LINCOLNUNIVERSITY
DI 124
Peripheral Vascular
Fall 2018 Course Syllabus

Instructor: Dr. Khatia Mania (Lecture), Ms. Marina Kay (Lab)
Credit: 4 units = 3-unit lecture and 1-unit lab
(75 total hours = 45 lecture hours + 30 lab hours)
Class Hours: Monday 9:00 – 11:45 am (Lecture) (08/20/2018 – 12/03/2018)
Monday 12:30 – 3:15 am (Lab) (09/10/2018-11/19/2018)

Contact: mania@lincolnuca.edu (Lecture), mkay@lincolnuca.edu (Lab)
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Office Hours: by appointment

REQUIRED TEXTBOOKS:

1. **Peripheral Vascular Sonography, by Joseph F. Polak (2004)**
   ISBN-13: **978-0781748711**; ISBN-10: **0781748712**
2. **Introduction to Vascular Ultrasonography, by John S. Pellerito, 6th Edition (2012)**
   ISBN-13: **978-1437714173**; ISBN-10: **143771417X**

Suggested Textbook:
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.

COURSE DESCRIPTION:

Ultrasound technologies including B-mode, Color, Power and Spectral Doppler imaging are used for examining peripheral arteries and veins. (4 units)
Prerequisite: DI 114

LEARNING 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 the anatomy, physiology and normal variations of peripheral arteries and veins
- Differentiate normal from abnormal blood flow patterns
- Apply the diagnostic criteria for carotid artery disease
- Optimize the use of color Doppler and pulsed wave Doppler
- Establish protocols for consistent performance of carotid examinations
- Recognize pitfalls of the carotid ultrasound study
- Diagnose complex and unusual cerebrovascular pathologies
- Link Doppler image information to the manifestations of cerebrovascular disease

- Apply the systemic protocol for physiologic assessment of the lower or upper extremity arterial tree by physiologic testing, using segmental pressures, volume pulse recording, and Doppler waveform analysis.
- Know a routine protocol for performing lower extremity arterial duplex/color and physiologic examination
- Describe standard measurements and diagnostic criteria or duplex/color evaluation of the lower extremity

	Course outcome	PLO	ILO	Assessment
		Number	Level		
1	Communicate all findings in a concise summary using standardized terminology; recognize urgent scenarios that require immediate physician attention. Acquire and identify Doppler signals from the MCA, ACA and PCA using transcranial Doppler and apply PI, RI, and Doppler timing measurements to each. Chart the vascular anatomy and discuss the physiology of the legs and arms from the aorta to the fingers and toes, through the microcirculation, and back to the heart.	PLO 1	ILO 1a, ILO 2a, ILO 3a		In-class activities, quizzes, midterm and final exams, lab activities.
2	Perform a complete ultrasound exam of the extracranial carotid and vertebral artery system; make and present all measurements of image and Doppler data.	PLO 2	ILO 1a,		In-class lab activities.
3	Describe the pathogenesis of atherosclerosis and relate it to the ultrasonic-rendered findings of plaque morphology. Discuss the interrelationship of plaque morphology and diameter reduction in the potential induction of TIA and/or stroke.	PLO 3	ILO 1a, ILO 4a		In-class activities, quizzes, midterm and final exams, lab activities
4	Perform Doppler assessment of any vessel or valve using proper angle correction and display controls to maintain compliance with ICAVL Standards.	PLO 3	ILO 1a, ILO 4a		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 (protocolshandouts);
- Ultrasound laboratory live & video demonstrations;
- Students' ultrasound hands-on self-study training.

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. A student 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 a 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 10 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.

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 20 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:

Evaluation		%
Lecture	Attendance	10%
	Quizzes	10%
	Project	10%
	Midterm Exam	20%
	Final Exam	20%
Laboratory	Scanning Performance	20%
	Attendance	10%
Total		100%

Grading Scale	
94-100	A
90-93	A-
87-89	B+
84-86	B
81-83	B-
78-80	C+
76-77	C
74-75	C-
72-73	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 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:

08/20/2018 – Normal vascular anatomy. Arterial physiology.

08/27/2018 – The extracranial dupelx ultrasound examination (part 1). Quiz #1

09/10/2018 – The extracranial duplex ultrasound examination (part 2).

00/17/2018 – Uncommon pathology of carotid system. Ultrasound following surgery and intervention. Quiz #2

09/24/2018 – Intracranial cerebrovascular examination. Quiz #3

10/01/2018 – Indirect assessment of arterial disease. Duplex ultrasound of lower extremity arteries. Quiz #4

10/08/2018 – Midterm Examination.

10/15/2018 – Upper extremity arterial duplex scanning. Ultrasound assessment of arterial bypass graft. Ultrasound following interventional procedures. Quiz #5

10/22/2018 – Duplex imaging of the lower extremity venous system. Quiz #6

10/29/2018 - Ultrasound evaluation and mapping of the superficial venous system. Quiz #7

11/05/2018 – Venous valvular insufficiency testing. Quiz #8

11/19/2018 – Duplex imaging of the upper extremity venous system. Special considerations in evaluating nonatherosclerotic arterial pathology. Quiz #9

11/26/2018 – Presentations of Projects. Quiz # 10

12/03/2018 – Review and **Final Examination**.

Due date for project: 11/26/2018

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Monday 12:30 pm – 3:15 pm

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 the 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 vascular system.

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 the optimal techniques related to the field size, power, gain, contrast for the interpretation.

8. Knowledge of the elements of the image labeling
9. Explanation of the sonographic findings and differential diagnosis of vascular pathology

10. Since the intent of the lab examination is for students to demonstrate the knowledge of the scanning protocol, 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
94-100%- A
90-93%- A-

87-89%- B+
84-86%- B
81-83%-B-
78-80%- C+
76-77%- C
74-75%- C-
72-73%- D+
70-71%- D
69%≤- F

Lab Term Grading (30% of the total DI 124 grade)
The term grade is based on: ----Midterm and Final examination grade (20% of the total DI 124 grade),
---Attendance (10% of the total DI 124 grade)

Dates	Topics
10-Sep	Vascular Scanning Technique and Exercises. Application of B-Scan, Color and Spectral Doppler Ultrasound in Carotid Arteries Scanning
17-Sep	Carotid Arteries Ultrasound Scanning Protocol. Image Optimization
24-Sep	Bi-Lateral Carotid Arteries Ultrasound Scanning Protocol.
1-Oct	Upper Extremity Arteries Scanning Protocol
8-Oct	Lower Extremity Arteries Scanning Protocol
15-Oct	MIDTERM EXAM
22-Oct	Lower Extremity Deep Venous System. DVT Protocol.
29-Oct	Bi-Lateral DVT Ultrasound Protocol
5-Nov	Lower Extremity Venous Insufficiency Exam. Upper Extremity Venous System Evaluation

19 -Nov	FINAL EXAM

Syllabus was updated in July 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.