LINCOLN UNIVERSITY

DI 244 – Vascular Scanning (Lab)

Course Syllabus

Spring 2019

Instructor:	Marina Kay, RDMS, RVT
Lecture Schedule:	Monday and Tuesday, 9:00 am - 11:55 am
Credits:	3 units (90 lab hours)
Pre-requisites:	DI 234
Level:	Advanced (A)
Office Hours:	Monday, Tuesday and Thursday by appointment **E-mail:** kaymarina@yahoo.com **or** mkay@lincolnuca.edu **Diagnostic Imaging Lab Telephone:** (510) 238-9744

TEXTBOOKS:

1. **Introduction to Vascular Ultrasonography.** William J. Zwiebel, John S. Pellerito.
   6th Edition (2012). ISBN-13: **978-1437714173,** ISBN-10: **143771417X.**
2. **Peripheral Vascular Sonography,** by Joseph F. Polak . 1st Edition (2004) ISBN-13: **978-0781748711;** ISBN-10: **0781748712**
3. **Vascular Technology: An illustrated Review,** by Claudia Rumwell, Michalene McPharlin, 5th Edition (2014) ISBN-13: **978-0941022859;** ISBN-10: **0941022854**

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

Last Revision:	December 14th, 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

CATALOG DESCRIPTION

The focus of this course is Peripheral and Abdominal Doppler scanning. Laboratory sessions are provided to acquire intermediate scanning skills necessary to succeed in the clinical setting.

COURSE OBJECTIVES

Upon completion, students should be able to:

- Demonstrate the knowledge and understanding of the anatomy, physiology and normal variations of the cerebrovascular (extracranial), peripheral and abdominal vascular systems.
- Understand and be familiarized with the routine ultrasound protocols and presenting sonographic images in a logical sequence.
- Describe and exercise the proper scanning technique and commonly used sonographic acoustic windows.
- Utilize the principles of instrumentation to set up the ultrasound equipment for acquiring optimal quality of diagnostic images.
- Be familiar with the standard measurements and diagnostic criteria for duplex/color evaluation of the vascular system.
- Recognize sonographic signs of vascular obstruction.
- Correlate sonographic and laboratory data
- Recognize and be able to compensate for common pitfalls in the diagnosis of vascular pathologies.

COURSE LEARNING OUTCOMES[1]

	Course Outcome	PLO		ILO	Assessment Activities
		Number	Level		
1.	Understand the theoretical basis and physiological implications of the diagnostic ultrasound procedures.	PLO 1	Adv	ILO 1a, ILO 2a, ILO 3a	Project presentations and discussions of the projects Ultrasound case analysis.
2.	Demonstrate the knowledge of the diagnostic criteria for duplex evaluation of the vascular system. Recognize sonographic signs of vascular pathological findings and differential diagnosis.				Ultrasound case analysis and group discussions. Ultrasound case analysis and group discussions.
3.	Utilize the principles of instrumentation, related to field size, TGC, focal zones, color scale, gain, depth, etc. for image interpretation.	PLO 2	Adv	ILO 1a	In-class ultrasound scanning training; lab live demonstrations; self-study scanning training

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

	Provide basic patient care and the preparation necessary for the examination				Laboratory live demonstrations
4.	Employ proper hands-on techniques to master and expand the routine ultrasound protocols. Understand the significance of clinical tests relevant to pathology. Correlate sonographic and laboratory data.	PLO 3	Adv	ILO 1a, ILO 4a	In-class ultrasound scanning training; lab live demonstrations; video demonstrations; self-study scanning training. Ultrasound case analysis and group discussions.
5.	Utilize oral and written communication. Select and utilize the required documentation.	PLO 4	Adv	ILO 2a, ILO 7a	In-class ultrasound scanning training; lab live and video demonstrations.

INSTRUCTIONAL METHODS

Instructional methods will include:

- In-class hands-on scanning, using ultrasound machines and other lab equipment
- Live demonstration of vascular ultrasound imaging
- The instructor's guidance to developing students' scanning skills.
- Students' ultrasound hands-on self-study training: ***20 lab hours*** minimum of independent scanning throughout the semester
- Group work, discussions and ultrasound case analysis
- Quizzes based on the relevant topics
- Ultrasound lab video demonstrations
- Presentations and discussions of students' projects.

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 website (ctl.lincolnuca.edu).

Homework:

The goal of the homework is to help students achieve the course learning objectives. Homework consists of two parts. The first part is to read the textbooks and printed materials to review the topic of the previous class session. Students' knowledge is graded through the short quizzes given at the beginning of the following class session. The second part of the homework consists of a project presented at the end of the course.

Project Presentation:

Students will acquire, record and analyze ultrasound images during each lab session.

Images containing anomalies should be selected and kept for the future presentation to others.

Each student will perform library research on a selected topic in the field of Vascular Scanning and present the findings along with their own images during a lab class orally, using Power Point.

A 10-minute presentation will be followed by a 5-minute question period.

Students should include enough background information, ultrasound images received during classes, pictures and references, for their peers to be able to understand the topic.

Each student will choose the topic of his/her presentation with the instructor's approval.

Evaluation Criteria for Presentation:

- Clinical statement: 2%
- Background information: 2%
- Slide content: 2%
- Slide design: 1%
- Resolution of the problem: 2%
- Oral presentation: 1%

Total: 10% of all the course grading elements

Hands-On Lab Examination:

During the final ultrasound hands-on examination, students have to demonstrate the understanding of the information presented during the course laboratory training.

1. The knowledge of the anatomy, physiology, normal variations, and pathology of the human vascular system.
2. In-depth knowledge of the ultrasound scanning protocols and the ability to present images in a logical sequence.
3. 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).
4. Ability to demonstrate the optimal scanning technique and proper images acquisition in B-, Color-Modes, and M-mode.
5. The utilization of different acoustic windows to achieve the best picture quality possible.
6. The knowledge of the elements of the proper image labeling.
7. The explanation of the sonographic findings and differential diagnosis of vascular pathology.

Since the intent of the lab examination is for students 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.

Only one time RETEST will be given to students with a valid excuse such as illness, family emergency, unforeseen traffic conditions or natural disaster.

Midterm/Final Exam Grading System

Midterm and Final Exams will be performed on the scheduled days in the presence of the lab instructor.

The length of the examination will depend on the type of the ultrasound protocol. The type of the protocol for the exam will be chosen by the instructor for each student individually.

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.

To successfully complete this exam, the student must pass it with a total score 70% or better.

Quizzes:

- Students will take 12 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 for every question to complete.
- The correct answers of 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.

Attendance and Participation:

Efficient use of the lab time, demonstration of the development of the scanning skills, effective use of ultrasound machines, active participation during the class meetings is expected.

Students are encouraged to use open lab time as needed. ***Minimum 20 lab hours*** of the independent scanning throughout the semester should be recorded in a log sheet as a part of each student's hands-on self-study training.

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

Instructor may dismiss a student from the course after missing 3 consecutive class meetings.

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	95-100	90-94	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
Class Attendance and Participation	10%
Quizzes	20%
Homework and Presentation	10%
Scanning Performance: Midterm Exam	30%
Scanning Performance: Final Exam	30%
TOTAL	100%

CLASS TOPICS SCHEDULE:

Jan 15 - Vascular System Anatomy and Physiology. Arterial Physiology and Hemodynamics. Extracranial Cerebrovascular (Carotid) System
Jan 17 - Extracranial Cerebrovascular System: Vascular Anatomy and Anatomical Variations. Scanning Techniques and Image Optimization Quiz 1
Jan 22 - Carotid Arteries Duplex Ultrasound Protocol. Various Scanning Approaches
Jan 24 - Carotid Arteries Plaque Assessment and Waveform Analysis. Quiz 2
Jan 29 - Carotid Arteries Duplex Ultrasound Protocol: Measurements and Utilization of the Diagnostic Criteria
Jan 31 - Bilateral Carotid Arteries Ultrasound Protocol Quiz 3
Feb 5 - Upper Extremity Arterial Duplex Ultrasound
Feb 7 - Bilateral Upper Extremity Arterial Duplex Ultrasound
Feb 12 - Lower Extremity Arterial Duplex Ultrasound Protocol Quiz 4
Feb 14 - Lower Extremity Arteries Diagnostic Criteria
Feb 19 - Bilateral Lower Extremity Arterial Duplex Ultrasound Protocol
Feb 21 - Lower Extremity Physiological Testing. Ankle-Brachial Index Quiz 5
Feb 26 - Lower Extremity Segmental Pressures
Feb 28 - Venous System Hemodynamics. Upper Extremity Venous Duplex Ultrasound: DVT, Superficial Veins Quiz 6
Mar 5 - Lower Extremity Duplex Ultrasound: Deep Venous Thrombosis. Diagnostic Criteria.
Mar 7 - Lower Extremity DVT Protocol.: Calf Veins Quiz 7
Mar 12 - SPRING RECESS
Mar 14 - SPRING RECESS
Mar 19 - Bilateral Lower Extremity DVT Protocol
Mar 21- MIDTERM EXAM
Mar 26 - Lower Extremity Venous Insufficiency. Reflux Study
Mar 28 - Abdominal Arterial Duplex Ultrasound. Aorta and Its Branches Quiz 8
Apr 2 - Mesenteric Duplex Ultrasound
Apr 4 - Renal Duplex Ultrasound Quiz 9
Apr 9 - Abdominal Venous System. IVC and Its Tributaries Quiz 10
Apr 11- Liver Vascular System Duplex Ultrasound Quiz 11
Apr 16 - Portal Venous System Ultrasound. Diagnostic Criteria
Apr 18 - Projects Presentations Quiz 12
Apr 23 - Projects Presentations
Apr 25 - Final Exam Review and Practice.
Apr 30 - FINAL EXAM
May 2 – Make-Ups

APPENDIX A. Program and Institutional Learning Outcomes.

Institutional Learning Outcomes (ILOs)	
Graduates of the BS program of Lincoln University should be able to:	
1a	Develop the habits and skills necessary for processing information based on intellectual commitment, and using these skills to guide behavior.
2a	Raise important questions and problems, and formulate them clearly and precisely in oral or written communication.
3a	Act with dignity and follow the principles concerning the quality of life of all people, recognizing an obligation to protect fundamental human rights and to respect the diversity of all cultures.
4a	Focus on individual and organizational benefits; communicate to co-workers and company's leadership in facilitation of collaborative environment; to be honest and transparent with regard to their work, and to be respectful of the work of others.
5a	Display sincerity and integrity in all their actions, which should be based on reason and moral principles; to inspire others by showing mental and spiritual endurance.
6a	Show creativity by thinking of new and better goals, ideas, and solutions to problems; to be resourceful problem solvers.
7a	Define and explain the boundaries, divisions, styles and practices of the field, and define and properly use the principal terms in the field.

Program Level Outcomes (PLOs)	
Students graduating our BS in Diagnostic Imaging program will be able to:	
1	Develop and demonstrate knowledge in principles of UT, medical terminology, physiology, sonography, and echocardiography.
2	Demonstrate ability of accurate patient positioning techniques and use of imaging technology.
3	Adapt imaging procedures based on patient's needs and clinical limitations.
4	Practice effective oral and written communication skills in the clinical setting.

APPENDIX B. Classification of LU Curriculum Courses.

Code	Classification	Description
Courses < 10, and 300A/300B	Review (R)	Review courses are supplemental courses that are not a part of any program.
Courses 10 - 99	Introductory (I)	Introductory undergraduate courses are designed to acquaint students with foundational concepts, ideas, and competences in a specific field of study as well as general education disciplines. General Education courses provide a background in the liberal arts and expose students to the fundamental aspects of human culture. They also help students to develop analytical and communication skills and foundation for advanced work in the major field of study.
Courses 100 - 199	Developed (D)	Developed undergraduate courses build upon the concepts, ideas, and competences introduced in the Introductory level; expanding students' understanding of the specific field of study.
Courses 200 - 286	**Advanced (A)**	**Advanced courses in undergraduate programs are intended to bring students' comprehensive knowledge of concepts, ideas, and skills in the specific field of study to the highest level within the baccalaureate programs.**
Courses 288 - 299	Bachelor Assessment (BA)	Bachelor Assessment courses are structured to provide opportunity to assess students' achievements of set program learning outcomes.
Courses 300 level w/o graduate prerequisites	Mastery 1 (M1)	Mastery 1 courses introduce graduate level concepts and ideas in a specific field of study and provide an opportunity to initiate the development of graduate level competences.
Courses 300 level with graduate prerequisites	Mastery 2 (M2)	Mastery 2 courses build upon students' execution of Mastery 1 learning outcomes and allow for further development of students' mastery of concepts, ideas, and competences in the specific field of study.

Courses 398, 399	Mastery 2 / Assessment (M2A)	Mastery 2/Assessment courses are structured to provide opportunity to assess students' achievements of set program learning outcomes.
Courses 400 level	Mastery 2 / Research (M2R)	Mastery 2/Research courses employ individual research project to deepen students' understanding of the subject developed in lower level courses and to equip students with knowledge and skills required by MS and DBA degree programs.
Courses 500 level	Doctorate Assessment (DA)	Doctoral Assessment courses are doctorate level seminars and research activities fostering the highest level of professional expertise by providing continuous assessment and development of students' ideas and analytical skills in the context of the doctorate program.