Principles of Servicing Nuclear Medicine Systems

Course length: 1 Week
CEU's Awarded: 4

COURSE INTRODUCTION

The Principles of Servicing Nuclear Medicine Systems course is a hands-on course for service professionals new to the Nuclear Medicine modality. It is designed to teach all of the skills necessary to service to the subsystem level. Heavy emphasis is placed on basic Nuclear Medicine principles, image analysis, operation, safe laboratory practices, system troubleshooting, and preventive maintenance. The lectures, hands-on lab procedures, and documentation are designed to provide the student with all of the knowledge needed to service Nuclear Medicine system.

COURSE OBJECTIVES

At the conclusion of this course, attendees will be able to:

- Demonstrate their understanding of Nuclear Medicine principles.
- Verify system operation.
- Verify system specifications.
- Troubleshoot system problems.
- Perform first and second level preventive maintenance procedures.

PREREQUISITE FOR ADMISSION

Attendees must possess an associates degree in electronics or equivalent experience. A background in imaging, although not a requirement, will be helpful. A strong microprocessor background is recommended

DAY 1

I. Introduction to Nuclear Medicine
II. Common Nuclear Medicine studies
  A. Study Terminology
III. Radiation safety
  A. Personal license
  B. OSHA and NRC
IV. System basic operation
  A. Front panel controls
  B. System specifications

LAB ACTIVITIES

I. System operation
II. Component location

DAY 2

I. Nuclear Medicine physics
  A. Atomic structure
  B. Radioactive isotopes
  C. Types of radiation
II. Radioactive measurements
  A. Energy levels
  B. Roentgen, Rad, Rem
  C. Half life
III. Statistics
  A. CHI square
  B. Mean
  C. Standard deviation
IV. Quality assurance
  A. Spatial resolution
    1. FWHM
    2. FWTM
  B. Uniformity
    1. Integral
    2. Differential
  C. Linearity
    1. Absolute
    2. Differential
  D. Energy resolution
    1. FWHM
    2. FWTM
V. Phantoms

LAB ACTIVITIES

I. Spatial resolution evaluation
II. Uniformity evaluation
III. Linearity evaluation
IV. Statistical measurements

DAY 3

I. Collimators
  A. Energy levels
  B. Resoultion/sensitivity
  C. Slant hole
  D. Pinhole
II. Crystals
  A. Shapes and sizes
  B. Handling and care
III. PMTs
  A. Light coupling
  B. Construction and purpose
  C. Gain
IV. Power supplies
  A. Low voltage
  B. High voltage
V. X,Y signal processing
  A. Detector
  B. X,Y summing
  C. Z division
  D. Sample and hold

LAB ACTIVITIES

I. PMT coupling
II. Power supply measurements
III. X,Y,Z calibration

DAY 4

I. Z signal processing
  A. Detector
  B. PHA window
II. Quality assurance checks
III. Uniformity correction methods
IV. Computer fundamentals
  A. DMA transfers
  B. Central processing unit
  C. Memory
  D. I/O techniques
  E. Numbering systems
V. System troubleshooting

LAB ACTIVITIES

I. Z PHA calibration
II. Quality assurance checks
III. System diagnostics

DAY 5

I. Common system problems
II. The future of Nuclear Medicine
III. Final exam
IV. Final exam review
V. Course evaluation
VI. Parts sourcing