Operating Manual

The Graduate Programs in Radiological Sciences and Medical Health Physics

University of Texas Health Science Center at San Antonio

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Program Director: Geoffrey D. Clarke, Ph.D.
Professor & Chief for Graduate Education in Radiology
Director, Graduate Program in Radiological Sciences
Chair, Committee on Graduate Studies, Graduate Program in Radiological Sciences

Program Co-Director: Andrew Sampson, Ph.D.
Assistant Professor of Radiology

University of Texas Health Science Center at San Antonio
7703 Floyd Curl Drive, Rm. 652E
San Antonio, TX 78229-3900
phone: 210-567-5550
FAX: 210-567-5541

CONTENTS

I. Program Goal and Objectives ***3***

II. Program Structure and Governance ***4***

III. Curriculum ***6***

A. Degree Requirements ***6***

B. Medical Physics Curricula ***6***

C. Academic Plans by Track ***6***

i) *PhD Radiation Biology Track Example Training Plan* *8*

ii) *PhD Neuroscience Imaging Track Example Training Plan* *9*

iii) *PhD Human Imaging Track Example Training Plan* *10*

iv) *PhD Medical Physics Track Example Training Plan* *11*

v) *MS Medical Health Physics Program* *12*

IV. Evaluation of Curriculum ***13***

V. Sequential Procedures for Master's Thesis in Medical Health Physics ***13***

VI. PhD and MS Qualifying Examinations ***16***

VII. Admission to Candidacy ***16***

VIII. Sequential Procedures for Radiological Science PhD Dissertation ***17***

IX. Students ***19***

X. Recruitment Activities ***21***

XI. Enrollment ***21***

XII. Evaluation of Student Progress ***21***

XIII. New Student Orientation ***23***

XIV. Policy for Vacation and Sick Leave for Graduate Students ***23***

XV. Policy for Withdrawal from Graduate Program ***24***

XVI. Safety ***25***

XVII. Faculty ***25***

I. *Program Goal and Objectives*

The Graduate Program in Radiological Science (GPRS) at the University of Texas Health Science Center in San Antonio (UT Health San Antonio) is a multi-disciplinary program in the Graduate School of Biomedical Science (GSBS) at UT Health San Antonio 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 in Radiological Science or (2) an MS degree in Medical Health Physics. The PhD program is subdivided into four tracks with specialized training in Medical Physics, Radiation Biology, Neuroscience Imaging and Human Imaging. The MS program in Medical Health Physics and the Medical Physics track of the PhD program in Radiological Science are independently accredited by the Commission for the Accreditation of Medical Physics Education Programs (CAMPEP). More information on CAMPEP accreditation can be found at www.campep.org.

The curricula provide opportunities for students to acquire a core of fundamental knowledge through a transdisciplinary program of formal courses, seminars, teaching opportunities and hands-on research experiences. After completing a qualifying exam, each student, under the supervision of a research advisor and research advisory committee, designs an individual course of study and research project consistent with his/her career goals.

The research programs in the GPRS bridge the biomedical sciences and medical applications. Exceptional facilities are available in the areas of advanced radiation treatment delivery technologies, magnetic resonance imaging, positron emission computed tomography, computer image analysis, nuclear medicine imaging, computed tomography, mammography, other x-ray imaging, radiation dosimetry methodologies, and imaging in pharmaceutical development. Ongoing research programs cover a wide range of topics in modern imaging, irradiation effects, and radiation applications. These programs are supported by grants and contracts from federal, state and private agencies. Extensive facilities and equipment are available to aid in the study of a wide range of translational research programs involving the use of ionizing and non-ionizing radiations. Several core courses are offered in conjunction with the professional Doctorate in Medical Physics (DMP) education program, which was started at UT Health San Antonio in 2014 and is a separate graduate program administered by the Department of Radiation Oncology. The GPRS and DMP programs interact closely, sharing courses and faculty.

The focus of the GPRS is to prepare students for academic careers and to be competitive for career development grants and research positions in university, industrial and government laboratories. In addition, the PhD medical physics track aims for graduates to be competitive for medical physics residency positions in therapeutic medical physics, diagnostic medical physics, and nuclear medical physics.

Beyond the coursework in science and technology, the curriculum includes supervised pedagogical training that allows the student to develop the skills of lecture preparation, lecture presentation and student testing. Students are also required to participate in seminars during which they make research-oriented presentations while their peers listen to and critique them. Presentation of papers at national scientific meetings may be substituted for up to two seminar classes.

The Radiology Department also administers a competitive research grant program for students under an endowment established by Julio Palmaz MD, inventor of the coronary stent. In addition, students are trained in procedures and processes of obtaining research funding by preparing research proposals in NIH or similar format as part of their qualifying examination prior to admission to candidacy for the PhD degree. This process gives the student experience to be competitive for other grants administered within the University for the state and federal governments and by national research organizations. Student competition programs at regional, national and international scientific meetings are also used to encourage frequent oral

presentation of research results. Publication of results in peer reviewed journals is also encouraged by offering 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 section drawing the papers together into a recognizable dissertation topic.

II. *Program Structure and Governance*

The administrative functions of the GPRS are housed in the Department of Radiology at UT Health San Antonio. 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).

The first key position is the Chair of the Committee on Graduate Studies (COGS) of the GPRS, currently Geoffrey Clarke PhD, who reports to the Dean of the Graduate School of Biomedical Sciences (GSBS). The Chief of Graduate Education in Radiology, currently Geoffrey Clarke, PhD, is appointed by the Chair of the Department of Radiology in the School of Medicine (Pamela Otto, MD), and functions as the Graduate Program's Director, administering the program through the Radiology Department. Faculty and funding come largely through the clinical departments of Radiology and Radiation Oncology in the Medical School and the Research Imaging Institute (RII). The Director of the RII, Peter Fox MD, also currently serves as the Vice-Chair for Research in the Department of Radiology. Faculty from the Departments of Ophthalmology, Neurology, Medicine, Psychiatry and in the Office of Environmental Health and Safety also contribute. Primary funding for the GPRS is awarded by the State of Texas through specifically "earmarked" funding to the Department of Radiology. Access to some coursework is also provided by the Integrated Multidisciplinary Graduate Program of the GSBS, the MS Program in Clinical Investigation and the Physical Therapy program in School of Allied Health Science. 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.) currently serves as the Department Administrator for the Radiology Department. Several administrative functions such as grant administration and education administration are shared amongst the Departments of Radiology, Radiation Oncology and the RII. These offices, departments, institutes and institutions provide their research and clinical facilities for student projects in the GPRS.

The Radiological Sciences Committee on Graduate Studies (COGS) sets all of the policy and procedures within the GPRS. The Chair of the Radiological Sciences COGS is elected by the COGS members and sits on the Graduate Faculty Council, chaired by the Vice-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 COGS Chair, Assistant COGS Chair, track chairs and standing committee chairs in the GPRS. The Radiological Sciences COGS meets monthly, typically on the first Thursday of the month. At the COGS meetings the following reports are given:

- The Student Representative to the Radiological Sciences COGS, is elected by the student body and reports on student concerns,
- The COGS Chair reports on the activities of the Graduate Faculty Committee (GFC) and on any issues raised by the Office of the Dean of the Graduate School,
- The Assistant COGS Chair is elected annually by the COGS members. The Assistant COGS Chair runs the COGS meetings and attends the Graduate Faculty Committee meetings in the COGS Chair's absence,
- The Chief of Graduate Education in Radiology 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 six track committees and three standing subcommittees of the COGS, which take care of the business of the GPRS 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 reports on student application policies and procedures. It receives and performs a preliminary review of applications for admission to the GPRS and forwards them to the appropriate track chair for review.
- The Recruiting Committee responds to inquiries by prospective students and coordinates recruiting events carried out by faculty members and students at a variety of schools.
- The Alumni Committee tracks the whereabouts of former students and faculty members of the GPRS and organizes events for the alumni at national and regional professional and scientific meetings.
- There are six Track Committees of the GPRS (Medical Health Physics, Neuroimaging Science, Human Imaging, Radiation Biology, Imaging Physics and Therapy Physics) corresponding to the 4 Ph.D. tracks and 1 M.S. track available within the GPRS. The Medical Physics track is subdivided into two sub-tracks (Imaging Physics and Therapy Physics), each of which are provided a separate track committee due to the number of students and specialized curriculum. Track Committees are responsible for reviewing curricula and developing courses, reviewing student applications and coordinating qualifying examinations. The membership of the track committees consists of Directors of the Courses associated with the track and/or the faculty who mentor students in the track. If a Track Chair cannot attend the monthly COGS meeting, another designated track committee member may represent the track.

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(s) that the new faculty member would play in the GPRS, 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 adjunct or cross-appointment to the Radiology Department faculty in the Medical School (if appropriate). For those who are not already UT Health San Antonio 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.

GSBS policies and special requirements for graduate study in the GPRS are summarized in the UT Health San Antonio catalog, which is available online. This guide is updated every two years and includes sections on admissions, application procedures, tuition and fees, program offerings, financial aid, facilities, and support services. The office of the Dean of the GSBS also provides documents to assist students in preparing submissions of dissertations and theses. The Registrar of the University maintains official matriculation records of students. In addition, the GPRS maintains a database on the progress of graduate students through requirements of the program.

III. *Curriculum*

A. General Degree Requirements

The Master of Science degree in Medical Health Physics requires a minimum of 30 semester credit hours of graduate work. For the Ph.D. degree in Radiological Science, a minimum of 72 semester credit hours of graduate work is required. Required courses are specific to the student's track and determined by the track committee. Elective courses are determined for each student, in consultation with his/her graduate advisor and dissertation committee. MS degree candidates must complete required courses, pass the qualifying examination, formulate an original research proposal, and carry out the research and defense of a thesis. While participating in research is an important component of any graduate studies program, the scope of research for an MS degree candidate is necessarily more focused, compared to students in the PhD program, due the shorter degree plan.

Ph.D. students can become eligible for admission to candidacy after completing the required course work and passing the qualifying examination. Following admission to candidacy, PhD students shall complete an original research project and orally defend a dissertation. The Ph.D. 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.

B. Medical Physics Curricula

The Medical Health Physics MS curriculum and the Medical Physics PhD curriculum of the GPRS have been designed to comply with the guidelines put forth by the American Association of Physicists in Medicine (AAPM) in AAPM Report No. 197, "Academic Program Recommendations for Graduate Degrees in Medical Physics" (2009), AAPM Report No. 159, "Recommended Ethics Curriculum for Medical Physics Graduate and Residency Programs," the requirements for certification by CAMPEP, medical physics licensure by the State of Texas and the policies of the Texas Higher Education Coordinating Board. The PhD medical physics curriculum has been divided into two sub-tracks, which facilitate students preparing for careers in imaging physics or therapy physics.

C. Academic Plans by Track

The Graduate Program in Radiological Sciences (GPRS) is a consolidated program in the Graduate School of Biomedical Sciences (GSBS) at the University of Texas Health Science Center in San Antonio. The consolidation of the program was approved by the Texas Higher Education Coordinating Board in September 2013. The result is an extremely transdisciplinary graduate program with students from diverse educational backgrounds including physics, medicine, biology, neuroscience, computer science, and bioengineering.

Thus, 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 in Radiological Sciences, specializing in Radiation Biology (CIP code 26.0209.01)
2. PhD degree in Radiological Sciences, specializing in Neuroscience Imaging (CIP code 26.0209.02)
3. Medical Resident / PhD degree in Radiological Sciences, specializing in Human Imaging (CIP code 26.0209.03)

4. PhD degree in Radiological Sciences, specializing in Medical Physics (CIP code 26.0209.04)

The MS degree program in Medical Health Physics (CIP code 51.2205.00) is highly integrated with the medical physics track of the PhD program in Radiological Sciences, sharing coursework, faculty and accreditation status.

Only the Medical Physics PhD program and Medical Health Physics MS program are accredited by CAMPEP.

While there is a variation between the MS and PhD programs graduate degree requirements, both programs have in common a period of pre-candidacy studies: typically involving intensive coursework and training in the basic skills of research, scholarship and professional practice appropriate to the discipline. This is followed by a period of post-candidacy studies in which research work is applied toward the completion of final degree requirement. Students demonstrate their readiness for advancement to candidacy by successful completion of a qualifying examination.

For PhD students, both degree and track name are printed on the diplomas and transcripts. The GSBS does not award Latin honors or other distinctions, so the line normally devoted towards honors (i.e. Cum Laude) is used by the UT Health San Antonio GSBS to designate the sub-plan. For MS students there is only one track and the third line is left blank. The following are examples of how the three lines would be utilized:

Doctor of Philosophy

Radiological Sciences

Medical Physics

Master of Science

Medical Health Physics

(Blank Line)

Examples showing details for course sequences for each track of the GPRS are available to students entering the GPRS on the program's website. The 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. The GPRS offers an extensive list of courses to allow each student to design a personalized study program. Sample academic plans for students are provided on the following pages.

PhD Radiation Biology Track (CIP code 26.0209.01) Example Training Plan

YEAR 1

Fall Semester	*CU*
RADI 5001 *Basic Radiation Safety	1
INTD 5000 Fund. Biomedical Sciences	8
RADI 5025 Molec. Oncol. & Radiobiology	3
TOTAL	**12**

Spring Semester	*CU*
RADI 6024 *Radiological Anatomy & Physiology	3
RADI 6012 *Physics of Nuclear Medicine	3
RADI 5020 Principles of Health Physics I	3
RADI 5007 *Statistics in Radiological Sciences	2
RADI 5090 *Seminars in Radiological Sciences	1
TOTAL	**12**

YEAR 2

Fall Semester	*CU*
RADI 5015 *Physics of Diag. Imaging I	3
TSCI 5070* Respon. Conduct Research	2
RADI 5090 *Semin. Radiological Sci.	1
RADI 6049 *Introduction to MRI	2
RADI 6097 *Research	4
TOTAL	**12**

Spring Semester	*CU*
RADIATION BIOLOGY ELECTIVE	3
RADI 5090 *Seminars in Radiological Sciences	1
RADI 6097 *Research	5
RADIATION BIOLOGY ELECTIVE	3
TOTAL	**12**

YEAR 3

Fall Semester	*CU*
RADI 5090 *Semin. Radiological Sci.	1
RADI 6071 Supervised Teaching	2
RADI 6097 *Research	9
TOTAL	**12**

Spring Semester	*CU*
RADI 6097 *Research	12
TOTAL	**12**

YEAR 4

Fall Semester	CU
RADI 7099 *‡Dissertation	12
TOTAL	**12**

Spring Semester	CU
RADI 7099 *‡Dissertation	12
TOTAL	**12**

TOTAL FOR DEGREE 96 CU

** Course required for all RADSCI students*

‡Student must be admitted to PhD candidacy to enroll in RADI 7099 - Dissertation

***Students who have completed their qualifying exam and have been accepted into candidacy should take RADI 7099 – Dissertation instead of RADI 6097-Research*

NOTE: Up to two hours of RADI 5090 can be waived if the student presents research to local and national scientific meeting or equivalent, as approved by COGS.

Students who are unable to complete their dissertation research within the four-year period may continue to be enrolled and take as many hours of RADI 7099 (Dissertation) as is appropriate to their student enrollment status (full- or part-time).

Possible Elective Courses *(student works with Supervising Professor to decide most appropriate courses)*

INTD 5007 Adv. Cell and Molecular Biology
RADI 6042 Non-Ionizing Radiation Biology and Biophysics
RADI 5050 Human Electrophysiology: Brain
RADI 6015 Physics of Diagnostic Imaging II
RADI 6019 Medical Image Processing
RADI 6020 Advanced Topics in Cognitive Neuroscience
RADI 6028 Advanced Molecular Biology
RADI 6050 Magnetic Resonance Imaging
RADI 6091 Special Topics

PhD Neuroscience Imaging Track (CIP code 26.0209.02) Example Training Plan

YEAR 1

Fall Semester	*CU*	*Spring Semester*	*CU*
RADI 5001 *Basic Radiation Safety	1	RADI 6024 *Radiological Anatomy & Physiology	3
RADI 5015 *Physics of Diag. Imaging I	3	RADI 6012 *Physics of Nuclear Medicine	3
RADI 6049 *Introduction to MRI	2	RADI 5007 *Statistics in Radiological Sciences	2
RADI 6017 Neuroimaging Methods	3	RADI 5090 *Seminars in Radiological Sciences	1
PHYT 7009 Neuroscience I	3	PHYT 7019 Neuroscience II	3
	TOTAL 12		**TOTAL 12**

YEAR 2

Fall Semester	*CU*	*Spring Semester*	*CU*
RADI 6051 Statistical Parametric Mapping	3	NEUROSCIENCE IMAGING ELECTIVE	3
TSCI 5070* Respon. Conduct Research	2	RADI 5090 *Seminars in Radiological Sciences	1
RADI 5090 *Semin. Radiological Sci.	1	RADI 6097 *Research	8
RADI 6049 Supervised Teaching	2		
RADI 6097 *Research	4		
	TOTAL 12		**TOTAL 12**

YEAR 3

Fall Semester	*CU*	*Spring Semester*	*CU*
RADI 5090 *Semin. Radiological Sci.	1	RADI 6097 **Research	12
RADI 6097 **Research	11		
	TOTAL 12		**TOTAL 12**

YEAR 4

Fall Semester	CU	Spring Semester	CU
RADI 7099 *‡Dissertation	12	RADI 7099 *‡Dissertation	12
	TOTAL 12		**TOTAL 12**

TOTAL FOR DEGREE 96 CU

** Course required for all RADSCI students*

***Students who have completed their qualifying exam and have been accepted into candidacy should take RADI 7099 – Dissertation instead of RADI 6097-Research*

‡Student must be admitted to PhD candidacy to enroll in RADI 7099 - Dissertation

NOTE: Up to two hours of RADI 5090 can be waived if the student presents research to local and national scientific meeting or equivalent, as approved by COGS.

Students who are unable to complete their dissertation research within the four-year period may continue to be enrolled and take as many hours of RADI 7099 (Dissertation) as is appropriate to their student enrollment status (full- or part-time).

Possible Elective Courses *(student shall work with Supervising Professor to determine most appropriate courses)*

INTD 5046 Meta-analysis in Cognitive Neuroimaging
RADI 6017 Neuroimaging Methods
PHYT 7009 Neuroscience I
PHYT 7019 Neuroscience II
RADI 6051 Statistical Parametric Mapping
RADI 6050 Magnetic Resonance Imaging
RADI 6020 Advanced Topics in Cognitive Neuroscience
RADI 6015 Physics of Diagnostic Imaging II
RADI 6019 Medical Image Processing
RADI 6002 Cognitive Neuroscience
RADI 6091 Special Topics

PhD Human Imaging Track (CIP code 26.0209.03) Example Training Plan
NOTE: Only students with MD degrees (or equivalent) can be enrolled in this track

YEAR 1

Fall Semester	*CU*	*Spring Semester*	*CU*
RADI 5001 *Basic Radiation Safety	1	RADI 6049 Supervised Teaching	2
RADI 5090 *Semin. Radiological Sci.	1	RADI 6097 *Research	4
RADI 6097 *Research	4		
TOTAL	**6**	**TOTAL**	**6**

YEAR 2

Fall Semester	*CU*	*Spring Semester*	*CU*
TSCI 5070* Respon. Conduct Research	2	RADI 5090 *Seminars in Radiol. Sciences	1
RADI 6097 *Research	4	RADI 5007 *Statistics in Radiological Sciences	2
		RADI 6097 *Research	3
TOTAL	**6**	**TOTAL**	**6**

YEAR 3

Fall Semester	*CU*	*Spring Semester*	*CU*
RADI 5015 *Physics of Diag. Imaging I	3	RADI 6012 *Physics of Nuclear Medicine	3
RADI 6049 *Introduction to MRI	2	HUMAN IMAGING ELECTIVE	3
RADI 5025 Molec Oncol & Radiobiology	3	RADI 6097 *Research	6
RADI 6097 *Research	4		
TOTAL	**12**	**TOTAL**	**12**

YEAR 4

Fall Semester	CU	Spring Semester	CU
RADI 5090 *Semin. Radiological Sci.	1	RADI 5090 *Seminars in Radiol. Sciences	1
RADI 7099 *Dissertation	11	RADI 7099 *Dissertation	11
TOTAL	**12**	**TOTAL**	**12**

TOTAL FOR DEGREE 72 CU

** Course required for all RADSCI students*

‡Student must be admitted to PhD candidacy to enroll in RADI 7099 - Dissertation

***Students who have completed their qualifying exam and have been accepted into candidacy should take RADI 7099 – Dissertation instead of RADI 6097-Research*

NOTE: Up to two hours of RADI 5090 can be waived if the student presents research to local and national scientific meeting or equivalent, as approved by COGS.

Students who are unable to complete their dissertation research within the four-year period may continue to be enrolled and take as many hours of RADI 7099 (Dissertation) as is appropriate to their student enrollment status (full- or part-time).

Possible Elective Courses *(student shall work with Supervising Professor to determine most appropriate courses)*

INTD 5046 Meta-analysis in Cognitive Neuroimaging
RADI 6015 Physics of Diagnostic Imaging II
RADI 6019 Medical Image Processing
RADI 6050 Magnetic Resonance Imaging
RADI 6051 Statistical Parametric Mapping
RADI 6017 Neuroimaging Methods
RADI 6091 Special Topics
TSCI 5071 Patient-Oriented Clinical Research Methods – 1
TSCI 5073 Integrating Molecular Biology with Patient-Oriented Clinical Research
TSCI 5076 Introduction to Informatics
TSCI 5078 Intellectual Property, Technology Transfer, and Commercialization

PhD Medical Physics Track (CIP code 26.0209.04) Example Training Plan

YEAR 1

Fall Semester	*CU*
RADI 5001 *Basic Radiation Safety	1
RADI 5015 *†Physics of Diag. Imaging I	3
RADI 6049 *Introduction to MRI	2
RADI 5005 †Fund. of Radiation Dosimetry	3
RADI 6030 †Physics of Radiotherapy	3
TOTAL	**12**

Spring Semester	*CU*
RADI 6024 *†Radiological Anatomy & Physiology	3
MEDICAL PHYSICS ELECTIVE	3
RADI 5007 *†Statistics in Radiological Sciences	2
RADI 5090 *Seminars in Radiological Sciences	1
RADI 5020 †Principles of Health Physics I	3
TOTAL	**12**

YEAR 2

Fall Semester	*CU*
RADI 5025 †Molec. Oncol. & Radiobiology	3
MEDICAL PHYSICS ELECTIVE	3
MEDICAL PHYSICS ELECTIVE	3
RADI 5090 *Seminars in Radiol. Sci.	1
TSCI 5070* Respon. Conduct Research	2
TOTAL	**12**

Spring Semester	*CU*
RADI 6012 *Physics of Nuclear Medicine	3
MEDICAL PHYSICS ELECTIVE	3
MEDICAL PHYSICS ELECTIVE	3
RADI 6097 *Research	3
TOTAL	**12**

YEAR 3

Fall Semester	*CU*
RADI 5090 *Semin. Radiological Sci.	1
RADI 6071 Supervised Teaching	1
RADI 6097 *Research	10
TOTAL	**12**

Spring Semester	*CU*
RADI 5090 *Seminars in Radiological Sciences	1
RADI 6071 Supervised Teaching	1
RADI 6097 *Research	10
TOTAL	**12**

YEAR 4

Fall Semester	CU
RADI 7099 *Dissertation	12
TOTAL	**12**

Spring Semester	CU
RADI 7099 *Dissertation	12
TOTAL	**12**

TOTAL FOR DEGREE 96 CU

** Course required for all RADSCI students*

† *Course required by CAMPEP for all Medical Physics students*

‡*Student must be admitted to PhD candidacy to enroll in RADI 7099 - Dissertation*

***Students who have completed their qualifying exam and have been accepted into candidacy should take RADI 7099 – Dissertation instead of RADI 6097-Research*

Students who are unable to complete their dissertation research within the four-year period may continue to be enrolled and take as many hours of RADI 7099 (Dissertation) as is appropriate to their student enrollment status (full- or part-time).

NOTE: Up to two hours of RADI 5090 can be waived if the student presents research to local and national scientific meeting or equivalent, as approved by COGS.

Possible Elective Courses *(student shall work with Supervising Professor to determine most appropriate courses)*

RADI 5018 Physics Measurements in Imaging
RADI 6017 Neuroimaging Methods
RADI 6019 Medical Image Processing
RADI 6033 Advanced Radiotherapy Physics – *pre-requisite: RADI 6030*
RADI 6051 Statistical Parametric Mapping
RADI 6031 Physics Measurements in Radiotherapy I
RADI 6042 Non-Ionizing Radiation Biology
RADI 6035 Physics Measurements in Radiotherapy II **–** *pre-requisite: RADI 6031*
RADI 6015 Physics of Diagnostic Imaging II **–** *pre-requisite: RADI 5015*
RADI 6050 Magnetic Resonance Imaging **–** *pre-requisite: RADI 6049*
RADI 6091 Special Topics

MS Medical Health Physics Program (CIP code 51.2205.*00) Example Training Plan*

YEAR 1

Fall Semester	*CU*	*Spring Semester*	*CU*
RADI 5001 *Basic Radiation Safety	1	RADI 6024 *†Radiological Anatomy & Physiology	3
RADI 5015 *†Physics of Diag. Imaging I	3	RADI 6012 *Physics of Nuclear Medicine	3
RADI 6049 *Introduction to MRI	2	RADI 5007 *†Statistics in Radiological Sciences	2
RADI 5005 †Fund. of Radiation Dosimetry	3	RADI 5090 *Seminars in Radiological Sciences	1
RADI 6030 †Physics of Radiotherapy	3	RADI 5020 †Principles of Health Physics I	3
TOTAL	**12**	**TOTAL**	**12**

YEAR 2

Fall Semester	*CU*	*Spring Semester*	*CU*
RADI 5025 †Molec.Oncol. & Radiobiology	3	RADI 6016 Physics of Diagnostic Imaging II	3
RADI 5090 *Seminars in Radiol. Sci.	1	RADI 5018 *Physics Measurements in Imaging	2
TSCI 5070* Respon. Conduct Research	2	RADI 6071 *Supervised Teaching	1
RADI 6021 Principles of Health Physics II	3	RADI 6098 *Thesis	6
RADI 6097 *Research	3		
TOTAL	**12**	**TOTAL**	**12**

TOTAL FOR DEGREE 48 CU

** Course required for all RADSCI students*

† *Course required by CAMPEP for all Medical Physics students*

IV. *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. Although the format varies from year-to-year, the retreat typically takes up between one-half day to an entire day meeting in even years to review 1) curriculum, 2) textbooks, 3) teaching methods, 4) laboratories, 5) clinical experience, 6) examinations, 7) matriculation procedures, and 8) research opportunities. All faculty, full-time and adjunct, are invited to attend the retreat. An introductory plenary session summarizes the goals of the retreat, which may include one or more presentations and discussions by external guest speakers and members of the UT Health San Antonio administration. Faculty and students are 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. If there are student-specific breakout sessions, these may be run by the student representative to the COGS, who raises and discusses the issues that concern the students at the retreat. 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 executive summary 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 and reported to the GSBS as program learning outcomes (PLOs), when appropriate.

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

V. *Sequential Procedures for Master's Thesis in Medical Health Physics*

A. Selection of the Supervising Professor

No later than three months after the student's admission to candidacy, the member of the graduate faculty of the program who will serve as the supervising professor of the thesis research shall be decided upon by mutual agreement among the candidate, the faculty member, and the Committee on Graduate Studies. The Supervising Professor meets with the student to develop a Student-Mentor Compact and Milestones Agreement, as described in Section XII, below. Normally, the research advisor who guided the student's preliminary research activities continues as supervising professor, but this arrangement is not obligatory.

B. Draft of Thesis Research Proposal

Within three months after admission to candidacy, the candidate shall submit a draft of a proposal for the thesis research to the supervising professor for review and modification. Subsequent drafts of the proposal may then be submitted for review and modification to other faculty members who have knowledge and expertise in the area of the research proposal. After approval of the final proposal draft by the supervising professor, the proposal is submitted to the Committee on Graduate Studies for consideration of approval. Students may change their Supervising Professor, with approval of the GPRS COGS, following submission of a completed GPRS "Change of Advisor Form", which can be downloaded from the GPRS website.

C. Appointment of the Supervising Committee

After approval of the thesis proposal by the Committee on Graduate Studies, the supervising professor and the candidate shall make recommendations to the Committee on Graduate Studies regarding the composition of the Supervising Committee for the thesis research.

The Supervising Committee must consist of at least four persons, as follows:

- The supervising professor, also a member of the program's graduate faculty,
- Two members must be members of the graduate faculty of the program.
- One member must be a faculty member at UT Health San Antonio in a supporting area outside the program or a person outside the UT Health San Antonio faculty, who is an expert in the field of the proposed thesis.

Immediately upon selection of the Supervising Committee, the Chair of the Committee on Graduate Studies will submit to the GSBS Dean's Office a completed GSBS Form 42, Composition of Supervising Committee -The Master of Science Degree. A copy of the proposed work in electronic format must accompany the form. Each member of the Supervising Committee is required to sign the form to certify her/his consent to serve on the committee. Any subsequent change in the Composition of the Supervising Committee must be approved by the COGS and approved by the Dean.

The composition of the Supervising Committee should, in principle, provide a group of research scientists who constitute an important resource to the candidate and her or his thesis research. Their functions are, with the Supervising Professor, to guide the candidate through the thesis research. They certify to the Committee on Graduate Studies that the candidate has, in fact, carried out a meritorious research investigation of the caliber appropriate for an M.S. thesis and, in their opinion, defended it satisfactorily.

D. Supervision of the Thesis Research

Within one month after appointment of the Supervising Committee, the Supervising Professor shall convene the Supervising Committee to discuss with the candidate the progress of the thesis research and the projected future work. At appropriate intervals thereafter, the Supervising Committee shall meet with the candidate for progress reports (written and/or oral) so that current status of the research may be evaluated, and direction of future work planned. It is essential that the Supervising Committee be fully informed of the research progress and be able to provide continued supervision throughout and that the Committee on Graduate Studies receive reports of the research progress from the Supervising Committee after each of its meetings with the candidate.

E. Submission of the Thesis

After members of the Supervising Committee agree that the research has progressed sufficiently for submission of the thesis, a draft of the thesis shall be submitted to the Supervising Professor and then to the other members of the Supervising Committee for review and recommendations for modification of content. An electronic copy will also be submitted to the Graduate School Dean's Office for review of formatting and recommendations for modification. It is the responsibility of the candidate to follow the guidelines for preparation of the thesis provided by the Graduate School Dean's Office in the Instructions for Preparation and Submission of Electronic Theses, Dissertations and Dissertation Abstracts. If an alternative chapter format is preferable, the candidate must obtain approval for such format from the Supervising Committee and the Committee on Graduate Studies. The candidate also has the responsibility to ensure adequate time for review and modification of the thesis.

F. Final Oral Examination

The Graduate School requires that the thesis be defended by the candidate in a Final Oral Examination conducted by the Supervising Committee. The thesis shall be defended in formal Final Oral Examination scheduled through the Graduate School Dean's Office and

open to all interested persons.

Three copies of the Abstract and the Vita should be submitted with the request for the candidate's file in their respective department, the Registrar's Office, and the Graduate School Dean's Office.

The Supervising Committee members vote on the candidate's success or failure on the Examination; more than one vote for failure signifies failure on the Final Oral Examination. The Supervising Committee submits the Report on Final Oral Examination (GSBS Form 41) to the Committee on Graduate Studies. In the event of a failing performance by the candidate, the Supervising Committee shall also submit to the Committee on Graduate Studies a recommendation regarding remedial action or further examinations; in such cases, the Committee on Graduate Studies shall decide upon the recommendation or other action to be taken. In the event of a successful performance by the candidate, the Committee on Graduate Studies shall vote on whether to approve the recommendation by the Supervising Committee for granting of the degree.

G. Recommendation for Granting of the Degree

If the Committee on Graduate Studies approves the favorable recommendation by the Supervising Committee, the Chair of the Committee on Graduate Studies shall so indicate by signature on the Report on Final Oral Examination and submit the Report to the Graduate Faculty Council for consideration. The candidate shall submit to the Graduate School Dean's Office the final electronic version of the thesis either by e-mail or on a disk or USB drive. The thesis Approval Page signed by the Supervising Professor and Committee members must also be submitted to the Graduate School Dean's Office. When the Report, the Approval Page and the electronic thesis have all been received in the Graduate School Dean's Office, the Graduate Faculty Council will consider the recommendation for granting the degree. If the Council does not approve the recommendation, it will refer the matter to the Committee on Graduate Studies with a recommendation for remedial action. If the Council does approve the recommendation, the Dean of the Graduate School of Biomedical Sciences will notify the President of The University of Texas Health Science Center at San Antonio that the candidate has fulfilled all requirements for the degree Master of Science. Upon the candidate's certification by the President, the degree is conferred by the Board of Regents of The University of Texas System.

VI. *PhD Radiological Sciences & MS Medical Health Physics Qualifying Examinations*

The qualifying examination committee, with the consent of and approval of the Radiological Sciences COGS, determines the content and format for the MS and PhD Qualifying Examinations (referred to as the 'qualifying exam' hereinafter). The committees are also responsible for the development of the examinations, and their administration and evaluation on an annual basis. The following summarizes the rules and procedures for the qualifiers.

A. Requirements for all Students:

1- All students in good standing who have completed their required core coursework should take the qualifier on the date scheduled for their track and degree program.

2- Students who are on academic probation are not allowed to take the qualifier. These students are given one year in which to improve their GPA above the probationary level before they can sit for the qualifier.

3- Students have two chances to pass the qualifying exam. Those who fail on their first attempt must retake the qualifier within one year. Typically, the second attempt is scheduled within 2 months and at an agreed time by the faculty and student. Failure to pass the exam on the second attempt may result in dismissal from the graduate program.

4- Students with prior coursework or professional experience adequate to prepare them in their declared track may request permission from the Radiological Sciences COGS to take the qualifier prior to completion of the core coursework. Students taking the exam prior to completion of all required courses must take the course(s) eventually, even if they pass the qualifying exam prior to course completion, unless specifically waived from taking each course by the Radiological Sciences COGS.

B. Administering and Grading the Qualifying Examination:

1- The Chair of the Qualifying Exam Committee for each Track is responsible for collating and tabulating the final scores and presenting them to the Track Committee. The Track Committee will prepare formal recommendations for each student at the next Track Committee meeting.

2 - The tabulated results of the qualifying exam and/or the recommendations of the Exam Panel shall be presented by the Chair of the Track Committee, or a designated representative, at the next COGS meeting where a vote shall be taken on acceptance of the results.

3- Within a week after the COGS meeting, each student's results will be communicated to him/her via e-mail.

VII. *Admission to Candidacy*

The Qualifying Exam committee shall be responsible for evaluating each student's research potential and reporting, to COGS, their recommendation regarding the student's admission to candidacy for the Ph.D. degree. After approval by the GSBS Dean of the GPRS COGS' recommendation for admission to PhD candidacy, the student may register for the GPRS Dissertation course (RADI 7099).

After successfully completing the Qualifying Examination appropriate to his/her track, each student (with the aid of his/her advisor) shall establish a Dissertation Advisory Committee. The composition of the Committee must be approved by the COGS. The Committee shall consist of at least three members from the Program faculty list. This committee shall provide guidance to the student as the dissertation proposal is developed and the thesis or dissertation project is

undertaken. When the student has completed the Dissertation document, the student shall schedule a Dissertation Defense at which Dissertation Advisory Committee shall decide whether the student has completed all of the requirements for earning the degree. The Dissertation Advisory Committee shall then make a formal recommendation to the COGS.

VII. *Sequential Procedures for PhD Dissertation*

A. Selection of the Supervising Professor

No later than three months after the student commences matriculation in the GPRS, the member of the graduate faculty of the program, who will serve as the supervising professor of the dissertation research, shall be decided upon by mutual agreement among the candidate, the faculty member, and the GPRS COGS. The Supervising Professor shall meet with the student to develop a Student-Mentor Compact and Milestones Agreement, as described in Section XII. Normally, the research advisor who guided the student's preliminary research activities continues as supervising professor, but this arrangement is not obligatory. Students may change their Supervising Professor, with approval of the GPRS COGS, following submission of a completed GPRS "*Change of Advisor Form*", which can be downloaded from the GPRS website.

B. Draft of Dissertation Research Proposal

The candidate shall identify a research question that will serve as a focus for the dissertation research. The candidate shall prepare a draft of a research proposal that specifies the research to be undertaken, its significance in the scientific field, and the general methods and techniques to be utilized. The proposal shall be submitted to the supervising professor for review and modification. Subsequent drafts of the proposal should then be submitted for review and modification to other faculty members who have knowledge and expertise in the area of the research proposal and who have been selected by mutual agreement among the candidate, the supervising professor, and the Committee on Graduate Studies. The final draft of the dissertation research proposal is subject to review and approval by the Committee on Graduate Studies, which may specifically designate a group of faculty members to review the proposal draft(s).

C. Composition of the Dissertation Supervising Committee

After approval of the proposal by the Committee on Graduate Studies, the supervising professor and the candidate shall make recommendations to the Committee on Graduate Studies regarding the composition of the Supervising Committee for the dissertation research. The Supervising Committee must consist of at least five persons, as follows:

1. The supervising professor, also a member of the GPRS faculty, designated as Supervising Professor and Chair of the Supervising Committee,

2. Two members must be members of the GPRS faculty.

3. One member must be from outside the UT Health San Antonio faculty and must be an expert in the field of the proposed dissertation

4. One member must be a faculty member at UT Health San Antonio in a supporting area outside the GPRS.

The GPRS COGS may nominate additional members in categories (2), (3), and (4) if necessary. Nomination is contingent upon the willingness of the designated person to serve on the Supervising Committee. The composition of the Supervising Committee should, in principle, provide a group of research scientists who constitute an important resource to the candidate and her or his dissertation research. Their functions are, with the Supervising

Professor, to guide the candidate through the dissertation research and to certify to the Committee on Graduate Studies that the candidate has, in fact, carried out a meritorious research investigation of the caliber appropriate for a Ph.D. dissertation and, in their opinion, defended it satisfactorily. Upon selection of the supervising committee, the chair of the Committee on Graduate Studies (COGS) will submit to the Graduate School Dean's Office a completed GSBS Form 30 Recommendation for Approval of Dissertation Research Proposal and Supervising Committee. The student must provide the Graduate School Dean's Office an electronic copy of their dissertation proposal to accompany GSBS Form 30.

D. Approval of the Dissertation Proposal and Supervising Committee

The GSBS Graduate Faculty Council and the GSBS Dean will review the recommendation of the GPRS COGS on the proposal and supervising committee. Any subsequent change in the Composition of the Supervising Committee must be approved by the COGS and then approved by the GSBS Graduate Faculty Council at a regularly scheduled meeting.

E. Supervision of the Dissertation Research

Approximately one month after formal approval of the Supervising Committee, the Supervising Professor shall convene the Supervising Committee to discuss with the candidate the progress of the dissertation research and the projected future work. At appropriate intervals thereafter (approximately every six months), the Supervising Committee shall meet with the candidate for presentation of progress reports (written and/or oral), so that current status of the research may be evaluated, and the direction of future work planned. If the external Committee member is unable to attend these meetings, it is the responsibility of the candidate and the Supervising Professor to provide this member with progress reports for review and recommendations. It is essential that the Supervising Committee be fully informed of the research progress and be able to provide continued supervision throughout and that the GPRS COGS receive reports of the research progress from the Supervising Committee. The Supervising Committee and/or the Committee on Graduate Studies may approve or direct alterations in the research plans within the general context of the dissertation proposal. Major changes in the candidate's research status (such as selection of a new Supervising Professor, new Supervising Committee members, or a new research question) must be reported to the Graduate Faculty Council and the GSBS Dean for consideration.

F. Submission of the Dissertation

After agreement by the members of the Supervising Committee that the research has progressed sufficiently for submission of the dissertation, a draft of the dissertation shall be submitted to the Supervising Professor and then to all other members of the Supervising Committee for review and recommendations for modification of content. An electronic copy will also be submitted to the Graduate School Dean's Office for review of formatting. It is the responsibility of the candidate to follow the guidelines of preparation of the dissertation provided by the Graduate School Dean's Office in the "*Instructions for Preparation and Submission of Electronic Theses, Dissertations and Dissertation Abstracts"*, which can be downloaded from the GSBS website. The candidate also has the responsibility to ensure adequate time for review and modification of the dissertation in accordance with the schedule of deadlines provided each term by the Graduate School Dean's Office.

G. Final Oral Examination

When the Supervising Committee judges the dissertation to be suitable for defense, the Supervising Professor shall be responsible for submitting a signed Request for Final Oral Examination Form (GSBS Form 40) through the Committee on Graduate Studies to the Dean and request scheduling of the Final Oral Examination. The Final Oral Examination must be scheduled at least 2 weeks before the date of the Final Oral Examination. Three copies of the Abstract and Vitae should accompany the Request for Final Oral Examination Form at the time it is submitted to the GSBS Dean's Office. Public announcement of the Final Oral

Examination is made by the GSBS Dean's Office. This examination is conducted by the Supervising Committee with the Supervising Professor as chair. Interested persons may attend the public defense and have the right to question the candidate. After the public defense, the Final Oral Examination continues with an intensive oral examination by the Supervising Committee that is not customarily open to the public. The Supervising Committee members vote on the candidate's success or failure on the Final Oral Examination; more than one vote for failure signifies failure on the examination. The Supervising Committee submits the Report on Final Oral Examination Form (GSBS Form 43) to the GPRS COGS. In the event of a failing performance by the candidate, the Supervising Committee shall also submit to the GPRS COGS a recommendation regarding remedial action; in such case, the GPRS COGS shall decide on the recommendation or other action to be taken. In the event of a successful performance by the candidate, the GPRS COGS shall vote on whether to approve the recommendation by the Supervising Committee for granting of the degree.

H. Recommendation for Granting of the Degree

If the GPRS COGS approves the favorable recommendation by the Supervising Committee, the Chair of the GPRS COGS shall so indicate by signature on the Report on Final Oral Examination and submit the Report to the Graduate Faculty Council for consideration. The candidate shall submit to the GSBS Dean's Office the final electronic version of the dissertation either by e-mail or on a disk or USB drive. The dissertation Approval Page signed by the Supervising Professor and Committee members must also be submitted to the GSBS Dean's Office. When the Report, the Approval Page and the electronic dissertation in final form have been received in the GSBS Dean's Office, the Graduate Faculty Council will consider the recommendation for granting of the degree. If the Council does not approve the recommendation, it will refer the matter to the GPRS COGS with a recommendation for remedial action. If the Council does approve the recommendation, the GSBS Dean the President of UT Health San Antonio that the candidate has fulfilled all requirements of the Graduate School of Biomedical Sciences for the degree of Doctor of Philosophy. Upon the candidate's certification by the President, the degree is conferred by the Board of Regents of the University of Texas System.

IX. Students

A. Admissions

Upon receiving inquires from prospective students, the Chair of the Recruitment Committee sends a reply, typically by e-mail that informs the prospective student of application deadlines, admission requirements, academic backgrounds expected and the competitive nature of the admission process. The message also directs the potential applicant to visit the GPRS website for more detailed information

Students may apply for admission to the GPRS to begin the Fall or, in special cases the Spring semester, of each academic year. Applications for the Fall semester must be received no later than February 1st, and all application materials must be in the GPRS office no later than March 1st. Applications for the Spring must be received no later than September 1st, and all application material must be in the GPRS office no later than October 1st. Due to course progression constraints, applicants are strongly encouraged to apply for the Fall semester. If all application materials are not received by the specified deadlines, an Admission Recommendation form is sent to the GSBS Associate Dean indicating rejection because of an incomplete application file, noting those items that are lacking. An applicant can reapply for the following semester once all pending materials have been received.

Students accepted into the UT Health San Antonio MS Medical Health Physics or PhD Radiological Science (Medical Physics track) programs shall have acquired a strong foundation in basic physics. This should be documented by either an undergraduate degree

in physics or a degree in a related engineering or physical science with coursework that is equivalent to a minor in physics (includes at least three upper level undergraduate courses such as modern physics, classical mechanics, introductory quantum mechanics or thermodynamics.). If applicants with deficiencies in their physics background are conditionally admitted to the program, they will have to correct their deficiency by completing the required advanced undergraduate physics courses at an accredited university. In addition, students are expected to have basic college-level chemistry and biology training (one year or two semesters each) and one semester of computer science.

Students accepted into the UT Health San Antonio PhD Radiological Science (Human Imaging track) program shall have been awarded a Doctor of Medicine (MD) degree or equivalent (i.e. Doctor of Osteopathic Medicine, DO; etc.).

GSBS admission requires a Bachelor's Degree and a cumulative undergraduate grade point average (GPA) of at least a 3.0. Although applicants are required to submit GRE scores from exams taken within the past five years, there is no specific GRE score required for admission. Foreign students who have not completed previous collegiate studies in an English-speaking country are required to have one of the following minimum TOEFL scores (computerized test: 220; paper test: 560; iNet: 68. A bachelor's degree in a natural science or engineering is highly recommended. Degrees in other disciplines are considered providing that the applicant has received sufficient science and mathematics course credits to give the applicant the equivalent of a minor in a natural science or engineering discipline. Waivers may be requested by the COGS from the Graduate Faculty Council of the GSBS if an applicant does not meet one of the above requirements.

The Application Review Committee has established three criteria to allow acceptance of an Applicant.

i. First, the Application Review Committee determines that the applicant has an adequate academic background, based on the above criteria. 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, 40-60 applications are received each year, of which at least ~20 are deemed academically acceptable.

ii. The second condition is that the Application Review Committee must identify a mentor for the applicant in the appropriate track of THE GPRS.

iii. The third task of the Application Review Committee is to establish that there is funding available, either through the GPRS, through an outside program or that the student can be self-funded. Funding within the GPRS 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 Committee presents its recommendations to the GPRS COGS for acceptance or rejection of each applicant reviewed. The GPRS COGS makes final decisions via a simple majority vote. The GPRS has adopted, as part of its admission goals, a geographical student distribution comprising 50% from Texas, 30% from within the US but outside of Texas, and 20% from foreign countries. For those students active in the GPRS PhD program for the 2018-2019 school year, the geographical distribution is 57% from Texas, 38% from within the US but outside of Texas, and 5% from foreign countries. The ethnic composition for US citizen or US resident alien graduate students enrolling in the GSBS for 2016-2017 is: 44% White, 22% Hispanic, 22% Asian and 6% African-American and 6% unknown. Females currently account for 47% of students in the GPRS.

The Chairman of COGS forwards recommendations for 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. Recruitment Activities

Colleges and Universities visited by faculty of the GPRS in recent years include the University of Texas at Arlington, Trinity University, University of Texas El Paso, Texas A&M Commerce and Texas A&M College Station. The Faculty have also mentored several undergraduate physics students and pre-medical students as summer research fellows. The Chair of the Recruitment Committee responds to hundreds of e-mails per year from prospective students.

XI. Enrollment

The GPRS started in the Fall of 1989 with four students. Enrollment in the GPRS rose rapidly until 2008 when a systemic downsizing was initiated, which was designed to turn the PhD program into a more trans-disciplinary research training program while concurrently transforming the MS medical physics program into a professional Doctorate in Medical Physics program. There were 21 students enrolled for the Fall term in 2018, which includes 19 PhD students and 2 MS Medical Health Physics student. The Radiological Sciences PhD program has been consolidated into four tracks. There are 13 students currently enrolled in the PhD Medical Physics and 2 in the MS Medical Health Physics track. There are 3 students currently enrolled in the PhD Human Imaging track and 4 enrolled in the PhD Neuroscience Imaging track. As currently configured, the maximum combined student capacity of the MS Medical Health Physics and PhD Radiological Science programs is in the range of 23-26. Approximately 85% of the MS students and 70% of the PhD students who have enrolled in the GPRS have graduated. Students enrolled in the MS program have taken an average of 29.9 months (SD=8.1 months) to graduate. Students enrolled in the Medical Physics PhD program tracks have required an average of 55.4 months (SD=13.4 months) to graduate.

XII. *Evaluation of Student Progress*

A. Master of Science Degree

In order to obtain their master's degree, students must complete required courses, pass a Qualifying Examination and demonstrate ability as an independent worker by completing a Master's thesis.

By the end of the Year 1 Spring semester and annually thereafter, a formal meeting between a student and his/her Thesis Mentor is expected. This discussion is intended to help ensure the integrity of the guiding principles and milestones that promote and support a positive mentoring relationship. This meeting will be documented by the signing and official filing of the Student-Mentor Compact. Although the Compact is not a legally binding contract, with their signatures, both the student and the mentor confirm that all topics listed in the Compact have been discussed and that they are committed to uphold the principles agreed upon. The signed form is to be reviewed by the GPRS COGS and then filed in the office of the GPRS Academic Coordinator.

In addition to the Student-Mentor Compact, and also by the end of the student's Year 1 Spring semester, a student is expected to review/discuss with the Thesis Mentor the official GPRS Milestones Agreement. This document is provided for the purpose of confirming that the student and the student's Dissertation Mentor have been clearly informed that certain programmatic milestones are expected prior to receiving the Ph.D. degree and that there is an expected timeline to complete these milestones. That is, the student is expected to reach particular milestones within a specified time period in order to demonstrate satisfactory

academic progress through the Program. Failure to demonstrate satisfactory academic progress may result in the student being placed on academic probation, or dismissal from the program.

B. Doctor of Philosophy Degree

In order to obtain their doctoral degree, students must complete required courses; pass a Qualifying Examination that tests their knowledge in their designated track and demonstrate ability as an independent researcher by completing a grant proposal, which consists of preparing a written research proposal in NIH or similar grant format. The students are encouraged to take the Qualifying Exam within one year following successful completion of required core 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.

By the end of the Year 1 Spring semester and annually thereafter, a formal meeting between a student and his/her Dissertation Mentor is expected. This discussion is intended to help ensure the integrity of the guiding principles and milestones that promote and support a positive mentoring relationship. This meeting will be documented by the signing and official filing of the Student-Mentor Compact. Although the Compact is not a legally binding contract, with their signatures, both the student and the mentor confirm that all topics listed in the Compact have been discussed and that they are committed to uphold the principles agreed upon. The signed form is to be reviewed by the GPRS COGS and then filed in the office of the GPRS Academic Coordinator.

In addition to the Student-Mentor Compact, and also by the end of the student's Year 1 Spring semester, a student is expected to review/discuss with the Dissertation Mentor the official GPRS Milestones Agreement. This document is provided for the purpose of confirming that the student and the student's Dissertation Mentor have been clearly informed that certain programmatic milestones are expected prior to receiving the Ph.D. degree and that there is an expected timeline to complete these milestones. That is, the student is expected to reach particular milestones within a specified time period in order to demonstrate satisfactory academic progress through the Program. Failure to demonstrate satisfactory academic progress may result in the student losing funding, being placed on academic probation, or dismissal from the program.

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 Radiological Sciences evaluation form as well as updated GSBS Milestone document. 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.

XIII. *New Student Orientation*

New student orientation is integrated with the orientation program conducted by the Office of Student Life. This program takes three half-days in the week before classes start. The program consists of lectures and presentations on the policies, facilities and services at the University.

One day in this program is devoted to a specific introduction of new students to the GPRS with a luncheon sponsored by the Radiology Department's Education Division at which all faculty and students in the program may meet for the first time. All new students tour the various research and clinical facilities used by the GPRS. At the end of this week the GSBS holds convocation, at which a guest speaker gives them some words of encouragement as the students begin their adventures in graduate school. After the convocation, the Graduate Student Association sponsors a graduate school picnic at which the new students can continue to develop relationships with faculty and student peers.

The Director of Radiological Sciences schedules an appointment with each new student within the first two weeks to go over their specific study plans and arrange research rotations. A faculty advisor is selected from the list of Faculty Advisors. The student is advised of policies regarding ID badges, e-mail usage, mailboxes, keys to labs and offices, required forms, computer usage and lockers. The GSBS compact and milestone forms shall be reviewed and signed by the student and his/her mentor by the end of the student's first month in the GPRS. The milestone agreement is reviewed by the student and supervising professor every year, early in the spring term. The completed milestones are noted and any changes in academic plan are submitted to the GPRS office and made part of the student's record.

An annual GPRS party is also held on a weekend during the school year, open to students, faculty members and their families so that all can get to know each other better and to continue to build a sense of community.

XIV. *Policy for Vacation and Sick Leave for Graduate Students*

Students who receive full-support stipends from UT Health San Antonio Ph.D. programs are required to pursue their training on a full-time basis devoting 20 hrs/week of the normal work week for their research project and the remaining time for academic courses and clinical training.

It is the policy of the University of Texas system, UT Health San Antonio, and the Graduate School of Biomedical Sciences that employees appointed to positions which require student status as a condition of employment are not eligible for any leave entitlements (sick, vacation, personal and holiday leave). This is in accordance with the UT Health San Antonio Handbook of Operating Procedures (HOP) Policy 4.3.5, Policy 4.7.5, Policy 4.7.7 and 4.7.10. However,

student employees are not specifically excluded from working with their mentors to develop an alternative work schedule under UT Health San Antonio HOP Policy 4.7.4.

For all other students (those on training grants, fellowships or otherwise self-supported) the following guidelines have been established for the GPRS use and are only the minimum requirements required for the students. Clearly, individual circumstances may cause a specific student-mentor pair to agree to an individual vacation plan that seems appropriate given the nature of the student's efforts over a period of time, particular family circumstances, parental leave, etc. Students must be sensitive, however, to their obligation to inform their advisor in writing before choice of all proposed or planned absences so that the flow of experimental work can be planned and discussed. The application for leave with Advisor co-signature must be presented to the Department of Radiology's Education Office prior to departure.

A. Vacation and Holidays

Graduate students shall receive all University holidays and 14 working days of paid vacation per annum. In the UT Health San Antonio GPRS, the times between academic terms and the summers are considered active parts of the training and research period and are not necessarily free times.

Vacation may be accumulated from year to year for students who may wish to take longer periods of time in one block, and then take less frequent vacations. This is particularly for individual students who must travel long distances to visit their families or have special needs. This accumulated vacation time must be approved by the supervising professor. Students should not take vacations when classes or exams are scheduled. For first year as well as advanced students, vacation time should ALWAYS be arranged with the supervising professor at least 1 month in advance.

B. Sick Leave

Graduate students may have up to 12 working days of sick leave per annum, with no year-to-year accrual. Under exceptional circumstances, additional sick days may be granted following a written request and approval by the student's program director. Sick leave may be used for medical conditions related to pregnancy and childbirth. Time taken for sick leave must be approved beforehand by the student's advisor.

C. Parental Leave

Since many of the students enrolled in the graduate program have families, graduate students with children may also have up to 14 working days of parental leave per annum for the adoption, the birth of a child, or extraordinary medical events concerning children. Either parent is eligible for parental leave. Parental leave must be approved by the student's advisor. Sick leave may not be used to supplement parental leave, except as noted above.

D. Scientific Meetings and Other Education-Related Leave

Graduate students may have up to 10 working days of conference leave per annum, with no year-to-year accrual. This leave is ONLY designated for travel to scientific meetings and days explicitly taken off for preparation and completion of examinations i.e. ABR Boards and Qualifying Exam. Time taken off for these purposes must be approved before hand by the student's advisor.

XV. *Policy for Withdrawal from Graduate Program*

A. *Withdrawal from the Graduate Program*

To leave the GPRS through graduation, withdrawal, dismissal, or leave of absence, the following procedures should be followed. It is not possible to complete the clearance

process in one day. Until a student is cleared in all areas, a "Hold" will be in force on that student's official transcript.

1. The student shall notify the Department of Radiology's Education Office by bringing by a letter describing her/his intentions to clear campus. At this time, the checklist below will be issued to the student for clearing through the GPRS.
2. The student shall inform the GSBS Dean, who will issue an Official University Student Clearance Form. (The Dean then notifies the Registrar's Office that the student is in the process of clearing.)
3. It is the student's responsibility to obtain clearance in appropriate areas listed on the form such as the library, laboratories, university police, financial aid, bursar's office, etc.
4. If the student is receiving financial aid or has student financial aid debt, an exit interview must be scheduled with the Financial Aid Office to work out repayment schedules, etc.

B. *Checklist for Clearing Radiological Sciences Graduate Program*

The student shall meet with Faculty Advisor or Division Chief to discuss plan of action and submit letter of intent.

1. Return any books or materials to the Radiology Library Center
2. Terminate user logon ID for electronic mail Computing Resources
3. Turn in any lab coat(s) issued for your use by Linen Services
4. Drop off any University lab or office keys to the Administration Office in Room 652E.
5. Sign and drop the withdrawal form off to the Radiological Sciences Graduate Student Office.

Please leave name, address and phone number of your new employer with the Program Coordinator and, if you have not cleared through the University, proceed to the Dean of the Graduate School of Biomedical Sciences for further instructions.

XVI. *Safety*

In addition to the safety topics covered in orientation sessions, students may also be required to complete training in a number of safety topics, as appropriate to the research laboratory or clinical setting in which they are working. Training offered by the Department of Environmental Health and Safety includes basic radiation safety orientation, radioisotope user's safety course, laser safety course, x-ray safety, weekly wipe test refresher course, laboratory safety and hazardous waste generators, chemical waste: monitoring and disposal, basic biological safety and basic training on blood-borne pathogens.

XVII. *Faculty*

A. Faculty Assignments

The Program assigns faculty into two categories: Core faculty and faculty-at-large. Core faculty are defined as faculty who are authorized to advise graduate students and chair thesis committees. Those members listed as *Faculty-at-Large* have at least two contact lecture hours per year and participate on thesis and dissertation committees. The faculty assignments are reviewed each August by the Committee on Graduate Studies (COGS).

*B. Advisors**

Faculty members are assigned as “advisors” each semester to mentor students who have been accepted into the program. Core faculty members are authorized to advise the research theses and/or dissertations of students in radiological sciences. Students are notified of their advisor and are asked to schedule to meet with them. The student is asked to discuss study plans with their advisor at least once a year but preferably twice a year. Each student has the option at any time of changing faculty advisor simply by submitting a completed *Change of Advisor Form* to the GPRS COGS.

Advisors report on their students at the beginning of each calendar year to the Track Chair, who then reports to the GPRS COGS at its monthly meeting. If a student's progress is not acceptable, the advisor documents this and develops an action plan with the student. The student is given a year to improve and is then re-evaluated.