

**Virginia Western Community College**  
**ROC 125**  
**Pre-Clinical Techniques in Radiation Oncology**

**Prerequisites**

None

**Course Description**

This course focuses on basic technical skills in preparation for patient set up and treatment in the clinical setting. Emphasis will be on simulation and treatment parameters. The student will gain an understanding of basic technical and patient care skills through phantom and lab work prior to direct contact.

**Semester Credits: 2 Lecture Hours: 2 Lab/Clinical/Internship Hours: 0**

**Required Material:**

Washington, C. and Leaver, D. (2020). *Principles and practice of radiation therapy* (5<sup>th</sup> ed.). St. Louis, MO: Mosby Co. ISBN 978-0-323-59695-4

Vann, A., Arazie, J., Sutton, M. (2010). *Radiation Therapy Essentials Board Preparation Tool*. RadOnc Publications ISBN: 978-0-615-41665-6

**Course Outcomes**

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

- Demonstrate proper manipulation and operation of treatment
- Demonstrate proper radiation safety practices and procedures.
- Identify appropriate referral channels.
- Practice basic patient care skills for patients undergoing radiation therapy treatments.
- Participate in lab demonstrations of pre-clinical concepts for performing radiation treatments.
- Demonstrate an understanding of the construction of radiation therapy treatment devices.
- Develop an understanding of the importance of equipment and patient safety.
- Develop an understanding of the emotional and physical needs of a cancer patient.

## **Topical Description**

### **Week One**

- Handouts
  - What is Radiation Therapy?
  - Terminology
  - Common RT terms
  - Definitions and Directional Terms
  - Homework worksheet
- Homework
  - Review terminology
  - Worksheet Terminology

### **Week Two-Lab #1-Introduction**

- Review
  - Terminology
  - Commonly used terms
  - Definitions
- Typical clinical components
- Gantry and location of angles (0°, 90°, 180°, 270°)
- Identifying Fields (AP, PA, LAO, LPO, RAO, RPO)
- Planes/contours
- Anatomic Positioning
- Field size
- Handouts
  - Beam Angulation
  - Typical clinical components (7 pages)
  - Homework worksheet (labeled Terminology quiz matching (1-10), labeling, directions)
  - Homework worksheet (labeled as homework starts with 1-20 matching)
- Homework:
  - Handout X 2
  - Reading W&L
    - pages 392-393 Anatomic Positioning
    - pages 135-143 Megavoltage Equipment
  - Bring a calculator each week to class

### **Week Three**

- Go over Freshman project – select topics
- Palliation vs. curative
- Patient marks/tattoos
- Patient set-ups, positioning, headrests, immobilization devices
- Parallel opposed fields
- Gantry angles for feet first
- Calculating opposed gantry angles
- Triangulation/backpointing
- Bones/ terminology and landmarks

- Handouts:
  - Project Guidelines
  - Sternum/landmarks
  - Pelvis
  - Skeleton
  - Vertebral column
  - Triangulation, Pt. Marks, Calculating POP fields
  - Landmarks to Know
  - Homework sheets
- Homework:
  - Handout
    - Worksheet
  - Reading W&L
    - pages 163-167 Patient Position, Isocenter, and Field Placement
    - pages 398-404 Axial Skeleton
    - pages 459-462 Patient Immobilization
    - page 185 1<sup>st</sup> column 2 paragraph Tattoos

#### Week Four

- Test One

#### Week Five

- Anatomical Regions
- Treatment Chart
  - Prescription, diagrams, field identification, elapsed days
  - RADS vs. cGy
  - Hypo vs. Hyperfractionation
  - MU
- EMR
- Consent, Graticule, Calipers and Fiducials
- AP for set-up
- Introduce IFDs (if time)
- Handouts:
  - Homework Charts
  - Copy of paper chart
- Homework:
  - Handout
    - Chart/Consent/Anatomical Regions Homework
  - Reading W&L
    - pages 157 (Radiation Oncology Record) – 160 (Treatment History)
    - page 28-31 Informed Consent

#### Week Six

- Depths and IFDs
- Review terms – depth, SSD, isocenter, IFD, TTI, midplane, isocentric
- Show how to calculate SSDs knowing depths, depths knowing SSDs, IFDs knowing IFDs, and IFDs given IDS and depth

- Worksheet #1 in class
- Show how to calculate AP for set-up, calculating PA SSDs with an AP for set-up
- Give example of four field pelvis - calculating SSDs given depth of fields
- Worksheet #2 in class
- Calculating field size at different depths, SSDs, SFD etc.
- Time in classroom for practice
- Worksheet #3 in class
- MLC
- Field Size limitations/calculating field sizes at different distances
- Handouts
  - Worksheets 1, 2, 3
  - Homework (labeled Depths and field sizes homework 3 pages)
  - MLC
  - Field Size
- Homework:
  - Worksheet depths and field sizes
  - Finish in class worksheets

### **Week Seven -Lab #2-The Machine**

- Review IFDs
- Calculate opposed collimator angles
- Field size change with collimator rotation
- Photons and  $d_{max}$
- Treatment Techniques
- Asymmetric Jaws
- ODI
- Maximum table weight limits
- Placement of Devices during photon beams
- Wedges
  - homogenous
  - Angles
  - Dynamic
  - Heel/toe
- Emergency hand pendant
- Machine Power outage
- Handouts:
  - Collimator/gantry rotation
  - Collimator Angle explanation
  - Depth of Maximum Equilibrium
  - Treatment techniques
  - Asymmetric Jaws
- Homework:
  - Reading W&L
    - pages 145-147 MLC
    - pages 168-169 Beam Shaping and MLC
    - pages 482-483 Field Size

### **Week Eight**

- **Test Two**

### **Week Nine**

- Electrons
- Cone safety
- Lead strips
- Depth of penetration for electrons
- Types and purpose of bolus
- Construct a bolus in the classroom (sign off on ARRT sheet)
- Personal cerrobend blocks - thickness for photons and electrons
- Mould room safety
- Creating a Personal Cutout
- Handouts
  - ARRT Competency Sign-off forms
  - Installing the electron applicator
  - Lead/cerrobend thickness
  - Mould room safety
  - Electron Transmission through Lead
  - Electron contamination (how far must devices be from patient surface?)
  - Homework:
    - Worksheet (why is skin sparing good for the patient)
    - Worksheet Electrons, Cone Safety, Bolus, and Mould Room
- Homework:
  - Handout X 2
  - Reading W&L
    - pages 174-175 Electron beam
    - page 169 Bolus
    - page 153 (last few lines)-154 Cerrobend

### **Week Ten**

- Machine Interlocks
- IVDs
- Film Badges
- Patient Monitoring system
- Treatment Door
- Imaging/looking at films Powerpoint
- DRRs
- Handouts
  - Interlock System
  - Varian list of interlocks
  - Measuring patient dose
  - Homework
    - Worksheet - Imaging
    - Worksheet -Interlocks, IVDs, and Film Badges
- Homework:
  - Worksheet X2

- Reading W&L
  - pages 171(Patient Monitoring systems) -171 (Treatment interruptions)
  - pages 342-343 Personnel Monitoring
  - pages 147-149 Imaging

### **Week Eleven**

- Lasers and Indexing
- Emergency Offs
- Hand pendant/Display Screen
- Timeouts/Identifying correct patient for treatment -2 methods
- Department flow
- Referrals
- Scope of practice of a radiation therapist (W & L pg. 33)
- Code of ethics (W & L pg. 22)
- MRI safety Video
- Handouts

- Radiation Therapy and You book
- Hand pendant
- Display screen
- Homework

- Homework:
  - Reading W&L
    - Pages 161-162 The Patient
    - Pg. 22 Box 2-2 Code of Ethics
    - Pgs. 23-24 Box 2-3 Rules of Ethics
    - Pgs. 32-33 Box 2-6 Practice Standards
  - Worksheet
  - Reading Radiation Therapy and You (NIH)
    - Pages 1 – 23

### **Week Twelve**

- Test Three

### **Week Thirteen**

- Librarian
- Moving patients- lab
  - Wheelchair
  - Stretcher

### **11/27 Thanksgiving Break!**

### **Week Fourteen**

- Freshman Project Presentations

### **Week Sixteen**

- Communicating with patients

- Therapeutic Relationship
- Verbal vs. Nonverbal communication
- Listening
- Watch Video :Empathy-The Human Connection to Patient Care
- Review student handbook regarding clinical
- Spring clinical expectations/clinical rotation schedule
- What to Expect?
- Homework:
  - Reading W & L
    - Pages 219-223
  - Worksheet