GROSSMONT COLLEGE

COURSE OUTLINE OF RECORD

Curriculum Committee Approval: 03/22/2022

GCCCD Governing Board Approval: 04/19/2022

CARDIOVASCULAR TECHNOLOGY 109 – X-RAY PHYSICS AND RADIATION SAFETY

1. Course Number Course Title Semester Units

CVTE 109 X-Ray Physics and Radiation Safety 3

Semester Hours

3 hours lecture: 48-54 hours 96-108 outside-of-class hours 144-162 total hours

2. Course Prerequisites

A “C” grade or higher in CVTE 100 and 101 and 102 and 103.

Corequisite

None

Recommended Preparation

None

3. Catalog Description

A course providing advanced study in medical electronics and instrumentation which focuses on imaging technologies, utilized in invasive cardiology. Emphasis will be placed upon radiation safety, fluoroscopic regulations, fluoroscopy techniques, the x-ray imaging chain, x-ray physics, cardiovascular angiographic projections, coronary angiographic techniques, optical principles, intravascular ultrasound and Doppler techniques. Additional emphasis is placed on fluoroscopic data collection, analysis and interpretation of clinical patterns.

4. Course Objectives

The student will:

a. Identify basic principles of x-ray physics as related to medical imaging.

b. Recognize and apply appropriate radiation safety equipment and dosage/exposure limits.

c. Calculate the theoretical contrast dosage limit for a patient.

d. Employ appropriate angiography equipment geometry to analyze disease patterns.

e. Compare and contrast normal and abnormal cardiovascular angiographic data.

f. Measure angiographic lesion placement and burden.

g. Define the significant angiographic characteristics of cardiovascular clinical disease patterns.

h. Compare and contrast normal and abnormal anatomy and physiology measured via intravascular ultrasound and optical coherence tomography techniques.

5. Instructional Facilities

a. Standard classroom.

b. Cardiovascular technology laboratory (on campus).

6. Special Materials Required of Student

None

7. Course Content

1. Xray Physics
2. Radiation principles
3. Xray production
   1. Bremsstrahlung
   2. Characteristic
4. Xray Instrument Chain
5. Xray Tube
6. C-arm
7. Image Intensifier/ Flat panel detector
8. Operating Console
9. Table
10. Display/archiving system
11. Contrast Media
12. Chemistry
13. Dosage
14. Adverse reactions
15. Power Injectors
16. Imaging
17. Acquisition/Cine
18. Fluoroscopy
19. Techniques/Positioning
20. Quality
21. Recognition
    1. Cardiovascular anatomy views
    2. Coronary angiography recognition
    3. Ventriculography
22. Alternate Imaging
23. Intravascular Ultrasound
24. Optical Coherence Tomography
25. Radiation Safety
26. Dosage
27. Exposure reduction
28. Safety Equipment
29. Radiobiology

8. Method of Instruction

a. Lecture.

b. Class discussionsuch as review ofcase studies.

c. Multimedia presentations.

d. Computer simulations.

9. Methods of Evaluating Student Performance

a. Computer-based and writtenexaminations.

b. Unknown image identifications using angiograms and intravascular ultrasound images.

c. Competency-based performance exams such as angiographic image identification.

d. Comprehensive final exam.

10. Outside Class Assignments

a. Assigned reading in medical literature.

b. Construction of coronary artery anatomic models.

c. Identification and analysis of angiographic data – still frames (CD-ROM).

d. Identification and analysis of cine angiographic data – motion pictures (CD-ROM).

11. Representative Texts

a. Representative Text:

Bushong, Stewart C. *Radiologic Science for Technologists*. 12th Edition. St. Louis, MO. Mosby Elsevier Publishers. 2021.

b. Supplementary texts and workbooks:

Instructor prepared handouts and study guides.

Addendum: Student Learning Outcomes

Upon completion of this course, our students will be able to do the following:

* 1. Describe the principles and clinical application of fluoroscopy and cineangiography in diagnostic and interventional cardiology.
  2. Describe the principles and clinical application of contrast injection used in the diagnosis of congenital and acquired heart disease.
  3. Identify and describe prescribed angiographic views utilized in the Cardiac Cath Lab setting utilizing clinical case presentations by the instructor.
  4. Identify and describe the clinical application of prescribed contrast agents used in diagnostic cardiology.