Effective Oncology Physics Education

The University of Texas
Graduate School of Biomedical Sciences
Texas Medical Center
Houston, Texas

M. R. Salehpour, Ph.D.

Acknowledgement

• Dr. Ed Jackson
Our Philosophy:

A Medical Physicist is a professional engaged in the application of physics to medicine and biology in clinical, research, and educational functions.

Research is the foundation for advancements in Diagnosis and Treatment

Program affiliation

Graduate School of Biomedical Sciences (GSBS)

- UT M. D. Anderson Cancer Center
- UT Health Science Center – Houston
Participating Departments in the Medical Physics Program

- **M. D. Anderson Cancer Center**
  - Department of Imaging Physics
  - Department of Radiation Physics
  - Department of Nuclear Medicine
  - Department of Diagnostic Radiology
  - Department of Radiation Oncology
  - Department of Experimental Diagnostic Radiology
  - Department of Experimental Radiation Oncology

- **University of Texas Houston Health Science Center**
  - Medical School: Radiology Department

Medical Physics Program

- 65 Program Faculty
- Current Enrollment: 55 students
- Medical Physics Enrollment: 62 in Fall 2010
- Funding: 100% Ph.D. Students, over 90% of SMS students (full or partial)
- Medical Physics Admissions:
  - ~10 (MS) PhD candidates per year
  - 4-6 Specialized MS candidates per year
Medical Physics Program

- Inception: 1963
- Program Directors:
  - Dr. Shalek (served 1963-1985)
  - Dr. Hogstrom (served 1985-2004)
  - Dr. Jackson (Served since 2004)
- Base Department: Imaging Physics
- Number of graduates since inception: >180
- Program is research focused (Thesis and/or Dissertation)

Medical Physics Program Goals

- Ph.D. track is primarily designed to prepare individuals for:
  - Research career in medical physics
  - Clinical Medical Physics Residency (or junior medical physics position)
- SMS track is primarily designed to prepare individuals for:
  - Clinically oriented career in medical physics
  - Clinical support research laboratory
  - Clinical support industry
  - Clinical Medical Physics Residency
Length of Program

- **Specialized MS Degree**
  - Approximately 2.25 years

- **(MS)PhD Degree**
  - Approximately 5.8 years for students entering with BS
  - Approximately 4 years for students entering with MS

Specialized MS Degree

- Accredited by Commission on Accreditation of Medical Physics Education Programs (CAMPEP)
- Provides clinical and research training.
- Consists of:
  - Didactic coursework in Medical Physics
  - Clinical rotations in radiotherapy and imaging physics
  - Thesis
(MS) PhD Degree

- Accredited by Commission on Accreditation of Medical Physics Education Programs (CAMPEP)
- Provides clinical and research training
- Consists of:
  - Didactic coursework in Medical Physics
  - Introductory Biochemistry
  - Three 10 week research tutorials
  - Additional elective program courses
  - Thesis (for a student entering with BS degree)
  - Dissertation

Program Courses

- GSBS requirement: Course in Quantitative, Molecular, Cellular, and System core courses as well as a course in Biomedical Ethics.
- Biomedical Sciences Core Curriculum (12 semester hours)
  - Applied Mathematics in Medical Physics (3)
  - Fundamental Biological Principles of Molecular Imaging and Therapeutics (4)
  - Radiation Biology (2)
  - Anatomy and Oncology for Medical Physicists (2)
  - The Ethical Dimensions of the Biomedical Sciences (1)
Program Courses

• Medical Physics Core Curriculum (24 semester hours)
  – Introduction to Medical Physics I: Basic Interactions (3)
  – Introduction to Medical Physics II: Medical Imaging (3)
  – Introduction to Medical Physics III: Therapy (3)
  – Introduction to Medical Physics IV: Nuclear Medicine (3)
  – Electronics for Medical Physicists (3)
  – Radiation Detection, Instrumentation, and Data Analysis (3)
  – Introduction to Radiation Protection (3)
  – Medical Physics Seminar (3 semesters) (3x1)

Program Courses

• Research Tutorials - 12 semester hours (3 semesters @ 4 semester hours) – 200 hours each
• Specialty and Special Topics course (not to exceed 12 semester hours)
  • Principles of Magnetic Resonance Imaging (2)
  • Physics of Positron Emission Tomography (2)
  • Special Radiation Treatment Procedures (3)
  • Radiation Transport Methods (2)
  • Digital Processing of Biomedical Images (3)
  • Volumetric Image Reconstruction (2)
Program Courses

• Clinical Rotations (8 semester hours)
  – Introductory Radiation Therapy Physics Rotation (4) (200 contact hours)
  – Introductory Diagnostic Imaging Physics Rotation (4) (200 contact hours)
• Maximum of 6 students per offering
• These rotations supplement topics addressed in many of the core topics courses with hands-on experience.

Main Challenges

• ABR (2012/2014 initiative)
  – Possible Solutions:
    • Increased Residency Slots (MDACC: 7 TP and 5 IP)
    • Establishment of DMP program
      – Pro: Self-funded
      – Con: Perhaps would eliminate our SMS program
      – Con: Perhaps reduce the Ph.D. applicants pool
• Decreased Federal funding