BAKER COLLEGE
STUDENT LEARNING OUTCOMES

RDT4210 Dosimetry & RDT4210L Dosimetry Lab

5 Semester Hours

Student Learning Outcomes and Enabling Objectives

1. Create plans using proper isodose techniques.
    a. Use photon and electron computerized plans.
    b. Differentiate various isodose curves and their characteristics.
    c. Explain the summation of plans.
    d. Create the proper direction appropriate photon, electron, and matching field techniques.
2. Examine various aspects of treatment planning.
    a. Describe the appropriate use of Intensity Modulated Radiation Therapy (IMRT) and Image Guided Radio Therapy Matching fields (IGRT) planning.
    b. Demonstrate the appropriate use of beam modifiers, to include:
        i. Blocking
        ii. Bolus
        iii. Wedges
        iv. Multi Leaf Collimators (MLC)
        v. Asymmetric beams
    c. Demonstrate proper field matching techniques.
3. Examine various depth dose curves and their characteristics.
    a. Explain the relationship between absorbed dose and dose distribution.
    b. Describe the effect of asymmetric beam.
4. Calculate manual treatment plans.
    a. Discuss the various aspects of manual treatment planning to include:
        i. Rule of thumb
        ii. Factors for calculations
        iii. Equivalent squares
        iv. Misadministrations and dose
    b. Discuss optimization techniques for computerized treatment planning.
    c. Describe fractionation schemes and integral dose concepts.
    d. Use treatment planning algorithms.
5. Identify clinical factors and variations that influence treatment.
    a. Examine internal and external patient factors and beam distribution with varying modalities.
    b. Discuss inhomogeneity.
6. Identify sites for conformal therapy.
    a. Differentiate the use of 2D versus 3D versus IMRT.
7. Examine various aspects of treatment planning.
    a. Identify the proper use of stereotactic techniques.
    b. Perform and analyze special treatments, including, Electron, Total Body Irradiation (TBI), Arc, and Rotational treatment plans.
    c. Identify the appropriate fractionation scheme.

8. Analyze the applications and techniques related to Brachytherapy.
    a. Examine intracavitary, interstitial, endovascular, and special.
    b. Calculate activity, decay, and convert to other radioactive units.
    c. Identify various brachytherapy delivery systems.
    d. Examine various aspects of Brachytherapy treatment planning, to include:
        i. Source localization
        ii. Computerized planning and optimization techniques
        iii. Dose specification and prescription techniques
9. Examine radiobiologic factors for treatment planning.
    a. Distinguish relevant terminology related to radiobiologic factors for treatment planning.
    b. Examine critical structures and biologic affective dose.
    c. Discuss International Commission on Radiological Units (ICRU) recommendations on dose variance within a target volume and the effect that variances may have on cure rates, local control and tolerance.
    d. Evaluate patient changes to determine the integrity of a treatment plan.
    e. Analyze dose volume histograms relative to treatment planning.
10. Utilize different treatment techniques for various anatomical regions.
    a. Explore past pointing techniques.
    b. Use volume shape techniques.
    c. Analyze beam modifiers related to dose distribution.
    d. Investigate the selection of appropriate beam types and energies.
11. Apply radiation safety techniques.
    a. Use appropriate radiation safety techniques for external beam treatment plans.
    b. Interpret radiation safety techniques for Brachytherapy.
    c. Identify the legal requirements for permanent records.
    d. Explain radioactive material safety procedures.

Big Ideas and Essential Questions

Big Ideas:

- Treatment Planning
- Depth Dose Curves
- Calculations
- Image manipulation and patient data
- Brachytherapy
- Radiation safety and legal documentation

Essential Questions:

1. How does treatment planning impact radiation therapy?
2. How do calculations influence treatment planning?
3. How do isodose techniques, depth dose curves, and clinical factors and variations affect treatment planning?
4. How do radiation safety and legal documentation impact my role as a radiation therapist?
5. How does treatment planning affect brachytherapy?
