RADI 6034
Clinical Therapy Rotation 7 & 8

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, Ph.D.

OFFICE LOCATION and HOURS: By Appt. Office: G242

EMAIL: papanikolaou@uthscsa.edu

TELEPHONE: (210) 450-5664

READ THIS DOCUMENT CAREFULLY - YOU ARE RESPONSIBLE FOR ITS CONTENTS.

COURSE DESCRIPTION AND OBJECTIVES

In the fourth semester of the clinical rotation, the students will cover the following topics: Treatment plan checks, Brachytherapy, eye plaque, weekly chart checks, LINAC Design, stereotactic treatment planning concepts, Stereotactic Quality Assurance, participate in all aspects of SBRT treatment and treatment planning QA.

Student will assume primary oversight of all QA, operations and service activities on Novalis. ***The resident shall not make any adjustments to their LINAC without faculty supervision***

Pre-requisites – RADI 6032

Semester credit hours – 12

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
RADI 6034
Clinical Therapy Rotation 5 & 6
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Competency	Resident Initials	Mentor Initials**
LINAC Design: discuss schematic of major components		
Klystrons and Magnetrons		
Circulator		
Waveguide		
Modulator		
Accelerator structure: Standing wave, traveling wave		
Buncher and side couple cavities		
Bending magnet		
Treatment head: primary collimator, monitor chamber, flattening filter, jaws, MLCs, electron foils, x-ray target		
Electron gun		
Mechanism for energy change: photons and electrons		
Mechanism for dose rate change		
Mechanism for change between photon and electron mode		
Can you identify a picture of all components above		
Perform treatment plan verification including:		
Review of patient history (including prior radiotherapy and potential overlap with current treatment), disease, course of treatment, and dose prescription;		
Review of appropriateness of treatment plan and dose distribution to achieve goals of treatment course;		
Review of simulation (e.g. patient positioning and immobilization), planning, imaging, and treatment field parameters;		
Review of monitor unit or time calculations;		
Review of images to be used for patient positioning and/or monitoring;		
Review of transfer of plan parameters and images to record and verify system and any other patient monitoring systems.		
Perform ongoing review of treatment records (chart checks) including verification of delivered treatments;		
Perform ongoing review of patient imaging and/or tracking using:		
a) Film		
b) Electronic portal imaging device (EPID)		
c) Real time planar imaging		
d) Cone beam CT (CBCT)		
e) Ultrasound (US)		
f) External fiducial and/or surface tracking		
g) Internal radiofrequency beacon tracking		

Sealed Radionuclide Sources		
Demonstrate an understanding of how commonly used sources are generated;		
Discuss the decay, decay energies (mean energy), and half-life of commonly used sources;		
Discuss the form and construction of sealed sources;		
Discuss and define the different units of source strength that have been used, past and present;		
Perform a decay calculation, total dose delivered for temporary and permanent implants;		
Discuss personal protection techniques (time, distance, and shielding) and safe handling of sealed sources;		
Discuss the appropriate methods of storage of radioactive material (security and accountability);		
Perform routine receipt procedure and check-out and check-in temporary and permanent sources into inventory;		
Perform a source room survey and quarterly inventory;		
Discuss and/or perform leak checks on sealed sources;		
Demonstrate an understanding of and gain hands-on experience of radioactive material packaging and transportation (Title 49 of the Code of Federal Regulations);		
Demonstrate an understanding of the equipment used to calibrate sealed sources;		
Discuss the process by which sealed sources are calibrated;		
Discuss the process by which measurement equipment (i.e. electrometers, well ionization chambers) is calibrated;		
Explain the theory of operation of a well ionization chamber;		
Discuss and/or perform an assay for sealed sources;		
Demonstrate an understanding of licensing issues and requirements (i.e. NUREG 1556);		
Discuss the operation and appropriateness of different survey instruments (i.e. Geiger-Muller counter, ionization survey meters, and scintillation counter);		
Demonstrate an understanding of the regulatory requirements for sealed sources (i.e. state regulations or 10 CFR 35).		
Unsealed radionuclide sources		
Demonstrate an understanding of how commonly used radiopharmaceuticals (i.e. I-131, P-32, Sm-153, Sr-89) are generated;		
Demonstrate an understanding of the decay, decay energies (mean energy), and half- life of commonly used radiopharmaceuticals;		
Discuss personal protection techniques (time, distance, and shielding) and safe handling of unsealed sources;		
Discuss the process by which unsealed sources are calibrated;		
Discuss the process by which measurement equipment (i.e. dose calibrator) is calibrated;		
Discuss and if possible, perform an assay for unsealed sources;		
Demonstrate an understanding of licensing issues and requirements (i.e. NUREG 1556);		
Discuss the operation and appropriateness of different survey instruments (i.e. Geiger-Muller counter, ionization chamber, and scintillation counter);		
Demonstrate an understanding of the regulatory requirements for unsealed sources (i.e. state regulations or 10 CFR 35);		

CLINICAL APPLICATIONS		
Discuss the various brachytherapy sources that have been used, past and present, clinically. Discuss the rationale for source selection.		
Discuss the how a brachytherapy program is developed.		
Discuss in detail the use and operation of different brachytherapy modalities, including their advantages and disadvantages.		
Low dose-rate (LDR)		
High dose-rate (HDR)		
Pulsed dose-rate (PDR) (optional)		
Electronic		
Discuss and perform source strength (Air Kerma Rate, S_k) verification and comparison between measured and vendor's specification;		
Discuss radiation protection for radiation workers and visitors;		
Demonstrate an understanding of commissioning and acceptance of Remote After Loaders (RAL);		
Demonstrate an understanding of GYN and GU anatomy;		
Demonstrate an understanding of the treatment of cervical and endometrial cancer with LDR, HDR, and PDR (recommended);		
Demonstrate an understanding of prostate cancer and the treatment with HDR and LDR;		
Treatment planning		
Perform brachytherapy treatment plans for a cylindrical applicator;		
Perform brachytherapy treatment plans for a cervical applicator (e.g. tandem and ovoids, tandem and ring);		
Discuss the differences between point and volume based treatment planning (ICRU 38 and the GEC ESTRO recommendations);		
Perform interstitial brachytherapy treatment plans (e.g. prostate, gynecologic, sarcoma);		
Perform a brachytherapy treatment plan for an eye plaque (Recommended but not required);		
Perform a brachytherapy treatment plan for microsphere therapy (Recommended but not required).		
Demonstrate an understanding of applicator acceptance, commissioning, and performance of periodic quality assurance;		
Demonstrate an understanding and performance of daily QA;		
Describe emergency training requirements (10CFR35);		
Demonstrate an understanding of Quality Management Program (QMP) as required by the federal/state for auditing;		
Discuss the criteria and subsequent handling of recordable and reportable events.		
IMAGING		
Demonstrate an understanding of the mathematics of localization of target volume and catheter reconstruction by orthogonal films (2D);		
Demonstrate an understanding of CT/MRI/US/PET based localization of Region of Interests (ROIs) and catheter reconstruction.		
TREATMENT PLANNING		
Demonstrate an understanding of source strength of radioactive sources;		
Discuss dose rates and dose calculation formalisms (HEBD, LEBD);		
Demonstrate an understanding of the performance of computerized planning of various imaging modalities of LDR and HDR;		
Discuss in details the advantages and disadvantages of dose optimizations;		
Discuss and perform secondary calculations as a QA check for computerized planning.		
Demonstrate an understanding testing of new sealed sources		
Discuss the calibration check of new sealed sources		

Discuss the calibration check of well chambers		
Discuss the elongation factor determination for well chambers (LDR Ir-192)		