BAKER COLLEGE
STUDENT LEARNING OUTCOMES

RDT 3120 Radition Therapy Physics II

3 Semester Hours

Student Learning Outcomes and Enabling Objectives

1. Describe the process of ionization and excitation.
    a. Explain ionization at an atomic level.
    b. Review the various atomic interactions.
    c. Describe the differences between ionization and excitation at an atomic level.
    d. Discuss these interactions with tissue and other materials.
2. Explore radiation therapy nuclides.
    a. Examine commonly used isotopes
    b. Calculate radioactivity, decay constant, activity and half-life, average life and attenuation requirements for commonly used isotopes in radiation therapy.
    c. Explain the various forms of radioactive equilibrium.
    d. Define fission and fusion.
    e. Discuss the activation of nuclides in terms of yield, probability, activity growth and saturation activity.
    f. Describe methods of artificial production of radionuclides.
3. Examine X-ray production and high energy equipment.
    a. Describe x-ray production for linear accelerators.
    b. Identify all components and function in a linear accelerator.
    c. Discuss methods of x-ray production in alternate therapy units.
    d. Compare the characteristics of other radiation therapy beams (cyclotron and other accelerated particles).
    e. Compare the characteristics of an isotope beam and an x-ray beam.
    f. Explain linear energy transfer (LET).
    g. Calculate half-value layer (HVL)
    h. Calculate attenuation requirements for beam modification devices.
    i. Define Mass stopping power.
    j. Describe a Bragg curve.
    k. Discuss the purpose and importance of National Institute of Standards and Technology (NIST) and the Accredited Dosimetry Calibration Labs (ADCL).
    l. Discuss protocols used for external beam calibration.
    m. Describe beam filtration for the various external beam modalities.
    n. Discuss the relationship between kinetic energy released in the medium (KERMA), exposure and absorbed dose.
    o. Discuss the clinical importance of phantom material and size when applying Bragg-Gray Cavity Theory.
    p. Determine how dose distribution measured in a phantom is used to predict dose distribution in a patient.
4. Apply principles of radiation protection.
    a. Discuss the principles of radiation protection room design factors.
    b. Describe the elements of a radiation protection survey.
    c. Calculate exposure based on time, distance, and type of radioactivity.
    d. Describe the procedure for a hot lab room survey.
    e. Describe procedures to receive and ship radioactive materials.
    f. Determine the required elements for an appropriate record keeping system.
5. Examine various Dosimetry applications

a. Discuss formula's used
b. Apply machine data to calculations
c. Describe how photon calculations differ from electron calculations
d. Discuss how basic calculations are affected by beam modifiers.

Big Ideas and Essential Questions

Big Ideas

- Processes of Ionization
- Radiation Therapy Nuclides
- X-ray Production/High energy equipment
- Radiation Protection
- Introduction to Dosimetry Applications

Essential Questions

1. Why is use of radioactive nuclides important in radiation therapy?
2. In what ways are radiation therapy equipment calibrations important to a radiation therapist and patient?
3. How do the characteristics of a therapy machine affect the choice of its use for treatment?
4. Why is accurate record keeping important in radiation protection surveys and monitoring?

These SLOs are not approved for experiential credit.

Effective: Fall 2018