Clinical Rotation 4: PHYS 707
Spring 2016 (Feb. 25, 2016 to Aug. 25, 2016)

COURSE INFORMATION

Class Days: Monday-Friday
Class Times: Forty hours per week
Class Location: One of the participating cancer clinics

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Office Hours Days: Friday
Office Hours Times (and by appointment): 3:00-4:00
Office Hours Location: P-139

Associate Program Directors at Participating Sites:

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Course Overview

Description from the Official Course Catalog:
On-site, full-day clinical training covering physics concepts and implementation of standard radiation treatment (RT) techniques for common cancer treatment sites, routine quality assurance associated with patient specific RT and planning, special RT procedures, quality assurance of RT planning systems, monitor unit calculations, patient safety with respect to radiation therapy, and treatment planning

Description of the Purpose and Course Content:
This course is a clinical rotation that comprises an integral part of the residency training for radiation oncology physics. It is designed to be in accordance with American Association of Physicists in Medicine Report 90, 'Essential and Guidelines for Hospital based Medical Physics Residency Training Programs', and the Commission on Accreditation of Medical Physics Educational Programs (CAMPEP).

This course extends over the fourth-six months of the certificate program and consists of rotations through areas of clinical training covering physics concepts and implementation of standard radiation treatment (RT) techniques for common cancer treatment sites, routine quality assurance associated with patient specific RT and planning, special RT procedures, quality assurance of RT planning systems, monitor unit calculations, patient safety with respect to radiation therapy, and treatment planning under the supervision of Board Certified Medical Physicists at one of the participating cancer centers. The course also includes assigned reading on the various aspects of external beam radiation therapy and ethics and professionalism. Objectives are established at the commencement of the course. The Resident will be assigned to one of the participating centers for this 6-month course. The total hours at the clinic, including self-study of reading material and contact hours of the Resident with the
The proposed course requires access to external beam radiotherapy equipment, simulation equipment, imaging equipment, quality assurance, and treatment planning equipment that are only available at community/academic cancer centers. Arrangements will be made to have board certified Clinical Medical Physicists at the hospitals train the Resident in all aspects of the physics of external beam radiation therapy including equipment usage and quality assurance and control. Once trained, the Resident will be expected to perform routine quality control of the equipment available at the assigned cancer center under the supervision of a qualified Medical Physicist.

Patient Treatment:
A. Treatment techniques – 4 weeks
1. Coplanar beam treatment techniques
2. Non-coplanar beams (3-D)
3. Image-guided radiation therapy
   a. Computed tomography (CT)
   b. Magnetic resonance imaging (MRI)
   c. Positron emission tomography (PET)
   d. Ultrasound
   e. Image registration and fusion
4. Site-specific techniques
   a. Breast
   b. Central nervous system (CNS)
   c. Genitourinary (GU)
   d. Gynecological (GYN)
   e. Gastrointestinal (GI)
   f. Head and Neck
   g. Lymphoma
   h. Melanoma
   i. Pediatrics
   j. Sarcoma
   k. Thoracic

B. Treatment planning – 8 weeks
1. Patient positioning, immobilization, and localization
2. Tumor localization/patient contours (radiographic/fluoroscopic, CT simulation)
3. Custom blocking and multileaf collimators (MLCs)
4. Computer-assisted isodose generation

C. Monitor unit (MU) calculations
1. Source-skin distance (SSD) and percentage depth dose (PDD)
2. Source-axis distance (SAD)
   a. Tissue-air ratio (TAR)
   b. Tissue-maximum ratio (TMR)
   c. Tissue-phantom ratio (TPR)
3. Extended SSD
4. Off-axis points
5. Inhomogeneity (heterogeneity) corrections
6. Tissue compensation
7. Asymmetric collimation
8. $S_c$ and $S_p$
9. Enhanced dynamic wedge
10. Virtual wedge
D. Quality assurance/Informatics – 4 weeks
1. Treatment plan verification
2. Treatment record verification
3. Monitor unit calculation rechecks
4. Patient positioning
   a. Ultrasound (US)
   b. Electronic portal imaging device (EPID)
5. Portal imaging (film, EPID, computed radiography [CR])
6. Tissue compensators and field-in-field techniques
7. MU calculators
8. Information systems data entry and integrity
   1. Record and verify systems
   2. Validation of data transfer
   3. Record and verify systems
   4. IHE – Radiation Oncology (IHE-RO)
   5. Image registration, fusion, segmentation, processing
   9. Fetal dose and pacemakers
   10. Treatment delivery verification
   11. In-vivo dosimetry

E. Special procedures – 3 weeks
1. Total body photon irradiation (TBI)
2. Total skin electron treatment (TSET)
3. Intraoperative (electrons)
4. Small field
   a. Stereotactic radiosurgery (SRS)
   b. Stereotactic radiation therapy (SRT)
5. Electron arc
6. Tissue compensation
7. Bolus and beam spoiler
8. Respiratory correlated planning and delivery

F. Treatment planning workstations–3 weeks
6. Beam data acquisition/management
7. Beam modeling
8. Acceptance testing
9. Quality assurance
10. Treatment planning algorithms
11. Treatment techniques
12. Normalization
13. Inhomogeneity (heterogeneity) corrections
14. Beam modeling

G. Patient safety– 1 week
1. Mechanical
   a. Blocks and trays
   b. Patient couch
   c. Gantry–patient collision
   d. Accessories
2. Electrical
3. Ozone
4. Cerrobend

Student Learning Outcomes:
All of the outcomes below will be assessed by competencies in clinical measurements and practice, oral evaluations, written reports and a final oral exam.

Patient Treatment:
A. Treatment techniques
   Outcome: Student will understand and be able to describe standard radiation treatment techniques.
B. Treatment planning
   Outcome: Student will understand and be able to describe and develop standard radiation treatment plans for common cancer treatment sites.
D. Quality assurance
   Outcome: Student will be able to perform routine quality assurance of associated with patient-specific radiotherapy treatment and planning.
E. Special procedures
   Outcome: Student will understand and be able to describe special radiation treatment procedures.
F. Treatment planning workstations
   Outcome: Student will be able to understand, describe, and perform quality assurance of radiotherapy treatment planning systems.
G. Patient safety
   Outcome: Student will understand and be able to describe patient safety with respect to radiation therapy.

Real Life Relevance:
This clinical rotation course provides practical hands on clinical training in radiation oncology physics.

Relation to Other Courses:
This is the fourth clinical rotation course in the Advanced Certificate of Medical Physics Residency Program. The topics covered in this and the other clinical rotations are core requirements for the Commission on Accreditation of Medical Physics Education Programs (CAMPEP).

Enrollment Information

**Prerequisites:**
Clinical Rotation 3 (PHYS 705)

**Adding/Dropping Procedures:**
The course must be added before the end of the second week of the semester. Dropping procedures will follow the Physics Department guidelines.

Course Materials

**Required & Recommended Materials:**
The following task group publications available at [http://www.aapm.org/pubs/reports/](http://www.aapm.org/pubs/reports/) from the American Association of Physicists in Medicine (AAPM) and books and will be the references for the course:

Course Structure and Conduct

Style of the Clinical Rotation:
- Residents will be trained by the Certified Clinical Medical Physicist to perform hands on clinical duties in the cancer center.
- Once trained the residents will gain practice by preforming routine clinical duties.
- Residents will be responsible for learning the recommended reference materials on their own.

Course Assessment and Grading

Grading Scale:
The Resident’s performance will be evaluated by direct observation, project/progress reports, and three oral evaluations (approximately bimonthly) administered by the supervising Medical Physicist. Note: The final oral examination is cumulative and will be administered by the Advisory Committee.

One of the writing components of this course will include a report by the resident that describes all of the clinical activities/projects in which they participated. The report will include the objectives and relevance, description, methods, and discussion/conclusions of each major clinical activity/project. Special assigned clinical project reports may also be included.

The final assessment breaks down as follows:
1. Observation of clinical measurements and practice by supervising Medical Physicist: 10%
2. Bimonthly oral evaluations based on the clinical rotation topics (Approximately ranging from 20 minutes to 1 hour long): 40%
3. Project/progress and reports: 20%
4. Final presentation and oral exam (1 hour): 30%

The following evaluation scheme from 1 to 5 will be used:
1. Unsatisfactory
   - Performance and/or consistency is below standard in most/all areas covered by evaluation
   - Immediate and consistent improvement to “Meets Expectations” rating is required in next evaluation and final oral exam
2. Needs Improvement
   - Performance and/or consistency is below standards in certain areas and improvement is needed
3. Meets Expectations
   - Competent level of performance that consistently meets high standards
4. Above Expectations
   - Examination results exceed expectations
   - Performance is consistently high quality
5. Outstanding
   - Knowledge of evaluation material is exceptional and consistently superior

The resident will be assigned a pass/fail for the course. An overall score of 3 or greater constitutes a pass. If the resident fails one section of the rotation, they will be given one chance to prepare and re-take the oral exam for that section two weeks later. A copy of all evaluations will be sent to the Program Director.
Excused Absence Make-up Policies:
Students should have an extraordinary reason (e.g., illness, death in the family, etc.), with proof, to miss the oral examination or final oral examination. A make-up for such a case will be arranged with the Advisory Committee.

Other Course Policies

The residents are expected to:

- Engage with supervising Medical Physicist for training.
- Record daily activities and time spent in the clinic. This will be reviewed by regularly the supervising Medical Physicist and quarterly by the Advisory Committee.
- Report for duties at the clinic and meetings on time.
- Perform assigned readings, presentations, lectures, and clinical duties in a timely manner.
- Report any QC results that are out of tolerance to the supervising or other qualified Medical Physicist at the clinic as soon as possible.
- Hand in project and progress reports by assigned deadline.
- Dress appropriately in the clinic (e.g., dress shirt and dress pants).
- Interact respectfully with all staff members and patients in the clinic.
- Advise the supervising Medical Physicist and Program Director of planned absences (e.g., vacation time or sick leave). A record of vacation days absent shall be kept by the Associate/Program Director and should not exceed the allotted two weeks per six-month semester. In addition, the holidays allotted to Medical Physicists at the center are applicable to the resident. The resident may also take up to 1.5 days of personal leave per six-month rotation.

Note:
A senior resident will be chosen to be part of the Advisory Committee to provide input on resident issues and concerns.

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Disability Services. Your cooperation is appreciated.