



LINCOLN UNIVERSITY

DI 114 – Vascular Anatomy and Hemodynamics

Fall 2017 Course Syllabus

COURSE TITLE: Vascular Anatomy and Hemodynamics

COURSE CODE: DI 114

UNITS: 3 units, 45 lecture hours

TIME: Thursday, 3:30 pm – 6:15 pm

INSTRUCTOR: Marina Kay, RDMS(Abd), RVT

CONTACT INFORMATION:

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OFFICE HOURS: Monday, Tuesday and Thursday by appointment

COURSE DESCRIPTION:

This course provides the knowledge of gross anatomy of the central, peripheral and cerebrovascular systems, principles of the dynamics of blood circulation in the human body, the factors that influence blood flow, and hemodynamic consequences of occlusive disease.

COURSE PREREQUISITE: DI 110

READING ASSIGNMENTS:

Introduction to Vascular Ultrasonography. William J. Zwiebel, John S. Pellerito. 6th Edition (2012). ISBN-10: **143771417X**; ISBN-13: **978-1437714173**

SUGGESTED TEXTBOOKS:

Ultrasound Physics and Instrumentation. Frank Miele. 5th Edition (2013). Volume II
ISBN-10: **0988582503**; ISBN-13: **978-0988582507**

Vascular Ultrasound: How, Why and When. Abigail Thrush, Tim Hartshorne. 3rd Edition (2009).
ISBN-10: **0443069182**; ISBN-13: **978-044306918**

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

COURSE OBJECTIVES:

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

- Demonstrate the basic understanding of the normal physiology and physical principles of the blood circulation
- Describe the anatomy, physiology and normal variations of central and peripheral arterial and venous systems
- Understand the use of color Doppler and pulsed wave Doppler in the process of vascular evaluation
- Be able to perform the basic Doppler waveform analysis
- Describe standard measurements for duplex vascular evaluation
- Recognize abnormalities that can occur in the presence of vascular obstruction
- Differentiate normal from abnormal blood flow patterns
- Know the different diagnostic criteria for peripheral arterial disease
- Apply the diagnostic criteria and link Doppler image information to the manifestations of cerebrovascular disease
- Understand normal venous physiology by the evaluation of Doppler imaging
- Recognize the significance of venous pathophysiology by the use of ultrasound imaging
- Apply the diagnostic criteria to determine the extent of venous insufficiency
- Determine the presence of thrombosis in deep and superficial venous systems

	Course Learning Outcome	Assessment activities
1	Understand the anatomy, physiology and normal variations of central and peripheral vascular systems	Lectures, homework assignments, quizzes, midterm/final exams.
2	Recognize sonographic signs of vascular pathological findings and differential diagnosis.	Lectures, homework assignments, ultrasound case analysis and group discussions, quizzes.
3	Demonstrate knowledge of diagnostic criteria for duplex evaluation of the vascular system.	Lectures, homework assignments, ultrasound case studies .
4	Be able to perform the basic Doppler waveform analysis	Lectures, homework assignments, case studies; presentations and discussions of students' projects.

INSTRUCTIONAL METHODOLOGY:

The topics will be presented through the following activities:

- Presentation of material (lectures) by the instructor, using the Power Point and visual aids;
- Homework assignments:
 - Reading lecture materials (handouts)
 - Assigned textbooks chapters
 - Supplementary reading
- Quizzes, based on homework reading assignments (text and lecture readings);
- Internet resources;
- Group discussions of the relevant topics and ultrasound case analyses;
- Final and midterm examinations;
- Students' in-class projects presentations and discussions.

Homework:

The goal of the homework is to help students achieve the course learning objectives. Homework consists of two parts.

- 1. Reading Assignments:** First part is to read the textbooks and the 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.
- 2. Project:** 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 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 the 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

Quizzes:

- Students will take 10 quizzes throughout the course. 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.

- Every class sessions will start with a 15 minutes quiz, based on the previous homework assignment.
- 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.

Midterm and Final Examinations:

- The exams will consist of the questions based on the course material, studied through the semester.
- The written examinations (multiple choice and true/false format and will be closed-book exams).
- The Midterm Exam will consist of 75 multiple choice and true/false questions and will cover Lectures 1-5
- The Final Exam will consist of 100 multiple choice and true/false questions, and will cover Lectures 1-8
- A student must take the exam during the scheduled time period.

There will be no make-up for a missed exam, unless you have the instructor's approval obtained prior to the exam date, with the exception of an emergency.

CLASS PROCEDURES:

- We will work together, as a team: communication, participation and interaction.
- A positive learning environment is a key to success. Nobody should be afraid to ask questions. A lot of questions and comments during the class are encouraged: nothing should remain unclear.
- I believe that the repetition is the mother of knowledge. So, we will be reviewing the previously studied material again and again: weekly written quizzes, quick oral tests, class discussions and case studies. We cannot forget what we have learned. Be prepared to work hard and to learn a lot.

ATTENDANCE:

- Attendance at all classes is essential for successful completion of this course.
- The topics covered in the lectures are related to each other. You can move forward only if you are familiar with the material of the previous lecture.
- Students are expected to attend and be prepared for all regularly scheduled classes: arriving on time, remaining quiet when others are speaking, and paying attention to whoever has the floor in the classroom.

- Students are required to behave in accordance with Lincoln University’s Student Honor Code and Standards of Conduct, which can be found in the Student Handbook.

STUDENT RESPONSIBILITIES:

- Students are expected to attend class, to participate in individual and group work in a productive manner, perform well on tests, and to complete assignments according to schedule.
- Every student should take personal responsibility for meeting the objectives of the course.
- Students are expected to treat faculty and fellow students with respect.
- Students engaging in disruptive behavior in class will be asked to leave and may be subjected to other penalties if the behavior continues.
- No eating, sleeping or personal grooming is permitted in the classroom.
- *Drinks are allowed only in closed containers.*
- The cell phones should be turned off.
- A computer can be used in class 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 messages.

GRADING:

Attendance	10%
Project	10%
Quizzes	20%
Mid-term Exam	30%
Final Exam	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

LECTURES SCHEDULE:

Dates	Lectures	Topics	Quiz
24-Aug	Lecture 1	Human Circulatory System. Systemic and Pulmonary Blood Circulation	
31-Aug	Lecture 2	Gross Anatomy of the Central and Peripheral Arterial System	1
7-Sep	Lecture 3 Part I	Physiology and Hemodynamics of the Arterial System. Types of Pressures. Blood Flow Characteristics	2
14-Sep	Lecture 3 Part II	Physical Principles of Fluid Dynamics. Poiseuille's Law, Bernoulli Equation, Reynolds Number	3a
21-Sep	Lecture 4	Arterial Doppler Waveform Analysis. Steady and Pulsatile Flow. Peripheral Resistance. Effects of Stenosis and Exercise on the Arterial Flow	3b
28-Sep	Lecture 5 Part I	Gross Anatomy of the Extracranial and Intracranial Cerebrovascular System	4
5-Oct	Lecture 5 Part II	Physiology and Hemodynamics of the Cerebrovascular System. Spectral and Color Doppler Analysis	5
12-Oct		Midterm Exam	
19-Oct	Lecture 6 Part I	Anatomy of the Peripheral Venous System	
26-Oct	Lecture 6 Part II	Peripheral Venous System. Muscle Pump Mechanism. Venous Valvular Function	6a
2- Nov	Lecture 7	Hemodynamics of the Peripheral Venous System. Effect of Respiration on Venous Pressure. Spectral and Color Doppler Analysis	6b
9- Nov	Lecture 8 Part I	Abdominal Venous System Anatomy and Hemodynamics. Portal Venous System. Abdominal Venous System B-scan, Spectral and Color Doppler Analysis.	7
16- Nov	Lecture 8 Part II	Abdominal Venous System B-scan, Spectral and Color Doppler Analysis.	
23- Nov		Fall Recess	
30- Nov		Presentations of Projects.	8
7- Dec		Final Exam.	

The syllabus updated: August 1, 2017

Note: Instructor may change this syllabus and course schedule at any time according to the needs of the class.

APPENDIX. Program and Institution Learning Outcomes.

Institutional Learning Outcomes (ILOs)	
<i>Graduates of the BS program of Lincoln University should be able to:</i>	
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)	
<i>Students graduating our BS in Diagnostic Imaging program will be able to:</i>	
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