

# Virginia Western Community College

## ROC 115

### Therapeutic Radiation Safety

#### **Prerequisites**

None

#### **Course Description**

Presents an overview of radiation protection focusing on detection and measurement, shielding and room design, somatic and genetic effects, maximum permissible dose, surveys, source handling, personnel monitoring, and organizations and agencies that guide radiation protection procedures.

**Semester Credits: 2**

**Lecture Hours: 2**

**Lab/Clinical/Internship Hours: 0**

#### **Required Materials**

##### **Textbook:**

Principles and Practice of Radiation Therapy. Washington, C. and Leaver, D. (2016). 4th Edition.  
ISBN: 9780323287524

##### **Other Required Materials:**

Internet Access

#### **Course Outcomes**

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

- Discuss the fundamental principles of radiation protection such as ALARA and time, distance and shielding
- Define the units of Radiation Exposure
- Understand the types of instruments used to measure radiation
- Identify the regulatory agencies associated with Radiation Protection
- Identify the NCRP recommendations for personnel monitoring (report #116)
- Understand the NRC regulations, Parts 20 and 35
- Discuss the information needed to perform radiation-shielding design for therapy equipment
- Apply Radiation Protection concepts to brachytherapy procedures

## **Topical Description**

### **I: Fundamental Principles of Radiation Protection**

- Risk vs. Benefit
- ALARA
- Radiation Safety Officer
- Basic Concepts
- Calculation Considerations

### **II: Personnel Monitoring**

- NCRP Recommendations
- Occupational Exposure
- Public Exposure
- Embryo/Fetus Exposure
- Maintenance and Evaluation of Personnel Exposure

### **III: Forms of Radiation**

- Non-ionizing
- Ionizing

### **IV: Types of Radiation**

- Natural
- Man-made

### **V: NCRP Recommendations for Personnel Monitoring**

- Annual Limits  
Occupational, General Public and Embryo/Fetus Exposure

### **VI: Units of Radiation Exposure**

- Exposure
- Absorbed Dose
- Equivalent Dose
- Effective Dose

### **VII: Methods of Radiation Detection**

- Types of Personnel Monitors
- Types of Survey Monitors

VIII: Facilities and Area Monitoring

- NRC Regulations (10 CFR, parts 20 and 35)
- Classification of Areas
- Required Postings (signs)
- Area Monitoring Devices

IX: Protective Barriers

- Primary
- Secondary
- Calculation Considerations

X: Radiation Protection and Safety Organizations

- ICRP
- NCRP
- NRC
- DOT
- FDA
- OSHA
- EPA
- Agreement States

XI: Environmental Protection

- Toxic or Hazardous Material
- Handling and Disposal
- Management of Accidents
- Licensing and Transporting
- Material Safety Data Sheet (MSDS)

**Note to Instructors**