Common Course Outline
RADT 232
Physics and Instrumentation in Computed Tomography (CT)
4 Semester Hours

The Community College of Baltimore County

Description

RADT 232—4 Credits—Physics and Instrumentation in Computed Tomography (CT) imparts an understanding of the physical principles and instrumentation involved in computed tomography. The historical development and evolution of computed tomography is reviewed. This course is delivered both online and in the classroom setting with lectures and discussion.

4 credits; 4 lecture hours per week
Prerequisite: RADT 231 with a grade of C or better

Overall Course Objectives

Upon completion of this course the student will be able to:
1. describe the events leading to the discovery of CT;
2. describe the components of the CT imaging system;
3. explain the location and function of detectors used in CT;
4. define the terms "raw data," "image data," "scan data," algorithm, and filter;
5. explain the difference between reconstructing and reformatting an image;
6. describe post-processing techniques;
7. define terms related to image display, such as pixel, voxel, and matrix;
8. explain why different window widths and levels are selected;
9. define and describe the functions of the data acquisition display (DAS); and
10. explain the difference between patient and equipment artifacts in CT and how to reduce them.

Major Topics

I. CT system principles, operation and components
    a. Tube
        1. KVP (kilovoltage peak)
        2. MA (milliamperage)
        3. Warm up procedures
    b. Generator and transformers
    c. Detector configurations
    d. Data acquisition
    e. Collimation
    f. Computer array processor
    g. Equipment maintenance
II. Image Processing
    a. Reconstruction
    b. Post processing
        1. Multiplanar reformation

    2. 3-D Rendering
    3. MIP (maximum intensity projection), SSD (surface shaded display), VR (volume rendering)
   c. Image Display
    1. Pixel, Voxel
    2. Matrix
    3. Image Magnification
    4. Field of view
    5. Attenuation Coefficient
    6. Window level, Window Width
    7. Plane specification (x, y, z coordinates)
    8. ROI (region of interest)
III. Informatics
   a. Hard/Soft Copy
   b. Storage/Archive
   c. PACS (picture archive communication system)
   d. Networking
IV. Image Quality
   a. Spatial resolution
   b. Contrast resolution
   c. Temporal resolution
   d. Noise
   e. Quality assurance
   f. CT Number
   g. Linearity
V. Artifact Recognition and Reduction
   a. Beam Hardening
   b. Partial Volume Averaging
   c. Motion
   d. Metallic
   e. Edge Gradient
   f. Patient Positioning
   g. Equipment Induced
    1. Rings
    2. Streaks
    3. Tube arcing
    4. Cone beam

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member but will include:

Discussion board postings
 Quizzes
 Tests
 Homework assignments
A comprehensive final exam will be given.

Writing: a minimum of 4 Discussion Board postings

Grading

A minimum score of 75% is required to pass this course. The American Registry of Radiologic Technologists (ARRT) has established a minimum scaled passing score of 75. The CT certificate program has developed standards of grading that are consistent with grading systems of other programs. Letter grades will be distributed according to the following standards:

92 - 100 A
83 - 91   B
75 – 82   C
65 - 74   D
below 65 F

Other Course Information

This course will be a hybrid course, taught partially online and partially in class.

This course is a required course in the CT certificate program within the Radiography department.

Date Revised: 1/28/10