



LINCOLN UNIVERSITY

DI 235 – Echo Imaging

Spring 2015 Course Syllabus

DATES: 01/20/2015 – 05/11/2015

COURSE NUMBER: DI 235

COURSE TITLE: Echo Imaging

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

LECTURES: Tuesdays 6:30 pm – 9:15 pm

INSTRUCTOR: Oxana Ostanina, MD, RDCS

LABORATORIES: Mondays 6:30 pm – 9:15 pm (02/09/15-04/20/15)

INSTRUCTOR: Diana Wagle, RDCS

OFFICE HOURS: By appointment, e-mail: ostanina@lincolnuca.edu

RESOURCE OF MATERIALS:

Textbook of Clinical Echocardiography, 4th edition, Catherine M. Otto, MD, 2009

ISBN-10: **1416055592**, ISBN-13: **978-1416055594**

Echocardiography Review Guide: Companion to the Textbook of Clinical Echocardiography 2nd edition, Catherine M. Otto and Rebecca G. Schwaegler, 2011

ISBN-10: **1437720218**, ISBN-13: **978-1437720211**

Echocardiographer's Pocket Reference, 3rd edition [Spiral-Bound], 2008, Terry Reynolds

ISBN-10: **001405101X**, ISBN-13: **978-0014051014**

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

COURSE DESCRIPTION:

Review of echo imaging methods based on 2-dimensional echocardiography. Applications of the technology for recording and for detection of heart abnormalities, their interpretations are emphasized. (4 units) *Prerequisite: DI 125*

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.
- 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 – obtain basic Doppler waveforms for calculations, i.e., stroke volume, cardiac output.
- Cardiac Physiology – explain the electrical and mechanical events within the cardiac cycle.
- Cardiac Hemodynamics – explain normal hemodynamic parameters, including intracardiac pressure and oxygen saturation. Estimation of pressures in cardiac chambers.
- 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.
- Diastolic function - Describe basic echocardiographic measurement parameters to assess LV and RV diastolic function.
- LA, RA, and RV Function – Explain and describe the basic echocardiographic measurement parameters that assess LA, RA and RV normal and abnormal function. Perform volumetric measurements of cardiac chambers.
- 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.

INSTRUCTIONAL METHODS:

The reading material will be provided in an electronic format. You will find a folder "ECHO" with weekly tasks in the DropBox from Google. Instructions on how to use DropBox will be given during the first class meeting.

- 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.

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.
- Students are not allowed to be late more than 15 minutes!
- 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.

CASE STUDY:

Choose the area of cardiac pathology that interests you and inform the instructor of your topic. Please write the paper that addresses the points listed below, diagrams and/or illustrations are a good addition to the paper. There is no set number of pages for this project yet I would suggest 4 to 6 pages would be needed. You should plan to write as many pages as necessary in order to adequately address each and every one of the items listed below. On separate page, site all sources used for this project.

- Describe the cardiac pathology including clinical signs and symptoms; etiology of the disease (use Terry Reynolds's Echasonographer Pocket Textbook as a reference).
- Describe the echo findings associated with this pathology: 2D/ M-Mode, Doppler findings. Your textbook is a good source.
- Describe formulas used to assess the pathology.
- Describe the treatment for this problem (medication, surgery).

PROJECT: Continue working on your flashcards (make 3-4 cards minimum on each pathology which is discussed during classes). Focus on echo signs, add pictures, EKG.

TESTING:

❖ **Quizzes and Home Work:**

There will be quizzes given over the course of 10-15 questions. Each quiz will be timed, 72 seconds for every question to complete. No make-up quizzes for missed quizzes will be administered (the student will receive no score for missed quizzes). There will be homework assignments given over the course of the semester. The due date for the

homework is the following class meeting.

❖ **Midterm & Final Examinations**

- The written examinations (multiple choice and true/false format are proctored and will be closed-book exams).
- Midterm Exam (20%) will cover chapters 6 through 10 in the *Clinical echocardiography by Otto, C.*
- The second and last exam will cover chapters 11 through 16.
- The Scranton 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-Modes, 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		%
LECTURE	Final Exam	20
	Midterm	20
	Quizzes	10
	Attendance lecture classes	10
	Presentation/project	10
LABORATORY	Performing of scanning protocol	20
	Attendance lab classes	10
TOTAL		100

90 - 100%	A
80 – 89%	B
70 – 79%	C
60 – 69 %	D
< 59 %	F

CLASS SCHEDULE:

WEEK	DATE	TOPICS	PRACTICE	HOME WORK
Week 1	01/20	Left and Right Ventricular Systolic Function, Assessment of Ventricular Systolic Function.		Home Work #1
Week 2	01/27	Ventricular Diastolic Function, Doppler Assessment of Left Ventricle Diastolic Function, Right Ventricle Diastolic Function.		Home Work #2
Week 3	02/03	Ischemic Cardiac Disease, Left Ventricle Walls Motion Assessment, Stress Echocardiography, Myocardial Infarction.		Home Work #3
Week 4	02/10	Cardiomyopathies, Heart Failure.	Perform color Doppler through valves and great vessels. Apply CW across of TV. PW and CW across the PV.	Home Work #4
Week 5	02/17	Hypertensive and Pulmonary Heart Disease. Pericardial disease. Tamponade. Midterm review.	Practice M-Mode of the AV, MV and LV chamber, LA. Perform basic measurement.	
Week 6	02/24	Midterm Examination (lectures)	Continue practice M-Mode of valves and chambers, start 2D measurements of the aortic root.	
Week 7	03/03	Valvular Stenosis. Aortic Stenosis Etiology, Hemodynamics. Doppler Quantitation of Stenosis Severity.	Practice 2D measurements of the aortic root, LA, LV chamber (linear dimensions).	Home Work #5
Week 8	03/10	Valvular Stenosis. Mitral Stenosis Etiology, Hemodynamics, 2-D Imaging, Doppler Quantitation of Stenosis Severity.	Practice volumetric measurements of the LV chamber for evaluation of LVEF (Simpson's method)	
Week 9	03/24	Valvular Regurgitation, Etiology of Aortic Insufficiency, Hemodynamics of Aortic Regurgitation, Basic Calculations.	Continue practicing measure LV volume and start LA and RV volumes.	Home Work #6

Week 10	03/31	Valvular Regurgitation, Etiology of Mitral Regurgitation, Hemodynamics of Mitral Regurgitation, Formulas and Calculations.	Practice obtaining PW and CW across the aortic valve. Perform basic measurements for calculations of SV, CO and AVA.	
Week 11	04/07	Tricuspid Valve Diseases, Tricuspid Stenosis, Pulmonary Valve Diseases, Pulmonary Stenosis.	Practice obtaining CW across MV and TV for evaluation of regurgitation.	
Week 12	04/14	Prosthetic Valves, Endocarditis.	Practice evaluation of diastolic function: PW of the MV, Pulmonary veins.	
Week 13	04/21	Cardiac Masses and Sources of Embolus.	Practice measurements PW waves of MV and PV; practice DTI and IVRT.	
Week 14	04/28	Diseases of the Great Vessels.	Perform all steps of diastolic function evaluation with basic measurements.	Case Study Due
Week 15	05/05	Final Examination.	Perform full protocol with color Doppler across valves and aorta; spectral Doppler across MV and AV.	

Syllabus Updated: 2/23/2015 (the syllabus is subject to change at any time)