



# LINCOLN UNIVERSITY

## DI 245 – Echo Scanning (Lab)

### Course Syllabus

Spring 2022

**Instructor:** Ms. Preetka Giri  
**Lab Class Schedule:** Wednesday, 12:30 pm – 3:15 pm, Thursday, 2:15 pm – 5:00 pm  
**Credits:** 3 units / 90 Lab hours  
**Pre-requisites:** *DI 235*  
**Level:** Advanced (A)  
**Office Hours:** By appointment  
E-mail: [pgiri@lincolnuca.edu](mailto:pgiri@lincolnuca.edu)

#### TEXTBOOKS:

1. **Echocardiographer's Pocket Reference**, 3rd edition [Spiral-Bound], Terry Reynolds, 2008. ISBN-10: 001405101X
2. **The Normal Examination and Echocardiographic Measurements**, 2nd revised edition, Bonita Anderson, 2007. ISBN-10: 0646468634
3. **Echocardiography pocket guide: The Transthoracic Examination**, 1st Edition, Bernard E. Bulwer, Jose M. Rivero, 2010. ISBN-13: 978-0-7637-7935-1 (pbk.); ISBN-10: 0-7637-7935-0 (pbk.)

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

**Last Revision:** 12/1/2021

**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.

#### CATALOG DESCRIPTION

Scanning protocols and practices for the ultrasound examination of the heart. (3 units)

**LEARNING OBJECTIVES**

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

- Assist patients to and from the exam area.
- Explain the examination and instruct the patient properly.
- Describe a scanning survey and explain its importance prior to taking images.
- Explain the selection of the proper transducer for the exam.
- Explain the elements of image labeling.
- Describe optimal techniques related to field size, power, gain, and contrast for image interpretation.
- Present images in a logical sequence.
- Describe the anatomy, physiology, normal variations, and pathology of cardiac function, abnormalities of myocardium, pericardium and valves.
- Explain the significance of clinical tests relevant to pathology within heart.
- Explain the sonographic findings and differential diagnosis of findings.
- Be prepared for ARDMS (RDCS(AE)/CCI registry exam.

**COURSE LEARNING OUTCOMES<sup>1</sup>**

	<b>Course Learning Outcome</b>	<b>Program Learning Outcomes</b>	<b>Institutional Learning Outcomes</b>	<b>Assessment activities</b>
1	Describe the normal structural anatomy of the heart and the electromechanical events that control and determine its function.  Complete a systematic survey of the heart with 2-D and M-Mode ultrasound imaging; document and measure all structures in standard views and expand the protocol as required to document ambiguous findings or suspected pathology.  Relate 2-D image anatomy to its correlate M-mode pattern, compare and contrast each method of display.	PLO 1  PLO 2	ILO 1a,  ILO 2a,  ILO 3a	In-class activities
2	Demonstrate the technique to image the posteromedial apical fossa and LA appendage to inspect for thrombus.	PLO 3	ILO 1a,  ILO 4a	In-class activities, lab

<sup>1</sup> Detailed description of learning outcomes and information about the assessment procedure are available at the [Center for Teaching and Learning](http://ctl.lincolnuca.edu) website (ctl.lincolnuca.edu).

				activities, quizzes
3	<p>Identify and distinguish the characteristics of pedunculated vs. mural thrombus vs. tumor.</p> <p>Identify and distinguish the characteristics of valvular vegetative excrescence vs. fibrotic thickening.</p> <p>Document and measure the course of blood flow through the entire heart using color and spectral Doppler</p>	PLO 3	ILO 1a, ILO 4a	In-class activities, lab activities, quizzes, midterm and final exams

### ULTRASOUND HANDS-ON LABORATORY TRAINING

Ultrasound hands-on laboratory training will involve:

- Using the theoretical material presented during lectures as a basis for hands-on training.
- Applying theoretical knowledge to practice.
- Learning to follow proper ultrasound scanning protocols.
- Acquiring optimal quality of diagnostic images.
- Proper operating of ultrasound machines and maximizing the us machines' capabilities.
- Gaining practical experience under the guidance of the lab instructor.

### INSTRUCTIONAL METHODS

- In-class hands-on scanning, using ultrasound machines and other lab equipment.
- Live demonstration ultrasound imaging of organs and blood vessels.
- The instructor's guidance to developing students' scanning skills.
- Group work, discussions and ultrasound case analysis.
- Ultrasound laboratory video demonstrations and presentations.

### 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.

Assignments and projects require students to actively use resources of the library. A detailed guide to business resources of the library as well as the description of Lincoln University approach to information literacy are available at the [Center for Teaching and Learning](http://ctl.lincolnuca.edu) website (ctl.lincolnuca.edu).

### **Classroom etiquette**

Full effort and participation is expected. If you are not scanning, you should still be involved in the study. Class time is limited and very valuable, please do all you can to attend all class sessions on time and be ready to work when you get there. You are only doing yourself a disservice by not maximizing your time in class.

### **ATTENDANCE AND PARTICIPATION**

- Class attendance is required.
- Absences, late arrival, poor participation in class discussions, early leaves will result in failing grade.
- It is the responsibility of the student to make arrangements for all course work missed, and to notify the instructor about the reason the absence in advance.
- Excessive absence or tardiness may result in loss of credit, lowering of grade, or dismissal from the university.
- USING OF CELL PHONES IS PROHIBITED DURING THE CLASSES.

### **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 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.
3. In-depth knowledge of the ultrasound scanning protocols and the ability to present images in a logical sequence.
4. The use of different acoustic windows to achieve the best picture quality possible.
5. The ability to select the proper transducer for the exam.

6. 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.).
7. The ability to describe optimal techniques related to field size, power, gain, and contrast for the image interpretation.
8. Knowledge of the elements of the image labeling.
9. Explanation of the sonographic findings and differential diagnosis of abdominal pathology.
10. 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.

### **Midterm and Final Exams**

- Midterm and Final Exams will be performed on scheduled days in the presence of the lab instructor.
- The length of the examination will depend on the type of the ultrasound protocol.
- The score (%) will be determined by acquiring the ratio of the correct / incorrect images recorded by the student.
- Depending on the quantity of the required images of the particular protocol, each image will be valued at certain amount of points.
- The points for missed (or completely incorrect) ultrasound images will be subtracted from the total 100% score.
- The added score of the correct ultrasound images (according to the protocol requirements) will represent the total examination grade.

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

- students have to demonstrate understanding of information presented during 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 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.
- 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.

**GRADING**

All activities will be graded according to the points as shown below.

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Points	94-100	90-93	87-89	84-86	81-83	78-80	76-77	74-75	72-73	70-71	0-69

The final grade for the course will be given as the total weighted score for all activities according to the percentage shown in the table below.

<b>GRADING FACTORS</b>	<b>%</b>
Scanning Performance: Final Exam	50
Scanning Performance: Midterm Exam	25
Quizzes	10
Attendance	5
Project Presentation	10
<b>TOTAL</b>	<b>100</b>

**COURSE SCHEDULE**

<b>WEEKS</b>	<b>DATES</b>	<b>ULTRASOUND SCANNINGS</b>
<b>1&amp;2</b>		Review anatomical structures, normal measurements and ECHO protocol
		Normal measurements of the heart structures (Quiz)
<b>3</b>		Review Diastology of the normal adult heart
		Normal Diastology (Quiz). Review Abnormal diastolic function
<b>4</b>		Evaluation of abnormal LV diastolic function
		Diastology: written and hands on test
<b>5</b>		LV systolic function and geometry (measurements and evaluation)
		Simpson method, dP/dT, LV Mass Index, Strain
<b>6</b>		LV systolic function (Written quiz)
		LV systolic FXN and geometry hands-on test

7		Evaluation of the right heart (measurements)
		Pulmonary hypertension evaluation
8		Pulmonary hypertension written quiz and hands on test
		Stenosis (AS, MS)
9		Stenosis (TS, and PS)
		Regurgitations (MR, TR, PI, and AI)
10		Valve disease (Quiz) Valve disease hands-on test
		Cardiomyopathy
11		Pericardial diseases
		Cardiomyopathy (written quiz)
12		Midterm hands-on exam (Systology, Diastology, PHTN, Valvular pathologies, Cardiomyopathy).
		Stress Echo Indication, type, and reading Echo Stress Test (treadmill, bike, dobutamine)
13		Hypertensive heart (Systemic/Pulmonic) Stress Echo/CAD – (written quiz and hands-on test)
		Echo protocol Review, ICE, TEE indication and application
14		Congenital diseases
		Presentations (common intervention procedures)
15		Final Exam
		Make up class