LINCOLN UNIVERSITY

DI 125 – Introduction to Echocardiography

Course Syllabus

Spring 2026

Instructor:	Dr. Oxana Ostanina, MD, RDCS
Instructor Lab:	Dr. Oxana Ostanina, MD, RDCS
Lecture Schedule:	Tuesday, 9:00 AM – 11:45 AM (Lecture) Tuesday, 12:30 PM – 3:15 PM (Lab) **(02/10/2026 – 04/21/2026)**
Credits:	4 units: 3-unit lecture and 1-unit lab (75 total hours: 45 hours of lectures and 30 hours of lab)
Pre-requisites:	*DI 110, DI 115*
Level:	Developed (D)
Office Hours:	by appointment E-mail: ostanina@lincolnuca.edu (Dr. Ostanina)

TEXTBOOKS (Optional):

1. **ASE's** Comprehensive Echocardiography, 2nd edition, Roberto M Lang, Steven A Goldstein, Itzhak Kronzon, Bijoy K Khandheria, Victor Mor-Avi. 2016 **ISBN: 978-0-323-26011-4**
2. **The Echo Manual, 4th edition**, Jae k Oh, Gavan C Kane, James B Seward, A Jamil Tajik, 2019 by Wolters Kluwer **ISBN: 978-1-4963-1219-8**
3. **Echocardiography: The Normal Examination and Echocardiographic Measurements, 3rd edition,** Bonita Anderson, 2017 **ISBN: 9780992322212**
4. **Clinical Echocardiography, 4th edition,** Catherine M. Otto, **ISBN: 978-1-4160-5559-4**

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

COURSE DESCRIPTION

This introductory course focuses on normal heart anatomy, scanning techniques, modes of echocardiographic examination and cardiac hemodynamics. (4 units)
Prerequisites: DI 110, DI 115

LEARNING OUTCOMES

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

- Utilize Two-dimensional echocardiography to 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.
- Spectral and Color Doppler – identify direction and velocity information given in the color and spectral Doppler images/waveforms.
- 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.
- Normal Examination – describe the ASE recommended views and measurements in the complete normal transthoracic echocardiogram.

COURSE LEARNING OUTCOMES[1]

	Course Learning Outcome	Program Learning Outcome	Institutional Learning Outcome	Assessment
1	Understand the anatomy and physiology of the cardiovascular system and the cardiac conduction system.	PLO 1	ILO 1a, ILO 2a	In-class activities
2	Complete a systematic survey of the heart with 2-D and M-Mode ultrasound imaging; document and measure all structures in all standard views and expand the protocol as required to document ambiguous findings or suspected pathology.	PLO 2 PLO 5	ILO 1a	In-class activities, lab activities, quizzes
3	Relate 2-D image anatomy to its correlated M-mode pattern and compare each method of display.	PLO 3 PLO 5	ILO 6a, ILO 3a	In-class activities, lab activities, quizzes, midterm

[1] Detailed description of learning outcomes and information about the assessment procedure are available at the Learning Outcomes Assessment section of LU website.

				and final exams
4	Properly judge the quality of acquired data and communicate any limitations. State the normal range measurement values for each principal cardiac structure and physiologic function.	PLO 1 PLO 7	ILO 3a	In-class activities, quizzes, midterm and final exams
5	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 4 PLO 5	ILO 7a	In-class activities, lab activities, quizzes, midterm and final exams

INSTRUCTIONAL METHODS

 Lectures and assigned reading material

 Internet resources

Assignments and projects require students to actively use the library resources. A detailed guide to the library's business *resources and* a description of Lincoln University's approach to *information literacy* are available at the LU Library website (lincolnuca.libguides.com).

REQUIREMENTS

Ultrasound Hands-on Laboratory Training

Students will gain practical experience under the guidance of a lab instructor. Students are expected to arrive at class on time and stay through the end of the ultrasound laboratory class.

EVALUATION

Quizzes

- Students will take 8-10 quizzes throughout the course. These quizzes will address the material presented in the previous lectures, discussions, and text readings to evaluate students' work inside and outside the classroom.
- A quiz will consist of 10-15 questions, some combination of true/false, multiple choice, and "fill-in" questions.
- Each quiz will be timed, 1 minute per question to complete.
- The correct answers to the quiz and a relevant topic will be discussed and reviewed.
- **No make-up quizzes for missed quizzes will be administered** (students will receive no score for missed quizzes).

- The primary purpose of these quizzes is to encourage and reward the students' progress through the course materials.

Midterm & Final Examinations

- The Midterm consists of 100 questions and the final examination of 100 questions.
- The written examinations are proctored and will be closed-book exams.
- The Canvas will be used to grade multiple-choice tests.
- A student MUST take the exam during the scheduled period.
- A student missing an exam because of an illness or legitimate emergency may take a make-up exam as soon as possible after the student returns from the illness and as determined by the instructor. Absences covering such emergencies as serious illness or similar may be excused by the Dean provided the absence is properly documented.
- If no excuse is received by the Records Office, the student will be considered as having no excuse.

Ultrasound Hands-on Laboratory Examination

- In the Final ultrasound hands-on examination, students must demonstrate an understanding of information presented during lectures and hands-on laboratory training.
- Students have to perform echocardiographic protocols and demonstrate scanning techniques and images in B-, Color-Modes, and M-mode.
- Students will schedule the time and date 2-3 weeks ahead of the Ultrasound hands-on laboratory examination.

ATTENDANCE AND PARTICIPATION

- **Students who arrive after a roll is taken will be considered absent.**
- **Students are not allowed to be more than 5 minutes late.**
- **A valid excuse such as illness, family emergency, or natural disaster is expected if you are late or absent.**
- **Three late arrivals would affect the grade.**
- **If you are late because of unforeseen heavy traffic more than 1 time during the semester it will be considered an absence.**
- **If a student arrives late twice for one session (at the beginning of the class and after break more than 5 minutes late) will be considered absent.**
- There are no requirements to make up any work for a missed class. However, it is a student's responsibility to obtain notes from other class members from the class session you missed.
- Efficient use of the lab time, demonstration of the development of the scanning skills, effective use of ultrasound machines, and active participation during the class meetings are expected.

Students are expected to arrive at class on time and stay through the end of the laboratory class. Absence, late arrival, poor use of class time, and early leave will result in a lower grade.

COURSE GUIDELINES

- To complete this course, the students must pass the midterm and final exam portions with a 70% or better. **Students should attend all the class meetings – lectures and labs. However, considering possible urgent situations, students may be absent from a maximum of one class meeting with prior notice to the instructor.**
- The term grade is based on attendance, class activity, midterm, scanning performance, and final examination.
- If students have missed a class without a valid reason, no make-up will be allowed.
- **Midterm cannot be retaken.**
- **The final examination, if failed, can be retaken only once. If failed a second time, the subject is considered failed. The course is considered failed if a student fails the Lab final examination.** Dictionaries can be used during the class time. No electronic devices during the test time. A student must take the exam during the scheduled time. A student missing an exam because of an illness or legitimate emergency may take a make-up exam as soon as possible after the student returns from the illness and as determined by the instructor. In such a circumstance, the student should make every reasonable attempt to contact the instructor before the exam period is over (or as soon as possible). The make-up exams cover the same content as a missed exam, but the format may be different, and questions may be stated differently.
- **During the exam, any student observed in a situation that could be considered suspicious (e.g., an open book or notebook within his/her field of vision, looking around or checking a cell phone, or other wireless devices, helping the examinee-sonographer to take images by guiding manually or verbally, etc.) but no cheating is observed, will be warned. Once warned, any applicant found cheating on the exam will fail the exam and be prohibited from retaking the exam without permission from the dean**.
- Students cannot leave the room during the test/exam. As soon as a student leaves, his/her exam is considered finished.
- Lecture is not a substitute for textbooks. Students should read textbooks, review lectures from previous courses, and use other sources to prepare for the exam. The lecture is to guide the students to prepare for the course subjects.
- An instructor may dismiss a student from the course after missing 3 consecutive class meetings.

GRADING

Attendance and Participation	10%
Quizzes, Homework	10%
Midterm	20%
Final	30%
Lab: Scanning Performance 20% and Attendance 10%	30%
Total	100%

100-95	A
94-90	A-
89-87	B+
86-84	B
83-81	B-
80-78	C+

77-76	C
75-74	C-
73-72	D+
70-71	D
69≤	F

Classroom Protocol:

- All students are expected to display professionalism, in preparation for hospital work. That means arriving on time, remaining quiet when others are speaking, and paying attention to whoever has the floor in the classroom.
- Students are expected to treat faculty and fellow students with respect. For example, students must not disrupt class by leaving and reentering during class, must not distract the class by making noise, and must be attentive to comments being made by the instructor and peers.
- Never speak while the instructor is speaking.
- Always raise your hand to speak or leave your seat and wait for a response before speaking.
- **Disruptive behavior will not be tolerated**, including touching other classmates or their belongings.
- Students engaging in disruptive behavior in class will be asked to leave and may be subject to other penalties if the behavior continues.
- No drinking, eating, sleeping, or personal grooming is permitted during ultrasound laboratory classes and lectures.
- Please turn off your cell phones, and refrain from activities that disrupt the class (such as eating and walking in and out of the room while the class is in session).
- If you use a computer in class, it should not be disturbing for others, please use it only to take notes, access course materials from the course webpage, or locate information relevant to the class discussion. **Do not** use your computer, or cell phone to surf the web, check emails, or send/receive text messages, as these activities distract those around you (and decrease your chances of getting the most out of your time in class).
- No part of any class may be recorded on audio or video media without the consent of the instructor. You may make notes by hand.
- The presence of guests to listen to any part of a class requires the consent of the instructor.

ACADEMIC HONESTY

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

LECTURES SCHEDULE

Week	Topic	Lecture Objectives	Lab / Hands-On Practice	Assessment / Activities
1	Introduction to Echocardiography	Overview of echo, clinical applications, ASE exam expectations		Quiz: machine parts & terminology
2	Cardiac Anatomy & Physiology I	Chambers, valves, great vessels, conduction system		Image labeling exercise
3	Cardiac Anatomy & Physiology II	Coronary circulation, pressures, flow patterns	Familiarize with ultrasound machine, probe orientation identify structures on 2D images; trace chambers on PLAX/PSAX	Short-answer quiz
4	Ultrasound Physics & Instrumentation	Ultrasound physics, transducers, gain, depth, focus	Lab: identify LV, RV, LA, RA, aorta, pulmonary arteries Adjust machine settings to optimize images	Lab evaluation: image optimization
5	Image Artifacts & Optimization	Common artifacts and strategies to reduce them	Recognize and correct artifacts in lab scans	Quiz: artifact recognition
6	Standard 2D Echocardiographic Views I	PLAX, PSAX views, orientation, landmarks	Acquire PLAX/PSAX views; measure LV wall thickness & cavity	Lab checklist assessment
7	Standard 2D Echocardiographic Views II	A4C, A2C, subcostal, suprasternal views	Acquire each view; label key structures	Peer assessment: image labeling
8	Midterm Exam Day	Review and assessment	Practical scan exam (PLAX, PSAX, A4C, M-mode)	Written exam
9	M-mode Basics	Principles, LV/LA/aorta measurement, EF estimation	Acquire M-mode images; calculate EF	Lab worksheet: measurements
10	Doppler Principles I	Basics of PW, CW, color Doppler, flow direction	Acquire color Doppler; practice PW in LVOT & MV inflow	Quiz: flow direction & aliasing
11	Doppler Principles II	Integration with 2D images, velocities & gradients	Measure peak velocities across AV and MV; calculate simple gradients	Lab worksheet: Doppler measurements

12	**Introductory Pathology I**	**Recognize mild LVH, mild valvular regurgitation, small pericardial effusion**	**Identify pathologies in lab cases/images**	**Image recognition quiz**
13	**Introductory Pathology II / Project Introduction**	**Integrate normal and mild abnormalities; project guidelines**	**Perform complete standard echo scan**	**Assign semester project (case study or mini-review of normal vs mild pathology with images)**
14	**Case-Based Review & Project Work**	**Review semester content through mini-cases; project progress check**	**Lab: scan volunteer/patient; compare with normal values**	**Group discussion, project draft submission**
15	**Final Exam Day (2 days)**	**Comprehensive assessment covering theory & practice**	**Full 2D + M-mode + Doppler acquisition**	**Written + practical exam; final project submission and presentation**

LAB SCHEDULE: **02/10/2026 – 04/21/2026**

1. Ultrasound ergonomics for a cardiac sonographer, entering data, patient preparation for the scanning, practice parasternal views.
2. ECG tracing optimization. Image optimization, B-color map, systole, and diastole. Practicing parasternal views, and identification of left and right heart structures.
3. Practicing PLAX and PSAX, image optimization, and electrical and mechanical events correlation.
4. Practicing 2D imaging optimization of images and using zoom on valves.
5. Continue practicing 2D-imaging PLAX, PSAX, and APICAL VIEWS.
6. Midterm scanning exam.
7. Practice the sequence of the images and optimization PLAX, PSAX, Apical, Subcostal, and SSN VIEWS.
8. Practice the sequence of the images and optimization PLAX, PSAX, Apical, Subcostal, and SSN VIEWS.
9. Practice the sequence of the images and optimization PLAX, PSAX, Apical, Subcostal, and SSN VIEWS.
10. Final scanning exam.

SCANNING LAB RULES

Students must wear a university uniform with a logo, face mask, and face shield in the Lab.

Lab Hours:

- **Lab hours are posted on the front door.** Please respect class time, try not to enter when a class is in session, or be quiet if you come late.
- **Use the student subjection envelope for questions or concerns.**
- **Sign in on the preferred machine** with your name, start time, and finish time. You must re-sign in if you want to continue to scan after you finish it. Ask a lab assistant.
- Students are encouraged to use open lab time as needed. **A minimum of *10 lab hours* of** independent scanning throughout the semester should be recorded in a log sheet as a part of each student's hands-on self-study training.

Respect Others and Lab:

- **No eating or drinking in the lab.**
- **No perfume or scented lotion if you are present in the lab.**
- **No long nails.**
- **No cell phones** (exit the room if have to use a phone).
- **Clean up working space** (table, transducer, put away chairs and other equipment, trash, etc.).
- **Inform the instructor or staff of needed supplies or equipment broken.**
- **Keep a low tone of voice.** The lab is small; speaking loudly can be disruptive for students who need their concentration on scanning.
- **Do not interrupt students' scanning time.** Ask the students whether it is okay to ask them questions while they are scanning.
- Never leave your **personal property** unattended. Although Lincoln University does have zero tolerance for theft, the university is not responsible for lost or stolen items. Any students caught stealing will be prosecuted.
- **Please do not remove any objects from the lab** (books and study materials).
- **Leave personal conversation outside the lab.**
- **Outside patients:** reconcile with instructor or Lab assistant.
- **No children are allowed in the lab.**

Machines (Acuson, Phillips, and GE):

- Please shut down the machine after the scanning class and check the cords, they should not be on the floor.
- Do not erase any information on machines (only instructors and lab assistants may do).
- Please inform lab assistants of missing supplies (baby wipes, paper towels, gel).
- Wipe down the transducer and cords after every patient, using the antiseptic spray/wipes.
- Change the paper after every patient, and place a pillow under the paper, not on top.
- Please safely move around the equipment (ultrasound machines, patient tables).

Syllabus Revised on 01/2026 (the syllabus is subject to change at any time).