Prediction of Scatter Radiation to Cardiac Implantable Electronic Devices (CIEDs) in Radiation Therapy

PHYS 4175.003

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<th>Monday</th>
<th>9:00am – 11:30am</th>
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<td>Thursday</td>
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Research Supervisor Information

- **Name:** Linda Allen Miller, M.S., D.A.B.R.
- **Position:** Therapy Physicist, CHI St. Luke’s Health – Memorial, Lufkin, TX

Class Information & Description

This is not a classroom course, but an experiential research course. The research supervisor shall determine location and hours, in addition to research duties.

- **Class Background Information:** Cardiac Implantable Electronic Devices (CIEDs) include implanted cardiac pacemakers (ICPs) and implantable cardioverter-defibrillator (ICD) devices. When CIEDs are exposed to radiation, potential damage can occur. Short of keeping CIEDs out of the direct beam of radiation, the distance from the beam and the energy of the beam are important factors in determining risk of damage. It would be useful for radiation oncologists and radiation physicists to have guidance in predicting which patients require closer attention when planning treatment for patients with CIEDs.

- **METHOD AND MATERIALS:** A study will be designed to measure scatter radiation for different photon and electron beam energies at various distances from the active beam of radiation to see if there is a distance beyond which scatter radiation is not likely to be clinically relevant.
Student Learning Objectives

1. Familiarize self with concepts of radiation beam energy (photons and electrons), scatter radiation (kV and neutron), beam modification, monitor units, and dose.
2. Learn basics of linear accelerator design, QA requirements.
3. Understand use of water phantom for dose calibration.
4. Review select literature on radiation dose and pacemaker functionality.

Program Learning Objectives

PLO 1: Critical Thinking: The student will demonstrate proficiency in physics by developing critical thinking and problem-solving skills.

PLO 2: Laboratory Skill: The student will develop good experimental techniques.

PLO 3: Written Communications: The student will develop effective writing communication skills.

PLO 4: Oral Communications: The student will develop effective oral communication skills.

Course Requirements

The grade of A will be earned for a student that completes all their responsibilities in the conducted research as detailed by the research supervisor. This includes the following objectives:

a. Supervised internship and research hours summing to a minimum of 12.5 hours (1 SCH equivalent).

b. Independent internship and research hours summing to a minimum of 24.5 hours (SFA Policy 5.4)

c. Complete one of the following:
   1. Complete a research poster to be presented in the STEM building and other related events.
   2. Give a poster presentation of research at a professional conference.
   3. Give an oral presentation of research at a professional conference.
   4. Be acknowledged as an (co)author on a research paper stemming from the research activity.

d. Curate a letter of recommendation from research supervisor.

The grade of B will be earned if 3 of 4 objectives are completed. The grade of C will be earned for 2 of 4 objectives are completed. The grade of D will be earned for 1 of 4 objectives are completed. Otherwise, a failing grade will be earned.
University Policies

Mental Health Statement

SFASU values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:

- SFASU Counseling Services
  www.sfasu.edu/counselingservices
  3rd Floor Rusk Building
  936-468-2401

- SFASU Human Services Counseling Clinic
  www.sfasu.edu/humanservices/139.asp
  Human Services Room 202
  936-468-1041

Crisis Resources:
- Burke 24-hour crisis line 1(800) 392-8343
- Suicide Prevention Lifeline 1(800) 273-TALK (8255)
- Crisis Text Line: Text HELLO to 741-741

Academic Integrity (4.1)

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been
purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit. Please read the complete policy at http://www.sfasu.edu/policies/4.1-student-academic-dishonesty.pdf.

**Withheld Grades Semester Grades Policy 5.5)**

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average. For additional information, go to http://www.sfasu.edu/policies/course-grades-5.5.pdf.

**Students with Disabilities**

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

**Disclaimer:** Per SFA policy 5.4, this schedule and chosen exercises reflects that for each credit hour we will have one hour of faculty instruction with at least two hours of out-of-class student work per week. In other words, for an X credit hour class the student should expect X class hours of faculty instruction with 2 times X out-of-class hours of student work per week.