LINCOLN UNIVERSITY

DI 110 – Ultrasound Principles and Protocols

Course Syllabus

FALL 2023

Instructor:	Dr. Khatia Mania (Lecture). Ms. Marina Kay (Lab)
Lecture Schedule:	Wednesday 9:00 – 11:45am (Lecture) Friday 9:00 – 11:45 am (Lab) 09/08/2023 – 11/17/2023
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 10, DI 30
Level:	Developed (D)
Office Hours:	By appointment: Wednesday 8:30 – 9:00 am; 11:45 am – 12:30 pm; 3:15 – 4:30 pm. Thursday 8:30 – 9:00 am; 11:45 am – 12:30 pm; 3:15 – 4:30 pm. **E-mail:** mania@lincolnuca.edu (Lecture) **Telephone:** (510) 238-9744 **mkay@lincolnuca.edu** (Lab)

TEXTBOOKS:

1. **Sonography Scanning: Principles and Protocols** by Betty Bates Tempkin, 4th edition (2014), ISBN-10: **1455773212**, ISBN-13: **978-1455773213**
2. **Sonography: Introduction to Normal Structure and Function** *by Reva Arnez Curry, Betty Bates Tempkin, 3rd edition (2010)*
   ISBN-10: **1416055568**, ISBN-13: **978-1416055563**
3. **Appleton & Lange Review for the Ultrasonography Examination** (Appleton & Lange Review Book Series) by Carol A. Krebs, Charles S. Odwin, Arthur C. Fleischer
   4th edition (2012), ISBN-10: **007163424X**, ISBN-13: **978-0071634243**

Last Revision:	August, 2023
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

This course includes introduction to abdomen and small parts, OB/GYN and vascular scanning, basic study of the structure and function of the human body. Upon completion, students should be able to demonstrate basic understanding of the fundamental principles of scanning of different organs. (4 units)

COURSE OBJECTIVES

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

- Assist patients to and from the exam area
- Explain the methods for identifying the patient
- Explain the examination and instruct the patient properly
- Describe a scanning survey and explain the importance of a survey prior to taking images
- Explain the selection of the proper transducer for the exam
- Explain the elements of film labeling
- Describe optimal techniques related to field size, power, gain, and contrast for interpretable images
- Demonstrate knowledge of presenting films in a logical sequence, justifying
- Define plane (planar) anatomy
- Describe the most basic protocol for scanning and labeling pathology

COURSE LEARNING OUTCOMES[1]

	Course Learning Outcome	Program Learning Outcomes	Institutional Learning Outcomes	Assessment activities
1	Understand the theoretical basis and physiological implications of diagnostic ultrasound procedures in the medical office and prepare the student for further professional training. Laboratory experiences in abdominal, OBGYN, and vascular studies.	PLO 1	ILO 4a	In-class activities, quizzes, midterm and final exams, case-studies in lab.
2	Prepare the patient examining room, take patient history and assist the physician during the ultrasound guided procedures. Provide basic patient care and comfort. Describe the preparation necessary for the examination.	PLO 2	ILO 1a, ILO 3a,	Lab activities, in-class activities.
3	Utilize oral and written communication. Select required/documentary images; label images according to standard protocols.	PLO 4	ILO 2a	In-class activities, quizzes, midterm and final exams

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

4	Demonstrate knowledge and understanding of human gross anatomy and sectional anatomy; understanding of acoustic physics, Doppler ultrasound principles, and ultrasound instrumentation; demonstrate knowledge and understanding of the interaction between ultrasound and tissue and the probability of biological effects in clinical examinations. Identify normal anatomical structures as demonstrated by sonography. Identify acoustic artifacts. Describe normal structures using correct sonographic terminology. Ensure images/views are adequately recorded.	PLO 1 PLO 5 PLO 7	ILO 7a	In-class activities, quizzes, midterm and final exams
5	Employ professional judgment and discretion. Utilize additional transducers and/or transducer frequency to obtain appropriate images. Locate the required anatomy using standard views and selecting the appropriate scan planes. Perform required measurements using calipers; uses software packages as applicable and/or perform manual calculations.	PLO 3 PLO 5	ILO 5a	In-class activities, quizzes, lab activities
6	Understand the fundamental elements for implementing a quality assurance and improvement program, and the policies, protocols, and procedures for the general function of the ultrasound laboratory.	PLO 1 PLO 6	ILO 5a, ILO 6a	Lab activities
7	Describe the basic operation, controls and features of the entire sonographic unit. Demonstrate safe handling and appropriate operation of the ultrasound unit, keyboard, transducer, cables and ancillary equipment. Clean transducer, cables and unit using appropriate methods and disinfection solution/wipes.	PLO 2	ILO 3a	In-class activities, quizzes, midterm and final exams, lab activities

INSTRUCTIONAL METHODS

Instructional methods will include lectures and in-class hands-on learning activities. Classroom activities are collaborative — students may and should help each other. The instructor will be available to help students with all tutorials and other assignments.

The previously described topics will be presented through the aid of the following activities:

- Reading assigned textbooks and lecture outlines (handouts);
- Demonstration of lectures by using the Power Point;
- Recommended study guide activities;
- Internet resources;
- Group discussions and ultrasound case analyses;

- Quizzes & examinations;
- Working with ultrasound machines;
- Hands-on ultrasound laboratory training (protocols handouts);
- Ultrasound laboratory live & video demonstrations;
- Students' ultrasound hands-on self-study training.

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

REQUIREMENTS

- This is a lecture-lab course in which lecture topics are presented by the instructor, and the ultrasound hands-on lab practice is explained and demonstrated by the lab instructor.
- Students are expected to be prepared in advance before the class sessions.
- Being prepared includes the following: having read text materials (e.g., reading textbooks and lecture outlines) assigned for each class session and bringing required work materials (e.g., textbook, handouts, writing supplies, etc.) to the session.
- Homework assignments will include reading the topic(s) one week ahead of time.
- Students are expected to attend and participate in all 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.
- Students should understand that "introductory" does not mean "easy".
- Students 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 students 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 the instructor. Students are expected to arrive at the class on time, and stay through the end of the ultrasound laboratory class.

COURSE GUIDELINES:

To successfully complete this course, the students must pass the quizzes, homework 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 maximum four class meetings with prior notice to the instructor. Three late arrivals would affect the grade.

The term grade is based on attendance, class activity, project, midterm and/or sum of quizzes, final examination and lab. Individual projects will be assigned at the beginning of the

semester. Project is due by the last meeting before the final examination. No project will be accepted after the due date.

If students have missed a class without a valid reason, no make-up for quizzes and presentations will be allowed. No make-up for missed or failed midterm. Final examination, if failed, can be retaken only once. If failed second time, the subject is considered failed. The course is considered failed if student fails Lab final examination. Dictionaries can be used during the class time. No electronic devices during the test time. Students must take the exam during the scheduled time 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. 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). While make-up exams will cover the same content area as a missed exam, the exam format and specific questions may be different.

During the written exam, any student observed in a situation that could be considered suspicious (e.g., an open book within his/her field of vision, looking around or checking a cell phone or other wireless devices, etc.) but no cheating is observed, will be warned. Once warned, any applicant found cheating on the written exam will be failed for the exam and prohibited from retaking the written exam without permission from the dean.

Students cannot leave the room during the test/exam. As soon as student leaves, his/her exam is considered finished.

Lecture is not a substitute for textbooks. Students should read textbooks and use other sources to be prepared for the tests. Lecture is to guide the students to prepare for the course subjects.

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 11 quizzes; 10-15 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 for missed quizzes will be administered if student doesn't provide supporting document to excuse the absence (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 primarily during the lectures and hands-on laboratory training.
- Students will have to perform different ultrasound protocols and demonstrate scanning technique and images in B-, Color-Modes, and M-mode.
- Students will have to schedule the time and date 2-3 weeks ahead of the 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 you arrive about 15 minutes prior to your scheduled exam time.)
- If you are late for your scheduled exam time, your time **CANNOT** be changed and you will NOT get a full hour! If you are late, you will only have the remaining time left in your hour.
- **Only one time RETEST 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 12 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.

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	93-100	90-92	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.

Activity		Percent
Lecture	Class Attendance	10%
	Quizzes	10%
	Project	10%
	Midterm Exam	20%
	Final Exam	20%
Laboratory	Scanning Performance	20%
	Attendance	10%
TOTAL		100%

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 the lecture and discussion, no matter who has the floor in the classroom.
- Students are expected to attend and be prepared for all regularly scheduled classes. If a student knows in advance that he or she will need to leave early, the student should notify the instructor before the class period begins.
- 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 class by making noise, and must be attentive to comments being made by the instructor and by peers.
- Never speak while the instructor is speaking.
- **Disruptive behavior will not be tolerated**.
- Students engaging in disruptive behavior in class will be asked to leave and may be subject to other penalties if the behavior continues.
- No eating, sleeping or personal grooming is permitted during lecture and ultrasound laboratory classes.
- Drinks only in closed container.
- 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 class is in session).
- If you use a computer in class, please use it only to take notes, to access course materials from the course webpage, or to locate information relevant to the class discussion. Do not use your computer to surf the web, check emails, or send/receive text messages, as these activities are distracting to those around you (and decrease your chances of getting the most out of your time in class).
- To encourage the free flow of conversation, no part of any class may be recorded on audio or video media without the permission of the instructor. You may record notes by hand or by typing into a mobile computer.
- The presence of guests to listen to any part of a class requires the consent of the instructor.

LECTURE SCHEDULE

08/23/2023 – General Principles. Scanning Planes & Scanning Methods
Patient's Safety and Ultrasound Ergonometric.
08/30/2023 – Ultrasound of the Liver. Quiz #1
09/06/2023 – Ultrasound of the Gallbladder & Biliary Tract. Ultrasound of the Pancreas Quiz #2
09/13/2023 – Ultrasound of the Kidneys & Adrenal Glands. Quiz # 3
09/20/2023 – Ultrasound of the Spleen. Quiz # 4
09/27/2023 – Ultrasound of the Scrotum & Prostate Gland. Quiz #5
10/04/2023 – Breast Sonography. Ultrasound of the Thyroid & Parathyroid Glands. Quiz #6. Review of midterm
10/11/2023 – Midterm Examination
10/18/2023 – Ultrasound of Blood Vessels. Abdominal Arteries & Veins. Quiz #7
10/25/2023 – Pelvic Sonography: Gynecological protocol. Quiz #8
11/01/2023 – Obstetrics Sonography: 1st trimester protocol. Quiz #9
11/08/2023 – Obstetrics Sonography: 2nd & 3rd trimesters protocol
11/15/2023 – Obstetrics Sonography: 2nd & 3rd trimesters protocol Quiz #10
11/29/2023 – Review and **Final Examination**
12/06/2023 – Presentations of Projects

DUE DATE

Due date for project: 12/06/2023

Summer 2023 DI 110 Laboratory Syllabus
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 ultrasound 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
- Students Self Study scanning: ***12 lab hours*** minimum of independent scanning throughout the semester

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, 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 students to demonstrate the knowledge of the scanning protocols, it is not allowed to ask questions and discuss the scanning procedures with classmates. Reference materials are not allowed.

Midterm / Final Exam Grading System

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 calculating the ratio of the correct / incorrect images acquired and recorded by the student.
Depending on the quantity, each image of the protocol 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.
To successfully complete this exam, the student must pass it with a total score 70% or better.

Grading Scale

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

Lab Term Grading (30% of the total DI 110 grade)
The term grade is based on: ----Midterm and Final examination grade (20% of the total DI 110 grade),
----Attendance (10% of the total DI 110 grade)

Lab Schedule

Dates	**Topics**
8- September	Scanning Methods and Approaches. Scanning Planes. Ergonomics. Ultrasound Scanning Protocol : Liver (1)
15 - September	Ultrasound Scanning Protocol : Liver (2)
22 – September	Ultrasound Scanning Protocol : GB & Biliary System
29 - September	Ultrasound Scanning Protocol: Pancreas. Spleen
6 – October	Ultrasound Scanning Protocol: Kidneys. Abdominal Blood Vessels. Aorta. IVC.
13 – October	MIDTERM EXAM
20 – October	Ultrasound Scanning Protocol : Thyroid Gland
27 – October	Gynecological Ultrasound Scanning. Scrotum and Prostate Gland Ultrasound.
3 – November	Breast Ultrasound Scanning. Obstetrical Ultrasound Scanning
17 - November	FINAL EXAM