LANCASTER GENERAL COLLEGE OF NURSING AND HEALTH SCIENCES
Cardiovascular Invasive Specialty

SYLLABUS
Fall Term

I. Title: CIS 215 Hemodynamics

II. Course Description: This course is designed for students to gain knowledge in therapeutic cardiovascular procedures, normal and abnormal hemodynamic waveform analysis, and calculations.

III. Prerequisite: Anatomy & Physiology I and II

IV Co Requisite: CIS 200 Cardiovascular Anatomy & Physiology
CIS 205 Invasive Procedures
CIS 210 Cardiology lab/Clinical
CIS 220 Rhythm Analysis & 12 Lead ECG

V. Placement: Fall Term

VI. Time Allotment: Theory 45 hours

VII. Faculty: William L. Fisher, M.Ed., RCIS
Office: LGCNHS Building, Phone: 544-4700 ext.44700
Pager: 544-5123 #1046

VIII. Credits: Three

IX. Evaluation: A. Theory Grade

Instrument	**Weight**	**Time/Date**
Unit Exams	30%	Weeks 3,6,9,12
Comprehensive Final Exam	25%	Final Exam Week
Quizzes	15%	
Hemodynamic Project	20%	Weeks 14-15
Class Participation	10%	Weeks 1-15

***A grade of "C" (2.0) is required to pass the theory portion of the course.**

X. Textbooks: Ahrens, T. & Taylor, L. (1992). Hemodynamic Waveform Analysis. Philadelphia: W.B. Saunders Company.

Grossman, W. & Baim, D. (2005). Cardiac Catheterization Angiography & Intervention. (7th ed.). Baltimore: Williams & Wilkins

Supplemental Readings: Kern, Morton. The Cardiac Catheterization Handbook, 4th Edition. Mosby Yearbook, Inc. 2003.

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XI. Course Objectives: Given the theoretical and clinical experiences, at the completion of Hemodynamics, the student will:

1. Interpret waveform morphology of each cardiac chamber.
2. Identify normal cardiac pressures.
3. Apply technical considerations to achieve accurate hemodynamic data.
4. Apply clinical applications of hemodynamic data to derive accurate calculations.
5. Describe the significance of “pullbacks”.
6. Given several hemodynamic tracings, measure systolic, diastolic and mean pressures.
7. Given hemodynamic data, solve the following calculations: cardiac output, cardiac index, stroke volume, pulmonary vascular resistance, systemic vascular resistance, valve area and shunts.

XII. Program Policies: Students are held accountable for all policies in the Student Handbook and any revisions made to those policies during the academic year.

XIII. Class Guidelines:

A. Importance of Attending Class

Cardiovascular education comprises more than just private reading and passing of exams. Students should recognize that active and informed participation in class is essential to the development of their intellectual abilities and scholarly growth. Students must also recognize the importance, for both the present and the future, of achieving an academic record that reflects their intellectual ability. Such records are seldom achieved without regular attendance and participation in class activities. Attendance will be taken.

B. Student Responsibility for Missed Material

Students are responsible for all material presented and announcements made in class, regardless of attendance. It is the student's responsibility to obtain materials and assignments if absent.

C. Unit Examinations

Examinations should only be missed in extenuating circumstances. A student who misses an examination will be required to make up the examination on the next day of lecture. Contact the instructor, prior to the next lecture day to make arrangements to take the exam.
A student who misses an examination, regardless of the reason, will have ten percent (10%) deducted from the grade achieved on the exam.
Example: The exam is worth sixty (60) points, the student takes the exam and achieves a grade of 52/60. The score of 52 is then decreased by ten percent (10%) or five (5) points, thus the grade on the exam will be 47/60.

An alternate examination may be given for the make-up examination.

D. Class Behavior

Once class has started, the instructor has the prerogative not to admit students into lecture. Students will be dismissed from class for any inappropriate behavior.

XIV. Other:

A. Academic Dishonesty and Plagiarism

Academic dishonesty violates the spirit and purpose of an academic community, and is therefore subject to disciplinary action. Academic dishonesty includes cheating on examinations and unauthorized duplication of work.

Plagiarism is an act of academic dishonesty. Any work submitted that is not your own is an act of plagiarism. In preparing assignments, you must acknowledge in writing, any use of outside sources or any assistance you received in preparing an assignment. All written work must be submitted adhering to LGCNHS guidelines.

If an instructor believes that a student has committed an act of academic dishonesty or has plagiarized material, the instructor may award a failing grade for that assignment to the student. If the occurrence is during an examination, the student will receive a zero for that portion of their grade and must leave the room.

If the student disagrees with this decision, the student may follow the grievance procedure.

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XVI.

CONTENT	HOURS	STUDENT ACTIVITIES	COURSE OBJECTIVE
Normal Pulmonary Capillary Wedge(PCW) & Central Venous Pressure (CVP) Waveforms EKG correlation with waveforms Relationship between Pulmonary Artery Diastolic (PAD) & PCW Confirming a PCW tracing Variations in waveform appearance	3	**Required Readings:** Ahrens, T. & Taylor, L. – Chapter 2. **Classroom Activities:** Lecture PowerPoint Practice waveforms	1,2
Abnormal PCW & CVP Waveforms A wave variation Large V waves	3	**Required Readings:** Ahrens, T. & Taylor, L – Chapter 3. **Classroom Activities:** Lecture PowerPoint Practice waveforms	1,2
Normal Arterial Waveforms Measuring arterial systolic and diastolic values Ventricular waveforms Normal arterial pressures and configurations Problems in reading diastole	3	**Required Readings:** Ahrens, T. & Taylor, L – Chapter 4. **Classroom Activities:** Lecture PowerPoint Practice waveforms	1,2
Abnormal Arterial Waveforms Dysrhythmias Intrathoracic pressure changes Valvular disturbances Accuracy of arterial line versus sphygmomanometer	3	**Required Readings:** Ahrens, T. & Taylor, L – Chapter 5. **Classroom Activities:** Lecture PowerPoint Practice waveforms	1,2
Respiratory Influence on Waveforms Artifact versus actual pressures Spontaneous breathing Assisted mandatory ventilation	3	**Required Readings:** Ahrens, T. & Taylor, L – Chapter 6. **Classroom Activities:** Lecture PowerPoint Practice waveforms	1,2,3,4

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CONTENT	HOURS	STUDENT ACTIVITIES	COURSE OBJECTIVE
Technical Considerations in Obtaining Hemodynamic Waveform Values Technical issues Waveform measurement Catheter tubing component Transducer/amplifier system Specific problems in monitoring Artifacts in pressure waveform	3	**Required Readings:** Ahrens, T. & Taylor, L – Chapter 7. **Classroom Activities:** Lecture PowerPoint Practice waveforms	1,2,3,4
Clinical Application of Hemodynamic Data Principles PCW & MVO_2 (myocardial oxygen consumption) Interaction of parameters determining stroke volume (SV)	3	**Required Readings:** Ahrens, T. & Taylor, L – Chapter 10. **Classroom Activities:** Lecture PowerPoint Practice waveforms	1,2
Treatment of Hemodynamic Disturbances Treatment guidelines Decrease in SV secondary to loss of contractility Increasing Preload Elevating the Systemic Vascular Resistance (SVR)	3	**Required Readings:** Ahrens, T. & Taylor, L – Chapter 11 **Classroom Activities:** Lecture PowerPoint Practice clinical scenarios	1,2
Pullback Identification Relation to adjacent cardiac chambers Significance of waveforms and relation to valvular competence/stenosis	3	**Required Readings:** Read handouts	1,2,5

CONTENT	HOURS	STUDENT ACTIVITIES	COURSE OBJECTIVE
Valvular Stenosis Aortic stenosis Mitral stenosis Tricuspid stenosis Pulmonic stenosis	3	**Required Readings:** Grossman – Chapters 10 and 28 **Classroom Activities:** Lecture PowerPoint	1,2,3,4,6,7
Valvular Insufficiencies Aortic insufficiency Mitral insufficiency Tricuspid insufficiency Pulmonic insufficiency Physiologic effects of valvular insufficiency on cardiac function	3	**Required Readings:** Grossman – Chapter 28 **Classroom Activities:** Lecture PowerPoint	1,2,3,4,6,7
Constrictive, Restrictive, Cardiac Tamponade Pressures Constrictive pericarditis Restrictive cardiomyopathy Cardiac tamponade	3	**Required Readings:** Grossman – Chapter 31 and 32 **Classroom Activities:** Lecture PowerPoint	1,2,3,4,6

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CONTENT	HOURS	STUDENT ACTIVITIES	COURSE OBJECTIVE
Valve Orifice Area Calculations Gorlin formula Aortic valve Mitral Planimetry Relationship between valve area, cardiac output, pressure gradients and areas under the curve with respect to hemodynamic waveforms	3	**Required Readings:** Grossman – Chapter 10 **Classroom Activities:** Lecture PowerPoint	1,2,3,4,6,7
Cardiac Output/Shunt calculations Cardiac output Definition Equation Various methods of determining cardiac output Pathological Conditions causing intracardiac shunts Oxygen saturations in the determination of intracardiac shunts Calculation of shunt magnitude	3	**Required Readings:** Grossman – Chapter 8 and 9 **Classroom Activities:** Lecture PowerPoint	1,2,3,4,6,7
Vascular Resistance Poiseuille's Law Calculations of vascular resistance Systemic vascular resistance Pulmonary vascular resistance Mean pressure formula Resistance Units Hybrid Resistance Units Absolute Resistance Units Normal values **LV Performance Calculations** Ejection Fraction Calculation Kinesia terminology	3	**Required Readings:** Grossman – Chapter 8 **Classroom Activities:** Lecture PowerPoint **Required Readings:** Grossman – Chapter 16	1,2,3,4,6,7