



# LINCOLN UNIVERSITY

## DI 235 – Echo Imaging

**Credit:** 4 units = 3 units of lectures and 1 unit of laboratories  
(45 hours of lectures and 30 hours of laboratories)

**Lectures:** Wednesday 6:30pm-9:15pm

**Instructor:** Dr. Alena Pershay, RDMS

**Contact:** rubelena@yahoo.com

**Laboratories:** Monday 3:30pm-6:15pm (9/10/2018-11/19/2018)

**Instructor:** Mr. Delbert Davis

**Contact:** sfbayn8tive@gmail.com

**Office Hours:** By appointments

### Required textbook:

#### ULTRA P.A.S.S.

Adult echocardiography Workbook includes U/S Technology and Physics

Written by: Patrick Coon, RDCS, RVT, FASE

ISBN#: 978-1-934864-16-6

#### ATLAS OF ECHOCARDIOGRAPHY

Volume Editors: Mani A. Vannan, Roberto M.Lang

Harry Rakowski, A.Jamil Tajik

ISBN#: 1-57340-217-6

#### FEIGENBAUM'S ECHOCARDIOGRAPHY

Sixth Edition

ISBN#: 13: 978-0-7817-3198-0

Additional recommended textbooks and instructional materials will be given during classes.

**Pre-Requisite:** DI125

### Course Description

Review of imaging methods and technology based on 2-dimensional echocardiography. Applications to recording and interpretation of echo imaging for detection of heart abnormalities are emphasized. (4 units)

### Learning Objectives

Upon satisfactory completion of this course, the students will be able to:

- Utilizing Two-dimensional echocardiography, identify and assess the normal anatomical structures of the heart and great vessels.

DI 235 Syllabus

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- 2D/M-mode Anatomy – identify basic two dimensional and M-mode anatomy and the structures contained within each image displayed.
- 2D and M-mode Measurements – perform basic two dimensional and M-mode measurements for each structure. Perform basic LV linear measurements and calculations.
- Spectral and Color Doppler – identify direction of and velocity information given in the color and spectral Doppler images/waveforms.
- Basic Doppler Calculations – perform basic Doppler calculations, i.e., stroke volume, cardiac output and valve areas.
- Cardiac Physiology – explain the electrical and mechanical events within the cardiac cycle.
- Cardiac Hemodynamics – explain normal hemodynamic parameters, including intracardiac pressure and oxygen saturation.
- Basic EKG and Auscultation – describe the normal EKG and commonly encountered abnormal EKG findings. Explain normal and abnormal heart sounds and their relationship to the cardiac cycle.
- Systolic Function – Describe basic echocardiographic measurement parameters to assess LV and RV systolic function.
- LA, RA, and RV Function – Explain and describe the basic echocardiographic measurement parameters that assess LA, RA and RV normal and abnormal function.
- Pharmacology – Name basic cardiac medications and their affect on the heart. Cite medications given for the most commonly encountered cardiac abnormalities, i.e., CHF, arrhythmias, etc.
- Normal Examination – Describe the ASE recommended views and measurements in the complete normal transthoracic echocardiogram.

### Course Learning Outcomes

	Course LO	Program LO	Institutional LO	Assessment Activities
1	Identify each anatomic region and segment of the heart from any given echocardiographic view; relate it to its usual coronary distribution.  Identify abnormalities of resting cardiac wall motion and thickening using standard terminology; classify each according to its clinical significance	PLO 1 PLO 3	ILO 1a, ILO 2a, ILO 3a, ILO 4a	In-class activities
2	Discuss the basis, significance, and pitfalls of the following measures of cardiac function (ejection fraction & fractional shortening; % Wall	PLO 2	ILO 1a,	In-class activities, lab activities,

	thickening; MAPSE, TAPSE; Stroke volume; Cardiac output; Cardiac index; LV mass).			quizzes
3	<p>Identify and differentiate ventricular hypertrophy by chamber, type, and degree.</p> <p>Identify, stratify, and discuss the clinical significance of pericardial effusion in the assessment of suspected tamponade.</p> <p>Identify and discuss the image and Doppler parameters associated with subaortic obstruction.</p>	PLO 3	ILO 1a, ILO 4a	In-class activities, lab activities, quizzes, midterm and final exams

### INSTRUCTIONAL METHODS:

The lectures and other reading material will be provided by email or electronic format:

- Assigned text readings and lecture outlines (handouts)
- Internet resources
- Group discussions and ultrasound case analysis
- Quizzes & examinations
- Working with ultrasound machines
- Hands-on ultrasound laboratory trainings (protocols-handouts)
- Ultrasound laboratory live and video demonstration
- **Students' Ultrasound Hands-on** self study trainings

### REQUIREMENTS:

- This is a lecture-lab course in which lecture topics are presented by the instructor (teacher), and the ultrasound hands-on lab practice is explained and demonstrated by the Lab Instructor (explanations and demonstrations by the lab instructor).
- The student is expected to be prepared in advance before the class sessions.
- Being prepared includes the following: having read text materials (e.g., textbook readings, and lecture outlines) assigned for that day's activities and bringing required work materials (e.g., textbook, handouts, writing supplies, etc.) to the session.
- Home works will include reading the topic (s) one week ahead of time.
- The student is expected to attend and participate in all course lectures and activities, and complete all quizzes, examinations and course assignments on time. Therefore an attendance and being on time are crucial to your final grade.
- The student must budget time efficiently and be realistic about all personal and professional commitments that consume time.

## **Academic Honesty**

The University maintains a strict policy concerning academic dishonesty, which includes cheating, plagiarism, giving assistance on an examination or paper when expressly forbidden by the instructor, and any other practices which demonstrate a lack of academic integrity. It is the responsibility of the student to know and to adhere to principles of academic honesty. A student found guilty of academic dishonesty will be subject to academic sanctions ranging from failure on the assignment to failure in the course too.

## **Ultrasound hands-on laboratory training**

Ultrasound hands-on laboratory will involve primarily students' demonstration of the knowledge presented during lectures. Practical experience will gain under the guidance of a supervisor (instructor). The syllabus set out includes a competency assessment sheet for training. This should be completed the course of training, as it will help to determine in which area(s) the student can practice independently. Students are expected to arrive to class on time, and stay through the end of Ultrasound laboratory class.

## **Ultrasound Hands-on Laboratory Examination**

During the Hands-On Lab Examination, students should demonstrate:

1. The understanding of the information presented primarily during the lectures and hands-on laboratory training.
2. The knowledge of the anatomy, physiology, normal variations, and pathology of the human body
0. In-depth knowledge of the ultrasound scanning protocols and the ability to present images in a logical sequence.
3. The use of different acoustic windows to achieve the best picture quality possible.
4. The ability to select the proper transducer for the exam
5. The knowledge of the ultrasound machine capabilities for the optimal quality of diagnostic images (frequency, TGC, B-mode, focal zones, color scale, gain, depth, etc).
6. The ability to describe optimal techniques related to field size, power, gain, and contrast for the image interpretation.
7. Knowledge of the elements of the image labeling
8. Explanation of the sonographic findings and differential diagnosis of abdominal pathology
1. Since the intent of the lab examination is for the student to demonstrate the knowledge of the scanning protocol, students are not allowed to ask questions and discuss the scanning procedures with classmates. Reference materials are not allowed.

## **Attendance and Participation:**

- > Students who are tardy, who arrive after the roll is taken, or leave before the end of class, will receive only half-credit for attendance.
- > Student shouldn't be late more than 10 min!
- > If you are late or absent, a valid excuse such as illness, family emergency, unforeseen heavy traffic or natural disaster is expected.
- > Administrative policies on ABSENCES FROM CLASSES are as follows:  
A student receives a WARNING NOTICE after missing 12% of all classes registered in a semester. A student is placed on PROBATION after missing 18% of all classes registered in a semester. A student may be DISMISSED after missing 30% of all classes registered in a semester.

## Homework:

The goal of the homework is to help students achieve the course learning objectives. Homework consists of two parts. First part is to read the textbooks and materials to review and analyze the lecture given during a previous class session. Students are expected to spend six hours for each class session outside of class in completing the reading assignments related to each lecture. These assignments are graded through short quizzes given at the beginning of the following class session. Second part of the homework consists of a project presented at the end of the course. Each student will choose the topic for presentation or will be assigned one by the instructor. The presentation should be approximately 10 minutes long and with 5 minutes for a discussion. The presentation should include ultrasound images related to the topic of presentation. The images need to be dated and should indicate the student's name. The topic and format for the presentation will be discussed in class for more details. A final draft of the presentation must be submitted for review one week prior to the presentation.

## Evaluation Criteria for Project:

- Clinical statement: 2%
  - Background information: 2%
  - Slide content: 2%
  - Slide design: 1%
  - Resolution of the problem: 2%
  - Oral presentation in class: 1%
- Total: 10% of all the course grading elements

## TESTING:

### Quizzes:

Students will take 10 quizzes; 10-20 questions each. These quizzes will address the detailed content and major concepts presented in the lectures, lecture outlines and text readings to evaluate students' work outside of the classroom. If a student takes more than ten quizzes, only the best ten quiz scores will be used in calculating the student's total points. Each quiz will be timed; 1 minute for every question to complete. No make-up quizzes for missed quizzes will be administered (students will receive no score for missed quizzes).

## Ultrasound Hands-on Laboratory Examination:

- During the final ultrasound hands-on examination, students will have to demonstrate understanding of information presented during lectures and hands-on laboratory training.
- Students have to perform different ultrasound protocols and demonstrate scanning technique and images in B-mode, M-mode, Color and Spectral Doppler.
- Students are required to schedule time and date 2-3 week ahead for Ultrasound hands-on laboratory examination.
- Students need to be at the Ultrasound Lab, ready to start scanning at the exact scheduled time. (It is recommended that students arrive about 15 minutes prior to the scheduled exam time.)
- If a student is late for the scheduled exam time, the time **CANNOT** be changed and the student **WILL NOT** get a full hour! The student will only have the remaining time left in the hour.
- Only one time **RETESTS** will be given to students with a valid excuse such as illness, family emergency, unforeseen heavy traffic or natural disaster.

## Lab Grading:

### \*Scanning Performance: 20%

Effective use of lab time, demonstrating development of scanning skills, applying scan techniques, effective use of ultrasound machine controls, IE: TGC, Depth PRF, Freq.

Transducers, and improving images on each patient. Complete/full participation and working during class time is expected. Students are encouraged to use open lab time as needed. Students are required to complete 20 hours in lab self-study (with 6 independently performed studies, which would represent date and student's name on each ultrasound image).

**\*Attendance: 10%**

Absences, late arrival, poor use of class times, early leaves will result in students' poor or failing grade.

**Midterm & Final examination**

- > The written examinations (multiple choice and true/false format are proctored and will be closed-book exams).
- > Midterm Exam (20%) will cover all topics have been taught up to the date of exam.
- > The second and last exam will cover all topics have been covered during semester.
- > The scantron machine will be used in grading multiple-choice tests.
- > A student must take the exam during the scheduled time period.
- > There are no make-up exams.

**Ultrasound Hands-on Laboratory Examination:**

- > Final ultrasound hands-on examination student have to demonstrate understanding of information presented primarily during lectures and hands-on laboratory trainings.
- > Students have to perform echocardiographic protocols and demonstrate scanning technique and images in B, Color, and M-mode.
- > Student will schedule time and date 2-3 week ahead to Ultrasound hands-on laboratory examination.
- > Student(s) need to be at the Ultrasound Lab – ready to start scanning at the exact time you scheduled your exam for. (It is recommended that you arrive about 15 minutes prior to your scheduled exam time.)
- > If a student is late for his/ her scheduled exam time – Your time CANNOT be changed and you will NOT get a full hour! If student late, he/she will only have the remaining time left in your hour. On exam days, you may come to class, but it is not mandatory until your scheduled exam time.

**Grading**

GRADING FACTORS		%
<b>LECTURE</b>	Final Exam	20
	Midterm Exam	20
	Quizzes	10
	Attendance	10
	Homework and Presentation	10
<b>LABORATORY</b>	Scanning Performance	20
	Attendance	10
<b>TOTAL</b>		100

%	Grades
100-94	A
93-90	A-
89-87	B+
86-84	B
83-81	B-
80-78	C+
77-76	C
75-74	C-
73-72	D+
71-70	D
69<	F

**Schedule: DI 235 – Echo Imaging**  
 Fall 2016

Date	Lecture
08/22/18	Review Standard Echo Procedures
08/29/18	Ventricular systolic function
09/05/18	Ventricular diastolic function. Spectral and Color Doppler exam. Assessment of LV syst and diast FX
09/12/18	Valvular Heart Disease Assessment (2D, Doppler, M-Mode) of Aortic, Mitral, Pulmonic and Tricuspid valves
09/19/18	Valvular disorders. Mitral Valve.
09/26/18	Valvular disorders. Tricuspid Valve.
10/03/18	Valvular disorders. Pulmonic Valve.
10/10/18	Ischemic Cardiac Disorders Introduction to evaluation of LV syst fx using modified Simpson's rule.
10/17/18	Cardiac wall segment evaluation
10/24/18	<b>Midterm Examination</b>
10/31/18	Introduction to Stress Echocardiology
11/07/18	Pericardial Disease Ability to identify pericardium
11/14/18	Systemic and pulmonary hypertensive heart disease Tricuspid and pulmonary valves assessment
11/28/18	Cardiomyopathies Assessment of LV function, using 2D, M-Mode, and Doppler studies

12/05/18	Final Exam
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## Lab Schedule:

Date	Lab
09/10/18	Spectral and Color Doppler Examination
09/17/18	2-D Linear and Volumetric measurements, Doppler Assessment of Ventricular Systolic Function
09/24/18	Doppler Assessment of Left Ventricle Diastolic Function
10/01/18	Tricuspid & Pulmonary Assessment
10/08/18	Aortic valve assessment
10/15/18	Mitral valve assessment
10/22/18	Wall Motion Assessment
10/29/18	Suprasternal notch window-short & long axis 2D, Duplex
11/05/18	Full protocol
11/19/18	Final Exam

Syllabus updated: 08/21/2018

**Note:** Instructor may change this syllabus and course schedule at any time according to the judgment as to what is best for the class. Any changes will be declared ahead of time in class.

