

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

**COURSE TITLE:** Vascular Sonography III

**COMMON COURSE NUMBER:** SON 2176

**CREDIT HOURS:** 3

**CONTACT HOUR BREAKDOWN**

**CLOCK HOURS:**

Lecture: 48

Lab:

Clinic:

Other:

**PREREQUISITE(S):** SON 2175

**COREQUISITE(S):**

**PRE/COREQUISITE(S):**

**COURSE DESCRIPTION:**

Venous and arterial anatomy and hemodynamic functions of the circulatory system of the neck and head, both normal and abnormal, are stressed, along with sonographic imaging techniques for vascular structures and Doppler analysis of normal and abnormal flow patterns. An understanding of the process of test validation and interpretation of test results will be covered.

**UNIT TITLES**

1. Anatomy of the Vascular System
2. General Physiology and Fluid Dynamics
3. Doppler
4. Cerebral Artery Disease Testing
5. Test Validation

**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 2176**

## **UNITS**

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

#### **General Outcome:**

- 1.0    The student will be able to identify and describe components of the arterial vascular system below the neck circulatory system.

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

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

- 1.1    Describe the components of the arterial vascular system below the neck.  
1.2    Describe the layers of the vessels of the arterial venous system.  
1.3    Identify the major arterial vessels below the neck;
- Aorta
  - Major abdominal arteries
  - Peripheral vessels
- 1.4    Describe the sonographic appearance of normal arteries.  
1.5    Identify arteries on sonography.

**Common Course Number: SON 2176**

**Unit 2      General Physiology and Fluid Dynamics**

**General Outcome:**

2.0      The student will be able to demonstrate understanding of the characteristics of normal blood flow in head and neck

**Specific Instructional Objectives:**

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

- 2.1      Define hemodynamics
- 2.2      Describe the characteristics of arterial & venous flow.
- 2.3      Explain the following types of flow:
  - laminar
  - parabolic
  - plug
  - turbulent
- 2.4      Describe how stenosis, in general, affects flow.
- 2.5      Explain the relationship of density & viscosity to characteristics of flow.
- 2.6      Define the following terms:
  - bruit
  - Bernoulli effect
  - Reynolds number
  - Eddy current (vortices)
  - Poiseuille's law
  - Volume flow
- 2.7      Explain the hemodynamics of blood flow.

**Common Course Number: SON 2176**

**Unit 3 Doppler**

**General Outcome:**

- 3.0 The student will be able to explain Doppler signal processing and demonstrate technique of Doppler examination of the circulatory system of the head and neck.

**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 & apply it to the Doppler examination.
- 3.3 Explain collateral circulation, its development and effect on arterial flow.
- 3.4 Identify the components of analog & spectral Doppler waveforms.
- 3.5 Compare analog and spectral Doppler.
- 3.6 Explain continuous wave and pulse wave Doppler.
- 3.7 Compare continuous wave and pulse wave Doppler & the advantages of each.
- 3.8 Explain how color Doppler is extracted.
- 3.9 Compare color and color energy Doppler.
- 3.10 Explain the limitations of the various types of Doppler and the appropriate use of each.
- 3.11 Demonstrate proper technique to obtain various forms of Doppler waveforms.

**Common Course Number: SON 2176**

**Unit 4      Cerebral Artery Disease Testing**

***General Outcome:***

4.0 The student will be able to explain pathologies of the cerebral arterial system and the testing procedures employed.

***Specific Instructional Objectives:***

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

- 4.1 List pertinent patient history, signs and symptoms of cerebral arterial disease process.
- 4.2 List the risk factors for cerebral arterial disease processes.
- 4.3 Describe the physical examination of patients with suspected cerebral arterial disease processes.
- 4.4 Explain the mechanism of stenosis of the cerebral arteries.
- 4.5 Describe the effects of embolism and thrombosis of the cerebral arterial system.
- 4.6 Explain the mechanism of the subclavian steal syndrome.
- 4.7 Describe the effects of aneurysm and dissection in the cerebral arterial system.
- 4.8 Demonstrate the proper technique for ultrasound 2-D and Doppler examination of the cerebral arterial system.
- 4.9 Explain interpretation of ultrasound examination of the extracranial arterial system.
- 4.10 Describe transcranial Doppler technique, interpretation, capabilities, and limitations.
- 4.11 Describe the role of ultrasound in intraoperative procedures of the cranium.
- 4.12 Describe the role of arteriography in cerebral arterial testing; its methods, interpretation, capabilities, and limitations.
- 4.13 Demonstrate proper technique to obtain various forms of Doppler waveforms.
- 4.14 Explain interpretation of various forms of Doppler display.

**Common Course Number: SON 2176****Unit 5      Test Validation*****General Outcome:***

5.0      The student will be able to demonstrate an understanding of the rationales for test validation.

***Specific Instructional Objectives:***

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

- 5.1      Define sensitivity and specificity.
- 5.2      Demonstrate calculation of sensitivity and specificity.
- 5.3      Explain false positive and false negative rates.
- 5.4      Demonstrate calculation of false positive and false negative rates.
- 5.5      Explain positive and negative predictive value.
- 5.6      Demonstrate calculation of positive and negative predictive values.
- 5.7      Define overall accuracy.
- 5.8      Demonstrate calculation of overall accuracy.
- 5.9      Explain the significance of test validation.