I. EXECUTIVE SUMMARY

A. GOAL AND SPECIFIC AIMS OF THE GPRS PROGRAM

Goal. The Graduate Program in Radiological Sciences at the University of Texas Health Science Center in San Antonio (UTHSCSA) (hereinafter referred to as the GPRS) is a multi-disciplinary program that prepares students to participate in the development and transmission of scientific knowledge concerning the uses of radiant energy forms in the diagnosis and treatment of human disease. The degrees offered are; (1) PhD degree specializing in Radiological Sciences, (2) PhD degree specializing in Radiological Sciences – Human Imaging, or (3) PhD degree specializing in Radiological Sciences - Radiation Biology (includes tracks - Radiation Biophysics and Neuroscience Imaging).

Specific Aims. The Specific Aims of the GPRS Program are to:

- Educate students to become scientists trained in the use of radiant energy forms in the diagnosis and treatment of disease.
- Provide students with a mentor-supervised research experience culminating in the completion of an approved dissertation.
- Train students for academic careers in the radiological sciences focusing on radiation biophysics, radiation biology, neuroscience imaging and human imaging areas through teaching opportunities and instruction in research-oriented publication and grant preparation.

The aims of the GPRS Program will be achieved via completion of objective activities:

- Participation and successful completion of required didactic coursework
- Successful completion of a qualifying examination
- Establishment of an approved Supervising Professor, Supervising Committee, and research project
- Active involvement in an approved research project
- Formal, annual assessment of progress
- Submission of an approved dissertation
- Award of the PhD degree in Radiological Sciences

B. HISTORY AND FUNDING

The Graduate Program in Radiological Sciences and Radiological Sciences – Radiation Biology was approved by the Graduate School of Biomedical Sciences (GSBS), Regents of the University of Texas, and the Coordinating Board for Higher Education of the State of Texas (THECB) in 1989. Initial program focus was in Radiological Sciences including Medical Physics and Radiation Biology. The program began with 4 enrolled students interested in Diagnostic Medical Physics. The program was financially sponsored and
housed within the Radiology Department. Expansion of the curriculum to include Radiation Therapy Physics occurred in 1995. State formula funding was granted in 1999. In 2002 a non-substantive addition for the Radiological Sciences -Human Imaging program was approved by the THECB. This residency/PhD track combines a radiology residency program, under the guidelines of the B. Leonard Holman Research Pathway of the American Board of Radiology (ABR), with pursuit of a doctorate degree in radiological sciences. To keep pace with evolving needs of the neuroscience community, a non-substantive addition for the Neuroscience Imaging track in PhD Radiation Biology program was granted by THECB in 2005. In 2006, the Radiology Department was reorganized and Geoffrey D. Clarke PhD was appointed Director of the GPRS in a new Division of Education. In 2009, Peter Fox MD was appointed Vice Chair for Research in the Radiology Department. In 2009, UTHSCSA also took full control of the Cancer Therapy and Research Center (CTRC), which was previously a foundation-supported entity staffed by UTHSCSA faculty. As a result, the medical physicists in the Department of Radiation Oncology, now led by Nikos Papanikolaou Ph.D. became full, rather than adjunct, UTHSCSA faculty.

The GPRS program was the first clinical department-based program at the UTHSCSA Graduate School of Biomedical Sciences (GSBS). The GPRS program reports academically to the Dean of the Graduate School of Biomedical Sciences. Until 2009 institutional funding for the GPRS was under the GSBS, but fiscal reporting of the program was moved to the School of Medicine since the program is housed in a clinical department. This move also allowed for better alignment of the GPRS with the recently restructured medical education activities within the institution.

C. ACCREDITATION

The University of Texas Health Science Center at San Antonio is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools, 1866 Southern Lane, Decatur, GA 30033-4097, to award certificates and baccalaureate, master's, doctoral, and professional degrees. UTHSCSA was last reviewed and reaffirmed in 2008, and this accreditation extends through 2018.

The Graduate School of Biomedical Sciences is reviewed by the Texas Higher Education Coordinating Board, 1200 E. Anderson Lane, Austin, TX 78752, on a statewide review schedule.

The last external review of the Radiological Sciences Program was 2000.

D. GPRS PROGRAM HIGHLIGHTS

The average student entering the GPRS program has previous educational background in the biological or biomedical sciences. Students in the Radiological Sciences -Human Imaging program have a health professional degree (e.g., MD, DO) and seek the opportunity to combine their residency training in Radiology or Radiation Oncology with a research experience in preparation for an academic career.

The GPRS program was the first clinical department-based program at the UTHSCSA Graduate School of Biomedical Sciences (GSBS). The GPRS program draws students interested in training in the use of radiant energy forms in biomedical applications including radiation biophysics, radiation biology, neuroscience imaging, human imaging, radiology, and radiation oncology. The core Graduate Faculty consist of 28 instructors and mentors with educational backgrounds in the biomedical sciences, medicine, physics and engineering. The diversity in both students and faculty provides for a stimulating educational
environment and reflects the inter-disciplinary and team-oriented nature of scientific research in the 21st century.

Highlights of the GPRS program, which will be described in more detail in other sections of this report, include:

- 27 matriculated students, of which 17 are currently enrolled
- Productive, diverse student body with 38 publications in peer-reviewed journals in the past five years
- 10 graduates
  - Average graduation rate of 83%
  - Current careers in science include academic/research (90%).
  - A large percent (80%) of graduates holding an academic faculty position have active publication records
  - Human Imaging Track is only program of its kind in the United States. This new 6-year residency/PhD program has 4 graduates that are currently in advanced fellowship training or hold faculty positions
- A highly-qualified multi-disciplinary Graduate Faculty that is active in both teaching and research
  - Graduate Faculty including 28 Core Faculty (Course Directors, Co-Directors and, Supervising Professors) plus 12 Adjunct Graduate Faculty at collaborating local institutions who provide practical workplace instruction and serve on Supervising Committees
    - More than 290 peer reviewed publications in the past three years
    - A total of $44.0 million in external grant funding over the past five years
- Availability of significant and modern facilities and equipment to support multi-disciplinary faculty and student research

E. WEBSITE

The website for the GPRS program is: http://radsci.uthscsa.edu.

F. EXTERNAL SITE REVIEWERS

The external Site Reviewers for the GPRS Program are:

1. Michael McNitt-Gray, Ph.D. DABR

- Associate Professor of Radiology, David Geffen School of Medicine at UCLA, Los Angeles CA, Present
- Director, Biomedical Physics Graduate Program, UCLA Biomedical Physics
- Chair, MESA Project, Helical CT Subcommittee of the CT Imaging Committee
- Committee Member on CT Image Quality and Radiation Dose, International Commission on Radiological Units & Measurement (ICRU)
- Graduate Faculty Advisor, UCLA Biomedical Physics, 2002-2004
- ABR Certification: Diagnostic Radiological Physics, 1998
- Assistant Professor of Radiology, UCLA Radiological Sciences, 1994-2001
- Postdoctoral Research Fellow, Thoracic Radiology, UCLA Radiological Sciences, 1993-1994
- Doctor of Philosophy, Biomedical Physics, UCLA Medical School, Los Angeles CA, 1993
• Instructor, Electrical Engineering, Pennsylvania State University, University Park PA, 1985-1988
• Assistant Engineer, American Electric Power Service Corp., Columbus OH, 1981-1984
• Master of Science, Electrical Engineering, Carnegie-Mellon University, Pittsburgh PA, 1980

Research Interests

Dr. McNitt-Gray's research interests involve investigations into X-ray computed tomography (CT) imaging with the goal of maximizing the information that can be extracted from the resulting image data. These activities include research into:

• The physics of CT image acquisition including estimating radiation dose and assessing image quality
• Image processing techniques to analyze and extract information from the CT image data, including computer aided detection and diagnosis (CAD)

PubMed results for Dr. McNitt-Gray may be found at: http://www.ncbi.nlm.nih.gov/pubmed/?term=McNitt-Gray+M

Source: http://radiology.ucla.edu/body.cfm?id=48&action=detail&ref=43

2. Terry M. Button, Ph.D.
Associate Professor of Radiology

Dr. Terry Button is an Associate Professor of Radiology at Stony Brook University Medical Center, Director of the Medical Physics Track in Biomedical Engineering, and Director of Medical Imaging Technology program in the School of Health Technology and Management. He received his BS degree in Physics/Math from SUNY Cortland in 1975, MS in Nuclear Physics at N. Texas State University in 1978, and his PhD degree in Biophysics at SUNY Buffalo in 1989. Dr Button was appointed Chair in the University Radiation Protection Committee, MRI Panel Chair in the American Board of Medical Physics, and Director of Radiological Sciences in the Health Sciences Department in the past year. Dr Button's research work in the past has focused on Advanced Magnetic Resonance Mammography and Dynamic Infrared Imaging. His current research projects are infrared imaging, breast cancer detection, magnetic resonance and computer aided diagnosis (CAD). PubMed results for Dr. Button may be found at: http://www.ncbi.nlm.nih.gov/pubmed/?term=Button+T+imaging

Source: http://www.stonybrookmedicalcenter.org/radiology/Meet_our_Researchers
G..ORGANIZATION OF GPRS PROGRESS REPORT

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II. GENERAL CHARACTERISTICS OF THE GPRS PROGRAM

A. GPRS HISTORY AND REPORTING STRUCTURE

The Graduate Program in Radiological Sciences and Radiological Sciences – Radiation Biology was approved by the Graduate School of Biomedical Sciences (GSBS), Regents of the University of Texas, and the Coordinating Board for Higher Education of the State of Texas (THECB) in 1989.

Gary D. Fullerton PhD directed the GPRS, as currently constituted, through its conception, development and for its first 17 years. In 1989, the GPRS focused on Diagnostic Physics as the Radiology Department had agreed to sponsor the program financially. This emphasis changed in 1995 when the new Chief of Physics at the Cancer Therapy and Research Center (CTRC), James Hevezi Ph.D., decided to expand the therapeutic medical physics track. The new resources for studying therapeutic medical physics allowed the program to grow, eventually receiving State formula funding in 1999.

In the late 1990’s the GPRS program recognized there are a limited number of students interested in the traditional field of Radiation Biology and explored the possibility of other, interdisciplinary studies incorporating Radiological Sciences, which would allow expansion of the graduate program. In a 1999 article entitled “Revitalizing the Radiology Research Enterprise,” Staab and Brady announced an initiative of the same name by the Radiological Society of North America (RSNA) (Staab EV, Brady TJ. Revitalizing the radiology research enterprise. Radiographics 1999; 19: 1405.). The Revitalizing the Radiology Research Enterprise (RRRE) was designed to help academic radiology departments strengthen their research infrastructure and clarify their research strategy. The GPRS was one of six programs elected in 2000 to be surveyed and assisted by the RSNA's RRRE committee. A site visit that year provided a review of our research facilities and programs. In 2001, as a response to the challenge of the RRRE, a proposal was developed to establish a non-substantive additional Radiological Sciences -Human Imaging program within the GPRS. This was approved by the Texas Higher Education Coordinating Board (THECB) in 2002 and the fully integrated 6-year Human Imaging program accepted its first students in 2003. This residency/PhD track combines a radiology residency program, under the guidelines of the B. Leonard Holman Research Pathway of the American Board of Radiology (ABR), with pursuit of a doctorate degree in radiological sciences. The first student only took four years to complete the program, since he was already in the radiology residency process, however it was anticipated that the next graduate would not be until 2009. The Human Imaging program of the GPRS is described in detail in an article published in the journal, Radiology (Rahal A, Head HW, Jung JA, et al. Radiology Residency/PhD Program for Education of Academic Radiologists: A Response to Revitalizing the Radiology Research Enterprise Radiology 2007; 245: 14-20.)

Later, in the early 2000’s the faculty of the GPRS also recognized that there was an increasing need for imaging scientists with specific neuroscience training. This was part of a larger effort within the neuroscience community, in which recognition that “improved imaging methods and sharing of imaging data and technology are crucial to current research in
neuroscience”, and that, “advance of research in neuroscience increasingly requires interdisciplinary training that is not readily supported under the programs of the individual NIH institutes and centers”. (Baughman RW, Farkas R, Guzman M, Huerta MF. The National Institutes of Health Blueprint for Neuroscience Research. The Journal of Neuroscience. 2006; 26 (41): 10329-10331) The GPRS therefore developed another new track, named Neuroscience Imaging, which was put forth as a non-substantive addition to the GPRS and which received approval from the THECB in 2005. It was expected that the typical student would require 5 years to obtain a degree this track. This track enrolled its first three students in 2006.

In 2006 the Radiology Department was reorganized and Geoffrey D. Clarke PhD was appointed Director of the GPRS in a new Division of Education, although Dr. Fullerton remained involved in the GPRS through 2008. In 2009, Peter Fox MD was appointed Vice Chair for Research in the Radiology Department. In 2009 UTHSCSA also took full control of the CTRC, which was previously a foundation-supported entity staffed by UTHSCSA faculty. As a result, the medical physicists in the Dept. of Radiation Oncology, now led by Nikos Papanikolaou Ph.D. became full, rather than adjunct, UTHSCSA faculty.

The GPRS program was the first clinical department-based program at the UTHSCSA Graduate School of Biomedical Sciences (GSBS). The GPRS program reports academically to the Dean of the Graduate School of Biomedical Sciences. Until 2009 institutional funding for the GPRS was under the GSBS, but fiscal reporting of the program was moved to the School of Medicine since the program is housed in a clinical department.

B. GPRS PROGRAMMATIC STRUCTURE

The current administrative structure that the GPRS program operates under is illustrated schematically in Figure 1. The first key position is the Chair of the Committee on Graduate Studies (COGS) of the GPRS who reports to the Dean of the Graduate School of Biomedical Sciences (GSBS). The Chief of Graduate Education in Radiology, appointed by the Chair of the Department of Radiology in the School of Medicine, is the Graduate Program’s Director and administers the program through the Radiology Department. Faculty and funding come largely through the clinical departments of Radiology and Radiation Oncology from the Medical School, although faculty in Ophthalmology, Neurology, Pharmacology and in the Office of Environmental Health and Safety also contribute. Primary funding for the GPRS is awarded by the State of Texas through specially “earmarked” funding to the Radiology Department. Some elective coursework is provided by the Integrated Multidisciplinary Graduate Program of the GSBS, the MS Program in Clinical Investigation and the graduate program in Biomedical Engineering. The Research Imaging Institute (RII) also supports graduate students working in their laboratories (the Director of the RII, Peter Fox MD, also serves as the Vice-Chair for Research in the Department of Radiology). Private and government clinical and research facilities, outside the University, may also contract with the GPRS to support its students. Lowell Glassburn (Col. USAF ret.) serves as the Department Administrator for both the Radiology and Radiation Oncology Departments. Several administrative functions such as grant administration, patient billing
and education administration are shared amongst the Radiology Dept., Radiation Oncology Dept. and the RII. These offices, departments, institutes and institutions provide their research and clinical facilities for students in the GPRS.

Figure 1. Administrative structure of the Graduate Program in Radiological Science. Although the program is administered through the Department of Radiology in the School of Medicine, the graduate program’s academic policy functions and degree awarding authority fall under the purview of the Graduate School of Biomedical Sciences (GSBS). A single, joint COGS meeting is held monthly for the Radiological Sciences Program (CIP code 26.0209.00) and Medical Physics Program (CIP code 51.2205.00) since the curriculum is shared between the programs.

III. RELATIONSHIP OF GPRS PROGRAM TO MISSION STATEMENTS

The mission of The University of Texas Health Science Center at San Antonio is to make lives better through excellence in education, research, health care and community engagement. Strategies for achieving this mission are:

- Educating a diverse student body to become excellent health care providers and scientists
- Engaging in research to understand health and disease
- Commercializing discoveries, as appropriate, to benefit the public
- Providing compassionate and culturally proficient health care
- Engaging our community to improve health
- Influencing thoughtful advances in health policy

(Approved by The Texas Higher Education Coordinating Board – April 25, 2012)

Source:  http://www.uthscsa.edu/op/mission.asp

The mission of the UTHSCSA Graduate School of Biomedical Sciences (GSBS) is to provide an individualized, diverse and multidisciplinary learning environment for students to develop the knowledge, skills, and creativity necessary to succeed in evolving biomedical disciplines. Strategies for achieving these missions are:

- Carrying out cutting edge, basic and translational science, from the molecular to the integrative, in an effort to understand human function in health and disease
- Developing programs to train the next generation of scientists and educators in the biomedical sciences.

(Approved – February 18, 2013)

Source:  http://gsbs.uthscsa.edu/

The administration and curriculum of the Graduate Program in Radiological Sciences (GPRS) program includes concepts and activities that relate to all aspects of the missions of the UTHSCSA and the Graduate School of Biomedical Sciences by:

- Educating students who are diverse in background, gender, and ethnicity to become scientists trained in the use of radiant energy forms in the diagnosis and treatment of disease.
- Offering course(s) to acquire a core fundamental knowledge of the use of radiant energy forms in medical applications.
- Providing students with a mentor-supervised research experience, culminating in the completion of an approved dissertation.
- Training students for academic careers in radiological sciences, radiation biophysics, radiation biology, neuroscience imaging, human imaging, radiology and radiation oncology through teaching opportunities and instruction in research-oriented publication and grant preparation.
IV. GPRS PROGRAM APPROVAL AND CHANGES TO PROGRAM ORIENTATION

A. GPRS PROGRAM APPROVALS

The Graduate Program in Radiological Sciences and Radiological Sciences – Radiation Biology was approved by the Graduate School of Biomedical Sciences (GSBS), Regents of the University of Texas, and the Coordinating Board for Higher Education of the State of Texas (THECB) in 1989. The Radiological Sciences -Human Imaging program was approved as a non-substantive addition in 2002 and enrolled the first student in 2003. In 2005, the Neuroscience Imaging track was approved as a non-substantive addition by the Texas Higher Education Coordinating Board (THECB).

B. CHANGES TO PROGRAM ORIENTATION

- **Program Structure.** The basic structure of the GPRS program’s timeline, scope, and recommended sequence of coursework is unchanged; however, non-substantive additions for the Human Imaging program and Neuroscience Imaging track of the Radiation Biology PhD were approved by Texas Higher Education Coordinating Board (THECB) in 2002 and 2005, respectively.

- **Committee on Graduate Studies (COGS) Reorganization.** With the new interdisciplinary curriculum additions to the GPRS program, a curriculum track-based organizational plan for COGS was approved in 2010 to replace the previous faculty-at-large organizational format (Figure 1). More information concerning the COGS procedures can be found in the Program Governance section.

- **Reporting Structures.** Academically, the GPRS program has always reported to the Dean of the Graduate School of Biomedical Sciences. Since inception, the GPRS program has reported fiscally to the UTHSCSA Department of Radiology. As the only graduate program at UTHSCSA housed in a clinical department, fiscal reporting for the GPRS was moved to the School of Medicine in 2009.

- **Research Training Program Focus.** For students interested in a research oriented career path, more focus has been placed on teaching opportunities as well as publication and grant preparation. Figure 2 depicts the current planned enrollment for the Radiological Sciences and Radiological Biology program.
Figure 2. The GPRS has recently undergone a systemic downsizing, designed to turn the PhD program into a more trans-disciplinary research training program while concurrently transforming the MS program into a professional Doctorate in Medical Physics program, to begin in 2013.
V. ADDITIONS TO FACULTY AND CURRICULUM

A. GRADUATE FACULTY

The Graduate Faculty of the GPRS program has increased to meet the needs of an expanded curriculum and student research. The program started with approximately 16 faculty members in academic year 1989, and this number has expanded to a Core Faculty of 28 at the end of academic year 2011-12. Additional details of the GPRS Graduate Faculty may be found in upcoming sections of this report.

B. NEW COURSE DEVELOPMENT

Over time, additional courses have been developed by the faculty to meet the changing needs for training students in new interdisciplinary areas (Human Imaging and Neuroscience Imaging Tracks). Also a course was developed in Statistical Methods pertaining to Radiological Sciences because current institutional courses offered did not meet our needs. These include:

- RADI 5007: Statistics in Radiological Sciences (1 SCH) - This course was added as a Core course for all tracks.
- RADI 6049: Introduction to MRI (2SCH) – This introductory course was added to bridge the physics knowledge gap of students enrolled in Radiation Biology, Human Imaging and Neuroscience Imaging tracks.
- RADI 5030: Neuroscience Imaging Lab (3 SCH)
- RADI 5050: Human Electrophysiology: Brain (3 SCH)
- RADI 6017: Neuroimaging Methods (3 SCH)
- RADI 6020: Advanced Topics in Cognitive Neuroscience (3 SCH)
VI. GPRS PROGRAM CHARACTERISTICS

A. GPRS DEGREE
The GPRS at the University of Texas Health Science Center in San Antonio is a multi-
disciplinary program that educates students in the uses of radiant energy forms in the
diagnosis and treatment of human disease. The degrees offered are; (1) PhD degree
specializing in Radiological Sciences, (2) PhD degree specializing in Radiological Sciences
–Human Imaging, or (3) PhD degree specializing in Radiological Sciences - Radiation
Biology (includes tracks - Radiation Biophysics and Neuroscience Imaging).

B. GPRS GOALS

Goal. The Graduate Program in Radiological Sciences at the University of Texas Health
Science Center in San Antonio is a multi-disciplinary program that prepares students to
participate in the development and transmission of scientific knowledge concerning the uses
of radiant energy forms in the diagnosis and treatment of human disease. The degrees
offered are; (1) PhD degree specializing in Radiological Sciences, (2) PhD degree
specializing in Radiological Sciences –Human Imaging, or (3) PhD degree specializing in
Radiological Sciences - Radiation Biology (includes tracks - Radiation Biophysics and
Neuroscience Imaging).

Specific Aims. The Specific Aims of the GPRS Program are to:

- Educate students to become scientists trained in the use of radiant energy forms in the
diagnosis and treatment of disease.
- Provide students with a mentor-supervised research experience culminating in the
completion of an approved dissertation.
- Train students for academic careers in radiological sciences, radiation biology, radiation
biophysics, neuroscience imaging, human imaging, radiology and radiation oncology
through teaching opportunities and instruction in research-oriented publication and grant
preparation.

The aims of the GPRS Program will be achieved via completion of objective activities:

- Participation and successful completion of required didactic coursework
- Successful completion of a qualifying examination
- Establishment of an approved Supervising Professor, Supervising Committee, and
research project
- Active involvement in an approved research project
- Formal, annual assessment of progress
- Submission of an approved dissertation
- Award of the PhD degree in Radiological Sciences

C. GPRS CURRICULUM AND COURSE PROGRESSION

PhD students are expected to successfully complete the required courses in addition to a
selection of advanced courses. For the PhD degree, no specific number of additional
semester hours is required for admission to candidacy. Required courses and electives are
determined for each student, in consultation with his/her graduate advisor and dissertation
committee.
The PhD student is eligible for admission to candidacy after completing the required coursework and passing the qualifying examination, which includes demonstrating proficiency as an independent researcher by preparing a research proposal and plan. Following admission to candidacy, the student must complete an original research project and orally defend a dissertation. The PhD degree is awarded when the candidate has demonstrated competence in conducting original and independent research in the general field of Radiological Sciences.

All students must be in good standing in order to graduate, which requires a minimum grade point average of 3.0 in a 0 to 4.0 system.

**Coursework Design and Content**

The GPRS Program offers an extensive list of courses to allow students to design a personalized study program. Material is accessible in more detail for each student through the GPRS website (http://radsci.uthscsa.edu), which is updated regularly. The updated information for the year that the student enters the program lays out the requirements for graduation. Subsequent changes to the program do not affect the curriculum of students going forward unless the students find it to their advantage to adopt the changes.

Table 1 provides a listing of each required course offered in the GPRS program along with course description and instructor. Table 2 provides the GPRS elective course listing. Students can also choose elective courses taught in other programs.

**Sample Academic Plans**

Sample academic plans for students in the PhD Radiological Sciences and Radiation Biology (Radiation Biophysics and Neuroscience Imaging tracks) and PhD Radiological Sciences -Human Imaging program taken from the GPRS website are shown in Tables 3-5. Each semester consists of 16 weeks.
<table>
<thead>
<tr>
<th>COURSE #</th>
<th>COURSE TITLE AND DESCRIPTION</th>
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</thead>
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| INTD 5007 | Fundamentals of Biomedical Sciences  
This core course covers the fundamentals of biochemistry, molecular biology, cell biology, organismal and systems biology, and microbiology and immunology. The course is designed for first-year graduate students matriculating into the Integrated Multidisciplinary Graduate Program.  
*Semester Credit Hours: 8*  
*Faculty: William Clarke, PhD* |
| INTD 6002 | Ethics in Research  
This course covers topics relevant to ethics in scientific research. The course is taught on a case-study basis, dealing with real and hypothetical situations relevant to the conduct of scientific research. Topics discussed will include, but will not be limited to: data management, peer review, recognizing scientific misconduct, authorship, and The University of Texas regulations relevant to human and animal research. This course is required of all doctoral graduate students.  
*Semester Credit Hours: 0.5*  
*Faculty: Joel Baseman, PhD* |
| RADI 5007 | Statistics in the Radiological Sciences  
This is course an overview of biomedical statistics methods and basic applications to experimental design with special emphasis given to those methods used in radiation detection, image analysis, and evaluations of diagnostic efficacy. Students will have the opportunity to learn the theory behind these methods and apply them to actual and simulated problems in Radiological Sciences.  
*Semester Credit Hours: 1*  
*Faculty: Geoffrey D. Clarke, PhD* |
| RADI 5015 | Physics of Diagnostic Imaging I  
This course introduces the student to the basic principles and radiological practice using noninvasive imaging systems. Topics include production of x-rays, interaction of radiation with matter, and the physics of imaging using computed tomography, ultrasound, and magnetic resonance. (Equivalent to BME 6703 at UTSA).  
*Semester Credit Hours: 3*  
*Faculty: Geoffrey D. Clarke, PhD* |
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<thead>
<tr>
<th>COURSE #</th>
<th>COURSE TITLE AND DESCRIPTION</th>
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| RADI 5025 | **Basic Radiation Biology**  
This course is an overview of the physics and chemistry of radiation biology; the biological effects of ionizing and non-ionizing radiations and hyperthermia at the cellular and tissue levels and whole body and late effects.  
*Semester Credit Hours: 3*  
*Faculty: Alonso Gutierrez, PhD* |
| RADI 5090 | **Seminars in Radiological Sciences**  
Each student is required to register a minimum of four terms if following a Ph.D. plan. Seminars will review current findings in the field.  
*Semester Credit Hours: 1*  
*Faculty: Beth Goins, PhD* |
| RADI 6024 | **Radiological Anatomy and Physiology**  
This course will provide students with an opportunity to learn anatomy, physiology, and commonly used medical terminology as it relates to radiologic imaging. Anatomic and physiologic features will be illustrated with radiologic images in formats commonly encountered in clinical radiology. By the end of the course, students are expected to be familiar with basic medical terminology and have a good understanding of medical anatomy, physiology, and some basic pathology as related to specific organs for which radiologic images are commonly applied.  
*Semester Credit Hours: 3*  
*Faculty: Kedar Chintipalli, MD and Geoffrey D. Clarke, PhD (Co-Directors)* |
| RADI 6071 | **Supervised Teaching**  
This course is a presentation of lectures and supervised teaching under the direction of faculty.  
*Semester Credit Hours: 2*  
*Faculty: Course Directors* |
| RADI 6097 | **Research**  
This course is supervised research under the guidance of a faculty member.  
*Semester Credit Hours: 1-9*  
*Faculty: Supervising Professor/Mentor* |
| RADI 7099 | **Dissertation**  
Registration for at least one term is required for Ph.D. candidates.  
*Semester Credit Hours: 0.5-9*  
*Faculty: Supervising Professor/Mentor* |
<table>
<thead>
<tr>
<th>COURSE #</th>
<th>COURSE TITLE AND DESCRIPTION</th>
</tr>
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| INTD 5046 | **Mind & Brain: Metanalysis in Human Brain Mapping**  
The objective of this course is to familiarize students with human functional brain imaging methods, experimental designs, statistical analyses, inferential strategies, and content. Students are guided through a literature-based research project that culminates in a quantitative metanalysis of a set of studies using similar tasks.  
*Semester Credit Hours: 2.5*  
*Faculty: Peter T. Fox, MD* |
| RADI 5001 | **Basic Radiation Safety in the Laboratory**  
This course provides the student with the opportunity to gain a conceptual understanding of the radiation protection principles involved in the research, diagnostic, and therapeutic uses of radiation sources. This course will cover the safe receipt, use, storage, and disposal of radiation sources in the biomedical research setting. The contents of this course fulfill Health Science Center training requirements in order to use radioactive materials on campus. Successful participants will earn three Health Science Center safety certificates of completion: Basic Radiation Safety Training, Basic Laser Safety Training, and Basic Laboratory Safety Training.  
*Semester Credit Hours: 1*  
*Faculty: Michael A. Charlton, PhD* |
| RADI 5005 | **Fundamentals of Radiation Dosimetry**  
This course is a detailed study of the fundamentals of radiation dosimetry in general rather than dealing only with its application in medical and health physics. Coverage includes charged particle and photon interactions with matter, the relationship between interactions and absorbed dose, cavity theory, ion chamber design and theory, and calibration techniques using ion chambers.  
*Prerequisite: RADI 5011 or concurrent enrollment*  
*Semester Credit Hours: 3*  
*Faculty: Niko Papanikolaou, PhD* |
| RADI 5010 | **Medical Biophysics**  
This course is an introduction to the basic principles of biophysics as applied to medicine and biology. Emphasis will be placed on non-imaging topics of medical biophysics such as mechanics, thermodynamics, diffusion, electrical conduction, biomagnetism, and light spectroscopy.  
*Semester Credit Hours: 3*  
*Faculty: Beth Goins, PhD and Eugene Sprague, PhD* |
<table>
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<tr>
<th>COURSE #</th>
<th>COURSE TITLE AND DESCRIPTION</th>
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</thead>
</table>
| RADI 5011 | **Radiation and Nuclear Physics**  
This course reviews nuclear structure, interactions of radiation with matter, and the statistical nature of radiation. The course covers gas, scintillation, and solid-state detector technologies and their applications, including spectroscopy.  
*Semester Credit Hours: 3*  
*Faculty: Wayne Wiatrowski, PhD* |
| RADI 5018 | **Physics Measurements in Imaging**  
This is a laboratory course focusing on performance of measurements used in quality assurance (QA), system characterization, and acceptance testing of medical imagers.  
*Prerequisite: RADI 5015*  
*Semester Credit Hours: 2*  
*Faculty: Jonathan Tucker, PhD* |
| RADI 5020 | **Principles of Health Physics I**  
This course covers the basic principles of protection dealing with the major forms of ionizing radiation.  
*Semester Credit Hours: 3*  
*Faculty: Michael A. Charlton, PhD* |
| RADI 5030 | **Neuroscience Imaging Laboratory**  
Students are assigned to rotate in 6 laboratories at the RIC: MRI, PET, TMS, ERP, animal imaging, and optical imaging. In each lab, students will have the opportunity for hands-on experience on subject preparation, data acquisition, and processing.  
*Prerequisite: RADI 5015*  
*Semester Credit Hours: 3*  
*Faculty: Jack Lancaster, PhD* |
| RADI 5050 | **Human Neuroelectrophysiology**  
A detailed study of the electrophysiological basis of human behavior, with an emphasis on event-related brain potentials associated with cognitive function, perception, and action.  
*Semester Credit Hours: 3*  
*Faculty: Nicole Y.Y. Wicha, PhD* |
<table>
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<tr>
<th>COURSE #</th>
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</thead>
<tbody>
<tr>
<td>RADI 6012</td>
<td><strong>Physics of Nuclear Medicine Imaging</strong>&lt;br&gt;This course is a study of physical principles of planar, SPECT, and PET radionuclide imaging; instrument theory; dosimetry; computer uses; and safety considerations.&lt;br&gt;<em>Prerequisite: RADI 5011</em>&lt;br&gt;<em>Semester Credit Hours: 3</em>&lt;br&gt;<em>Faculty: Paul Jerabek, PhD and Beth Goins, PhD</em></td>
</tr>
<tr>
<td>RADI 6014</td>
<td><strong>Physics of Dental Imaging</strong>&lt;br&gt;This course is a survey of imaging procedures used in modern dentistry with an emphasis on the clinical objectives and physical principles underlying intraoral, panoramic, cephalometric, and digital dental radiography.&lt;br&gt;<em>Prerequisite: RADI 5015</em>&lt;br&gt;<em>Semester Credit Hours: 2</em>&lt;br&gt;<em>Faculty: Wayne Wiatrowski, PhD</em></td>
</tr>
<tr>
<td>RADI 6016</td>
<td><strong>Physics of Diagnostic Imaging II</strong>&lt;br&gt;This course includes theory and applications of various forms of electronic imaging systems; advanced diagnostic imaging principles involving mathematical image analysis, digital image processing, digital image display, and concepts of electronic imaging.&lt;br&gt;<em>Prerequisite: RADI 5015</em>&lt;br&gt;<em>Semester Credit Hours: 3</em>&lt;br&gt;<em>Faculty: Jack Lancaster, PhD</em></td>
</tr>
<tr>
<td>RADI 6017</td>
<td><strong>Neuroimaging Methods</strong>&lt;br&gt;This course will deal extensively with several noninvasive brain imaging techniques to study the functional organization of the human and animal brains. Methods covered include positron-emission tomography (PET), event-related potentials, magneto-encephalography, optical imaging, voltage and calcium imaging, autoradiography, as well as transcranial magnetic stimulation. The course will only touch upon anatomical and functional MRI as well as high field MRI, as students will receive exhaustive MRI training from other classes. Course format will include both lectures on the several methods and seminars in which recent technical advances in the field are discussed.&lt;br&gt;<em>Semester Credit Hours: 3</em>&lt;br&gt;<em>Faculty: TBD</em></td>
</tr>
<tr>
<td>COURSE #</td>
<td>COURSE TITLE AND DESCRIPTION</td>
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</table>
| RADI 6018 | **Foundations of Neuroscience Imaging**  
This course will explore several advanced topics in cognitive neuroimaging techniques. Examples of such topics include strategies to study the functional and/or anatomical organization of the human brain and paradigms used for studying a variety of brain functions. Students interested in functional MRI as well as DTI will have an opportunity to gain extensive knowledge and experience.  
*Semester Credit Hours: 3*  
*Faculty: Peter T. Fox, MD* |
| RADI 6019 | **Medical Imaging Processing**  
This course is an introduction to the basic principles of image processing as applied to digital radiography, computed tomography, ultrasound imaging, and magnetic resonance images.  
*Prerequisite: RADI 5015*  
*Semester Credit Hours: 3*  
*Faculty: TBD* |
| RADI 6020 | **Advanced Topics in Cognitive Neuroscience**  
This course will explore several advanced topics in cognitive neuroscience. It includes exhaustive study of a brain function in normal and in disease states. Brain functions include but are not limited to sensation, perception, action, language, motion, and cognition.  
*Semester Credit Hours: 3*  
*Faculty: Peter T. Fox, MD* |
| RADI 6028 | **Advanced Molecular Radiobiology**  
This course assesses the types of molecular damage that occurs after radiation exposure of cells, and the methods used to detect such damage.  
*Prerequisite: RADI 5025*  
*Semester Credit Hours: 3*  
*Faculty: Vijayalaxmi, PhD* |
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<th>COURSE #</th>
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</table>
| RADI 6030 | **Physics of Radiotherapy**  
Theory, design, and operation of radiation-producing equipment used in radiation therapy are introduced. Exposure and absorbed dose calculations, patient dosimetry, treatment planning, and use of computers in radiation therapy are covered.  
*Prerequisite: RADI 5005*  
*Semester Credit Hours: 3*  
*Faculty: Wayne Wiatrowski, PhD* |
| RADI 6031 | **Physics Measurements in Radiotherapy**  
Performance of measurements on radiation therapy equipment used to determine therapy treatment parameters is the opportunity for study in this course.  
*Semester Credit Hours: 2*  
*Faculty: Sotorios Stathakis, PhD and Alonso Gutierrez, PhD* |
| RADI 6033 | **Advanced Radiotherapy Physics**  
This course includes the coverage of advanced radiation therapy special topics: intensity modulated radiation therapy, advanced brachytherapy, and radiation therapy shielding.  
*Prerequisite: RADI 6030*  
*Semester Credit Hours: 3*  
*Faculty: Niko Papanikolaou, PhD, Carlos Esquivel, PhD, Sotorios Stathakis, PhD* |
| RADI 6035 | **Physics Measurements in Radiotherapy II**  
In this course students will have the opportunity to further gain didactic and hands-on familiarity with radiation therapy measurement equipment (ion chambers, films, TLDs, water tanks, profilers, etc.) and learn daily clinical practices. Students will have the opportunity to learn the roles of a radiation oncology team, the generation of radiation therapy treatment plans, patient quality assurance, and advanced, specialized radiation therapy techniques. Learning can be accomplished through attendance of didactic lectures, homework assignments, presentations of class projects, and a comprehensive oral exam.  
*Prerequisite: RADI 6030*  
*Semester Credit Hours: 3*  
*Faculty: Alonso Gutierrez, PhD and Sotorios Stathakis, PhD* |
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<tr>
<th>COURSE #</th>
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</table>
| RADI 6049 | **Introduction to Magnetic Resonance**  
This course presents the basics of the practice of magnetic resonance as the experimentalist or clinician first meets them. The approach begins with images, equipment, and scanning protocols. The student will have the opportunity to face issues pertinent to practice with theoretical background added as experience grows. Through this approach, key ideas are introduced in an intuitive style that is faithful to the underlying physics.  
*Semester Credit Hours: 2*  
*Faculty: Geoffrey D. Clarke, PhD* |
| RADI 6050 | **Magnetic Resonance Imaging**  
This course explores the physics of magnetic resonance image formation through discussion of imaging problems, reviews of current research topics with an emphasis on quantitative methods using MRI, and hands-on experience in MRI laboratories.  
*Prerequisite: RADI 6049*  
*Semester Credit Hours: 2*  
*Faculty: Geoffrey D. Clarke, PhD* |
| RADI 6051 | **Statistical Parametric Mapping**  
Course content includes principles of NMR Spectroscopy as applied to the resolution of molecular structural problems in chemistry, biology, and medicine; and principles and methods for designing BOLD contrast MRI experiments and evaluating fMRI data.  
*Prerequisite: RADI 5015*  
*Semester Credit Hours: 3*  
*Faculty: Jack Lancaster, PhD* |
| RADI 6060 | **Biophotonics and Optical Imaging**  
Optical methodologies for imaging, diagnosis, and therapy are rapidly advancing in biology and medicine. This course will review basic elements of optics and optical sources, especially lasers and light-emitting solid state devices, in the context of biomedical applications. Dosimetry, tissue optics, and the principles of laser-tissue interaction will be considered in depth. Current medical uses of lasers will be surveyed, along with their scientific and technical foundations. The course will conclude with several case studies of research areas that are currently “hot topics” in biomedical optics. The course grade will be based on one exam given during the course, and a final term paper on a topic chosen by the student and approved by the instructors.  
*Semester Credit Hours: 3*  
*Faculty: Randolph D. Glickman, PhD* |
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<tr>
<th>COURSE</th>
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</table>
| RADI 6062| Cognitive Neuroscience  
Cognitive Neuroscience deals with the neural basis of cognition and behavior, including considerations of perception, attention, motor control, language, learning, memory, executive function, spatial cognition, emotion, and social cognition. It also presents discussions on neurocognitive development and the evolution of the human brain. Unlike courses in basic neuroscience, this course has a more human focus, presenting in-depth discussions of neuroimaging techniques and literature. In addition, it focuses on psychological models of cognitive function derived from psychological experimentation, human lesion studies, and computational modeling. Cognitive Neuroscience presents an integrated view of the psychology and neurobiology of human cognition and behavior. By the end of the semester, students will have had the opportunity to: (a) become highly familiar with the structure of the human nervous system; (b) become conversant about the physical basis and limitations of neuroimaging techniques; (c) become familiar with the principal brain areas thought to be involved in a host of human cognitive competencies and behaviors, including perception, action, emotion, and language; and (d) understand how psychological theory and neural theory come together to form the foundation of cognitive neuroscience.  
Semester Credit Hours: 3  
Faculty: Peter T. Fox, MD |
| RADI 6091| Special Topics  
This course covers topics of special interest that may include emerging and new modalities in radiological sciences relating to x-ray, nuclear, or magnetic imaging  
Semester Credit Hours: 1-9  
Faculty: Various Faculty |
| RADI 7005| Treatment Planning Techniques in Radiation Therapy  
The goal of the course is to provide an overview of the physics and clinical elements that contribute to the development of computerized treatment plans in radiation therapy. The commissioning and acceptance testing of a planning system will be discussed and demonstrated in several planning platforms. Anatomy specific treatment planning will be described, including imaging of the specific disease, as well as contouring and plan development. Multiple plans will be generated for each site using different planning modalities, such as 2D, 3D, and IMRT.  
Prerequisite: RADI 5005  
Semester Credit Hours: 3  
Faculty: Niko Papanikolaou, PhD |
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<tr>
<th>COURSE #</th>
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</table>
| RADI 7010 | Motor Learning and Brain Imaging  
This course is designed for the advanced student (doctoral or postdoctoral) to obtain a comprehensive overview of the field of motor learning from behavioral and brain imaging perspectives. Topic coverage will include general motor learning and speech motor learning (with reference to treatment of motor speech disorders). The course will be structured in a seminar format. The course will explore measurement methods and issues in motor learning and the neural substrates of learning in intact and disordered subject groups.  
*Semester Credit Hours: 3*  
*Faculty: Donald Robin, PhD* |
Table 3: Radiation Biophysics Curriculum Ph.D. Plan

**-YEAR 1-**

<table>
<thead>
<tr>
<th>Fall Semester</th>
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<td>RADI 5025 Basic Radiation Biology</td>
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<td>RADI 5010 Medical Biophysics</td>
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<td>INTD 5000 Fund. of Biomedical Sciences</td>
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**-YEAR 2-**

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<tr>
<td>RADI 5015 Physics of Diagnostic Imaging I</td>
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<td>RADI 5020 Principles of Health Physics I</td>
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### -YEAR 3-

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### -YEAR 4-

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### -YEAR 5-

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Radiation Biology & Biophysics Electives:
- PHAR 5013 Principles of Pharmacology
- RADI 6030 Physics of Radiotherapy
- CSBL 6068 Cancer Biology Core I
- CSBL 6069 Cancer Biology Core II
- CSBL 5077 Scientific Writing
- INTD 6007 Advanced Cell and Molecular Biology: Cell Signaling
- INTD 6008 Advanced Cell and Molecular Biology: Mitochondria And Apoptosis
- INTD 6009 Advanced Cell and Molecular Biology: DNA Damage and Cell Cycle
- INTD 5067 Introduction to Bioinformatics and Computational Biology

All other Radiological Sciences courses See Course list
A combined MD Residency/PhD program is offered through Radiological Sciences. Physicians may complete their residency in radiology, psychiatry or radiation oncology concomitant with completing requirements for a PhD degree in Radiation Biology that includes a training track in Human Imaging. Students in this program study and perform research within dedicated groups of medical physicists, biomedical imaging specialists and biomedical researchers from specialties using imaging as a research tool. The recommended curriculum for this program is given below. (Note: Human imaging students may request the Radiological Sciences COGS to grant waivers of specific courses in the first year based on previous medical school work.)

**Table 4: Human Imaging Curriculum Ph.D. Plan**

<table>
<thead>
<tr>
<th></th>
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<tr>
<td><strong>INTD 5005</strong>&lt;br&gt;  Core Course I-Molecular Biology</td>
<td>INTD 5005&lt;br&gt;  &lt;Core Course I-Molecular Biology&gt;</td>
<td>BIOC 1005&lt;br&gt;  &lt;Biochemistry&gt;</td>
<td>Clinical Rotation</td>
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<tr>
<td><strong>MICR 5014</strong>&lt;br&gt;  Essentials of Medical Microbiology</td>
<td>MICR 5014&lt;br&gt;  &lt;Pathogenic Microbiology&gt;</td>
<td>PHYL 5026&lt;br&gt;  &lt;Physiology in Everyday Life &amp; Medicine&gt;</td>
<td>CSBL 5019&lt;br&gt;  &lt;Gross Human Anatomy for Grad. Students&gt;</td>
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*can be substituted with PHYL 5042, 5043 or 5044 depending on specialization area.

### -YEAR 2-

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++ Year 2 resident will typically be doing clinical rotation and 1 day/week research ++

### -YEAR 3-

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<tr>
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<td>RADI 5015 *Physics of Diagnostic Imaging I</td>
<td>3</td>
<td>RADI 6012 *Physics of Nuclear Medicine</td>
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</tr>
<tr>
<td>RADI 5025 *Basic Radiation Biology</td>
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<td>RADI 5018 *Physics Measurements in Imaging</td>
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<td>RADI 5007 Statistics in the Radiological Sciences</td>
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<td>RADI 6049 *Introduction to MRI</td>
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### -YEAR 4-

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### Investigation Elective

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| TOTAL                           | 9        | TOTAL 9        | 6       |

#### -YEAR 5-

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### Human Imaging Electives

- MEDI 6062 Pat. Oriented Clin. Research Methods 1 hr.
- MEDI 5074 Data Management, Quality Control and Regulatory Issues 2 hr.
- MEDI 5073 Integration of Molecular Biology with Clinical Research 2 hr.
- RADI 5010 Medical Biophysics 3 hrs.
- RADI 6019 Medical Image Processing 3 hrs.
- RADI 6049 *Introduction to MRI* 2 hrs.
- CSBL 5095 Experimental Design & Data Analysis 2 hrs.
- INTD 5006 Molecular Biology 4 hrs.
- INTD 5006 Molecular Biology 4 hrs.
- INTD 5005 Biochemistry 4 hrs.
- MMED 6020 Molecular & Cellular Neurobiology 3 hrs.
- PATH 5022 Design of Experiments 3 hrs.
- PATH 6326 Applied Regression Analysis 3 hrs.
**Table 5: Neuroscience Imaging Curriculum Ph.D. Plan**

* Required for all students < Neurosciences Track ^ Prerequisite Courses

### -YEAR 1-

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### YEAR 3

- Fall Semester: RADI 6097 Research 3
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- Summer Semester: RADI 6097 Research 3

**Total:** 9

### YEAR 4

- Fall Semester: RADI 6097 Research 9
- Spring Semester: RADI 6097 Research 9
- Summer Semester: RADI 6097 Research 9

**Total:** 9

### YEAR 5

- Fall Semester: RADI 7099 Dissertation 9
- Spring Semester: RADI 7099 Dissertation 9
- Summer Semester: RADI 7099 Dissertation 9

**Total:** 9

### Neuroscience Track Imaging Electives: minimum 6 hours

Courses (Only RADI classes are listed here)
RADI 5011 Radiation and Nuclear Physics
RADI 5015 Physics of Diagnostic Imaging I
RADI 5025 Basic Radiation Biology
RADI 5050 Human Electrophysiology: Brain
RADI 6016 Physics of Diagnostic Imaging II
RADI 6019 Medical Image Processing
RADI 6020 Advanced Topics in Cognitive Neuroscience
RADI 6028 Advanced Molecular Biology
RADI 6042 Non-Ionizing Radiation Biology and Biophysics
RADI 6050 Magnetic Resonance Imaging
RADI 6060 Biophotonics and Optical Imaging
RADI 6091 Current Topics in Radiological Sciences
RADI 6002 Cognitive Neuroscience
RADI 7010 Motor Learning and Brain Imaging
D. GPRS EVALUATION OF STUDENT PROGRESS

Successful completion of the GPRS Program requires the satisfactory completion of required coursework, completion of an approved research project, and the submission and approval of a thesis or dissertation.

Doctor of Philosophy degree candidates must complete required courses; pass a Qualifying examination that tests their knowledge in radiological sciences and demonstrate ability as an independent researcher by completing of the oral Qualifying Examination, which consists of preparing a written research proposal in NIH or similar grant format. The student presents this proposal to his/her research advisory committee and defends it following an oral presentation before the committee and a public audience. The students are encouraged to take the Qualifying Exam within one year following successful completion of required coursework. The PhD degree is awarded following successful completion of an original, independent research project, preparation of a written dissertation and oral defense of the dissertation in front of an audience including faculty and students from the entire University community.

The progress of all students enrolled in the program is evaluated annually to ensure timely and consistent progress through the study plan prepared by the student and his/her research advisor. This evaluation is based on course grades, timely and successful completion of components of the Qualifying Examination and acceptable demonstration of the student’s progress in undertaking independent research. Failure to maintain a 3.0 GPA results in a notation of “Academic Probation” on the student’s transcript until the GPA is satisfactory. Students on academic probation are not allowed to sit for the Qualifying Examination. Faculty members give their judgments concerning the research potential of their students but with specific examples of performance to substantiate their evaluation. This research evaluation of PhD candidates also uses preparation of a research proposal and presentation to the faculty as an objective criterion of research performance.

The annual student evaluation process is undertaken at the track committee meetings early in the calendar year. The advisor and student meet to review the student’s progress, filling out and signing a standard evaluation form (See the student review form on the next page). The advisor then submits the form with a recommendation for acceptable or unacceptable performance to the Chair of the student’s Track Committee. The Track Committee Chair reports on all students in the track to the COGS, which votes on approval of the recommendations. The information on this form is maintained in a database in the GPRS office. If progress is unacceptable for any reason, corrective action is proposed and the student is informed concerning the COG’S decision. The first negative evaluation is cautionary while two such annual evaluations in sequence may be taken as grounds for dismissal from the program. The following list of factors have caused decisions of unacceptable progress in recent years: (1) inadequate GPA, (2) failure to pass written portions of the Qualifying Examination, (3) failure to take the Qualifying Examination in a timely manner, (4) failure to make progress in pursuing a research topic, and (5) failure to take sufficient course work to qualify for progress in part-time status (minimum of 3 credits per semester). Inadequate research performance is reviewed with great care to avoid the possibility of faculty bias or personality conflict, involving contributions of multiple faculty members who have worked with the student in question. A majority of the COGS must agree before an inadequate progress decision is made.
The University of Texas Health Science Center at San Antonio
Radiological Sciences Program

Student Review Form

Section 1: Academic Data (to be completed by student) Attach printout of web-based grades.
Name: _________________________ Semester of Entry: ___________
Expected Graduation Date: _______________ Current Semester: ___________
Semester GPA: _______________ Total # of Hours Completed: _________
# of Hours Completed this Semester: ___________ Current Overall GPA: _________

Section 2: Achievements and Goals
Achievements this semester: ____________________________ Date Completed
1) _____________________________________________________________________________________
2) _____________________________________________________________________________________
3) _____________________________________________________________________________________
Academic & Research Goals for Upcoming Semester: ____________________________ Date Completed
1) _____________________________________________________________________________________
2) _____________________________________________________________________________________
3) _____________________________________________________________________________________

Section 3: Coursework for Next Semester
Course # Course Title Instructor Credit Hrs
1) ______________________________________________________________________________________
2) ______________________________________________________________________________________
3) ______________________________________________________________________________________
4) ______________________________________________________________________________________
5) ______________________________________________________________________________________
6) ______________________________________________________________________________________
Total Credit Hours = _____

Section 4: Review of Student Progress (to be completed by Advisor)
Y N N/A
1) Completed Set Coursework for Semester? □ □ □
2) GPA Adequate? □ □ □
3) Met Required Research Goals? □ □ □
4) On Track for Graduation? □ □ □
5) Qualifier
   Written □ □ □
   Oral □ □ □

Section 5: Signatures
I hereby certify that both my advisor and I have met and I understand the requirements for next semester that have been presented before me.

Signature of Student ______________________ Date Completed _______________

I hereby certify that I have met with the student and we have discussed the next semester’s requirements. I recommend that they have met the following status during the review process of the previous semester:

□ ACCEPTABLE □ NON-ACCEPTABLE (please check appropriate box)

Print name of Advisor ______________________ Signature of Advisor ______________________ Date Completed

Turn in original to Program Coordinator Deadline: January and February
E. GPRS EVALUATION OF CURRICULUM

On a biannual basis the faculty and students of the GPRS go on retreat to identify and solve global problems associated with the structure of the curriculum and/or the matriculation process (See the executive summaries of the 2009 and 2011 retreats on the next pages). The retreat typically takes up between one-half day to an entire day meeting in odd years to review 1) curriculum, 2) textbooks, 3) teaching methods, 4) laboratories, 5) clinical experience, 6) examinations, 7) matriculation procedures, and 8) research opportunities. The students have a separate meeting, which occurs a few days before the faculty retreat. The student meeting is run by the student representative to the COGS, who raises and discusses the issues that concern the students at the retreat. All faculty, full-time and adjunct are invited to attend the retreat. An introductory plenary session summarizes the goals of the retreat, which is followed by one or more presentations and discussions with the participants by members of the Health Science Center administration. Faculty and the student representative are then asked to identify which topics are of greatest importance to the graduate program. After the critical topics are identified, the retreat participants are assigned to break-out groups in which they develop strategies for dealing with each of the issues identified previously. The entire group then reconvenes to discuss all of the above topics and vote on changes in the policies and/or curriculum in a session that follows Roberts Rules of Order. Proposals from the breakout groups are evaluated in the afternoon in plenary session and recommendations made for implementation in the subsequent biennium. The minutes of the retreat provides a plan for program structure and curriculum development over the next two years. The strategies adopted at the retreat and official implementation of all curriculum decisions are charged to the COGS.

Most of the recommendations approved by the combined student and faculty retreat from the last three retreats have been implemented unless there were limitations of funding available to support the desired changes.

F. COMPARISON OF CURRICULUM TO PEER PROGRAMS

Since the Radiological Sciences, Radiation Biology (Radiation Biophysics and Neuroscience Imaging tracks and Human Imaging program are unique curriculum programs, there was not sufficient data available for peer comparison. The Medical Physics Program (CIP Code 51.2205.00) described in an accompanying document has been compared with peer programs.
Graduate Program in Radiological Science 2009 Retreat

Executive Summary

The Graduate Program in Radiological Sciences (GPRS) at UTHSCSA is considering a major restructuring in response to both internal and external pressures that is aimed at improving research training the Radiological Sciences and improving the professional training of Clinical Medical Physicists. A retreat of the program’s graduate faculty was held at the Children’s Cancer Research Institute at 8AM on Friday, February 27, 2009 to discuss a variety of issues involving this transition.

Since its inception the GPRS has attempted to fulfill the dual functions of preparing students for careers in both *Radiological Sciences Research* and in *Clinical Medical Physics*. This approach has led to some confusion about the academic quality of the program and the roles of both students and faculty within the dual missions of the program. In recent years research training has improved with the establishment of new education tracks, a resident MD/PhD program in Human Imaging and a program focused on Neuroscience Imaging, which complement the established training in medical physics and radiation biophysics. In 2004 the GPRS was also awarded a T32 training grant from NIH/NIBIB. Clinical Medical Physics training has also been recognized by continuing certification of the GPRS by the Commission on Accreditation of Medical Physics Education Programs, the award of a P20 NIH exploratory grant to develop a program for increasing Hispanic representation in medical physics and the fact that almost 60% of students graduating the program in the past ten years have gone on to become certified medical physicists.

However, it has become clear in recent years that the 4-5 year period allotted for PhD training is not sufficient to adequately train students in both the clinical and research areas of the field. Whereas completion of an MS degree has traditionally been accepted as adequate training for a clinical medical physicist, the profession is moving toward a new standard in which the didactic training received during MS training will have to be supplemented with two years of standardized clinical medical physics training. This additional criterion will be required of PhD students who wish to work in the clinic as well. Thus to become fully competent for a career that includes both research and clinical duties, students of the Radiological Sciences will soon need to take at least six years of training, which can be loosely categorized as two years of didactic class work, two years of focused scientific training and two years of structured clinical training.

In order to clarify the focus of a student’s career aspirations and allow for a more coherent mission for the GPRS, it is desirable to plainly define and separate the clinical and research training pathways for students of the Radiological Sciences. Various approaches have been considered and consensus was not reached on all issues, however a few principles were broadly accepted as the planning moves forward.

Regarding research training, it was generally accepted that research education can improved in several ways. Research mentorship can be improved by allowing only the more experienced faculty members with the greatest resources to act as mentors. Also, the number of students per mentor should be limited and procedures should be instituted to evaluate the effectiveness of faculty members both in their roles as course directors and in mentor-student relationships. Also, research projects for students should be established in a manner which not only ensures effective completion of the dissertation but also familiarizes the student with the NIH’s expectations (and those of other funding agencies) for research.
training programs so that students can begin planning their research career path while still in graduate school. Students should be given greater exposure, through rotations or some other mechanism, to the full array of laboratory training opportunities available to them. Before starting work in a laboratory, the students should be provided with a clear set of expectations regarding the quantity and quality of their research work and how it fits in with their course work and other responsibilities. Students working under a Teaching Assistantship should be made fully aware of what work will be required and how many hours they should expect to put in per week.

It is in the organization of a standardized track for clinical training that the greatest structural changes to the program will occur. A clinical medical physics training track might be established in one of several ways. For instance, the Department of Radiation oncology is in the early stages of establishing a traditional medical physics residency program. However, this is difficult to fund. The total cost of a resident includes salary and benefits totaling ~$60,000/year plus 10%-15% of a faculty mentor’s time. One approach to reduce these costs would be to establish a professional doctorate in medical physics which would, in general combine the didactic teaching of the MS with the clinical training of a residency program. The professional doctorate program would have the benefits of students paying their own tuition and living costs and, if approved, state funding being provided to the institution that would roughly for the professional doctorate and the GPRS, the same amount that is currently provided to UTHSCSA for the current program. However this is new concept in the medical physics community. Only one other school, Vanderbilt University, has such a program and it is not yet clear whether this approach to clinical education of medical physicists will be broadly accepted. Nevertheless, the establishment of a professional doctorate program is the most straightforward approach to providing a clear pathway for students entering school to clinical careers in medical physics. Thus, a formal proposal for a professional doctorate in medical physics is being developed and planning is underway for establishing standardized clinical training for students in both radiation therapy physics and diagnostic imaging physics.
Graduate Program in Radiological Science 2011 Retreat
Executive Summary

The Graduate Program in Radiological Sciences (GPRS) at UTHSCSA is in the process of a major restructuring. A new educational program, a professional Doctorate in Medical Physics has been proposed to start for the 2012 school year. The COGS and the Radiation Biology tracks have been restructured and ways to improve students’ training and experience in skills required to successful professional scientists are being pursued. A retreat of the program’s graduate faculty was held at the Children’s Cancer Research Institute at 1PM on Friday, April 29, 2011 to update the general GPRS faculty and discuss future issues involving this transition.

Dr. David Weiss, Dean of the Graduate School of Biomedical Science (GSBS) gave short presentation on his plans for the GSBS. He said that his major goal is enhance and improve the Integrated Multidisciplinary Graduate Program (IGMP). Other issues that he is tackling include improving the GSBS web site, creating a graduate student lounge and setting up an office to coordinate UTHSCSA post-doctoral fellows. In the subsequent discussion a number of potential ways that the coursework in the PhD track of the GPRS could be more effectively aligned with the IGMP curriculum were discussed. Dr. Weiss also expressed an interest in meeting with students from the GPRS at some time in the future.

The GPRS faculty expressed a general interest in working more closely with the Graduate School and becoming developing coursework that will become more aligned with the IMGP. Several specific points of discussion were pursued, but three overreaching factors emerged.

1. The current prerequisites for biology and the current biology curriculum in the GPRS are probably inadequate for modern biomedical researchers; and this is particularly true for the medical physics tracks. Although anatomy and physiology has been taught since the program started, there is now also a need to enhance instruction in cell biology and molecular biology, particularly as it relates to neuroscience and cancer biology and cancer treatment strategies. However, the GPRS faculty recognizes that a major strength of the GPRS is the strong emphasis on physics both didactically and in the research education program. Strategies such as requiring more undergraduate biology, adding introductory courses to the curriculum and incorporating IMGP biology instruction, without diluting physics instruction, were all discussed.

2. Radiological Sciences graduate students need to become more generally proficient in information science technology and develop the skills required, not only to complete image processing, but also statistical analysis, bioinformatics, data mining, modeling and other tasks important to modern science. Suggestions included developing coursework, integrating more information technology instruction within existing coursework and making available workshop-type programs, such as those offered by The Computational Biology Initiative, as joint program of UTSA and UTHSCSA (http://www.cbi.utsa.edu/workshops).

3. Funding for PhD students, especially for the first two years of the program has been inadequate and unstable. The GPRS has only three state-funded graduate student slots. Another six are funded through Radiology MSRDP funds, but these will soon be disappearing. NIH-funded investigators are reluctant to support students in these years because they are in class and studying for the qualifying examination during this time so they are not available to work much on research. Various suggestions were made including finding additional external funding, reducing the required course-load and modifying the qualifying exam.
As noted above, there has been a strong emphasis on enhancing and standardizing the clinical training of medical physicists. This has resulted in the development of two medical physics residency programs. The radiation oncology physics residency program at the CTRC was recently accredited by the Commission for the Accreditation of Medical Physics Education Programs (CAMPEP). The diagnostic imaging medical physics residency program is a joint program, established with the Air Force, which will be seeking CAMPEP accreditation later this year.

Another major effort has been the development of the proposal for the Doctor of Medical Physics degree. This shall be a professional doctorate, offered by the School of Medicine, which will effectively replace the MS degree for all but the Medical Health Physics tracks of the GPRS.

Dr. Nan Clare, Vice Dean for Education at the School of Medicine (SoM) discussed the progress and organization of the Doctor of Medical Physics (DMP) program. The program was approved by the UTHSCSA Executive Committee on March 15, 2011 and is on the agenda for consideration at the May 12 meeting of the UT Board of Regents. Dr. Clare explained how the SoM is setting up an oversight committee that will consider administrative details, such as the admission process, application process, arranging presently listed courses to be presented in the SoM portion of the university catalog and other issues. She also plans to consider how the DMP students will be integrated into the medical school culture. She expressed the SoM’s strong support for the DMP program and said that she was excited to start implementing it.

At the end of the meeting it was suggested that the retreat be made in to annual rather than a bi-annual event, in order to keep the general faculty fully updated on the progress of the various projects, currently being undertaken. This issue, as well as the three areas of concern, listed above, will be taken to the CPRS Committee on Graduate Studies, where appropriate action can be considered and undertaken.
VII. SPECIFIC PROGRAM CHARACTERISTICS

A. RELATIONSHIP OF GPRS TO GSBS

The GPRS program offers the following degrees: (1) PhD degree specializing in Radiological Sciences, (2) PhD degree specializing in Radiological Sciences – Human Imaging, or (3) PhD degree specializing in Radiological Sciences - Radiation Biology (includes tracks - Radiation Biophysics and Neuroscience Imaging). that is part of the portfolio of Doctoral programs in the Graduate School of Biomedical Sciences.

B. INTER-DISCIPLINARY CURRICULUM

In 2003, the Radiological Sciences-Radiation Biology PhD curriculum was expanded to include interdisciplinary studies using current radiological sciences faculty and resources. The Human Imaging track combines a Radiology residency program with pursuit of a doctorate degree in radiological sciences. The Neuroscience Imaging track combines neuroimaging technology training with neuroscience research training.

C. MULTI-DISCIPLINARY CURRICULUM

The GPRS program is a multi-disciplinary program combining radiation sciences and medical physics with the biomedical sciences and practice of medicine. Students within the GPRS program are encouraged to enroll in courses offered outside of the GPRS program to broaden their knowledgebase and allow more effective communication between disciplines needed for the team based approach in current academic research and health care settings. Examples of offered courses routinely taken by the Human Imaging students include MEDI 6062 (Patient Oriented Clinical Research Methods), MEDI 5074 (Data Management, Quality Control and Regulatory Issues) and MEDI 5073 (Integration of Molecular Biology with Clinical Research). Students in the Radiation Biophysics track are required to take INTD 5000 (Fundamentals of Biomedical Sciences) and INTD 5007 (Advanced Cell and Molecular Biology).
D. FACILITY AND LABORATORY RESOURCES

GPRS students are expected to conduct research that is of interest to them and relevant to their current or future careers. Many important UTHSCSA institutional components contribute to the research training carried out in the GPRS. A brief summary of these resources include:

The UTHSCSA, designated a Hispanic-Serving Institution by the U.S. Department of Education, is the only tier one research institution in South Texas, with $231 million in total research and sponsored program expenditures in FY2011, of which $96 million was from NIH awards. Currently, the UTHSCSA ranks in the top three percent of all institutions worldwide receiving federal funding. Because of its long standing partnerships and productive relationships, the Health Science Center is the chief catalyst for the $24.5 billion biosciences and healthcare industry in San Antonio.

UTHSCSA Institutional components that contribute resources for the GPRS program include:

- **UTHSCSA Graduate School of Biomedical Sciences (GSBS):** The Graduate School of Biomedical Sciences is one of five schools at the UTHSCSA. The GSBS was established in 1972 and today has an enrollment of 400 graduate students. The primary GSBS mission is to educate students committed to advancing knowledge in contemporary biomedical science. For the GPRS program, this mission is accomplished through a combination of advanced didactic courses and mentored research experiences.

- **South Texas Research Facility and Medical Arts and Research Center:** To support its clinical and translational research mission, the UTHSCSA recently constructed a new 200,000 sq ft research building (South Texas Research Facility – STRF). Both the location of the STRF and the scientific disciplines and programs that are housed there (metabolic biology, regenerative medicine, adult cancer, healthy aging, neuroscience, IIMS, business accelerator, laboratory animal research, and research cores) combine to create synergies for the Health Science Center’s education and research missions. The STRF is in close proximity to the Greehey Children’s Cancer Research Institute (GCCRI - with its outstanding vivarium space and animal imaging facilities), the Research Imaging Institute (RII - which features both human and animal imaging capabilities), the Cancer Therapy and Research Center (CTRC - home to the Health Science Center’s cancer clinical research program), and the Medical Arts and Research Center (MARC - a 250,000 sq ft ambulatory care center that was completed in 2009 and houses state-of-the-art clinical, imaging and outpatient medical and surgical facilities supports clinical research and education activities). In the near future, two new facilities will be added to the clinical and research missions of UTHSCSA - ground was broken in 2012 for a new $95M dental facility, the Center for Oral Health Care and Research, which will be located adjacent to the MARC, and authorization was received in 2012 to establish an academic children’s hospital that will also be located adjacent to the MARC. Both facilities are scheduled for completion in 2015.

- **Department of Radiology:** The Department of Radiology at UTHSCSA has been the home of the Graduate Program in Radiological Sciences. The Division of Education of the Radiology Department is housed in an office suite having 2200 sq ft and includes 3.5 FTE educational administrative staff along with offices for the directors of the Radiology Department’s medical education, graduate education and radiology residency programs.
The Department houses a classroom where students will attend classes and clinical conferences. The department houses a molecular imaging laboratory in which faculty are engaged in using liposome-based compounds for theranostic applications. This effort is support by a multit-modality small animal imaging system (PET, SPECT & cone beam CT) as well as a high-frequency (60 MHz) ultrasound imaging system. The Radiology Department also has an image processing laboratory (450 sq ft) and a phantom laboratory (425 sq ft) where students can learn how to manage digital medical images and design and build test objects for evaluating clinical imaging equipment.

- **Cancer Therapy and Research Center (CTRC):** CTRC is a National Cancer Institute-designated cancer center (one of three in Texas) that conducts programs for research, prevention, and treatment of cancer. CTRC provides cutting edge research, state-of-the-art technology, and multidisciplinary clinical care teams to translate research findings to patient care. The Department of Radiation Oncology resides on the CTRC campus and within it students will have access to diverse range of cancer patients and cutting-edge treatment facilities is which they will be trained in the most advanced clinical methods. Educational programs in the Department of Radiation Oncology include Radiation Oncology residency, clinical dosimetrist certificate program, post-doctoral research training and medical physics residency programs. The Department of Radiation Oncology has five medical physicists who are certified by the American Board of Radiology in Therapeutic Radiologic Physics. Radiation therapy equipment at the CTRC include high energy Varian linear accelerators with multi-leaf collimators, low energy Varian linear accelerators, Hi-ART Tomotherapy unit with integrated imaging and IMRT treatment planning, Phillips and GE Medical Systems CT simulators with 4D imaging capabilities, 3D treatment planning networked workstations, advanced intensity-modulated radiation therapy and image-guided radiation therapy treatment planning, remote afterloading brachytherapy unit (Nucletron Microselection High Dose Rate), Peacock system for intensity modulated conformal radiation therapy, an imaging center with CT, digital x-ray, mammography, and CT/PET scanner on-site, a low dose rate brachytherapy unit for prostate implants, a Kodak digital radiography (filmless department) and an array of dosimetric and quality assurance equipment.

- **Research Imaging Institute (RII):** The RII uses noninvasive biomedical imaging methods for measuring the structure and function of living organisms, in support of neuroscience research. The RII maintains its own research portfolio, in addition to providing imaging services for a number of research projects inside and outside UTHSCSA. RII Divisions include: Positron Emission Tomography; Magnetic Resonance Imaging; Human Electrophysiology; Biomedical Image Analysis; Translational Imaging; and Human Performance. Services include: NeuroCognitive Assessment and Technical Support. Programs include: Computational Biology, Speech and Language, Genomic Imaging, and Human Neuroscience. Students in the DMP program will participate in medical health physics, equipment quality assurance and radiation safety tasks related to the state-of-the-art nuclear medicine and magnetic resonance imaging equipment at the RII.
Research Support Offices:

- **The Office of Sponsored Programs (OSP)** provides support for all research grants and contracts operated through the Health Science Center. OSP is responsible for reviewing and approving institutional proposals; negotiating and reviewing award agreements; establishing appropriate accounts; preparing and monitoring subawards; advising on post-award business and financial matters; preparing accurate and complete financial reports; and, closing accounts. In addition, the Office is responsible for enforcing costing and other administrative policies of the Health Science Center and its external sponsors.

- **The Office of Clinical Research (OCR)** provides consultation, delivers education and training programs, develops policy and processes, and leads quality improvement efforts to ensure the conduct of ethical clinical research and human subject protection that is in compliance with the required federal, state, and local regulations.

- **South Texas Technology Management (STTM)** is a regional technology transfer office affiliated with the UTHSCSA, and is allied with the research departments of the University of Texas at San Antonio, the University of Texas Pan American in Edinburg, Texas State University in San Marcos, and the University of Texas at Brownsville. STTM provides comprehensive and integrated technology development services for its affiliated universities.

- **The Institutional Review Board (IRB)** is the IRB of record for the UTHSCSA, the South Texas Veterans Health Care System, University Health System, the Texas Biomedical Research Institute, and Southwest Research Institute. In addition, the HSC IRB has limited IRB agreements with the other 14 UT campuses, Children’s Hospital of San Antonio, Brooke Army Medical Center (BAMC), the National Cancer Institute (NCI), and the Clinical Trials Network of Texas (CTNeT).

- **Laboratory Animal Resources and the Institutional Animal Care and Use Committee (IACUC)** has affiliations with the South Texas Veterans Health Care System.

- **Institutional Cores, Institutes, and Centers:** The UTHSCSA regularly invests funds to purchase and maintain state-of-the-art technology to support institutional research cores that provide instrumentation, service-oriented and knowledgeable staff, and education and assistance in the technical aspects of the core service to research investigators and students:

  - **Bioinformatics:** Provides computing services and supports research and educational projects that require high-performance computational approaches involving supercomputing and high-speed networking.

  - **Biomolecular NMR Spectroscopy:** Provides access to high-field high-resolution NMR instrumentation for research and other projects that require analysis of molecular structure ranging from small molecules to structural analysis of biological macromolecules.

  - **Center for Medical Humanities and Ethics:** This center provides activities and training to assure that the students are knowledgeable about the principles of medical ethics related to their professional activities.

  - **Electron Microscopy Lab:** Offered through the Department of Pathology, this lab offers access to the equipment, plus faculty expertise in pulmonary biology and
pathology, clinical renal pathology, ultrastructure of tumors, hematopathology, cardiovascular and myocardial biology and pathology, cell injury and experimental renal biology, and pathobiology of vascular stenting procedures.

- **Flow Cytometry**: Assists researchers requiring the service of a flow cytometer, which counts and examines microscopic particles suspended in fluid.

- **Genomics**: Provides state-of-the-art services including genotyping and cell banking. This core also provides microarray technology using the Illumina system.

- **Greehey Children's Cancer Research Institute**: GCCRI is a specialized cancer research center to advance scientific knowledge and develop new therapies for childhood cancer. Work at GCCRI is organized around five major disciplines (Biochemistry, Cell Biology, Genetics, Epidemiology, and Pathology) and utilizes a number of approaches including Functional Genomics, In-vivo Imaging, Animal Models, Gene Targeting, Clinical Trials and Assays, and Bioinformatics.

- **Optical Imaging Facility**: This core facility provides state-of-the-art technology for imaging of living cells, tissues, and animals, allowing the researcher to observe the dynamics of the molecular, chemical, structural and functional environment of cells at the cellular and sub-cellular level.

- **Institute for Integration of Medicine and Science's (IIMS)**: The IIMS mission is to integrate clinical and translational research and career development across all UTHSCSA schools and among a group of diverse public and private partners in South Texas. Funded through an NIH Clinical and Translational Science Award (CTSA), the IIMS works to bring together scientific talent and resources for the purpose of reducing barriers to research and stimulating the transformation of knowledge into improved health care. MSCI students may access resources available through the IIMS, including access to collaborating IIMS facilities, faculty who have expertise in cross-cultural and community-based research methods, statistical analysis, and other resources that may benefit MSCI student research.

- **Micro CT**: Provides research services using high-resolution, x-ray microtomography (microCT) technology.

- **Nucleic Acids Core**: Provides automated DNA sequencing with data analysis, custom DNA synthesis, genome project services, gene amplification services, and robotic application custom projects.

- **Sam and Ann Barshop Institute for Longevity and Aging Studies**: The Barshop Institute operates basic science centers and research cores as resources for research scientists conducting aging and longevity research. The Basic Science Centers available through the Barshop Institute include the San Antonio Nathan Shock Center for Excellence in the Basic Biology of Aging; the Comparative Biology of Aging Center; the Intervention Testing Program; the Marmoset Aging Center; and the Neuroscience Research Center. Barshop Nathan Shock Institute Research Cores include the Animal Core, Optical Imaging Core, Oxidative Stress Core, Pathology Core, Development Core, Behavioral Core, and Histology Core.

- **Southwest Research Consortium**: The SRC is a consortium of nine research and educational organizations in San Antonio, TX, toward the goal of collaborative biomedical research; education programs in life, physical and engineering sciences; and applied research and development. Members of the consortium are: Texas Biomedical Research Institute; Southwest Research Institute; UTSA; UT Health Science Center; Trinity University; Human Systems Wing, Brooks City-Base; St.
Mary’s University; Brooke Army Medical Center; and Wilford Hall Ambulatory Surgical Center.

- **Library:** The UTHSCSA Library is the central information and knowledge resource for all five schools of the university – medical, dental, nursing, health professions, and biomedical graduate school. The library also provides services to the extension programs of the School of Public Health-University of Texas Health Science Center at Houston, and the College of Pharmacy-University of Texas at Austin.

- The mission of the UTHSCSA Library is to advance the educational, research, clinical care, and community service programs of the UT Health Science Center at San Antonio by critically appraising, selecting, and organizing health sciences information and by facilitating and maintaining access to these resources for the faculty, staff and students of the UTHSCSA and for the South Texas community.

**Facilities and Services**

- The Briscoe Library is the main library, located on the Long Campus of the UTHSC in San Antonio. The Briscoe Library building was completed in 1983 and recently underwent several renovation projects that are transforming the library into a 21st century facility. Among the recent renovations were electrical and data upgrades, a new multipurpose classroom facility with 24/7 access and state of the art instructional technology, and new study rooms located in an Information Commons central to the library’s reference area.

- The library has several branch facilities in San Antonio and elsewhere in South Texas. The Mario E. Ramirez, MD, Medical Library is located at the Regional Academic Health Center in Harlingen and also provides services to the Regional Academic Health Center Research Campus in Edinburg. Other library branches are located in an ambulatory care facility in downtown San Antonio, at the Texas Research Park, and at the Laredo Regional Campus in Laredo.

  The library employs 19 master degree level librarians and 39 support staff. Librarians and support staff provide a full range of services including reference, literature searching, consultation, instructional services, circulation, interlibrary loan, selection, acquisition, and organization of library materials. Librarians are active in professional organizations and the library is well known for its active outreach services.

**Print and Electronic Collections**

The collection of the UTHSC Library is primarily focused on the specialized literature of the biomedical and health sciences. Access to the collections is provided through a Web-based catalog based on the Innovative Interfaces, Inc. integrated library system. The library’s Web address is http://www.library.uthscsa.edu.

At the end of fiscal year 2009, the library’s collection contained over 112,000 print journal volumes and 105,427 print books. Since 1998, the library has consciously sought to convert its journal collection from print to electronic format. The library subscribes to 5,667 titles in electronic format and 107 journals are received in print only format. In addition through various consortium arrangements, the library has access to 19,855 electronic journals in a wide array of disciplines. Access to electronic journals is provided through the library catalog, through an A-Z electronic journals list, and through a link
resolver that allows direct linking from journal citations to the full-text of an article. The library subscribes to journals from the major scientific, technical and medical publishers such as Elsevier, Wiley, Springer, Lippincott Williams and Wilkins, AAAS, Nature Publishing, as well as journals published directly by scientific societies. Collection Resource librarians continually monitor trends in journal and book publishing and meet with librarians from other institutions to seek the best arrangements for journal subscriptions.

In addition to books and journals, the library maintains subscriptions to essential databases that facilitate access to the scientific literature. These databases include but are not limited to the National Library of Medicine’s PubMed, Web of Science, Scopus, SciFinder Scholar, Current Protocols, Collexis Research Profiles, and Digital Dissertations and Theses. Databases are accessed through the library’s Web site. The library maintains a proxy server that allows anywhere, anytime access to the library’s wide array of electronic journals, books, and databases.

The library’s print reference collection is located in the Briscoe Library Information Commons and contains approximately 3,600 items in the form of general and specialized dictionaries, directories, encyclopedias, handbooks, bibliographies and guides to the literature of the health sciences, including dentistry, nursing and allied health sciences, medicine, public health, pharmacy and the biomedical sciences. The library also subscribes to the online version of a number of reference resources. The reserve collection consists of faculty-selected books and articles, and other textbooks, reference sources, software and teaching tools that have limited circulation. A large number of reserve items are available electronically through the library’s electronic reserve system and course readings assignments are also available through the university’s online course management system.

Cooperative Arrangements
The library seeks cooperative arrangements among libraries that will enhance collections and services to its users. The library belongs to TexShare, the statewide consortium that provides databases and circulation services to the state of Texas. Faculty and students can obtain a TexShare card which allows check-out of library materials from a wide range of university, community college, and public libraries around the state. In the spirit of cooperation, the UTHSC Library accepts the TexShare card from other universities as well. The library also belongs to the University of Texas System Digital Library, a consortium of University of Texas System libraries formed for cooperative licensing of electronic products. By belonging to this consortium, the library is able to extend its collection to include not only those electronic subscriptions held by the UTHSCSA Library but also the subscriptions of all other UT libraries. The consortium works to obtain the best prices from publishers for the combined UT libraries. The library is also an active participant in SCAMeL, a consortium of medical school libraries in the five state region of Texas, Arkansas, Louisiana, Oklahoma, and New Mexico. SCAMeL seeks to obtain favorable pricing for electronic subscriptions for its members from publishers.

The UTHSCSA Library is a resource library within the National Network of Libraries of Medicine, meaning that it is active in the interlibrary loan network of medical libraries.
around the country. The library provided over 14,000 documents from its collection to other libraries in FY 2009 and processed over 1,700 interlibrary borrowing requests from UTHSC faculty and students. If the library does not own a book or journal needed by faculty or students, interlibrary loan service is provided at no charge to faculty or students.

- **Information Management and Services**: This department provides support services to Health Science Center faculty, staff, and students in all areas related to educational development and instructional technology. Services include communications (videoconferencing, Teleconference Network of Texas), instructional technology (audiovisual, Blackboard, instructional design), multimedia, networking, print media, research and clinical support (instrumentation, statistical consulting), computer, server, and software support, technology support, website support, and training and continuing education.

- **Collaborations and Partnerships with Local Health Facilities**: Teaching hospitals and organizations affiliated with the UT Health Science Center that offer opportunities for research are:
  - University Hospital and University Health Center Downtown (operated by the University Health System)
  - South Texas Veterans Health Care System, Audie Murphy Division
  - Children’s Hospital of San Antonio
  - Baptist Health System
  - San Antonio Metropolitan Health District
  - Texas Biomedical Research Institute and the Southwest National Primate Research Center
  - San Antonio Military Health System, comprised of the San Antonio Military Medical Center, Brooke Army Medical Center, and the Wilford Hall Ambulatory Surgical Center

UTHSCSA has strong, stable and highly effective partnerships with a number of health-related organizations, demonstrating a solid foundation for collaboration and innovation. The most important of these to the GPRS is the San Antonio Military Medical Center (SAMMC), which is the largest military healthcare and biomedical research program in the U.S. Since it is located in San Antonio, SAMMC provides unique collaborative opportunities not available in other locations. In 2010 completed a $1.5 billion project that integrated and expanded Brooke Army Medical Center and Wilford Hall Medical Center (Air Force) into the San Antonio Military Medical Center (SAMMC). The SAMMC is destined to be the primary medical training facility of the DOD in the 21st century. The Graduate Program in Radiological Sciences has had long-standing collaborations with physicians and medical physicists employed by the DOD, who serve as adjunct faculty and provide both clinical and research training to UTHSCSA students. Brooke Army Medical Center (SAMMC–North) is a modern state-of-the-art, 450-bed health care facility that provides level-one trauma and graduate medical education. It is located on Fort Sam Houston, which is within the city limits of San Antonio, 15 miles from the UTHSCSA main campus. Dr. Jonathan Tucker (Radiology) and Dr. Jim Prete (Radiation Oncology) are medical physicists working at BAMC who have are active participants
in the current graduate program as adjunct faculty engaged in didactic and clinical training of students.
VIII. INDICATORS OF STUDENT SUCCESS

A. STUDENT ENROLLMENT

From 2008-2012, of the students enrolled into the GPRS program:

- 17 students are currently actively enrolled in the GPRS
- 8 PhD students have graduated
- Between 2008-2012, 2 students withdrew from the program (1 PhD student withdrew to transfer to another graduate program in the institution and 1 student was dismissed for failure to progress) (Table 6)
- Between 2008-2012, the three-year rolling average retention rate was 83.3%.

Table 6: Student Enrollment and Retention for Doctoral Students

<table>
<thead>
<tr>
<th>Year</th>
<th>Status</th>
<th>Entering Year</th>
<th>Entering Year</th>
<th>Entering Year</th>
<th>Entering Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td># Entered</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td># Withdrew</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td># Graduated</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009-2010</td>
<td># Continue</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td># Withdrew</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td># Graduated</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td># Continue</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td># Withdrew</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td># Graduated</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2011-2012</td>
<td># Continue</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td># Withdrew</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td># Graduated</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2012-2013</td>
<td># Continue</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td># Withdrew</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td># Graduated</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
B. DIVERSITY BY GENDER AND RACE/ETHNICITY (ENROLLED STUDENTS)

The diversity of students currently enrolled in the GPRS program in 2012-2013 academic year by Gender and Race/Ethnicity are demonstrated in the tables below. The ethnic composition for US citizen or US resident alien graduate students enrolling in GPRS program for 2012-2013 is: 70% White, 16% Hispanic, 10% Asian and 0% African-American. Females currently account for 35% of students in GPRS program. For those students active in GPRS program for the 2012-2013 school year, the geographical distribution is 52% from Texas, 19% from within the US but outside of Texas, and 29% from foreign countries.

<table>
<thead>
<tr>
<th>Citizenship</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign nationals</td>
<td>5</td>
<td>29.4%</td>
</tr>
<tr>
<td>US citizen or permanent residents</td>
<td>12</td>
<td>70.6%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>6</td>
<td>35.3%</td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
<td>64.7%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>7</td>
<td>70 %</td>
</tr>
<tr>
<td>African-American</td>
<td>0</td>
<td>0 %</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>1</td>
<td>10 %</td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>2</td>
<td>20 %</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2</td>
<td>16.7%</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>10</td>
<td>83.3%</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
C. GPRS GRADUATES

The GPRS program produced 139 (99 PhD and 40 MS) graduates through academic year 2012.

Graduate Diversity. Review of the demographics of the GPRS graduates indicates that approximately 35% of the graduates have been female. About 80% of MS graduates and 50% of PhD graduates have been US citizens or US resident aliens. Approximately 12% have been from Hispanic or other educationally underserved population.

<table>
<thead>
<tr>
<th>GPRS GRADUATES</th>
<th>Diversity by Citizenship, Gender, and Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Foreign</td>
</tr>
<tr>
<td></td>
<td>U.S. Citizen</td>
</tr>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>African-American</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
</tr>
<tr>
<td></td>
<td>Asians</td>
</tr>
<tr>
<td></td>
<td>Pacific Islanders</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Progress to Graduation/Time-to Degree and Graduation Rates • Between 2007-2012 there have been 10 PhD graduates from the GPRS program. The graduation rate for these students is 83% for the PhD degree. The time-to-degree for the PhD degree is 4.95 years (SD = 0.74 y).

Graduate Student Publications/Presentations Students are encouraged to communicate their research findings at the national level. GPRS students have been very productive in terms of abstract acceptance to attend conferences although exact numbers could not be tabulated. Publication of results in peer reviewed journals is encouraged by GPRS faculty. For PhD students, GPRS faculty offer the opportunity of a dissertation format combining at least three or more published papers as chapters with a small amount of additional background and a final chapter summarizing the papers findings into a recognizable dissertation topic. In the last five years (2007-2012) GPRS PhD students authored 38 peer-reviewed articles (22 as first author, 7 as second author). The number of PhD student authors for each program were Radiation Biophysics (3), Human Imaging (29), and Neuroscience Imaging (6). Of note is the student productivity in number of publications for the new Human Imaging and Neuroscience Imaging curriculum tracks. The rolling three-year average (2009-2012) of peer-reviewed publications per year per student was 1.53.
D. GRADUATE OUTCOMES

- **Career Information.** As students graduated and pursued their careers, the GPRS program maintained contact and collected data on current job title and licensure. Public domain databases such as PubMed were utilized for tracking publications by graduates pursuing academic careers. Information generated from this data collection is used here to report student activity and outcomes and maintained on the Alumni section of the GPRS website. Current careers of the GPRS program graduates are shown in Table 7.

Table 7: Listing of Current Careers by GPRS Graduates.

<table>
<thead>
<tr>
<th>Career</th>
<th>PhD Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Trainee</td>
<td>5</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>5 (3)</td>
</tr>
<tr>
<td>(License)</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
</tr>
<tr>
<td>Deceased</td>
<td>0</td>
</tr>
</tbody>
</table>

- **Academic and Research Careers (PhD 90%):** Of the 10 PhD graduates, 10 are in academic, advanced fellowship training, or research positions. Among these:
  - 1 continued at the UTHSCSA (1 Assistant Professors).
  - 9 are in additional training or faculty positions at other universities (5 Fellows, 4 Assistant Professors). These other institutions include:
    - Schools in Texas (UT MD Anderson, and UT Medical Branch Galveston)
    - Schools in the U.S. (Harvard Medical School, , the Mayo Clinic, University of California San Francisco)
    - International (Fudan University [China])

- **Publications.** Using PubMed, the number of peer-reviewed publications of GPRS graduates in academic and research careers was determined. Publications included are only those published in positions after graduation. Of the graduates in academic/research careers, 50% have contributed to the scientific literature after graduation. The rate (80%) is higher for those graduates in faculty positions. There were 18 publications with an average of 4 publications per graduate.

IX. STUDENT RECRUITMENT AND ADMISSION CRITERIA

A. STUDENT RECRUITMENT

The GPRS Committee on Graduate Studies (COGS) is responsible for recruiting and selecting students into the GPRS program. The Recruitment Subcommittee (currently chaired by Dr. Geoffrey Clarke) responds to inquiries by prospective students and coordinates recruiting events. Typically this subcommittee responds to 150-200 emails per year from prospective students. A variety of methods are used on an ongoing basis:

- The GPRS Website ([http://radsci.uthscsa.edu](http://radsci.uthscsa.edu)) provides helpful information for prospective students concerning the requirements and steps for applying to the program.
It is also provides contact information so that students may interact with GPRS administration and directors.

- The GPRS program maintains an annual listing in the AIP’s publication, *Graduate Programs in Physics, Astronomy, and Related Fields*.
- As an accredited medical physics program, the GPRS program has a listing on the CAMPEP Website.
- GPRS faculty visit local Colleges and Universities around the state. Recent visits by faculty in the past five years include University of Texas at Arlington, Trinity University, University of Texas El Paso, Texas A&M Commerce and Texas A&M College Station.
- Faculty from the GPRS program also has hosted a Nuclear Science Merit badge workshop at the CTRC for a group of Boy Scout troops.
- Faculty have mentored several undergraduate students as summer research fellows.

**Minority Recruitment:** UTHSCSA is committed to recruiting and retaining minority students into research and academic careers, and the large population of Hispanic students in the State of Texas, particularly the Mexican American majority in South Texas, is advantageous to minority recruitment. The current level of Hispanic enrollment in all UTHSCSA schools is 26%, and, through academic year 2012, 10-12% of students enrolled in the GPRS program have been Hispanic and 35% have been women. The GPRS has been one of the more important programs for educating young Hispanics in radiological sciences—Human Imaging as evidenced by the NIH grant entitled “Multidisciplinary Human Imaging Training Grant” that the GPRS received for 2004-2009.

**B. APPLICATION/ADMISSION REQUIREMENTS**

The following general admission requirements are applied to all applicants of the GPRS program. These requirements meet or exceed the admission requirements of the Graduate School of Biomedical Sciences for graduate programs at UTHSCSA.

- A baccalaureate degree in a natural science or engineering from an accredited institution in the United States or proof of an equivalent degree from a foreign institution.

- Applicants must have undergraduate credit for the following courses: 1) Biology: Two semesters of general biology; 2) Chemistry: Two semesters of general chemistry; 3) Physics: Two semesters of general physics; 4) Mathematics: Through calculus and ordinary differential equations; 5) Computer Science: Introduction to Computer Science (one semester).

- Applicants for the Human Imaging program must hold a MD or DO degree and match with a Radiology Residency slot.

- A cumulative grade point average (GPA) of no lower than “B” (3.0 in a 4.0 system).

- A satisfactory score for the combined verbal and quantitative portions of the Graduate Record Examination (GRE). While no minimum is recommended by the UTHSCSA Graduate School of Biomedical Sciences, a minimum of 1,000 (New scoring system 266) for the combined scores is desirable. Typical GRE scores for GPRS students is 1220 (New scoring system 312). Scores on the GRE must have been obtained less than five years from the date of application. USMLE scores can substitute for GRE scores for the Human Imaging Applicants.

- A minimum score on the Test of English as a Foreign Language (TOEFL) (computerized test: 220; paper test: 550; iMET: 68) or 6.5 on International English Language Testing System (IELTS) for applicants from countries where English is not the native language.
Scores on TOEFL or IELTS must have been obtained no more than two years prior to the date of matriculation.

- Letters of recommendation (three) attesting to the applicant’s readiness for graduate level studies in Radiological Sciences.
- Essays stating the applicant’s reasons for their interest in Radiological Sciences, description of professional goals and an outline of their undergraduate, industrial or summer research, teaching experience and clinical experience are required.

**Applicant Review Procedures**

The COGS Application Review Subcommittee has established three criteria to allow acceptance of an Applicant. First, the Application Review Subcommittee determines that the applicant has an adequate academic background, based on the above criteria.

1. The Application Review Committee uses the following criteria to determine academic acceptability of an application: cumulative undergraduate GPA, GRE scores, TOEFL scores (if applicable), GPA for any graduate studies completed, three letters of recommendation and appropriateness of undergraduate courses taken. Typically 50-80 applications are received each year, of which at least ~30 are deemed academically acceptable.

2. The second condition is that the Application Review Subcommittee must identify a mentor for the applicant in the appropriate track of GPRS program.

3. The third task of the Application Review Subcommittee is to establish that there is funding available, either through GPRS program, through an outside program or that the student can be self-funded. Funding within GPRS program for entering students is subject to availability, but typically three to five new students can be funded each year.

After establishing these three criteria the Application Review Subcommittee presents its recommendations to the COGS for acceptance or rejection of each applicant reviewed. The COGS makes final decisions via a simple majority vote.

The GPRS program has adopted, as part of its admission goals, a geographical student distribution comprising 50% from Texas, 25% from within the US but outside of Texas, and 25% from foreign countries. For those students active in GPRS program for the 2012-2013 school year, the geographical distribution is 48% from Texas, 26% from within the US but outside of Texas, and 26% from foreign countries.

The Chairman of COGS forwards recommendations of approval or rejection to the Dean of the Graduate School of Biomedical Sciences. Applicants are informed by the Dean in writing of the action taken on their application and any contingencies imposed upon their acceptance.
X. FACULTY CREDENTIALS

None of the GPRS Graduate Faculty members are full-time teachers; rather, they are fully engaged in a combination of clinical service, research, teaching, grant writing, publishing, and/or other activities expected of faculty members at UTHSCSA. The faculty members who teach the GPRS core curriculum were selected based on their expertise in the topic of instruction and their interest in teaching. GPRS Core Faculty is comprised of course directors and co-directors as well as serve as supervising professors, and/or members of supervising committees. GPRS also has 12 adjunct faculty with appointments outside of UTHSCSA.

A. GPRS FACULTY APPOINTMENT

The GPRS Committee on Graduate Studies (GPRS COGS) assesses the qualifications of each individual seeking appointment to the GPRS Graduate Faculty prior to recommendation to the Dean of the Graduate School of Biomedical Sciences. Applications for new faculty members to the GPRS can be considered at any COGS meeting throughout the year. Any active member of the COGS may sponsor a new faculty member by writing a letter to the COGS Chair, explaining the role that the new faculty member would play, providing a CV and other documentation of the candidate’s qualifications to fulfill the proposed role. Membership is determined by majority vote of the COGS. The Program Director then submits paperwork to the GSBS for appointment to the GSBS faculty and to the Medical School for appointment to the Radiology Department faculty in the Medical School. For those who are not already UTHSCSA faculty, the GSBS initiates a background check and an official transcript is requested from the institution that granted the new faculty member her/his most advanced degree.

When considering an individual’s qualifications, emphasis is placed upon the following criteria:

- Teaching excellence
- Mentored research training experience
- Availability of research funding to support a student’s mentored research project
- Research productivity (publications)
- Other scholarly activities

Although UTHSCSA Graduate School of Biomedical Sciences requires a maximum period of 3 years between faculty appointment reviews, GPRS Graduate Faculty appointments are reviewed every year by the GPRS COGS.
B. FACULTY DIVERSITY
Faculty diversity of GPRS core faculty for the 2012-2013 academic year is shown in the table below. Female faculty currently only account for 7.1% of core faculty. This represents a decrease from 5 to 2 female faculty due to retirement (1) and relocation (2) in August 2012. Also six adjunct faculty are female.

<table>
<thead>
<tr>
<th>Diversity of GPRS Core Graduate Faculty By Gender and Race/Ethnicity</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>26</td>
<td>92.9%</td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>7.1%</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>100.0%</td>
</tr>
<tr>
<td>White</td>
<td>22</td>
<td>78.6%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2</td>
<td>7.1%</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>4</td>
<td>14.3%</td>
</tr>
<tr>
<td>Black</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

C. GPRS GRADUATE FACULTY
GPRS Core Graduate Faculty Members (n = 28), credentials, rank, departmental affiliation(s), role(s) with the GPRS program, and research interests are listed in the Table 8. Table 9 lists the current Adjunct faculty of the GPRS program.
<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Credentials</th>
<th>Degree Year</th>
<th>Institution</th>
<th>Rank</th>
<th>Primary and Secondary Appointment(s)</th>
<th>Role(s)</th>
<th>Research Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asmis, Reto</td>
<td>PhD</td>
<td>1989</td>
<td>University of Fribourg (Switzerland)</td>
<td>Professor</td>
<td>Biochemistry Associate Dean GSBS</td>
<td>Graduate Faculty Supervising Professor</td>
<td>Imaging of Macrophages in Chronic Inflammatory Diseases</td>
</tr>
<tr>
<td>Baseman, Joel</td>
<td>PhD</td>
<td>1968</td>
<td>Univ Massachusetts Amherst</td>
<td>Professor</td>
<td>Microbiology</td>
<td>Course Director Research Ethics</td>
<td>Biology of Pathogenic Mycoplasmas;</td>
</tr>
<tr>
<td>Bower, James M.</td>
<td>PhD</td>
<td>1981</td>
<td>University of Wisconsin</td>
<td>Professor</td>
<td>Radiology</td>
<td>Supervising Committee Member</td>
<td>Computational neurobiology</td>
</tr>
<tr>
<td>Charlton, Michael A.</td>
<td>PhD</td>
<td>2001</td>
<td>Texas A&amp;M</td>
<td>Assistant Professor</td>
<td>Assistant Vice President for Risk Management and Safety</td>
<td>COGS Course Director Graduate Faculty Supervising Professor</td>
<td>Environmental Health and Safety Medical Health Physics</td>
</tr>
<tr>
<td>Chintipalli, Kedar</td>
<td>MD</td>
<td>1974</td>
<td>Guntar Medical College (India)</td>
<td>Professor</td>
<td>Radiology</td>
<td>Co-Course Director; Supervising Committee Member</td>
<td>Abdominal Imaging, Transplant Evaluations and Optimizing Imaging Protocols</td>
</tr>
<tr>
<td>Clarke, Geoffrey D.</td>
<td>PhD</td>
<td>1984</td>
<td>UT Health Science Center Dallas</td>
<td>Professor</td>
<td>Radiology</td>
<td>Course Director Graduate Faculty Supervising Professor</td>
<td>Cardiovascular Imaging Physics, Clinical Imaging Equipment Quality Control, Radiation Safety in Diagnostic Radiology, In vivo Magnetic Resonance Spectroscopy, Novel MRI Methods</td>
</tr>
<tr>
<td>Crownover, Richard L.</td>
<td>PhD, MD</td>
<td>1988, 1991</td>
<td>Duke University</td>
<td>Professor</td>
<td>Radiation Oncology Director of Radiation Oncology Residency Program</td>
<td>Supervising Committee Member</td>
<td></td>
</tr>
<tr>
<td>Faculty Name</td>
<td>Credentials</td>
<td>Degree Year</td>
<td>Institution</td>
<td>Rank</td>
<td>Primary and Secondary Appointment(s)</td>
<td>Role(s)</td>
<td>Research Interests</td>
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<tr>
<td>----------------------</td>
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<td>--------------------------------------------</td>
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</tr>
<tr>
<td>Davis, Michael Duff</td>
<td>PhD</td>
<td>1985</td>
<td>University of Zurich</td>
<td>Associate Professor</td>
<td>Pharmacology Radiology</td>
<td>Graduate Faculty Supervising Committee Member</td>
<td>Brain maturation in primate aging model, Neuropharmacology of ADHD, depression and schizophrenia, Mechanism of action and influence of physical exercise in reducing stroke-induced damage</td>
</tr>
<tr>
<td>Duong, Timothy Q.</td>
<td>PhD</td>
<td>1998</td>
<td>Washington University</td>
<td>Professor</td>
<td>Ophthalmology Radiology</td>
<td>Graduate Faculty Supervising Professor</td>
<td>Development of in-vivo MRI and optical imaging technologies for studying brain and retina, Application of imaging technologies to study stroke, retinal degeneration and retinopathy in animal models and humans</td>
</tr>
<tr>
<td>Esquivel, Carlos Jr.</td>
<td>PhD</td>
<td>2005</td>
<td>UT Health Science Center San Antonio</td>
<td>Assistant Professor</td>
<td>Radiation Oncology</td>
<td>Course Director; Graduate Faculty Supervising Professor</td>
<td>Brachytherapy, Radiation dosimetry and Monte Carlo modeling</td>
</tr>
<tr>
<td>Fox, Peter T.</td>
<td>MD</td>
<td>1979</td>
<td>Georgetown University</td>
<td>Professor</td>
<td>Radiology, Neurology Director of Research Imaging Institute Vice Chair for Radiology Research</td>
<td>COGS Course Director Graduate Faculty Supervising Professor</td>
<td>Human functional Brain Mapping using PET and MRI, Event-related potentials, trans-cranial magnetic stimulation</td>
</tr>
<tr>
<td>Glickman, Randolph D.</td>
<td>PhD</td>
<td>1978</td>
<td>University of Toronto</td>
<td>Professor</td>
<td>Ophthalmology</td>
<td>Course Director Graduate Faculty Supervising Professor</td>
<td>Laser Bioeffects and medical applications; photosensitized free-radial reactions in the eye; light damage and repair mechanisms in the eye; retinal information processing; photodynamic therapy; optical tissue diagnostic spectroscopy</td>
</tr>
<tr>
<td>Faculty Name</td>
<td>Credentials</td>
<td>Degree Year</td>
<td>Institution</td>
<td>Rank</td>
<td>Primary and Secondary Appointment(s)</td>
<td>Role(s)</td>
<td>Research Interests</td>
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</tr>
<tr>
<td>Goins, Beth A.</td>
<td>PhD</td>
<td>1988</td>
<td>University of Tennessee (Knoxville)</td>
<td>Professor</td>
<td>Radiology</td>
<td>COGS Course Director Graduate Faculty Supervising Professor</td>
<td>Molecular imaging; small animal imaging; radiopharmaceutical development; liposomes; nanotechnology; drug delivery</td>
</tr>
<tr>
<td>Gutierrez, Alonso N.</td>
<td>PhD</td>
<td>2007</td>
<td>University of Wisconsin</td>
<td>Assistant Professor</td>
<td>Radiation Oncology</td>
<td>COGS Course Director Graduate Faculty Supervising Professor</td>
<td>Radiological modeling of radiotherapy response; intra- and extra-cranial stereotactic radiotherapy; Image guided intensity modulated radiotherapy</td>
</tr>
<tr>
<td>Jerabek, Paul A.</td>
<td>PhD</td>
<td>1982</td>
<td>University of California Irvine</td>
<td>Associate Professor</td>
<td>Radiology</td>
<td>Course Director</td>
<td>Synthesis and development of positron-emitting radiopharmaceuticals for positron emission tomography (PET) studies</td>
</tr>
<tr>
<td>Lancaster, Jack L.</td>
<td>PhD</td>
<td>1978</td>
<td>UT Health Science Center Dallas</td>
<td>Professor</td>
<td>Radiology</td>
<td>COGS Course Director Graduate Faculty Supervising Professor</td>
<td>Mapping and modeling of human brain anatomy and function; Development of image analysis and synthesis methods, MRI and PET; transcranial magnetic stimulation; 3-D visualization for medical imaging</td>
</tr>
<tr>
<td>Mavroidis, Panayiotis</td>
<td>PhD</td>
<td>1994</td>
<td>University of Patras (Greece)</td>
<td>Assistant Professor</td>
<td>Radiation Oncology</td>
<td>Course Co-Director Supervising Committee Member</td>
<td>Radiobiological modeling of cancer cell lines; Software development for dose-response curve estimation; Radiobiological optimization in conformal radiotherapy; Biostatistics</td>
</tr>
<tr>
<td>Natarajan, Mohan</td>
<td>PhD</td>
<td>1986</td>
<td>University of Madras (India)</td>
<td>Professor</td>
<td>Otolaryngology</td>
<td>Graduate Faculty Supervising Professor</td>
<td>Molecular mechanisms of radioprotection/sensitization of normal vs cancer cells after clinical doses of ionizing radiation; molecular mechanisms of high-LET heavy ion radiation; Mechanisms of radiation Bystander effect</td>
</tr>
<tr>
<td>Faculty Name</td>
<td>Credentials</td>
<td>Degree Year</td>
<td>Institution</td>
<td>Rank</td>
<td>Primary and Secondary Appointment(s)</td>
<td>Role(s)</td>
<td>Research Interests</td>
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</tr>
<tr>
<td>Papanikolaou, Niko</td>
<td>PhD</td>
<td>1994</td>
<td>University of Wisconsin</td>
<td>Professor</td>
<td>Radiation Oncology</td>
<td>COGS Course Director Graduate Faculty Supervising Professor</td>
<td>Novel dose calculation algorithms for radiation therapy treatment planning; inhomogeneity corrections in treatment planning; Novel techniques for intensity modulated radiation therapy</td>
</tr>
<tr>
<td>Phillips, William T.</td>
<td>MD</td>
<td>1980</td>
<td>UT Medical Branch</td>
<td>Professor</td>
<td>Radiology</td>
<td>Graduate Faculty Supervising Professor</td>
<td>Blood substitutes; bone marrow drug delivery; gastric emptying; nuclear medicine; nanotechnology; liposomes; radionuclide therapy; PET cancer imaging</td>
</tr>
<tr>
<td>Rahal, Andreas</td>
<td>MD, PhD</td>
<td>1995, 2007</td>
<td>Instituto de Ciencias de la Salud (Columbia) UT Health Science Center San Antonio</td>
<td>Assistant Professor</td>
<td>Radiology</td>
<td>Graduate Faculty Supervising Professor</td>
<td>MRI hyperglycemic index in Achilles tendon; Radiofrequency ablation of hepatic tumors; MRI of tendon and ultra-short TE/orientational MRI</td>
</tr>
<tr>
<td>Robin, Donald A.</td>
<td>PhD</td>
<td>1984</td>
<td>Case Western Reserve</td>
<td>Professor</td>
<td>Neurology</td>
<td>Graduate Faculty Supervising Professor</td>
<td>Sensory motor mechanisms in disorders of motor control (e.g. Parkinson’s Disease); Development of behavioral treatments for speech and limb disorders</td>
</tr>
<tr>
<td>Sprague, Eugene A.</td>
<td>PhD</td>
<td>1979</td>
<td>UT Health Science Center San Antonio</td>
<td>Professor</td>
<td>Medicine-Cardiology Radiology</td>
<td>Course Co-Director</td>
<td>Role of hemodynamics in atherogenesis and vascular healing responses; development and evaluation of novel biomaterial surfaces to enhance endothelization and limit restenosis of vascular prosthetic devices</td>
</tr>
<tr>
<td>Stathakis, Sotorios</td>
<td>PhD</td>
<td>2003</td>
<td>University of Padras (Greece)</td>
<td>Assistant Professor</td>
<td>Radiation Oncology</td>
<td>COGS Course Director Graduate Faculty Supervising Professor</td>
<td>Monte Carlo simulations of HDR and LDR brachytherapy; Inhomogeneity correction algorithms; Intensity modulated radiation therapy</td>
</tr>
<tr>
<td>Faculty Name</td>
<td>Credentials</td>
<td>Degree Year</td>
<td>Institution</td>
<td>Rank</td>
<td>Primary and Secondary Appointment(s)</td>
<td>Role(s)</td>
<td>Research Interests</td>
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</tr>
<tr>
<td>Suri, Rajeev</td>
<td>MD</td>
<td>1991</td>
<td>Panjab University (India)</td>
<td>Associate Professor</td>
<td>Radiology Director of Radiology Residency Program</td>
<td>Supervising Committee Member</td>
<td>Arterial interventions with distal protection; Image-guided interventional oncologic management</td>
</tr>
<tr>
<td>Swanson, Gregory P.</td>
<td>MD</td>
<td>1985</td>
<td>UT Medical School Houston</td>
<td>Associate Professor</td>
<td>Radiation Oncology</td>
<td>Supervising Committee Member</td>
<td>Treatment planning methods for radiation therapy; Prostate cancer treatment with radiation oncology</td>
</tr>
<tr>
<td>Wiatrowski, Wayne</td>
<td>PhD</td>
<td>1979</td>
<td>UT Health Science Center San Antonio</td>
<td>Associate Professor</td>
<td>Radiology</td>
<td>Course Director</td>
<td>Dose reduction in diagnostic radiology; medical health physics; radiation regulatory issues; small electron field dosimetry; total body irradiation techniques</td>
</tr>
<tr>
<td>Wicha, Nicole Y.Y.</td>
<td>PhD</td>
<td>2002</td>
<td>University California San Diego</td>
<td>Assistant Professor</td>
<td>Biology UTSA</td>
<td>Course Director</td>
<td>Uncovering the neural correlates for cognition</td>
</tr>
<tr>
<td>Member</td>
<td>Credentials</td>
<td>Degree Year</td>
<td>Institution</td>
<td>Title</td>
<td>Role</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Blough, Melissa</td>
<td>PhD</td>
<td>1999</td>
<td>UT Health Science Center San Antonio</td>
<td>Adjunct Assistant Professor</td>
<td>Supervising Committee Member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feng, Ching-Mei Janet</td>
<td>PhD</td>
<td>2003</td>
<td>UT Health Science Center San Antonio</td>
<td>Adjunct Assistant Professor</td>
<td>Co-Course Director</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goff, David Lloyd</td>
<td>PhD</td>
<td>1995</td>
<td>University California Los Angeles</td>
<td>Adjunct Assistant Professor</td>
<td>Co-Course Director</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jiang, Steve B.</td>
<td>PhD</td>
<td>1998</td>
<td>Medical College of Ohio, Toledo</td>
<td>Adjunct Assistant Professor</td>
<td>Supervising Committee Member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keener, Carl</td>
<td>PhD</td>
<td>1996</td>
<td>UT Health Science Center San Antonio</td>
<td>Adjunct Assistant Professor</td>
<td>Co-Course Director</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laird, Angela</td>
<td>PhD</td>
<td>2002</td>
<td>University of Wisconsin</td>
<td>Adjunct Associate Professor</td>
<td>Supervising Committee Member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lee, Nina</td>
<td>PhD</td>
<td>1998</td>
<td>UT Health Science Center San Antonio</td>
<td>Adjunct Assistant Professor</td>
<td>Supervising Committee Member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nes, Elena</td>
<td>PhD</td>
<td>2006</td>
<td>UT Health Science Center San Antonio</td>
<td>Adjunct Assistant Professor</td>
<td>Supervising Committee Member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ozus, Bahadir</td>
<td>PhD</td>
<td>2004</td>
<td>UT Health Science Center San Antonio</td>
<td>Adjunct Assistant Professor</td>
<td>Course Co-Director</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prete, James</td>
<td>PhD</td>
<td>1998</td>
<td>UT Health Science Center San Antonio</td>
<td>Adjunct Assistant Professor</td>
<td>Supervising Committee Member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tucker, Jonathan</td>
<td>PhD</td>
<td>2000</td>
<td>UT Health Science Center San Antonio</td>
<td>Adjunct Assistant Professor</td>
<td>Course Co-Director, Supervising Committee Member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vijayalaxmi</td>
<td>PhD</td>
<td>1966</td>
<td>S.V. University (India)</td>
<td>Adjunct Associate Professor</td>
<td>Course Co-Director</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
XI. FACULTY RESEARCH, SCHOLARSHIP, AND SERVICE – MOST RECENT 5 YEARS
(September 2007 – August 2012)

A. FACULTY PUBLICATIONS

During the past five years, GPRS Graduate Faculty have made a significant number of scholarly contributions to their fields of research through externally funded grant awards and contributions to professional literature. Comparison of scholarly activities by core faculty has been limited to peer-reviewed publications in the past three years (Table 10).

Table 10: GPRS Core Faculty Scholarly Activity

<table>
<thead>
<tr>
<th>PUBLISHED ARTICLES (LIMITED TO PubMed) ²</th>
<th>MOST RECENT THREE YEARS (September 2009 – August 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td># Faculty publishing an Article Recorded in PubMed</td>
<td>27</td>
</tr>
<tr>
<td>% of Total Faculty</td>
<td>96.4%</td>
</tr>
<tr>
<td>Total Publications in PubMed</td>
<td>291</td>
</tr>
<tr>
<td>Average Publications for Faculty</td>
<td>10.8</td>
</tr>
<tr>
<td>Rolling 3-year Average of Publications per Year per Core Faculty</td>
<td>3.45</td>
</tr>
</tbody>
</table>

² All GPRS Core Graduate Faculty (n=28)

<table>
<thead>
<tr>
<th>Publications Range</th>
<th>Number of Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Publications</td>
<td>1</td>
</tr>
<tr>
<td>1-10 Publications</td>
<td>16</td>
</tr>
<tr>
<td>11-20 Publications</td>
<td>7</td>
</tr>
<tr>
<td>21-30 Publications</td>
<td>3</td>
</tr>
<tr>
<td>31-50 Publications</td>
<td>1</td>
</tr>
</tbody>
</table>
B. GRANT FUNDING

Table 11 outlines the external grant funds received by GPRS core faculty for the past five years (2007-2012). The total external grant funding during this period was $44,034,822.

Table 11: External Grant Funding by Core Faculty

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td># Grants</td>
<td>21</td>
<td>21</td>
<td>18</td>
<td>38</td>
<td>37</td>
</tr>
<tr>
<td>Total External</td>
<td>4,496,537</td>
<td>3,985,211</td>
<td>12,320,772</td>
<td>11,643,412</td>
<td>11,588,890</td>
</tr>
<tr>
<td>Grant $</td>
<td>4,496,537</td>
<td>3,985,211</td>
<td>12,320,772</td>
<td>11,643,412</td>
<td>11,588,890</td>
</tr>
<tr>
<td>Federal %</td>
<td>85</td>
<td>87</td>
<td>43</td>
<td>39</td>
<td>38</td>
</tr>
<tr>
<td>State/Local %</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Non-profit/Private</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Industry %</td>
<td>1</td>
<td>2</td>
<td>55</td>
<td>58</td>
<td>59</td>
</tr>
</tbody>
</table>

Approximately 68% of GPRS core faculty received external grant funding during this period. The rolling three-year (Academic period ending August-2012) average of the number of core faculty receiving external funds was 19. The average annual external grant funding per faculty was $225,269.

C. TEACHING LOAD OF GPRS CORE FACULTY

Teaching load is defined as the total number of semester credit hours in organized teaching courses taught per academic year by core faculty divided by the number of core faculty in the prior year. Average teaching load for GPRS core faculty is 2.93 credit hours/year.

The UTHSCSA maintains teaching loads in accordance with The UT System Regents’ Rules and Regulations, Series 30000, Rule 31006 (“Academic Workload Requirements”), which sets minimum workload requirements to ensure that faculty are able to meet the instructional needs of their students. Section 51.402 of the Texas Education Code includes classroom teaching, basic and applied research, and professional development as important elements of faculty workload. In line with this, each university, and often individual academic units, recognizes activities that may be attributed to workload, including but not limited to:

- Course development and coordination
- Course instruction (graduate instruction, team teaching, lab classes)
- Student supervision (dissertation supervision, teaching assistant supervision)
- Administrative functions and committee activities
- External funding for research or other activities
- Clinical duties
Faculty Policies and Procedures for UT Health Science Center are found in Chapter 3 of the UTHSCSA Handbook of Operating Procedures (http://www.uthscsa.edu/hop2000/3-toc.aspx). Minimum teaching requirements for each person paid full time from the appropriations item "Faculty Salaries" must be in accord with Regents' Rule, Series 30000, Rule 31006, but the Health Science Center does not have a specific policy outside that specified in the Regents’ Rules and Regulations for Teaching Load. Within those guidelines, teaching loads for core faculty at the Health Science Center varies by administrative unit/School, based on expectations for graduate instruction, supervision of teaching assistants, dissertation supervision, and administrative duties in combination with external support for research and clinical responsibilities.

D. STUDENT TO FACULTY RATIO

For the 2012-2013 academic year, the student-core faculty ratio is 0.46 (rolling three-year average of 0.51). The GPRS program student-to-teacher ratios for didactic courses have ranged from 1:3 to 20:1 over the past five years.
XII. ADMINISTRATION, GOVERNANCE, AND FINANCE

A. ADMINISTRATION

The GPRS program is operated under the direction of a Program Director, Geoffrey D. Clarke PhD, Professor of Radiology, and Associate Director, Beth Goins, PhD, Professor of Radiology.

Program Director, Geoffrey D. Clarke, PhD has served as the GPRS Program Director since 2006. Dr. Clarke is also Chief of Graduate Education within the UTHSCSA Radiology Department. A Fellow of the American College of Medical Physics and American College of Radiology, Dr. Clarke has a successful track record in Radiological physics graduate education. He currently is a member of the Board of Directors of the Commission for the Accreditation of Medical Physics Education Programs (CAMPEP). He has held membership on the Joint Review Committee on Education in Radiologic Technology, Radiological Society of North America and Texas Radiological Society as well as chaired the MRI Physics Certification Test Panel. Dr. Clarke has also served as a Test Item Writer for the Texas Medical Physicists Licensing Examination and Diagnostic Imaging Physics Board Examination for the American Board of Radiology and American Board of Medical Physics.

As Professor of Radiology, Dr. Clarke has developed and adopted innovative teaching methods in his medical physics curriculum including the development of curriculum to integrate physics principles with biomedical sciences and clinical medical practice. He also has an active research program training graduate students in MRI physics. This array of activities demonstrates Dr. Clarke’s long-term commitment to improve the quality of Radiological Sciences research education.

Associate Program Director, Beth A. Goins, PhD is a Professor of Radiology and currently serves as the Chair of the Committee on Graduate Studies (COGS) for the GPRS program. Since 1993, she has actively participated in the GPRS program as a course director and faculty advisor. Throughout her career, Dr. Goins has provided research training opportunities to individuals of diverse educational backgrounds (PhD, MD) and mentored many pre- and postdoctoral research trainees and junior faculty.

Dr. Goins is actively engaged in translational biomedical research and currently collaborates on several externally-funded studies using nanoparticle-based technology as imaging agents and therapeutic radiopharmaceuticals, as well as preclinical small animal imaging protocol development.

B. GOVERNANCE

The Radiological Sciences Committee on Graduate Studies (COGS) sets all of the policy and procedures within GPRS program. The Chair of the Radiological Sciences COGS sits on the Graduate Faculty Council, chaired by the Dean of the GSBS, with the COGS Chairs from the other graduate programs in the GSBS. The membership of the Radiological Sciences COGS consists of the track chairs and standing committee chairs in GPRS program (Figure 1). The Radiological Sciences COGS meets monthly, typically on the first Thursday. A single, joint COGS meeting is held for both Radiological Sciences (CIP code 26.0209.00) and the Medical Physics (CIP code 51.2205.00) programs since the curriculum is shared between the programs. At the COGS meetings the following reports are given:

- The Student Representative to the Radiological Sciences COGS (currently Pamela Myers), is elected by the student body and reports on student concerns,
• The Chair of the Radiological Sciences COGS (currently Beth Goins) is elected by the COGS members. The COGS Chair reports on the activities of the Graduate Faculty Council and on any issues raised by the Office of the Dean of the Graduate School.

• The Chief of Graduate Education in Radiology (currently Geoffrey Clarke) is appointed by the Chair of the Department of Radiology. The Chief serves as the Graduate Program’s director and reports to the Vice-Chair for Research and Research Education in Radiology. The Chief coordinates with Radiology and Medical School administration on policy and budgetary issues, reports on student administrative issues and funding issues to the COGS and works closely with the COGS Chair on student issues and implementing policies with the GPRS.

There are 6 track committees and three standing subcommittees of the COGS, which take care of the business of GPRS program between COGS meetings. Membership of these committees is reviewed on an annual basis with the COGS giving its approval. The following reports are given at each COGS meeting:

• The Application Review Committee (currently chaired by Beth Goins) receives and performs a preliminary review of applications for admission to the GPRS program and forwards them to the appropriate track chair for review.

• The Recruiting Committee (currently chaired by Geoffrey Clarke) responds to inquiries by prospective students and coordinates recruiting events carried out by faculty members and students at undergraduate programs in a variety of schools.

• The Alumni Committee (currently chaired by Carlos Esquivel) tracks the whereabouts of former students and faculty members of the GPRS program and organizes events for the alumni at national and regional professional and scientific meetings.

Standing subcommittee Chairs are elected annually by the COGS.

The six Track Committees of the GPRS program (see Figure 1) are responsible for reviewing curricula and developing courses, reviewing student applications and producing qualifying exam tests for each of the six tracks. If a Track Chair cannot attend the monthly COGS meeting, another designated track committee member may represent the track.

The membership of the track committees consists of Directors of the Courses associated with the track and the faculty who mentor students in the track. The positions of Track Chair, Qualifying Exam Coordinator and Recruiting Coordinator for each track are elected by track members at the beginning of each school year.

Applications for new faculty members to GPRS program can be considered at any COGS meeting throughout the year. Any active member of the COGS may sponsor a new faculty member by writing a letter to the COGS Chair, explaining the role that the new faculty member would play, providing a CV and other documentation of the candidate’s qualifications to fulfill the proposed role. Membership is determined by majority vote of the COGS. The Program Director then submits paperwork to the GSBS for appointment to the GSBS faculty and to the Medical School for appointment to the Radiology Department faculty in the Medical School. For those who are not already UTHSCSA faculty, the GSBS initiates a background check and an official transcript is requested from the institution that granted the new faculty member her/his most advanced degree.
C. FINANCES AND RESOURCES

Sources of revenue for the GPRS program are (a) Tuition and Fees, and (b) Formula Funding. Tuition, fees, and formula funding accrue to UTHSCSA and the UT System; however, there are no processes that clearly track the income back to GPRS program support. Primary funding (~$180,000/year) for the GPRS program is awarded by the State of Texas through specially “earmarked” funding to the Radiology Department. This funding provides for three State-supported doctoral student stipends and program administrative costs. The current stipend for GPRS students is $24,783 plus an additional $2,478 in employee benefits (for which students need to opt in). Doctoral students are strongly encouraged to apply for funding through various agencies during their course of graduate study. Previous students have been supported by the Fulbright Scholar Program, American Heart Association pre-doctoral fellowship, Radiological Society of North America, AAPM Graduate Study Fellowship and various fellowships through the National Institutes of Health. Two current students are being supported by the Cancer Prevention and Research Institute of Texas (CPRIT) (1), United States Air Force AFID scholarship (1) and Foundation for Medical Physics Research (1). The percentage of Full-time Radiological Sciences PhD students in Fall 2012 receiving financial aid support was 100%.

**Tuition and Fees:** GPRS income is derived from student tuition, fees, and formula funding. Projecting for the 2012-2013 academic year, Texas resident tuition and fee income is estimated as follows for each full-time equivalent student:

<table>
<thead>
<tr>
<th>TEXAS RESIDENT TUITION AND FEES PER FULL-TIME STUDENT EQUIVALENT (FTSE) ACADEMIC YEAR 2012-2013</th>
<th>Fall (9 hrs)</th>
<th>Spring (9 hrs)</th>
<th>Summer (6 hrs)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition</td>
<td>1,377</td>
<td>1,377</td>
<td>918</td>
<td>3,672</td>
</tr>
<tr>
<td>Fees</td>
<td>844</td>
<td>893</td>
<td>565</td>
<td>2,302</td>
</tr>
<tr>
<td>Total</td>
<td>2,221</td>
<td>2,270</td>
<td>1,483</td>
<td>5,974</td>
</tr>
</tbody>
</table>

**NOTE:**
- Tuition and fees in this chart are based on full-time enrollment of one full-time student.
- Resident tuition is used for the purpose of this example. Non-resident tuition is significantly higher.
- The GSBS Tuition and Fee schedule for academic year 2012-13 can be found at: http://studentservices.uthscsa.edu/CS_TuitionFees.aspx

**Formula Funding**

**Source for Formula Funding:** General Appropriations Act for the 2012-13 Biennium, 82nd Texas Legislature, Regular Session, 2011; http://www.lbb.state.tx.us/Bill_82/GAA.pdf; Article III (Education), Section 29, Health Related Institutions Funding; Page III-239.

Using the information in the referenced link, formula funding for health related institutions is calculated as follows:

\[
\text{Weight} \times \text{Student Base Value} \times \text{FTSE} = \text{FTSE/year}
\]

\[
1.018 \times 8,429 \times 1 = 8,581 \text{ per 1 FTSE/year}
\]

**Full-Time Student Equivalent (FTSE):** Based on enrollment data, the GPRS program had 17 FTSE in academic year 2012-13.
**Total Estimated Revenue from the GPRS Program:** Using tuition, and formula funding, GPRS program revenue for 2012-2013 is estimated to total:

<table>
<thead>
<tr>
<th>GPRS PROGRAM</th>
<th>ANNUAL REVENUE ESTIMATE BASED ON 41 FTSE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per Student</td>
</tr>
<tr>
<td>Tuition</td>
<td>$3,672</td>
</tr>
<tr>
<td>Formula Funding</td>
<td>$8,581</td>
</tr>
<tr>
<td>TOTAL ANNUAL REVENUE</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**
1. The FTSE is based on actual enrollment for academic year 2012-32.
2. Tuition is under-estimated because it does not take out-of-state tuition paid for foreign national students enrolled while on F-1 or J-1 visas.
3. Student fees are excluded in this calculation; however, it is acknowledged that collection of student fees does contribute to the revenue needed to operate services used to support the student population. In this estimate, student fees would add an additional $39,134 to the total revenue.

**XIII. STATEMENT OF AFFIRMATIVE ACTION AND EEO**

The Faculty and Academic EO/AA Office governs all matters related to affirmative action and equal opportunity at the UT Health Science Center. The mission of the Faculty and Academic EO/AA Office is to insure that every member of the Health Science Center (HSC) community, individuals seeking employment or an education, and individuals who wish to participate in a benefit from programs and activities offered by the HSC are afforded equal opportunity and freedom from all forms of discrimination that may violate their civil rights and other protections afforded them by the State of Texas, The University of Texas System, and The University of Texas Health Science Center at San Antonio (UTHSCSA). The University of Texas Health Science Center at San Antonio is an Equal Employment Opportunity/Affirmative Action Employer. Source: [http://www.uthscsa.edu/eeo/](http://www.uthscsa.edu/eeo/)