Clinical Rotation 2: PHYS 703  

COURSE INFORMATION

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

Program Director: M. Tambasco, Ph.D., MCCPM  
Contact Information: mtambasco@mail.sdsu.edu  
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:

Genesis Health Partners  
George Mardirossian, Ph.D., DABR (T), NMTB  
Genesis Healthcare Partners | 2466 First Ave Suite B |  
San Diego, CA 92101  
mygenesishealth.com  
Office: 858 505-4100  
Fax: 858 888-7733  
E-mail: gmardirossian@genhp.com

Naval Medical Center  
Richard LaFontaine, Ph.D., DABR (T)  
34800 Bob Wilson Drive, STE 14  
San Diego, CA 92134-5014  
Office: 619-532-8185  
Cell: 619-379-4627  
E-mail: Richard.Lafontaine@med.navy.mil

Course Overview

Description from the Official Course Catalog:
On-site, full-day clinical training in intensity modulated radiation therapy (IMRT), volumetric modulated radiation therapy (VMAT), and brachytherapy. Training in quality assurance, calibration, inverse planning, IMRT/VMAT delivery, and radiation safety. Radionuclides and sealed sources in brachytherapy, clinical applications of the sources, treatment planning, and quality assurance.

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 second-sixth months of the certificate program and consists of rotations through areas of external beam, intensity-modulated radiation therapy (IMRT), brachytherapy, and associated radiation safety under the supervision of Medical Physicists at one of the participating cancer centers. Objectives are established at the commencement of the course. The student’s performance is evaluated by direct observation, a project/progress report, and bimonthly oral examinations administered by the supervising Medical Physicist including a final oral examination by the Advisory Committee. The 40 hrs/week indicates the total contact hours of the student with the clinic team (medical physicists, dosimetrists, radiation oncologists, tumor board meetings).
Note: The proposed course requires access to external beam radiotherapy equipment, brachytherapy equipment, and quality assurance 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 residents in all aspects of the physics of external beam radiation therapy including equipment usage and quality assurance. 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.

I. Quality assurance and calibration of equipment (Refs. 1, 2, 3, 4, 6 & 9) – 4 weeks

II. Intensity-Modulated Radiation Therapy – Total 8 weeks
   A. Inverse planning (Refs. 1 & 2) – 1 week
      1. Objective functions
      2. Optimization
   B. IMRT and VMAT delivery (Refs. 1-3) – 2.5 weeks
      1. Tomotherapy
      2. MLC sliding window
      3. MLC step and shoot
      4. Volumetric modulated arc therapy (VMAT)
   C. IMRT and VMAT quality assurance (Refs.1-3 & 9-11) – 2.5 weeks
      1. Field fluence maps
      2. MLC positioning accuracy
      3. Phantom plan and delivery
      4. Isodose verification
      5. Dose delivery verification
   D. Radiation safety (Refs. 1&2) – 1 week
      1. Leakage radiation
      2. Vault shielding

III. Brachytherapy (Refs. 1-8) – Total 12 weeks
   A. Radionuclides – 1 week
      1. Sealed sources
      2. Unsealed sources
   B. Sealed sources – 3 weeks
      1. Form/construction
      2. Activities
      3. Protection/storage/handling
      4. Standardization/calibration
      5. Activity check
      6. Leak checks
      7. Licensing
      8. Most appropriate survey instrument
   C. Radiation protection – 2 weeks
      1. Shielding design
      2. Surveys
      3. Personal radiation safety badges
      4. Shipping and receiving
      5. Patients with implanted radioactive material
   D. Clinical applications – 2 weeks
      1. Radionuclide selection
      2. Applicator choice
         a. Low dose-rate (LDR)
         b. High dose-rate (HDR)
      3. Activity considerations
4. Protection (staff, visitors)
5. Procedure requirements

E. Treatment planning – 2 weeks
1. Source spacing
2. Activities
3. Dose rates and dose calculation formalisms
4. Source localization
5. Computerized planning

F. Quality assurance (QA) – 2 weeks

**Student Learning Outcomes:**
All of the outcomes below will be assessed by competencies in clinical measurements and practice, oral evaluations (online evaluation for “Ethics and Professionalism”), written reports and a final oral exam.

I. Quality assurance and calibration of equipment
   **Outcome:** Student will be able to calibrate equipment for clinical use, and perform routine quality assurance of equipment.

II. Intensity-Modulated Radiation Therapy
   **Outcome:** Student will understand and be able to describe inverse planning, IMRT and VMAT quality assurance, and associated radiation safety. They will also be able to perform IMRT and VMAT QA and understand the meaning of the results.

III. Brachytherapy
   **Outcome:** Student will understand and be able to describe radionuclides and sealed sources used in brachytherapy, the clinical applications of the sources, treatment planning, and quality assurance (QA). They will be able to create basic treatment plans and perform QA.

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

**Relation to Other Courses:**
This is the second 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 1 (PHYS 701)

**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:


10. IMRT commissioning: Multiple institution planning and dosimetry comparisons, a report from AAPM Task Group 119, Med. Phys. 36 (11), November 2009.


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 monthly) 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.