RADI 6026
Clinical Therapy Rotations 3 & 4

Spring 2017

CLASS DAYS and TIME: Monday – Friday 8:00 a.m. – 5:00 p.m.

CLASSROOM: CTRC Building – Radiation Oncology Clinic

COURSE FACULTY: Niko Papanikolaou, Ph.D., Sotirios Stathakis, Ph.D., Neil Kirby, Ph.D., Karl Rasmussen

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COURSE DESCRIPTION AND OBJECTIVES

The first clinical rotation is designed to give an introduction and an overview of all the clinical processes and the basic safety training. In detail the student will cover the following topics:

Pre-requisites – RADI 6025 and has passed the Core Knowledge Exam

Semester credit hours – 12

By the end of this course, each student should be able to: On Board MV and kV Imaging, ExacTrac design and function, ExacTrac Daily, Monthly QA, Linac Annual QA, The RPC: The resident knows what the RPC is/does, TBI and TSE, IMRT Planning, LDR planning, Eye plaque process, Patient Safety, and Learn shielding techniques for CT, kV imaging, LINAC and isotopes.

COURSE ORGANIZATION

The student is assigned a mentor from the physics staff and performs clinical tasks under the mentor's direct supervision. A rotation is considered complete when all rotation assessments have been signed off by the mentor and student.

Materials – See below

Computer Access – Many of the presentations are given in the common lecture format and are accompanied by Pdf converted PowerPoint slide files. You are responsible for all information included in the lecture materials. However, you should not assume that all testable lecture material is found only in the posted materials. That is, lectures may be expanded and enhanced during in-class presentations. So, take good notes because any information discussed in class is considered testable.

Reading Assignments – Required reading assignments are assigned throughout the rotations. Unless specifically noted by the instructor, anything in the required readings, whether emphasized in class or not, is considered testable on exams.

ATTENDANCE

In order to achieve the expected level of competency, students must be fully engaged. Therefore, attendance for every class session is expected. It is recognized that a student may occasionally arrive late to class due to unexpected traffic problems or inclement weather. However, chronic lateness is considered an unprofessional behavior that disrupts the learning environment for everyone else in the classroom.

TEXTBOOKS

Required: Click here to enter text.

GRADING POLICIES AND EXAMINATION PROCEDURES

A rotation is considered complete when all rotation assessments have been signed off by the mentor and student. Failure to complete a rotation or unsatisfactory progress in a rotation will be reviewed by the DMP Committee on Graduate Studies (COGS). The student will be notified in writing of their probationary status and will be given a plan for remediation.

Secure a passing grade for twenty one (21) monthly written exams on the assigned topics that will be covered during each rotation. Each exam is two hours long, and has up to 50 multiple choice questions. Passing grade is considered to be a score above 70%. In case of a failing exam grade, a second exam will be given within 7 days. After a second failed attempt, the student will be given a plan for remediation that has to be completed before the next examination.

Complete a comprehensive oral examination every 6 months. Oral examinations are considered complete when the oral evaluation form has been signed by the appropriate faculty mentor and student. A minimum of two faculty members must be present during the examination or else the examination will be rescheduled.

REQUESTS FOR ACCOMODATIONS FOR DISABILITIES

In accordance with policy 4.2.3, **Request for Accommodation Under the ADA and the ADA Amendments Act of 2008 (ADAAA)**, any student requesting accommodation must submit the appropriate request for accommodation under the American with Disabilities Act (ADA, form 100). to his/her appropriate Associate Dean of their School and a copy to the ADA Coordinator. Additional information may be obtained at http://uthscsa.edu/eeo/request.asp.

ACADEMIC INTEGRITY AND PROFESSIONALISM

Any student who commits an act of academic dishonesty is subject to discipline as prescribed by the UT System Rules and Regulations of the Board of Regents. Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an exam for another person, signing attendance sheets for another student, and any act designed to give unfair advantage to a student or the attempt to commit such an act. Additional information may be obtained at http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/academicdishonestypolicy/

TITLE IX AT UTHSCSA

Title IX Defined:
Title of the Education Amendments of 1972 is a federal law that prohibits sex discrimination in education. It reads "no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance."

University of Texas Health Science Center San Antonio's Commitment:
University of Texas Health Science Center San Antonio (UTHSCSA) is committed to maintaining a learning environment that is free from discriminatory conduct based on gender. As required by Title IX, UTHSCSA does not discriminate on the basis of sex in its education programs and activities, and it encourages any student, faculty, or

staff member who thinks that he or she has been subjected to sex discrimination, sexual harassment (including sexual violence) or sexual misconduct to immediately report the incident to the Title IX Director.

In an emergency, victims of sexual abuse should call 911. For non-emergencies, they may contact UPD at 210-567-2800. Additional information may be obtained at http://students.uthscsa.edu/titleix/

EMAIL POLICY

Every student is issued a University e-mail address and account at the time of enrollment. As a matter of University Policy, communications between students and faculty that occur using the student's University e-mail address is considered official business. Therefore, students are expected to check their university email inboxes on a regular basis so that any announcements, instructions, or information regarding this course will be received in a timely way. Missed communications due to inadequate monitoring of incoming emails on the University's email server will never be a valid excuse for unsatisfactory academic progress.

USE OF RECORDING DEVICES

Recording of lectures and other learning activities in this course by any means (*e.g.*, video, audio, etc.) is only permitted if approved by the instructor or required for compliance with Americans with Disabilities Act (ADA).

ELECTRONIC DEVICES

Cell phones must be turned off during all class meetings and exams. Computers and electronic tablets are allowed only for participating in classroom activities (*e.g.*, viewing slides presented in lecture or conference materials). No texting, tweeting, emailing, web-surfing, gaming, or any use of electronic devices that is not directly connected with classroom activities is permitted.

Objectives Master Checklist
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Topic	Resident Initials	Mentor Initials**
Retina, optic nerves, chiasm and lens: fractionated and single dose		
Brain: fractionated		
Brainstem: single dose		
Spinal cord: fractionated and single dose		
Parotid: fractionated		
Lung: fractionated		
Kidney: fractionated		
Small bowel: fractionated		
Large bowel: fractionated		
Heart: fractionated		
Liver: fractionated		
Bladder: fractionated		
Rectum: fractionated, prostate implant		
Urethra: prostate implant		
Femoral Head: fractionated		
Skin: fractionated		
Lyman-Kutcher model for calculation of NTCP		
Definition and understanding of gEUD		
Irregular Fields		
Lung 3D		
Pelvis 3D		
Pancreas 3D		
Brain 3D		
Larynx 3D		
GYN 3D		
Abdomen (seminoma)		
Prostate 3D		
Breast 3D		
Lung IMRT		
Pelvis IMRT		
Pancreas IMRT		
Brain IMRT		
Larynx IMRT		
GYN IMRT		
Prostate IMRT		
Breast IMRT		
Electron fields		
Discuss the program requirements for control of radioactive material, isotope room layout, logout-login procedures for Cs-137, Ir-192, I-131		
Demonstrate an understanding of TG-43 formalism and update		

Radiation Protection Checklist

Competency	Resident Initials	Mentor Initials**
Megavoltage photons (linear accelerators and/or cobalt-60 units) and electrons, kilovoltage, superficial x-rays, and/or protons		
Demonstrate an understanding of the Nuclear Regulatory Commission (NRC) and/or state licensing (by-product materials and x-ray producing devices);		
Explain the principles behind a radiation protection program, including the rationale for the dose limits for radiation workers and members of the general public;		
Demonstrate an understanding of NRC and/or state, local, and institutional regulatory requirements;		
Explain the ALARA (As low as reasonably achievable) concept;		
Demonstrate an understanding of site planning and how to supervise construction (key elements to monitor);		
Demonstrate an understanding of structural shielding designs for a radiotherapy department (e.g. NCRP 151) and discuss the key parameters necessary to perform a shielding calculation;		
Perform shielding calculations for an accelerator vault. Calculations should include primary and secondary barrier transmission calculations;		
Discuss the shielding requirements for the maze and door of a high energy room;		
Perform radiation survey of a facility including low energy (4–6 MV) and high energy (15–25 MV) units;		
Discuss advantages and disadvantages of various materials that may be used for shielding;		
Discuss how special procedures such as TBI and SBRT may impact shielding parameters.		
IMRT		
Demonstrate understanding of effects of IMRT delivery on leakage radiation and its potential effects on patients and personnel exposure;		
Demonstrate understanding of the effects of different IMRT delivery techniques on the amount of leakage radiation produced;		
Demonstrate understanding of effects of IMRT delivery on vault shielding requirements.		
Conventional Simulator (Radiographic/Fluoroscopic)		
Demonstrate an understanding of state licensing (x-ray producing devices);		
Explain the principles behind a radiation protection program, including the rationale for the dose limits for radiation workers and members of the general public;		
Discuss the key parameters necessary to perform a shielding calculation;		
Demonstrate an understanding of structural shielding designs for a conventional simulator and perform a shielding calculation (walls, ceilings, floor, and control area);		
Demonstrate an understanding of film processing and darkroom design.		
CT Simulator		
Demonstrate an understanding of state licensing (x-ray producing devices);		
Explain the principles behind a radiation protection program, including the rationale for the dose limits for radiation workers and members of the general public;		
Discuss the key parameters necessary to perform a shielding calculation;		
Discuss the significance of an isodose distribution plot for the CT simulator;		

Demonstrate an understanding of structural shielding designs for a CT simulator and perform a shielding calculation (walls, ceilings, floor, and control area);		
Demonstrate an understanding of film processing and darkroom design.		
Brachytherapy		
Demonstrate an understanding of shielding calculations for primary and secondary barriers (i.e. NCRP 151);		
Discuss the key parameters necessary to perform a shielding calculation;		
Discuss and/or perform a shielding calculation for a brachytherapy vault;		
Discuss and/or perform a radiation survey for a brachytherapy vault;		
Discuss requirements for personal radiation safety badges;		
Discuss labeling, shipping, and receiving requirements for radioactive material;		
Discuss management of isotope inventory;		
Discuss patient-release criteria for radioactive patients (i.e. patients with temporary or permanent implants and radiopharmaceuticals);		
Discuss how to handle changes in medical status for radioactive patients (i.e. medical emergency or death, NCRP 155);		
Explain the key concepts of Title 10 of the Code of Federal Regulations parts 19, 20, and 35;		
Demonstrate how to safely operate a remote afterloader unit, including emergency procedures.		
Regulations/recommendations/licensing		
Demonstrate an understanding of Nuclear Regulatory Commission (NRC) and/or state licensing (by-product materials and x-ray producing devices);		
Demonstrate an understanding of the appropriate regulations for radiation protection and dose limits for radiation workers and members of the general public;		
Demonstrate an understanding of NRC and/or state, local, and institutional regulatory requirements;		
Explain the ALARA (As low as reasonably achievable) concept;		
Discuss the role and significance of the Joint Commission;		
Discuss the role and responsibility of a radiation safety committee;		
Discuss the role and responsibility of a radiation safety officer;		
Discuss the significance of ACR, ASTRO, and AAPM recommendations;		
Demonstrate an understanding of release of patients (with sealed or unsealed sources).		
Survey meters (ionization chamber, Geiger Müller (GM), scintillation)		
Discuss the operation and appropriateness of different survey instruments (i.e. Geiger-Muller counter, ionization survey meters, and scintillation counter);		
Performs battery and constancy checks. Understands the allowable deviation from baseline reading;		
Understands how a survey meter is calibrated, who may calibrate a meter (i.e. ionization versus GM) and the required frequency of calibration;		
Personnel monitoring		
Demonstrates an understanding of the physical mechanisms involved in the process of radiation detection and readout of personnel monitors (film, TLD, and OSLD).		
Understands the rationale for occupational dose limits and the federal/state limits;		
Understands the definition of a “declared pregnant woman”;		
Understands the federal/state personnel monitoring requirement;		
Understands the rationale for ALARA investigation levels;		
Understands the role and responsibility of physics in developing a radiation safety culture;		

Understands the requirements for providing personnel monitoring reports to staff;		
Reviews and discusses the results of personnel monitoring reports.		
Guidelines and instructions for personnel		
Understands the roles and responsibilities of a radiation worker (i.e. NRC Form 3).		
Understands the requirements and frequency of radiation safety refreshers for staff;		
Understands the personnel radiation safety hazards specific to the uses of radiation in a therapeutic setting (e.g. linear accelerator, brachytherapy, radioisotope handling);		
Demonstrates the ability to tailor a radiation safety training program for the intended audience (e.g. physicists, therapists, dosimetrists, nurses, physicians, physician residents, students, and maintenance staff).		
Hazards of low levels of radiation		
Understands the linear no-threshold (LNT) hypothesis, its origins and limitations;		
Understands the collective dose theory as it applies to large populations;		
Understands the potential biological effects associated with prolonged exposure to low levels of radiation;		
Knows the major natural sources of background radiation;		
Knows the major man-made sources of background radiation.		

Patient Safety (Form R.4.E)

Competency	Resident Initials	Mentor Initials**
General		
Understand the principles behind the development of a general patient and staff safety management program within the hospital;		
Discuss the physicist's role in developing and overseeing an overall quality assurance program both for equipment and for procedures, including a discussion of allocation and management of resources necessary to carry out these tasks, incorporation of tools and techniques, and inclusion of various groups within the structure of the radiation oncology department;		
Discuss the principles and rationale of the Joint Commission Universal Protocol and discuss the use of pre-procedure verification and time-outs for the prevention of treatment errors;		
Discuss the implementation of a continuous quality improvement (CQI) program, including the use of both internal review and external audits/peer review for the assurance of high quality care;		
Discuss the concept of a Failure Mode and Effect Analysis (FMEA), how to design and implement an FMEA, and how to use the results for error prevention minimization of risks to patients and staff;		
Discuss charting systems for prescription, delivery, and recording of treatment information, standardization of such systems, and the use of such systems within a record and verify / electronic medical record system;		
Discuss mechanisms for independent checking of treatment information.		
Equipment		
Discuss the implementation of an effective set of equipment operating procedures including preventative maintenance and repair, maintenance and repair records, emergency procedures, and systematic inspection of interlock systems;		

Discuss the development of a program to prevent mechanical injury by the machine or accessory equipment, including the need for visual and audio contact with the patient while under treatment;		
Understand potential patient safety hazards related to the use of blocks, block trays, wedges, and other ancillary treatment devices and accessories and mechanisms to minimize these risks;		
Understand potential patient safety hazards related to patient support and immobilization systems and mechanisms to minimize these risks;		
Understand the potential patient safety hazards with respect to potential gantry–patient collision and mechanisms to minimize this risk.		
Other Patient/Staff Safety Issues		
Understand potential electrical hazards to patients and staff;		
Understand potential hazards of strong magnetic fields to patients and staff;		
Understand the mechanisms of ozone production and potential hazards to patients and staff;		
Understand potential hazards to patients and staff from the use of cerrobend.		