

University of Pennsylvania
School of Nursing
Course Syllabus
Fall 2013

TITLE: N 682 Applied Physiology for Nurse Anesthesia II

COURSE UNITS: 1 cu

CATALOG DESCRIPTION:

This course provides an in-depth analysis of the anatomy, physiology and pathophysiology of the cardiac, circulatory, renal, hepatic, hematologic, & immunological systems with focus on anesthesia implications. Emphasis will be placed on assessment of the patient, adult and gerontological, with common disorders of these systems.

PLACEMENT: Fall, Year I

FACULTY: Joseph R. Libonati, Ph.D.

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**PRE-REQUISITE (S): N 607 Advanced Physiology and Pathophysiology
N 681 Applied Physiology for Nurse Anesthesia I**

CO-REQUISITE (S): None

COURSE OVERVIEW:

This course focuses on an in-depth analysis of anatomy, physiology and pathophysiology of the cardiac, circulatory, renal, & neurological systems with related anesthesia implications. Common effects of compromised cardiac, circulatory, renal, & neurological function and related implications for patient care and the anesthesia plan are discussed.

COURSE OBJECTIVES:

1. Define the cellular electrophysiology underlying the two types of cardiac muscle tissue, pacemaker and non-pacemaker tissue.

2. Determine the effects of plasma electrolyte alterations on automaticity and the action potential.
3. Describe the cellular basis of automatic control of heart rate and contractile state.
4. Understand basic concepts of arrhythmia pathogenesis and pharmacological manipulations that exacerbate or ameliorate abnormal automaticity and conduction.
5. Integrate concepts of myocyte calcium handling with physiology and pathophysiology of cellular contraction and relaxation.
6. Correlate the cardiac cycle with pressure-volume analysis of myocardial function in health and disease, including abnormal function of the cardiac valves.
7. Critically examine the determinants of myocardial function and their regulation.
8. Define the factors that regulate pressure and resistance as determinants of cardiac output.
9. Differentiate between systolic and diastolic dysfunction of the myocardium.
10. Identify factors involved in local control of arterial perfusion in health and disease.
11. Compare and contrast adaptive mechanisms to maintain blood pressure in circulatory versus hemorrhagic shock.
12. List the properties of healthy endothelium and describe alterations in endothelial function in atherosclerosis.
13. Identify the risk factors for atherosclerosis and their relationship to the development of disease.
14. Describe mechanisms of autoregulation of blood flow to the brain, heart and kidney.
15. Examine the anatomy of the kidney, nephron, bowman's capsule, and loop of henle.
16. Discuss renal blood flow, GFR, and urine formation.
17. Examine renal regulation of fluids, pH, and electrolyte balance.
18. Discuss alterations in renal function.
19. Examine tests to monitor renal function.
20. Describe anesthetic effects on renal function.
21. Discuss hepatobiliary function
22. Discuss hepatic function with relation to drug metabolism
23. Discuss the relationship between liver function and coagulation.
24. Examine the genesis and function of the red blood cell.
25. Examine the genesis and function of the platelet.
26. Examine the formation of a platelet plug to maintain homeostasis.
27. Examine the changes in physiology associated with the geriatric population.
28. Discuss the function of the immune system.
29. Discuss types of immunity.
30. Differentiate between anaphylactic reactions and anaphylactoid reactions.

31. Examine the concept of cross sensitivity related to organisms and antibiotics.
32. Explore Latex allergies.

TEACHING METHODS:

Lecture & group discussion

EVALUATION METHODS

Exam #1	Cardiovascular	40%
Exam #2	Gerontology, Liver, & Hematology	30%
Exam #3	Immunology & Renal	30%

GRADING POLICY:

A+ 97-100	B+ 87-89	C+ 77-79	F 0-69
A 93-96	B 83-86	C 73-76	
A- 90-92	B- 80-82	C- 70-72	

Rounding will be done as follows:

Grades of .5 and above will be rounded up to the next whole number

Grades of .4 or less will be rounded down to the next whole number

Code of Academic Integrity

Since the University is an academic community, its fundamental purpose is the pursuit of knowledge. Essential to the success of this educational mission is a commitment to the principles of academic integrity. Every member of the University community is responsible for upholding the highest standards of honesty at all times. Students, as members of the community, are also responsible for adhering to the principles and spirit of the following Code of Academic Integrity.

Academic Dishonesty Definitions

Activities, which have the effect or intention of interfering with education, pursuit of knowledge, or fair evaluation of a student's performance are prohibited.

Examples of such activities include but are not limited to the following definitions:

A. Cheating: using or attempting to use unauthorized assistance, material, or study aids in examinations or other academic work or preventing, or attempting to prevent, another from using authorized assistance, material, or study aids. Example: using a cheat sheet in a quiz or exam, altering a graded exam and resubmitting it for a better grade, etc.

B. Plagiarism: using the ideas, data, or language of another without specific or proper acknowledgment. Example: copying another person's paper, article, or computer work and submitting it for an assignment,

cloning someone else's ideas without attribution, failing to use quotation marks where appropriate, etc.

C. Fabrication: submitting contrived or altered information in any academic exercise. Example: making up data for an experiment, fudging data, citing nonexistent articles, contriving sources, etc.

D. Multiple submissions: submitting, without prior permission, any work submitted to fulfill another academic requirement.

E. Misrepresentation of academic records: misrepresenting or tampering with or attempting to tamper with any portion of a student's transcripts or academic record, either before or after coming to the University of Pennsylvania. Example: forging a change of grade slip, tampering with computer records, falsifying academic information on one's resume, etc.

F. Facilitating academic dishonesty: knowingly helping or attempting to help another violate any provision of the Code. Example: working together on a take-home exam, etc.

G. Unfair advantage: attempting to gain unauthorized advantage over fellow students in an academic exercise. Example: gaining or providing unauthorized access to examination materials, obstructing or interfering with another student's efforts in an academic exercise, lying about a need for an extension for an exam or paper, continuing to write even when time is up during an exam, destroying or keeping library materials for one's own use., etc.

* If a student is unsure whether his action(s) constitute a violation of the Code of Academic Integrity, then it is that student's responsibility to consult with the instructor to clarify any ambiguities.

<http://www.vpul.upenn.edu/osl/pennbook.html>

REQUIRED TEXTS:

Rhoades, R.A. & Bell, D.R. (2013). *Medical Physiology: Principles for Clinical Medicine* 4th Edition. Philadelphia: Lippincott, Williams, & Wilkins.

Nagelhout, J. & Zaglaniczny (2013). *Nurse Anesthesia* 5th Edition. Missouri: Elsevier Saunders.

Barash, P.G., Cullen, B.F. & Stoeling, R.K. Eds. (2013). *Clinical Anesthesia* 7th Edition. Phila., PA: Lippincott, Williams & Wilkins.

RECOMMENDED TEXTS:

Morgan, E.G., Mikhail, M. S., & Murray, M.J. (2006). *Clinical Anesthesiology* 4th Ed. New York: Lange Medical Division/McGraw-Hill Companies, Inc.

McPhee, S.J., Lingappa, V.R., Ganong, W.F., Lange, J.D. *Pathophysiology of Disease: An Introduction to Clinical Medicine*, 6th Ed., New York, Lange Medical Books/McGraw-Hill, 2006. ISBN: 007144159X.

Netter, F.H., & Hanson, J.T. (2010). *Atlas of Human Anatomy*. 5th Edition. Missouri: Elsevier Saunders.

WEEKLY TOPICAL OUTLINE:

Day/Time	Topic	Objective	Readings
Week 1 9/9/2013 J. Libonati	Cardiac electrophysiology	1-14	R&B Ch. 11-12. N&P Ch. 23. Barash Ch. 10.
Week 2 9/16/2013 J. Libonati	Excitation-contraction coupling	1-14	N&P Ch. 23. R&B Ch. 13-14. Barash Ch. 10.
Week 3 9/23/2013 J. Libonati	Vascular Physiology, Microcirculations	1-14	N&P Ch. 24-26. R&B Ch. 15-17. Barash Ch. 10.
Week 4 9/30/2013 J. Libonati	Vascular Physiology, Special circulations	1-14	N&P Ch. 23. R&B Ch. 15-17. Barash Ch. 10.
Week 5 10/7/2013 L. Winner	Exam #1 (CV Physiology)		Information from weeks 1-4.
Week 6 10/14/2013 L. Winner	Gerontology Lecture	27	Barash Ch. 33. M&M Ch. 45. N&P Ch. 49.
Week 7 10/21/2013 R. Lynn	Liver Physiology Lecture	21-23	N&P Ch. 30. R&B Ch. 27. Barash Ch. 45.
Week 8 10/28/2013 K. Wiltse-Nicely	Hematology Lecture	23-26	N&P Ch. 34. R&B Ch. 9. Barash Ch. 16.
Week 9 11/4/2013 L. Winner D. Bent	Exam #2 (Gerontology, Liver, and Hematology) Immunology Lecture	 28-32	Information from weeks 6-8. N&P Ch. 41. R&B Ch. 10. Barash Ch. 13.

Week 10 11/11/2013 M. Ames-Connor	Formation of urine, GFR, and the factors that influence it.	14-20	M&M Ch. 31. N&P Ch. 29. Barash Ch. 49. R&B Ch. 22-24.
Week 11 11/18/2013 9a-4p Dr. Gaiser	Muscle Relaxants (N580)	Information on N580 syllabus	Information on N580 syllabus
Week 12 11/25/2013 M. Ames-Connor	Renal regulation of Fluid, pH, and electrolytes	14-20	M&M Ch. 31. N&P Ch. 29. Barash Ch. 49. R&B Ch. 22-24.
Week 13 12/2/2013 Augoustides L. Winner	Case Discussions N682 & Review of Cardiovascular semester content from N580		Information on N580 and N682 syllabus
Week 14 12/9/2013	Exam #3 (Immunology & Renal)		Information from weeks 9-13.
Week 15 12/11-12/2013	Reading Days		
Week 16 12/13-20/2013	Final Exams		

TOTAL NUMBER OF THEORY HOURS: 45

TOTAL NUMBER OF CLINICAL HOURS: 0