Academic Programs in Medical Physics

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Graduate Programs in Medical Physics

• Educate graduates to succeed in research and/or clinical careers
• Interface with credentialing organizations and residency programs
• Most current graduates seek individual certification through the American Board of Radiology (ABR)
Terminology

- **Certification:** Individual physicists are certified in a specialty area of medical physics through an exam by process by the American Board of Radiology (ABR)

- **Licensure:** Individuals are licensed to practice in specific States by the State

- **Accreditation:** Educational programs in Medical Physics are accredited by CAMPEP (Commission for Accreditation of Medical Physics Educational Programs)
Pathways to Professional Practice of Medical Physics

• Overview of Recent Changes
  – Required 2 year clinical residency for eligibility to complete Board exam process
  – Effective for 2014 exams (effectively in place now)
  – Residencies must be CAMPEP Accredited
  – Residency Applicants should have a CAMPEP accredited graduate degree
Motivation for Board Certification

• Board Certification is generally accepted as the standard of practice
• Defines a Qualified Medical Physicist (QMP)
• Required for State License to practice MP
  – a regulatory requirement to independently practice medical physics in licensure states
  – Florida, Hawaii, New York, Texas (others in progress)
Types of Programs Accredited by CAMPEP

• **Graduate Programs**
  – Certificates
  – MS
  – PhD

• **Clinical Residency Programs (Imaging or Therapy)**
  – May also grant Certificates

• **Doctorate of Medical Physics (DMP)**
  – A professional degree integrating a 2 yr didactic and 2 yr residency programs.
Pathway to Professional Practice

1. BS in Physics or Engineering (must include the equivalent of a minor in Physics)
2. CAMPEP Graduate Degree in Medical Physics (MS or PhD)
3. CAMPEP Residency
   Specialization in Diagnostic Imaging or Radiation Therapy
Alternate Pathway

- Earned PhD in related Field (i.e. Physics)
- Earn CAMPEP Certificate in Medical Physics
- CAMPEP Residency
  Specialization in Diagnostic Imaging or Radiation Therapy
Source of Requirements?

**American Board of Medical Specialties (ABMS)**

- Parent organization to the ABR
- Certifies all Physician Specialties and Physicists
  - Medical Physicists are one of two non-physician groups certified under the ABMS
- Uniform standards drive physics training to parallel physician training
  - i.e. the requirement for residency training
- Dictates Maintenance of Certification requirements
American Board of Radiology (ABR)

- Adopts the ABMS requirements
- Tailors these to Radiologist, Radiation Oncologists, and Medical Physicists
- Conducts the Certification Process through Board Exam
- Implements the Maintenance of Certification Process
CAMPEP

• Accredits educational programs in MP
• Ensures ABR requirements are integrated into educational programs.
• Reviews programs annually
ABR Board Exam Process

• **Part I (Written: General and Clinical)**
  – May be taken while enrolled in CAMPEP Graduate Program

• **Part II (Written in specialization area)**
  – Diagnostic Radiological Physics
  – Therapeutic Radiological Physics
  – Medical Nuclear Physics
  – Taken following completion of corresponding residency program.

• **Part III (Oral)**
  – In specialization area
  – Taken after passing Part II written
CAMPEP Residency Programs

• Located in the US, Canada, Ireland
• 66 Programs in Radiation Therapy Physics
• 8 Programs in Imaging Physics

• Approximate Number of Graduates:
  – 90 per year in Radiation Therapy
  – 8 per year in Imaging
CAMPEP Graduate Programs

• Located in the US, Canada, Korea
• 44 graduate programs

• Approximate number of graduates
  – 300 per year
Observations:

• Not enough residency positions to accommodate all graduate program graduates
• Residency programs can be selective and preferentially accept PhD graduates
• Not enough residency programs to satisfy expected MP workforce needs
• Few imaging residency programs
• No dedicated Nuclear Medicine residency programs (integrated into Imaging programs)
Medical Physics Graduate Programs

• Subject matter to be covered by curriculum is describe by AAPM Task Group Report 197
• Typically ~ 2 years in length for MS
• Program sizes range from approximately 5-80 students (Average ~ 20 students)
• Some programs accredited only for the MS degree
CAMPEP Accreditation

• Accreditation includes
  – Initial review of program’s Self Study
  – Site Visit

• Accreditation Period
  – 3 year initial accreditation
  – 5 year subsequent accreditation
  – Annual review
UF Medical Physics Program Offerings

*BS in Biomedical Engineering*- Medical Physics Track  
(incorporates equivalent of Physics Minor)

*Certificate in Medical Physics*  
May be completed via distance education

*MS*  
*PhD*

*Diagnostic Imaging Physics Residency*  
*Radiation Therapy Physics Residency*

UF offerings include all CAMPEP programs except the DMP
UF Medical Physics Graduate Program

• One of the oldest and largest programs
• Established 1961 in Department of Radiology
• CAMPEP Accredited in 2001
• Joint Program between College of Engineering and College of Medicine
• Departments: Biomedical Engineering, Neurosurgery, Radiology, Radiation Oncology
Graduate Students

- Steady state student enrollment ~ 42
- 75% of admitted students will pursue PhD
- 25% earn MS degree
- 50/50 male/female student population
- ~ 220 graduates since 1980
MS Curriculum Summary

First Fall
- Radiological Physics, Measurement & Dosimetry
- Medical Physics
- Radiological Anatomy

First Spring
- Therapy Physics I
- Diagnostic Physics
- Radiation Biology

Summer
- Diagnostic Practicum
- Therapy Physics II
- Elective: Research

Second Fall
- Imaging System Analysis
- BME Seminar
- Elective: Diagnostic or Rad Therapy III or Research

Second Spring
- Shielding & Rad Protection
- Nuclear Medicine
- BME Seminar
  Elective: Rad Dosimetry or Research

Summer
- Optional: Research
Academic Backgrounds of entering students

- Nuclear Engineering: 28%
- Physics: 29%
- Medical Physics: 24%
- Other Engineering: 19%
Initial Career Paths of Graduates

- Residency: 30%
- Continuing Ed: 30%
- Junior Physicist: 30%
- Post-doc: 10%
Conclusions

• UF has had near 100% placement of students in positions in past years
• Challenges ahead as competition for limited Residency positions increases
• Medical Physics Profession opportunities are uncertain:
  – Currently not enough residency requirements to satisfy work force requirements
  – Employment of MS graduates?
  – May see opportunities for non-certified physicists in states that do not require licensure?
  – Or continued increase in residency programs?
References for more details:

- ABR: [http://www.theabr.org/](http://www.theabr.org/)
- UF Programs: [https://www.bme.ufl.edu/](https://www.bme.ufl.edu/)