATRIUM
ELASTIC TISSUE	SMOOTH MUSCLE	CILIA
ALVEOLAR MACROPHAGE	MUCOUS GLANDS	SEROUS GLANDS
TYPE I PNEUMOCYTE	TYPE 2 PNEUMOCYTE	PORES OF KOHN

INSPIRATORY/EXPIRATORY MUSCLES RESTFUL BREATHING [DIAPHRAGM, EXTERNAL INTERCOSTALS]

MUSCLES OF FORCED INSPIRATION [STERNOCLEIDOMASTOID MUSCLE, SCALENES]

MUSCLES OF FORCED EXPIRATION [INTERNAL INTERCOSTALS, RECTUS ABDOMINIS,
EXTERNAL & INTERNAL OBLIQUES, TRANSVERSUS ABDOMINIS]

INTRA PLEURAL PRESSURE

INTRA PULMONARY PRESSURE

AIRWAY RESISTANCE

PULMONARY COMPLIANCE

WORK OF BREATHING = 28% TURBULENCE 65% COMPLIANCE 7% RESISTANCE

ALVEOLAR VENTILATION
PERFUSION [V/Q ratio]
TOTAL LUNG CAPACITY: TLC
TIDAL VOLUME: TV
RESIDUAL VOLUME: RV
FUNCTIONAL RESIDUAL VOLUME
MAXIMUM EXPIRATORY FLOW
SURFACTANT

MINUTE RESPIRATORY VOLUME: MRV
SPIROMETER
INSPIRATION RESERVE VOLUME: IRV
INSPIRATORY CAPACITY: IC
EXPIRATORY RESERVE VOLUME : ERV
VITAL CAPACITY : VC
ANATOMICAL DEAD SPACE
SURFACE TENSION

ATMOSPHERIC PRESSURE
GRADIENTS
DIFFUSION DISTANCE
DEAD SPACE AIR

PARTIAL PRESSURE OF GAS
SURFACE AREA
ALVEOLAR AIR
EXPIRED AIR

VENOUS BLOOD
HEMOGLOBIN
O2 TRANSPORT: 3% dissolved
Carbon Monoxide affinity for Hb is 200 times that of Oxygen!
BOHR EFFECT
CARBONIC ANHYDRASE
CHLORIDE ION SHIFT
CO2 TRANSPORT: 10% dissolved

ARTERIAL BLOOD
PORPHYRINS [heme]
97% bound to Hb [oxyhemolobin]
SHIFT TO THE RIGHT
CARBONIC ACID
HAMBURGER SHIFT
30% bound to Hb

IRON ATOMS

SHIFT TO THE LEFT
BICARBONATE (70%)
CARBAMINO Hb
60% as HC03

UPTAKE AND RELEASE OF CARBON DIOXIDE
TRANSPORT AND TRANSFER OF OXYGEN AND CARBON DIOXIDE IN ARTERIAL BLOOD
TRANSPORT AND TRANSFER OF OXYGEN AND CARBON DIOXIDE IN VENOUS BLOOD

HALDANE EFFECT

CONTROL OF RESPIRATION [neural, chemical]

MEDULLA: RHYTHMICITY AREA [generates inspiratory "ramp"]

UPPER PONS: PNEUMOTAXIC AREA [inhibits inspiratory center, acts as an "off" switch]

LOWER PONS: APNEUSTIC AREA [blocks pneumotaxic "switch off" signal?]

HERING-BREUER REFLEX [stretch receptors in bronchiole, vagus nerve, tractus solitarius]

CHEMO-RECEPTORS [carotid body, aortic arch]

HOW DO OXYGEN AND CARBON DIOXIDE LEVELS INFLUENCE RESPIRATION?

HYDROGEN ION INCREASE and RESPIRATION?

RESPIRATORY ALKALOSIS

RESPIRATORY ACIDOSIS

DIAGNOSTIC TESTS

SIGNS and SYMPTOMS OF RESPIRATORY DISEASE

DISEASE CATEGORIES [obstructive, restrictive, infectious]

ACUTE BRONCHITIS

CHRONIC BRONCHITIS

BRONCHIAL ASTHMA

BRONCHIECTASIS

EMPHYSEMA

ATELECTASIS

LUNG COLLAPSE

SPECIAL TYPES OF PNEUMONIA [viral, broncho-, lobar-]

LUNG ABSCESS

TUBERCULOSIS

PNEUMOCONIOSIS

ANTHRACOSIS

SILICOSIS

ASBESTOSIS

FARMER' LUNG

BIRD BREEDERS LUNG

BAGASSOSIS

MUSHROOM WORKER'S LUNG

PULMONARY FIBROSIS

CHEMICALS AND DRUGS ON LUNGS

TUMORS [papilloma adenoma, SMALL CELL- LARGE CELL- SQUAMOUS CELL- and ADENO-CARCINOMAS]

[BRONCHIAL GLAND CARCINOMA, CARCINOID TUMOR, and MESOTHELIOMA in pleural space] p271

DISEASES OF PLEURA [fibrinous, sero-fibrinous]

PLEURAL EFFUSIONS [hydrothorax, hemothorax, empyemic, chylothorax]

Renal PhysPath - Learning Objectives:

Renal Anatomy

retroperitoneal location	capsule, cortex, medulla, renal pelvis	
ureter	bladder	prostate gland
nephron	cortical and juxtamedullary nephrons	
renal corpuscle = glomerulus + Bowman's capsule		proximal tubule
loop of Henle	distal tubule	collecting duct
renal sinus	renal artery	renal vein
afferent/efferent arterioles	peritubular capillaries	vasa recta
25% of cardiac output	pain reference T12-L2	

Renal Physiology

concentration units	osmolarity	hypotonic-hypertonic
distribution of body fluids	body's fluid compartments	
capillary filtration	<u>hydrostatic</u> vs <u>oncotic</u> pressure	edema
glomerular filtration rate	filtered load	Tmax
reabsorption	secretion	excretion
membrane transport processes	Na ⁺ dependent pumps	
inulin clearance	creatinine clearance	PAH clearance
urea clearance	production of dilute vs concentrated urine	
ADH	[diabetes insipidus	SIADH]
renin/angiotensin system	renin	angiotensin I and II
aldosterone	blood volume regulation	K ⁺ regulation
pH buffers	bicarbonate/CO ₂	carbonic anhydrase
pKa	Henderson-Hasselbalch equation	
alkalosis/acidosis	kidneys contribute to pH regulation	

Renal Pathology

renal failure -> hypertension, edema, acidosis, electrolyte imbalances		
dialysis	anemia	osteomalacia
glomerulonephritis [strep]	nephrotic syndrome	proteinuria
diuresis	oliguria	polyuria
dysuria	azotemia	glycosuria
urinalysis	hematuria	ketonuria
casts, crystals	stones [concretion, nephrolith]	renal colic
BUN	creatinine	uremia
hydronephrosis	diabetes [mellitus and insipidus]	gout
Addison's disease	aldosteronism	[Cushing's disease]
renal artery stenosis	benign prostate hyperplasia	prostate cancer
SLE [lupus]	chemicals/drugs on kidneys	pyelonephritis