

Cardiovascular Concepts (DSAE 2403)



Credit: 4 semester credit hours (3 hours lecture / 2 hours Lab)

Prerequisite/Co-requisite: Passed all previous sonography courses.

Course Description

Anatomy, physiology and pathophysiology of the cardiovascular system. Focuses on cardiac and vascular structural anatomy and relationships, electrical innervation, embryology and hemodynamics of the heart and vascular system. Includes pathophysiology, etiology, pathology, signs, symptoms, risk factors, and treatment of cardiovascular diseases.

Required Textbook and Materials

1. The Notebook 6.5; Echocardiography From a Sonographer's Perspective by Susan DeWitt, BS, RDCS, RCS; WWW.echonotebook.com
2. The Workbook 6.5; Echocardiography From a Sonographer's Perspective by Susan DeWitt, BS, RDCS, RCS; WWW.echonotebook.com

Course Objectives

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

1. Identify the anatomical structures of the cardiovascular system.
2. Describe blood flow and electrical conduction through the heart.
3. Describe normal and pathological hemodynamics.
4. List the major stages of fetal cardiovascular development.
5. Describe the signs, symptoms, etiology, pathophysiology, risk factors, treatment methods, and evaluation methods for the most prevalent cardiovascular diseases.

Course Outline

- A. Hemodynamics of the heart
 - a. Pulmonary circulation
 - b. Systemic circulation
 - i. Effect of systemic diseases on cardiovascular anatomy and physiology
 - c. Coronary Circulation
 - i. Myocardial infarction
 - ii. Abnormal wall motion
 - d. Types of flow
 - e. Factors affecting blood flow
 - i. Pressure gradient
 - ii. Stenosis

- iii. Preload
 - iv. Afterload
 - f. Disease states affecting afterload and preload
- B. Cardiovascular physiology
- a. IVCT
 - b. Systole
 - c. IVRT
 - d. Diastole
 - e. Cardiac function
 - i. Heart rate
 - ii. Stroke volume
 - iii. Cardiac output
 - iv. Cardiac index
- C. Cardiac function and physiology
- a. Preload
 - b. Afterload
 - c. Propagation of electromechanical events
 - d. Electrical events vs. mechanical events
- D. Differential diagnosis in the echocardiographic examination
- a. Chest pain
 - b. Edema
 - c. Dyspnea on Exertion
- E. Doppler echocardiography
- a. Doppler equation
 - b. Types of Doppler
 - i. Spectral Doppler
 - ii. Color Flow Doppler
 - c. PW Doppler
 - d. CW Doppler
 - i. HPRF Doppler
 - ii. Pedoff probe
 - e. Doppler angle
 - f. Aliasing
 - g. Types of flow
- F. Normal and abnormal hemodynamics and flow patterns
- G. Quantification by Doppler
- a. Bernoulli's Formula
 - i. Pressure gradient
 - ii. RVSP
 - b. Poiseuille's Law

- c. Stroke volume by Doppler
- d. Continuity equation
- e. Pressure half time
- f. PISA

H. Embryology

- a. Heart development
- b. Fetal circulation
 - i. Foramen ovale
 - ii. Ductus arteriosus
 - iii. Ductus venosus
 - iv. Placenta
 - v. Pressures
- c. Changes at birth
- d. Persistent fetal circulation

Grade Scale

93 – 100	A
85 – 92	B
77 – 84	C
69 - 76	D (not able to continue in sonography program)
68 or below	F

Course Evaluation

Semester grades will be calculated from the following criteria:

- 1. Unit tests **59%**
 - a. 39% Unit Test
 - b. 20% Final Exam
- 2. Research Project **10%**
- 3. Homework Assignments **5%**
- 4. Lab Assignments **26%**
 - a. **6.50% Lab Test**
 - b. **6.50 % Participation**
 - c. **13.0% Final Exam**

Course Requirements

- 1. Unit tests
- 2. Reading assignments
- 3. Worksheets/Homework
- 4. Research Project
- 5. Lab Assignments/ Tests

Course Policies

1. No food, drinks, or use of tobacco products in class.
2. Beepers, cell phones, head phones and any other electronic devices must be turned off while in class.
3. Do not bring children to class.
4. If a unit test is missed, arrangements will be made with the instructor to take the test in a timely manner.
5. All exams will be on the dates specified unless the instructor makes a change. In case of an absence on exam day, the exam must be completed on the day the student returns to class or a grade of zero will be awarded.
6. Attendance Policy: Students are expected to be in class unless prior arrangements have been made. Absences must be limited to serious illness and/or immediate family emergencies. Unexcused absences are not allowed. **Three (3) lecture absences will result in a letter grade reduction. Two (2) lab absences will result in a 10 point grade reduction from the overall lab average. Excessive tardiness (more than 10 minutes/class or more than 2 consecutive classes)** will result in an absence being awarded. In the event that LIT is forced to cancel classes due to inclement weather, DMS classes and clinical rotation will also be canceled. Notification of closures will be made through local radio and TV stations. Students out of the immediate broadcast area should contact the Program Director for information. **It is extremely important that students communicate with the faculty regarding absences by telephone and/or email at all times.**
7. **Lab Practical Final Exam grade must have a passing grade of 77 or higher to continue in the program. If not, you may have two additional attempts to pass the Lab Practical Final Exam with a 77 or higher. If this is not achieved, you will be given 0% for your OVERALL LAB GRADE resulting in failing the course and the inability to continue in the sonography program.**
8. All assignments are due when stated. Late assignments will result in a drop of 10 points per late day, and more than five days past due will result in a grade of 0. If a student has an excused absence with written documentation, assignments will be accepted at the beginning of class upon return. Missed in-class assignments receive a grade of 0.
9. Whenever testing occurs, all books/ backpacks must be placed in the front of the classroom away from the entire class. Cellphones and any other electronic devices are to be placed in a basket in the front of the room and will be returned when the test is turned in.
10. It shall be considered a breach of academic integrity (cheating) to use or possess on your body any of the following devices during any examination unless it is

required for that examination and approved by the instructor: Cell phone, smart watch/watch phone, laptop, tablet, electronic communication devices (including optical), and earphones connected to or used as electronic communication devices.

a. **Cheating on any (lecture/lab) exam results in immediate dismissal from the program and an F for the course.**

11. You will have the length of the class to finish an exam. **No extra time** will be given.
12. If you wish to drop a course, the student is responsible for initiating and completing the drop process. If you stop coming to class and fail to drop the course, you will earn an “F” in the course.
13. There will be no extra credit assignments given in this course.
14. Students with special needs and/or medical emergencies or situations should communicate with their instructor regarding individual exceptions/provisions. It is the student’s responsibility to communicate such needs to the instructor.
15. Additional class policies as defined by the individual course instructor and sonography handbook.

Technical Requirements (for courses using Blackboard)

The latest technical requirements, including hardware, compatible browsers, operating systems, software, Java, etc. can be found online at:

https://help.blackboard.com/en-us/Learn/9.1_2014_04/Student/015_Browser_Support/015_Browser_Support_Policy

A functional broadband internet connection, such as DSL, cable, or WiFi is necessary to maximize the use of the online technology and resources.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building. You may also visit the online resource at <http://www/lit.edu/depts/studerv/special/defaults.aspx>

Student Code of Conduct Statement

It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the *LIT Catalog and Student Handbook*. The *LIT Catalog and Student Handbook* may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office. Please note that the online version of the *LIT Catalog and Student Handbook* supersedes all other versions of the same document.

Starfish

LIT utilizes an early alert system called Starfish. Throughout the semester, you may receive emails from Starfish regarding your course grades, attendance, or academic performance. Faculty members record student attendance, raise flags and kudos to express concern or give praise, and you can make an appointment with faculty and staff all through the Starfish home page. You can also login to Blackboard or MyLIT and click on the Starfish link to view academic alerts and detailed information. It is the responsibility of the student to pay attention to these emails and information in Starfish and consider taking the recommended actions. Starfish is used to help you be a successful student at LIT.



Week	Topic	Reference
Week 1	Cardiac hemodynamics/ Cardiac Phys.	The Notebook pgs. 11-21
Week 2	Cardiac Physiology/Cardiac Function	The Note book pgs. 21-29
Week 3	Coronary Circulation and Disease	The Notebook pgs 30-36
Week 4	TEST I	
Week 5	Echo Doppler	The Notebook pgs. 72-124 Understanding US Physics pgs. 275-328
Week 6	Echo Doppler	The Notebook pgs. 72-124 Understanding US Physics pgs. 275-328
Week 7	Echo Doppler/ TEST II	The Notebook pgs. 72-124 Understanding US Physics pgs. 275-328
Week 8	Echo Doppler Quantification	The Notebook pgs. 72-124
Week 10	Echo Doppler Quantification	The Notebook pgs. 72-124

Week	Topic	Reference
Week 11	Echo Doppler Quantification/ TEST III	The Notebook pgs. 72-124
Week 12	Embryology	
Week 13	Embryology/ TEST IV	
Week 14	RESEARCH PROJECTS	
Week 15	Review For Final	
Week 16	FINAL EXAM	

Contact Information:

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