

Virginia Western Community College

ROC 241

Therapy Physics II

Prerequisites

Successful completion of ROC 141.

Course Description

Studies methods and devices used for measurement of and protection from ionizing radiation. Various types of brachytherapy applicators and dose distribution systems will be discussed. Electron beam dosimetry will be introduced. The physics component of quality assurance in radiation oncology will be discussed as well as various treatment methods.

Semester Credits: 2

Lecture Hours: 2

Lab/Clinical/Internship Hours: 0

Required Materials

Textbook:

The Physics and Technology of Radiation Therapy. McDermott, P. & Orton C. (2010). Medical Physics Publishing. ISBN: 9781930524323

Other Required Materials:

Scientific Calculator

Course Outcomes

At the completion of this course, the student should be able to:

- Discuss radiation safety and protection
- Examine different methods and equipment used to measure ionizing radiation
- Describe the relationship between beam energy, its penetration, absorption, and scatter
- Describe the method of brachytherapy including source selection, source placement, and calculations for permanent and temporary implants
- Discuss the relationship between x-ray beam quality and the half-value layer.
- Describe the interactions of electrons in matter and the characteristics of clinical electron beams
- Discuss quality assurance in radiation oncology physics
- Examine different treatment methods currently being used in radiation oncology

Topical Description

I: Basic Physics Review

- Attenuation of Ionizing x & Gamma Radiation
- Interaction of Radiation and matter
- Radioactivity

II: Types of Radiotherapy Machines

- Contact therapy
- Superficial Therapy
- Orthovoltage
- Co60
- Super-voltage

III: Design and Operation of Modern Day Medical Linear Accelerator

- RF Generation
- Wave Guide Design
- Accelerator Structure
- Bending Magnet
- Beam Steering
- Target Operation
- Scatter Foil Design and Applications

IV: Performance of Radiotherapy Unit

- Measurement of Energy
- Beam Flatness
- Beam Symmetry
- Penumbra
- Geometric Isocenter Verifications

V: Absolute Dose Measurement

- Concept of Air Ionization Chamber
- Review of Calibration Protocols

VI: Physics of Electron Beams

- Define Charged Particle Therapy
- Beam Energy Definition
- Beam Profiles

VII: Brachytherapy

- Description of Sources
- Source Calibration Protocols
- Paterson-Parker distribution Laws
- HDR

Note to Instructors