

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

COURSE TITLE: Vascular Sonography II

COMMON COURSE NUMBER: SON 2175

CREDIT HOURS: 3

CONTACT HOUR BREAKDOWN

CLOCK HOURS:

Lecture: 48

Lab:

Clinic:

Other:

PREREQUISITE(S): SON 2171

COREQUISITE(S):

PRE/COREQUISITE(S):

COURSE DESCRIPTION:

Arterial anatomy below the neck and head, and hemodynamic functions, both normal and abnormal, are stressed, along with sonographic imaging techniques for arterial vascular structures, non-imaging testing modalities, and Doppler analysis and abnormal flow patterns.

UNIT TITLES

1. Anatomy of the Arterial Vascular System
2. General Physiology and Fluid Dynamics
3. Arterial Hemodynamics
4. Doppler
5. Peripheral Arterial Disease 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.

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| 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 2175

UNITS

Unit 1 Anatomy of the Arterial 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
- 2.3 Describe the sonographic appearance of normal arteries.
- 2.4 Identify arteries on sonography.

Common Course Number: SON 2175**Unit 2 General Physiology and Fluid Dynamics****General Outcome:**

2.0 The student will be able to demonstrate understanding of the characteristics of normal arterial blood flow in various parts of the circulatory 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 arterial flow.
- 2.5 Explain the following types of flow:
 - laminar
 - parabolic
 - plug
 - turbulent
- 2.6 Describe how stenosis, in general, affects flow.
- 2.7 Explain the relationship of density & viscosity to characteristics of flow.
- 2.8 Define the following terms:
 - bruit
 - Bernoulli effect
 - Reynolds number
 - Eddy current (vortices)
 - Poiseuille's law
 - Volume flow
 - potential energy
 - pressure energy
 - gravitational energy
 - hydrostatic energy
 - kinetic energy
 - viscous friction
 - inertial energy
- 3.3 Explain the hemodynamics of blood flow.

Common Course Number: SON 2175

Unit 3 Arterial Hemodynamics

General Outcome:

3.0 The student will be able to explain the hemodynamics of arterial flow.

Specific Instructional Objectives:

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

- 3.1 Explain the forces affecting the movement of blood in the arterial system.
- 3.2 Define the following terms:
 - energy gradients
 - pressure/flow relationships
 - velocity, mean and peak
- 3.3 Explain collateral circulation, its development and effect on arterial flow.
- 3.4 Identify and explain triphasic, biphasic, and monophasic waveforms.

Common Course Number: SON 2175

Unit 4 Doppler

General Outcome:

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

Specific Instructional Objectives:

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

- 4.1 Explain the Doppler effect.
- 4.2 Explain the Doppler formula and apply it to the Doppler examination.
- 4.3 Describe analog and spectral Doppler waveforms and how they are extracted.
- 4.4 Identify the components of analog and spectral Doppler waveforms.
- 4.5 Compare analog and spectral Doppler.
- 4.6 Explain continuous wave and pulse wave Doppler.
- 4.7 Compare continuous wave and pulse wave Doppler and the advantages of each
- 4.8 Explain how color Doppler is extracted.
- 4.9 Explain color and color energy Doppler.
- 4.10 Compare color and color energy Doppler.
- 4.11 Explain the limitations of the various forms of Doppler waveforms.
- 4.12 Demonstrate proper technique to obtain various forms of Doppler waveforms.
- 4.13 Explain interpretation of various forms of Doppler display.

Common Course Number: SON 2175

Unit 5 Peripheral Arterial Disease Testing

General Outcome:

- 5.0 The student will be able to discuss the techniques and indications of peripheral arterial disease testing.

Specific Instructional Objectives:

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

- 5.1 Explain the pathophysiology of acute arterial occlusion: signs and symptoms, risk factors, and mechanisms of disease.
- 5.2 Describe the testing techniques for acute arterial occlusion.
- 5.3 Explain the pathophysiology of chronic arterial occlusion: signs and symptoms, risk factors, and mechanisms of disease.
- 5.4 Describe the testing techniques for chronic arterial occlusion.
- 5.5 Explain the evaluations of Doppler studies of the arterial peripheral vascular system.
- 5.6 Demonstrate understanding of the evaluation of B-mode ultrasound of the arterial peripheral vascular system.
- 5.7 Explain the procedure for pressure measurement of the arterial peripheral vascular system and evaluation of these tests.
- 5.8 Describe arteriography's role in arterial peripheral vascular testing and how it compares to noninvasive tests