Course: RTT-210, Dosimetry and Treatment Practices  
Credits: 3  
Tuesdays, 5:00 – 7:45 PM, S-231

Prerequisites: PHY-110, RTT-150

Instructors: Amanda Caringi  
E-mail: Amanda.caringi@gmail.com  
Office Hours: by appointment

Required Text: The Physics and Technology of Radiation Therapy, McDermott & Orton  
Medical Physics Publishing and Handouts

Recommended Text: The Physics of Radiation Therapy, 2nd ed., Faiz M. Khan, Williams & Wilkins, 1994

Course Objectives: To provide the students with knowledge of the Physics of photon & electron dosimetry, treatment planning, dose calculations, brachytherapy, and radiation protection, and the rationale for quality assurance in the delivery of radiation for therapeutic purposes. Implementation of methods for quality control will be discussed.

Expected Student Outcomes:  
The student will be able to:  
1. Define and discuss dosimetric parameters such as PDD, TAR, TMR, TPR, etc.  
2. Discuss, analyze and perform various dose and MU calculations.  
3. Discuss the various aspects of the physics of photon dosimetry  
4. Discuss the various aspects of the physics of electron dosimetry.  
5. Discuss the principles and process of simulation and treatment planning.  
6. Discuss the advances in treatment planning techniques.  
7. Discuss the rationale of brachytherapy to include: radioactive materials, applicators, types of implants, dosimetry and safety considerations.  
8. Discuss the principles of special treatment procedures to include: SRT, TBI, TSET and IORT.  
9. Discuss the procedures and regulations concerning the handling and disposal of radioactive materials.  
10. Discuss and demonstrate the appropriate procedure for documenting brachytherapy quality assurance procedures.

Grading System:  
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<th>Score Range</th>
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<td>95 – 100</td>
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Grade Calculation:

- Attendance: 10%
- Quizzes: 15%
- Assignments: 15%
- Presentation: 10%
- Midterm: 20%
- Final: 30% (Cumulative)

NOTE: ALL QUIZZES AND EXAMINATIONS MUST BE TAKEN WHEN SCHEDULED. IT IS THE STUDENT'S RESPONSIBILITY TO NOTIFY THE INSTRUCTOR OF ABSENCE FROM CLASS BY 3:00PM OF THE TEST DAY. ANY QUIZ OR EXAMINATION TAKEN AT A TIME OTHER THAN THAT SCHEDULED WILL RESULT IN AN AUTOMATIC 10 POINT DECREASE IN YOUR TEST GRADE. MAKE-UP QUIZZES AND EXAMINATIONS WILL ONLY BE GIVEN FOR DOCUMENTED ABSENCES AND AT THE DISCRETION OF THE INSTRUCTOR. ALL MAKE-UP QUIZZES AND EXAMINATIONS MUST BE SCHEDULED PRIOR TO THE NEXT CLASS MEETING. FAILURE TO DO SO WILL RESULT IN A ZERO GRADE FOR THE QUIZ/EXAMINATION.

ALL ASSIGNMENTS MUST BE HANDED IN ON TIME. FAILURE TO DO SO WILL RESULT IN A DECREASE IN YOUR GRADE.

OUTLINE

I. Photon Beam Dosimetry
   - A. Dosimetry systems & dose measurements
   - B. Depth dose distribution & characteristics
   - C. Dosimetric parameters (PDD,TAR,TPR,TMR) and dose calculations
   - D. Dose calculations in rotational therapy
   - E. Dose calculations in irregular fields
   - F. MU/Time calculations & parameters

II. Treatment Planning
    - A. Isodose curves, penumbra
    - B. Combination of radiation fields
    - C. Arc rotation
    - D. Wedge filters and wedge field techniques
    - E. Patient data (contours, internal structures, CT, MRI, etc.)
    - F. Tissue inhomogeneities
    - G. Tissue compensation & skin dose
    - H. Field shaping
    - I. Field matching and gap calculations

III. Advances in Treatment Planning Techniques
     - A. 3D Treatment planning, IMRT, etc.
     - B. Terminology & plan evaluation

IV. Electron Beam Dosimetry
    - A. Depth dose distribution
    - B. Isodose curves
    - C. Dose prescription & dose calculations
    - D. Field shaping & matching
    - E. Skin dose & shielding