

Common Course Outline

RTTT 127

Radiation Therapy Physics II

3 Credits

The Community College of Baltimore County

Description

Radiation Therapy Physics II analyzes the structure of matter, properties of radiation, nuclear transformations, x-ray production, and interactions of ionizing radiation. Also presented are treatment units used in external radiation therapy, measurement and quality of ionizing radiation produced, absorbed dose measurement, dose distribution, and scatter analysis.

3 credits; 3 credits; 0 laboratory hours required.

Prerequisite: RTTT 125

Overall Course Objectives

Upon completion of this course the student will be able to:

1. describe isotope, isotone, isobar and isomer;
2. explain nuclear stability and types of radioactive decay;
3. describe electromagnetic (EM) radiation and the characteristics of the EM spectrum and the various radiations;
4. describe the processes of ionization and excitation;
5. define and compare radioactivity, decay constant, activity and half-life;
6. differentiate between artificially produced and naturally occurring therapeutic nuclides;
7. examine and calculate radioactive series and the decay schemes for commonly used radiation therapy nuclides;
8. describe x-ray production for linear accelerators;
9. explain the factors that influence x-ray production and output;
10. explain linear energy transfer (LET);
11. Compare photon interactions with matter and classify radiations produced by direct and indirect ionization;
12. explain major influencing factors of photon beam attenuation;
13. describe the parameters of narrow beam geometry used in the measurement of attenuation;
14. plot heteroenergetic and monoenergetic beam attenuation data;
15. calculate half value layer (HVL);
16. calculate attenuation requirements for beam modification devices;
17. discuss the purpose and importance of the National Institute of Standards and Technology (NIST);
18. discuss the purpose and importance of the Accredited Dosimetry Calibration Labs (ADCL);
19. choose the appropriate type of radiation detector for given clinical applications;

20. explain how correction factors for chamber calibration, temperature, pressure and other factors are used to correct a chamber reading;
21. compare absorbed dose vs. exposure;
22. discuss the relationship between kinetic energy released in the medium (KERMA), exposure and absorbed dose;
23. calculate air dose to absorbed dose conversions in tissue, including but not limited to energy considerations, applicable conversion factors, necessary instrumentation and methods; and
24. compare source-skin distance (SSD) and isocentric methods of calibration.

Major Topics:

- I. Properties of radiation
- II. Nuclear transformation
- III. Production of x-rays
- IV. Radiation therapy treatment units
- V. Interaction of ionizing radiation
- VI. Measurement of ionizing radiation
- VII. Quality of x-ray beams
- VIII. Measurement of absorbed dose
- IX. Dose distribution

Courses Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member, but will include the following:

1. Class participation
2. A minimum of at least three exams

