

**LAST REVIEW:** 2009-2010      **NEXT REVIEW:** 2014-2015      **STATUS:** A

**COURSE TITLE:** Vascular Sonology

**COMMON COURSE NUMBER:** SON 2171

**CREDIT HOURS:** 3

**CONTACT HOUR BREAKDOWN**

**CLOCK HOURS:**

Lecture: 48

Lab:

Clinic:

Other:

**PREREQUISITE(S):** Student must be an American Registry for Diagnostic Medical Sonography (ARDMS) Registered Sonographer

**COREQUISITE(S):**

**PRE/COREQUISITE(S):**

**COURSE DESCRIPTION:**

Venous and arterial anatomy and hemodynamic functions, both normal and abnormal are stressed. Sonographic imaging techniques for vascular structures and Doppler special analysis of normal and pathological patterns are also studied.

### **UNIT TITLES**

- 1.0 Anatomy of the Venous Vascular System**
- 2.0 General Physiology and Fluid Dynamics**
- 3.0 Doppler**
- 4.0 Venous Disease**
- 5.0 Venous Testing**

**ASSESSMENT:**

Please provide a brief description (250 characters maximum) that details how students will be assessed on the course outcomes.

1. Announced and unannounced quizzes and Unit examinations:
2. Midterm and/or Final Exam (cumulative/comprehensive);

*\*\*\* Complete the following only if course is seeking general education status \*\*\**

**GENERAL EDUCATION Competencies and Skills \*:**

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	
2. Speak and listen effectively	
3. Speak and listen effectively	
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	
5. Demonstrate and apply literacy in its various forms: (highlight in green ALL that apply) ( 1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental )	
6. Apply problem solving techniques to real-world experiences	
7. Apply methods of scientific inquiry	
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	
10. Collaborate with others to achieve common goals.	
11. Research, synthesize and produce original work	
12. Practice ethical behavior	
13. Demonstrate self-direction and self motivation	
14. Assume responsibility for and understand the impact of personal behaviors on self and society	
15. Contribute to the welfare of the community	

\* General Education Competencies and Skills endorsed by '05-'06 General Education Task Force

**Common Course Number: SON 2171**

## **UNITS**

### **Unit 1      Anatomy of the Venous Vascular System**

#### **General Outcome:**

- 1.0    The student will be able to identify and describe components of the venous circulatory system.

#### **Specific Instructional Objectives:**

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

- 1.1    Describe the components of the venous vascular system.
- 1.2    Describe the layers of the vessels of the venous system.
- 1.3    Describe the venous valve system of the human body.
- 1.4    Identify the major veins of the human body, excluding those of the neck and head.
  - a.    Great vessels and their branches
  - b.    Peripheral vessels
- 1.5    Describe the sonographic appearance of normal veins.
- 1.6    Identify veins on sonography.

**Common Course Number: SON 2171****Unit 2      General Physiology and Fluid Dynamics****General Outcome:**

- 2.0      The student will be able to demonstrate an understanding of the characteristics of normal flow in the venous system.

**Specific Instructional Objectives:**

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

- 2.1      List the constituents of blood.
- 2.2      Name the dominant cells in human blood.
- 2.3      Define hemodynamics.
- 2.4      Describe the characteristics of venous flow.
- 2.5      Define the following terms.
  - a. Potential energy
  - b. Gravitational energy
  - c. Hydrostatic energy
  - d. Kinetic energy
  - e. Viscous friction
  - f. Inertial energy
  - g. Pressure/volume relationship
  - h. Muscle pump
- 2.6      Explain the forces effecting movement of blood in the venous system.
- 2.7      Describe the forces which affect flow in the human body, including, but not limited to:
  - a. Gravity
  - b. Hydrostatic pressure
  - c. Force of contraction of the heart
  - d. Condition of the venous system
  - e. Extrinsic pressure
- 2.8      Explain the effects of respiration on venous blood flow.

**Common Course Number: SON 2171**

**Unit 3 Doppler**

**General Outcome:**

3.0 The student will be able to explain Doppler signal processing and demonstrate techniques of Doppler examination of the venous circulatory system.

**Specific Instructional Objectives:**

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

- 3.1 Explain the Doppler effect.
- 3.2 Explain the Doppler formula and apply it to the Doppler examination.
- 3.3 Describe spectral Doppler waveforms and how they are extracted.
- 3.4 Identify the components of spectral Doppler waveforms.
- 3.5 Explain pulse wave Doppler of the venous system.
- 3.6 Explain how color Doppler is extracted.
- 3.7 Compare color and color energy Doppler.
- 3.8 Explain the limitations of the various types of Doppler and the appropriate use of each.
- 3.9 Demonstrate proper technique to obtain various forms of Doppler waveforms.

**Common Course Number: SON 2171**

**Unit 4      Venous Disease**

***General Outcome:***

4.0    The student will be able to explain pathologies of the venous system.

***Specific Instructional Objectives:***

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

- 4.1      Describe the signs and symptoms of deep vein thrombosis, acute and chronic.
- 4.2      Explain the mechanism of the deep vein thrombosis process.
- 4.3      Explain the risk factors for deep vein thrombosis.
- 4.4      List the signs and symptoms of venous insufficiency.
- 4.5      Explain the risk factors for venous insufficiency.

**Common Course Number: SON 2171****Unit 5      Venous Testing****General Outcome:**

5.0    The student will be able to explain various testing techniques for the venous system, both imaging and non-imaging.

**Specific Instructional Objectives:**

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

- 5.1      Demonstrate understanding of duplex imaging of the venous system of the abdomen.
  - a. Patient positioning
  - b. Techniques
  - c. Interpretation
  - d. Capabilities and limitations
- 5.2      Demonstrate understanding of duplex imaging of the upper and lower extremities.
  - a. Patient positioning
  - b. Techniques
  - c. Interpretation
  - d. Capabilities and limitations
- 5.3      Demonstrate understanding of strain gauge plethysmography of the lower extremities.
  - a. Patient positioning
  - b. Techniques
  - c. Interpretation
  - d. Capabilities and limitations
- 5.4      Demonstrate understanding of impedance plethysmography of the lower extremities.
  - a. Patient positioning
  - b. Techniques
  - c. Interpretation
  - d. Capabilities and limitations
- 5.5      Demonstrate understanding of air plethysmography of the lower extremities.
  - a. Patient positioning
  - b. Techniques
  - c. Interpretation
  - d. Capabilities and limitations
- 5.6      Demonstrate understanding of photo plethysmography of the lower extremities.
  - a. Patient positioning
  - b. Techniques
  - c. Interpretation
  - d. Capabilities and limitations
- 5.7      Describe the role of venography in peripheral venous testing, its capabilities and limitations as well as how its results compare to other testing modalities.