Doctorate of Medical Physics

Program Handbook

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DMP program policies and guidelines are in compliance with those established by the UT System (http://www.utsystem.edu/) Board of Regents (http://www.utsystem.edu/bor/rules/), the UT Health Science Center at San Antonio (http://www.uthscsa.edu/hop2000/), and the Graduate School of Biomedical Sciences (http://gsbs.uthscsa.edu/). The *Catalog* (http://catalog.uthscsa.edu/) of the UT Health Science Center at San Antonio provides general information and regulations that relate to students. In the event of discrepancies between DMP program policies/guidelines and those established by UT governing components, those described by the governing components will prevail.

The policies of the DMP Program are regularly reviewed and updated; therefore, this copy may not be the most current. Current policies are provided in the DMP Handbook that is electronically available at the DMP website: http://iims.uthscsa.edu/ed_DMP_handbook.html

The UT Health Science Center at San Antonio is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (http://www.sacscoc.org/) (1866 Southern Lane, Decatur, Georgia 30033-4097; telephone number 404-679-4501) to award certificates, and baccalaureate, masters, doctoral, and professional degrees.

The UT Health Science Center Doctorate of Medical Physics program accredited by the:

Commission on Accreditation of Medical Physics Education Programs (CAMPEP)
http://campep.org/default.asp

DMP Program, Policies, and Guidelines — Graduate School of Biomedical Sciences

Doctor of Medical Physics (DMP)

Program, Policies, and Guidelines

Contents

THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO GRADUATE SCHOOL OF BIOMEDICAL SCIENCES (GSBS)

Doctor of Medical Physics (DMP)

AIMS/OBJECTIVES

The goal of this program is to provide high quality clinical education with state-of-the-art radiotherapy and imaging equipment, and to prepare the students to become board certified clinician scientists in medical physics.

The specific aims of the DMP Program are to:

- The Doctor of Medical Physics program aims to enhance and standardize clinical training for medical physicists.
- The DMP is a professional degree that prepares the students for a clinical career in either imaging or therapeutic medical physics.

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

- Participation and successful completion of required didactic coursework
- Successful completion of two years of clinical training
- Completion of an approved Project of Quality Improvement
- Formal, semi-annual assessment of progress

APPLICATION ELIGIBILITY REQUIREMENTS

All students should have a sufficient educational background in the biological or biomedical sciences to be considered for admission to the program. The typical student applicant should have a Bachelor's Degree in Physics, Applied Physics, Physical Science, or Engineering (with the equivalent of a minor in physics) from an accredited college or university in the USA or equivalent.

The following general requirements will be applied:

1. A **grade point average** (GPA) no lower than B (3.00 in a 4.00 system) in the last 60 hours of coursework for a BS/BA degree or a GPA of at least 3.0 for applicants with a MS degree.
2. A satisfactory score for the combined verbal and quantitative portions of the Graduate Record Examination (**GRE**). A minimum of 300 (1,000 for scores prior to August 2011) for the combined scores on the verbal and quantitative portions of the GRE is required. Scores on GRE tests taken more than five years prior to the date of application will not be accepted. *Applicants who have completed a graduate degree in a health-related discipline or an U.S. equivalent degree (if awarded from a foreign institution, in a health-related discipline) (MD, DDS, RN, or PhD) are exempted from the requirement to complete the GRE.*
3. A minimum score of 560 on the paper version or 68 on the internet version of the Test of English as a Foreign Language (**TOEFL**) or 6.5 on the academic version of the International English Language Testing System (**IELTS**) for applicants from countries where English is not the native language. Scores on the TOEFL and IELTS (academic version) tests taken more than two years prior to the date of matriculation will not be accepted.

Science Prerequisites: Applicants must have undergraduate credit for the following courses:

1) Biology: One semester of general biology;

2) Chemistry: One semester of general chemistry;

3) One semester of Human Anatomy OR Physiology;

4) Physics: Include at a minimum Modern Physics, Modern Physics Lab, Electricity & Magnetism, Classical Mechanics, and Quantum Mechanics;

5) Mathematics: Through calculus and ordinary differential equations;

6) Computer Science: Introduction to Computer Science (one semester).

Note: The GRE Advanced Physics Exam is not required but is recommended.

APPLICANT DOCUMENTATION REQUIREMENTS

Completed and submitted GSBS online application. The GSBS online application can be found on the GSBS homepage at http://gsbs.uthscsa.edu/.

1. **Official transcripts** from **ALL** colleges and universities attended.
2. **Course by Course Translation of foreign** transcripts to include GPA and U.S. degree equivalency by the ECE or WES agencies.
3. **Official GRE scores** taken within the past five (5) years.
4. **Official TOEFL or IELTS (academic version) scores** taken within the past two (2) years for foreign national applicants.
5. **Three (3) Letters of Recommendation** attesting to the applicant's readiness for graduate level studies in clinical investigation. These letters should be uploaded to the Recommendation Form by the individual recommenders who will receive an e-mail from the online application system (EMBARK) with a link to the Recommendation Form.
6. A **Statement of Purpose (a.k.a. Personal Statement)** (1-2 pages) that includes a brief description of the applicant's background, long term research and/or career goals, and an indication of the basis for application into the DMP Program including how this program fits into the applicant's career objectives. The Statement of Purpose should be submitted with the online application to the GSBS.
7. A **current curriculum vitae.** This should be submitted with the online application to the GSBS.
8. **A copy of current visa** for foreign national applicants.
9. **Official test scores, transcripts, and foreign transcript translations, mentioned above, should be sent to:**

Registrar's Office-Graduate Admissions - MSC 7702
The UT Health Science Center at San Antonio
7703 Floyd Curl Drive
San Antonio, Texas 78229-3900

Applicants should utilize the checklist of required documentation for admission that is provided in the Appendix of this Handbook.
All of the **required** information described above **must** be submitted in order for an applicant to be considered by the DMP Student Admissions Committee. Requests for an exemption to any of these general admission requirements should be addressed to the DMP Program Director and sent directly to the DMP Program Coordinator at the following address.

DMP Program Coordinator
Cancer Therapy and Research Center – MC 7979
UT Health Science Center at San Antonio
7979 Wurzbach Rd., San Antonio, Texas 78229

APPLICATION PROCESS

Application. An online application for admission into the DMP Program must be processed through the UT Health Science Center at San Antonio Graduate School of Biomedical Sciences (GSBS). This application is available at: https://apply.embark.com/Grad/UTHSCSA/27/

As described in the online application for admission into the GSBS, official transcripts from **ALL** colleges and universities attended by the applicant are required; these must be submitted in sealed institutional envelopes. In addition, all transcripts from foreign institutions must be translated and submitted by the ECE or WES agencies. Official GRE and TOEFL or IELTS (academic version) test scores must also be submitted. For foreign nationals with a J-1 or H-1B visa, a copy of the visa must be submitted. And, F-1 visa holders must apply for and receive an I-20 form. For health care professionals, a copy of the applicant's medical license or other professional accreditation must also be submitted.

Deadlines. The DMP Program will accept applications for admission until December 31st. Matriculation into a specific academic semester is July 1st.

Applicants will have the responsibility for the timely submission of application materials to the DMP Program in order to meet the deadlines established by the GSBS for registration and course enrollment.

Application Review. After receipt of the online application together with all of the required admission materials outlined above, the DMP Student Admissions Committee will review and provide a recommendation to the DMP Committee on Graduate Studies (COGS).

The DMP Students Admissions Committee will review each application individually and will consider: the applicant's undergraduate and graduate course work and degree(s), scores on the GRE and, if applicable, TOEFL or IELTS (academic version) tests, research experience, and all other required documentation submitted with the online application or sent directly to the DMP Academic Programs Coordinator. Research experience is not required but may be beneficial. Shadowing a clinical medical physicists prior to applying to the program is strongly encouraged.

After sequential review by the DMP Student Admissions Committee, the DMP COGS, and the GSBS, applicants will be formally notified of the outcome by the Graduate Dean of the UT Health Science Center at San Antonio. The DMP COGS recommends admission to the most highly qualified applicants regardless of ethnicity, gender, age, sexual orientation, nation of origin, or disability.

TUITION AND FEES

Tuition and Fees. Rates for in-state and out-of-state student tuition and fees are established by the institution and subject to adjustment.

STUDENT PATHWAYS in THE DMP PROGRAM

After acceptance, students may complete the requirements for graduation while enrolled as a full-time student.

Full-Time students. Full-time work is regarded as enrollment in at least eight (12) semester credit hours (SCH) during the Fall and Spring semester.

Foreign Nationals as Students in the DMP Program. Consistent with the aims of the DMP Program, the DMP COGS firmly believes that enrollment in courses related to the conduct of clinical medical physics training is directly relevant to the education of fellows and trainees at the UT Health Science Center at San Antonio. As a consequence, denying access to the DMP courses to foreign nationals (persons at UT Health Science Center at San Antonio on a J-1 or H-1B visa) potentially puts them at a disadvantage in their research education and experiences. Additionally, the DMP Program will directly benefit the J-1 and H-1B visa programs because the skills taught in the DMP courses will enhance the quality of the candidates' work that they were hired to do under the auspices of these visas.

Accordingly, the DMP COGS has agreed to the following enrollment principles for persons with J-1 or H-1B visa status.

1. They may be accepted as a candidate working towards the DMP degree, but enrollment in classes must be incidental to their primary activities for which they came to the UT Health Science Center at San Antonio.
2. At no time, will participation in the DMP Program interfere with the timely completion of the duties and responsibilities for which the visa status was granted to the individual for admission to the United States.

These principles assure that the Federal Rules and Regulations for the visa process are upheld while creating a pathway by which foreign nationals may participate in clinical research education at UT Health Science Center at San Antonio.

Foreign nationals who seek admission to the DMP Program as full-time students are required to obtain an F-1 visa.

All foreign nationals with a J-1, H-1B, or F-1 visa who are enrolled in the DMP Program are required to submit a letter of continued support from the Supervising Professor bi-annually (prior to enrollment in the Fall and Spring semesters).

DEGREE REQUIREMENTS

Successful completion of the DMP Program requires the satisfactory completion of all required coursework, completion of a DMP COGS approved project on quality improvement, completion of two years of clinical training courses and DMP COGS approval of the student's.

Coursework. One hundred (100) semester credit hours (SCH) are required to obtain the DMP degree. Students must satisfactorily complete all *required courses*. (Note: Details and requirements are provided in the Coursework and Grading section of the DMP Handbook.)

Secure a passing grade on the Core Knowledge Exam at the end of Year 1.

The DMP student must complete a learning module on ethics and professionalism as specified in AAPM Report 159. The resident is expected to complete the ABR/ACR/RSNA/AAPM/ASTRO/ARR/ARS, Online Module on Ethics and Professionalism. (http://www.aapm.org/education/onlinemodules.asp)

Secure a passing grade for twenty one (21) monthly written exams on the assigned topics that will be covered during each rotation (see table 3). Each exam is two hours long, and has up to 50 multiple choice questions. Passing grade is considered to be a score above 70%. In case of a failing exam grade, a second exam will be given within 7 days. After a second failed attempt, the resident will be given a plan for remediation that has to be completed before the next examination.

Complete a comprehensive oral examination every 6 months. The topics of all oral examinations are listed below. See Table 4 for the specific topics of each exam. Oral examinations are considered complete when the oral evaluation form has been signed by the appropriate faculty mentor and student. A blank oral evaluation form is included in the Appendix. The student will be given feedback on their performance and it is possible that the examining committee will ask the student to be prepared to answer question on the same topics (in addition to the new ones) for the next oral examination. A minimum of two faculty members must be present during the examination or else the examination will be rescheduled.

COURSEWORK & GRADING

A minimum of 100 credit hours (48 of which are clinical rotations) and a minimum overall GPA of 3.0 are required for the D.M.P. degree. The student is required to demonstrate intellectual command of the subject area and proficiency in all aspects of their chosen clinical specialization. A Core Knowledge Exam is offered at the end of the first year of studies that has to be passed for the student to remain in the program.

Required Courses. Degree-seeking students in DMP Program must successfully complete the following didactic and clinical courses.

D.M.P. - Therapy Track

First Year	
Fall	**Credit Hours**
RADI 5015 Physics Of Diagnostic Imaging 1	3
RADI 6030 Physics Of Radiotherapy	3
RADI 5005 Fundamentals Of Radiation Dosimetry	3
RADI 6023 Introduction To Clinical Medical Physics Practice	2
RADI 6049 Intro To Magnetic Resonance	2
Spring	
RADI 6033 Advanced Radiotherapy Physics	3
RADI 5020 Principles of Health Physics 1	3
RADI 6012 Phys Nuclear Medi Imaging	3
RADI 6023 Introduction To Clinical Medical Physics Practice	1
RADI 6016 Physics of Diagnostic Imaging 2	3
Second Year	
Fall	
RADI 5025 Molecular Oncology & Radiobiology	3
RADI 6031 Physics Measurements In Radiotherapy I	3
RADI 7005 Treatment Planning Techniques In Radiation Therapy	3
RADI 6023 Introduction To Clinical Medical Physics Practice	3
Spring	
RADI 7006 Treatment Planning Techniques in Radiotherapy 2	3
RADI 6035 Physics Measurements In Radiotherapy 2	3
RADI 6024 Radiological Anatomy & Physiology	3
RADI 6023 Introduction To Clinical Medical Physics Practice	1
RADI 5007 Statistics in the Radiological Sciences	2
Third Year	
Fall	
RADI 6025 Therapy Clinical Rotation 1	12
Spring	

RADI 6026	Clinical Therapy Rotation 2	12
	Fourth Year	
	Fall	
RADI 6032	Clinical Therapy Rotation 3	12
RADI 6097	Research (Capstone Project)	1
	Spring	
RADI 6034	Therapy Clinical Rotation 4	12
RADI 6097	Research (Capstone Project)	1
	Total Credit Hours:	100.0

D.M.P. - Imaging Track

	First Year	
	Fall	**Credit Hours**
RADI 5015	Physics Of Diagnostic Imaging 1	3
RADI 6030	Physics Of Radiotherapy	3
RADI 5005	Fundamentals Of Radiation Dosimetry	3
RADI 6023	Introduction To Clinical Medical Physics Practice	2
RADI 6049	Intro To Magnetic Resonance	2
	Spring	
RADI 6033	Advanced Radiotherapy Physics	3
RADI 5020	Principles of Health Physics 1	3
RADI 6012	Phys Nuclear Medi Imaging	3
RADI 6023	Introduction To Clinical Medical Physics Practice	1
RADI 6016	Physics of Diagnostic Imaging 2	3
	Second Year	
	Fall	
RADI 5025	Molecular Oncology & Radiobiology	3
RADI 6038	Methods in Dosimetry & Shielding Design	3
RADI 6051	Statistical Parametric Mapping	3
RADI 6023	Introduction To Clinical Medical Physics Practice	3
	Spring	
RADI 6015	Physics Measurements in Imaging 2	3
RADI 6050	Magnetic Resonance Imaging	2
RADI 6024	Radiological Anatomy & Physiology	3
RADI 6023	Introduction To Clinical Medical Physics Practice	3

RADI 5007	Statistics in the Radiological Sciences	2
	Third Year	
	Fall	
RADI 6027	Imaging Physics Clinical Rotation 1	12
	Spring	
RADI 6039	Imaging Physics Clinical Rotation 2	12
	Fourth Year	
	Fall	
RADI 6040	Imaging Physics Clinical Rotation 3	12
RADI 6097	Research	1
	Spring	
RADI 6043	Imaging Physics Clinical Rotation 4	12
RADI 6097	Research	1
	Total Credit Hours:	101.0

Grading System

Credit hours are earned in the graduate programs only for the grades **A**, **B**, **C**, and **S**. Grade points are assigned as follows:

A = 4 (above average graduate work)
B = 3 (average graduate work)
C = 2 (below average graduate work)
D = 1 (failing graduate work)
F = 0 (failing graduate work)

Grades of **D** and **F** are not acceptable for graduate credit. If a course is repeated, the last grade earned is used in computing the cumulative grade point average.

A grade of **S** (satisfactory), **U** (unsatisfactory), is not included in the computation of the grade point average. These grades are given in the following courses in all programs.

Other symbols used in reporting the standing of students in their classes are: **WP** and **WF** (see "Withdrawal"), **W** (course dropped while receiving a passing grade with no penalty), and **I** (incomplete). The course director will record the symbol **W** if a course is dropped before the first

evaluation period in that course. After that time, the course director will assign a grade of either **WP** (withdrew passing) or **WF** (withdrew failing).

An **I** is used only to report cases in which the student has not completed all of the assignments and/or examinations before the conclusion of the course. Unless the student has been granted a leave of absence, all work must be completed within one year, at which time the grade of **I** (incomplete) will be changed to the appropriate letter grade.

The grading system described above applies to courses in the medical and dental curricula in which graduate students may be enrolled as well as to courses in the graduate programs. Grades for courses taken to satisfy a contingency or condition of admission or those transferred for credit are not included in computation of the grade point average.

Exemption of Required Course. Exemption of the requirement for completion of a required course will be considered by the DMP COGS on a case-by-case basis. A written request for exemption of a required course must be submitted to the DMP Program Director through the DMP Program Coordinator and should include a brief description of the reason(s) for the request as well as documentation (publication copies, meeting abstracts, etc.) supporting the reason(s) for the request.

In the event that prior coursework is the basis for the request, the following documentation must be submitted to the DMP Program Director through the DMP Program Coordinator.

1. A written request that includes a comprehensive description of the prior course detailing when and where completed, course semester credit hours, and details of course content and objectives.
2. An official copy of the student's transcript that indicates successful course completion and the grade issued.
3. A copy of the course description from the catalog that was in effect during the semester the course was taken.
4. A course syllabus is suggested but not required.

DMP COGS approval of a request for course exemption does not grant the student credit for the semester credit hours associated with the course. The semester credit hours for the exempted course can be obtained by taking a RADI elective course or additional clinical hours. Transfer of coursework for credit is described below.

Transfer of Coursework for Credit. If a student has successfully completed graduate level coursework that is duplicative of required or elective DMP courses, it is possible that transfer of course credit may be allowed. A written request for consideration of transfer of course credit in substitution for a given DMP course must include the following documentation and be submitted to the DMP Program Director through the DMP Program Coordinator.

1. A written request that includes a comprehensive description of the prior course detailing when and where completed, course semester credit hours, and details of course content and objectives.
2. An official copy of the student's transcript that indicates successful course

completion and the grade issued.
3. A copy of the course description from the catalog that was in effect during the semester the course was taken.
4. A course syllabus is required.

If the transfer of credit request is approved by the DMP COGS, the DMP Academic Coordinator will prepare a request for transfer of course credit (on GSBS form) and submit it to the GSBS for consideration/approval by the Dean. In no case will the allowable semester credit hour(s) of transfer for a given course exceed that of the corresponding DMP course.

Attendance

Attendance. Attendance requirements for regularly scheduled classes, laboratories, and clinic periods are the option and prerogative of the course instructor for that particular portion of the curriculum. The policy regarding attendance for each course is announced by the instructor at the first meeting.

Unexcused absences in courses in which attendance is required may be considered sufficient cause for failure. Excused absences may be granted by the course director in such cases as illness or personal emergency. Such leaves are considered on an individual basis, and verification of the reason for the absence may be required. It is the responsibility of the student to take the initiative in arranging with the faculty to make up work that is missed.

Absence Makeup. Makeup of absences (both excused and unexcused) is allowed at the discretion of the Course Director.

Ethics/Professionalism Policy

The DMP Program expects all students to exhibit the highest standards of conduct, honesty, and professionalism. Academic misconduct includes activities that undermine the academic integrity of the institution. The University may discipline a student for academic misconduct as outlined in the UT Health Science Center at San Antonio **Catalog** and **Handbook of Operating Procedures**. Academic misconduct may involve human, hard-copy, or electronic resources. Policies of academic misconduct apply to all course-, department-, school-, and university-related activities including conferences and off-campus performances as well as research work (including lab experiments, data collection, and analyses). All cases of academic misconduct must be reported to the Dean of the Graduate School of Biomedical Sciences (GSBS) and the seriousness of the violation may be taken into account in assessing a penalty. Academic misconduct includes, but is not limited to, the following:

Cheating. Any attempt to use or provide unauthorized assistance, materials, information, or access in any form and in any academic exercise or environment is considered cheating

and is expressly forbidden.

Fabrication. A student must not falsify or invent any information or data including, but not limited to, records or reports, laboratory results, data analyses, and citation to the sources of information.

Plagiarism. Plagiarism is defined as presenting someone else's work as one's own. Ideas or materials taken from another source for either written or oral use must be fully acknowledged. The adoption or reproduction of ideas, opinions, theories, formulas, graphics, or research results of another person without acknowledgment is expressly forbidden. Credit must be given to the originality of others whenever:

- Quoting the works of another
- Using another person's ideas, opinions, or theories
- Paraphrasing the words, ideas, opinions, results, or theories of others
- Borrowing facts, statistics, or illustrative material
- Offering materials assembled or collected by others

Facilitating Academic Dishonesty. A student must not intentionally or knowingly help another student commit an act of academic misconduct, nor allow another student to use his/her work or resources to commit an act of misconduct.

DMP Graduate Faculty

The DMP COGS assesses the qualifications of each individual prior to recommendation to the Dean of the GSBS for their appointment to the DMP Graduate Faculty. The following must be submitted *via* e-mail to the DMP Program Coordinator for DMP COGS assessment:

- NIH Biosketch (PDF)
- All college transcripts

In consideration of individuals for membership in the DMP Graduate Faculty, emphasis will be placed upon the following:

- Experience and accomplishments in the provision of mentored clinical training
- Board certification in either imaging or therapy with a minimum of 2 years of clinical experience

- Research productivity (publications)
- Teaching excellence
- Other scholarly activities

Consistent with the by-laws of the GSBS, all DMP Graduate Faculty will be automatically reviewed at least once every three (3) years

A list of current DMP Graduate Faculty is included in the Appendix

Completion of the DMP Program

***Recommendation for Granting the DMP Degree*.** Upon satisfactory completion of all degree requirements, the DMP COGS must review and approve the recommendation for graduation; the DMP COGS Chair will then submit a recommendation form to the GSBS Graduate Faculty Council (GFC) through the Dean of the GSBS for further consideration and approval.

Helpful Online Connections

Graduate School of Biomedical Sciences	http://gsbs.uthscsa.edu/
GSBS Application for Admission	http://apply.embark.com/grad/UTHSCSA/
Office of Student Services (Registrar)	http://students.uthscsa.edu
Class Times and Locations	http://uthscsa.edu/fsprec/schedules.asp
Office of International Services	http://www.uthscsa.edu/ois
UT Health Science Center Catalog	http://catalog.uthscsa.edu/

UT Health Science Center Handbook of Operating Procedures (HOP)	http://www.uthscsa.edu/hop2000/

Appendices

2016 - 2017
Committee on Graduate Studies
(DMP COGS)

Michael A. Charlton, Ph.D

Geoffrey D. Clarke, Ph.D.

Richard Crownover, M.D., Ph.D.

Alonso N. Gutiérrez, Ph.D., M.B.A., **DMP Vice-Chairman**

Nikos Papanikolaou, Ph.D.

James Prete, Ph.D.

Sotirios Stathakis, Ph.D., **DMP COGS Chairman**

2016 – 2017
DMP Graduate Faculty

Michael A. Charlton, Ph.D.
Kedar Chintapalli, M.D.

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Richard Crownover, M.D., Ph.D.

Alonso N. Gutiérrez, Ph.D., M.B.A.

Chul Ha, M.D.

Paul Jerabek, Ph.D.

Neil Kirby, Ph.D.

Jack L. Lancaster, Ph.D.

Pamela Otto, M.D.

Nikos Papanikolaou, Ph.D.

Sotirios Stathakis, Ph.D.

Rajeev Suri, M.D.

Wayne A. Wiatrowski, Ph.D

Course Descriptions

RADI 5005 Fundamentals of Radiation Dosimetry – 3 Credit
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.

RADI 5007 Statistics in Radiological Sciences. 3 Credit Hours
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 learn the theory behind these methods and apply them to actual and simulated problems in the Radiological Sciences using the R statistical programming environment.

RADI 5015 Physics of Diagnostic Imaging I. 3 Credit Hours
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. Prerequisites: consent of instructor.

RADI 5020 Principles of Health Physics I. 3 Credit Hours
This course covers the basic principles of protection dealing with the major forms of ionizing radiation.

RADI 5025 Molecular Oncology & Radiobiology. 1.5-3 Credit Hours
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.

RADI 6012 Physics of Nuclear Medicine. 3 Credit Hours
This course is a study of physical principles of planar, SPECT, and PET radionuclide imaging; instrument theory; dosimetry; computer uses; and safety considerations.

RADI 6016 Diagnostic Imaging Physics II. 3 Credit Hours
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. Prerequisites: consent of instructor.

RADI 6019 Physics Measurements in Imaging II. 3 Credit Hours
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. Prerequisites: RADI 6016.

RADI 6023 Clinical Medical Physics. 1-9 Credit Hours
This course allows students to observe professional medical physicists in a clinical setting and learn the roles of various other medical professionals in the Radiology and Radiation Oncology medical clinic. Students participate in simple tasks related to medical physics data and are shown how to evaluate data to provide reports and tables. Students are also trained in basic safety and ethical issues in clinical medicine and the professional conduct of the medical physicist, following the guidelines established in AAPM Report 109. This material is intended to cover ethical issues in clinical medicine and in the professional conduct of the medical physicist .The term ethics is used here in the sense of a permissible standard of conduct for members of profession. While different people may have different opinions of what is ethical professions always have certain ethical standards or codes of conduct that are compiled in written form and are generally by practitioners. In addition to becoming familiar with written codes of conduct, the student shall be introduced to commonly encountered situations in which a choice of actions is available, some of which would be considered unethical and some of which be considered ethical, according to current standards of care of practice. These would include more specific issues that arise with respect to recent patient privacy concerns and legislation specific to the Health Insurance Portability and Accountability Act (HIPAA) and compliance both in clinical practice and research. A case-based approach in a seminar setting with class participation is utilized. This allows the student to put him or herself in the place of an individual who faces an ethical dilemma and to explore variations of the case that is presented. Other faculty members are also encouraged to attend, to offer comments, and to relate situations that they encountered either first- or secondhand.

RADI 6024 Radiological Anatomy & Physiology. 3 Credit Hours
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.

RADI 6030 Physics of Radiotherapy. 3 Credit Hours Theory, design, and operation of radiation producing equipment used in radiation therapy. Exposure and absorbed dose calculations, patient dosimetry, treatment planning, and use of computers in radiation therapy.

RADI 6031 Physics Measurements in Radiotherapy I. 3 Credit Hours
Performance of measurements on radiation therapy equipment used to determine therapy treatment parameters is the opportunity for study in this course.

RADI 6033 Advanced Radiotherapy Physics. 3 Credit Hours
This course includes the coverage of advanced radiation therapy special topics: intensity modulated radiation therapy, advanced brachytherapy, and radiation therapy shielding.

RADI 6035 Physics Measurements in Radiotherapy II. 3 Credit Hours

In this course students will have the opportunity to gain further 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. Prerequisites: RADI 5005, RADI 6030, and RADI 6031.

RADI 6038 Methods in Dosimetry and Shielding Design

The goal of the course is to teach students the guidelines established by the American Association of Physicists in Medicine (AAPM) and the National Council of Radiation Protection (NCRP) relating to patient dosimetry and shielding design of radiological facilities. Students will be responsible to read, comprehend, and learn the selected Task Group reports. Students will be evaluated of their knowledge by weekly quizzes and a final oral evaluation held at the end of the course. Successful completion of the course will be accomplished when the student is knowledgeable and understands the recommendations for a practicing clinical physicist. Learning is accomplished through attendance of weekly conferences, assignments (presentation of assigned reports and guidelines), and exercises that simulate real-world situations.

RADI 6049 Introduction to MRI. 2 Credit Hours

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.

RADI 6050 Magnetic Resonance Imaging. 2 Credit Hours

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. Prerequisites: RADI 6049.

RADI 6051 Statistical Parametric Mapping. 3 Credit Hours

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.

RADI 6091 Special Topics – Professionalism and Ethics

Students will be trained in professionalism and ethical issues in clinical medicine and the profession conduct of the medical physicists following the guidelines established in AAPM Report 109.
Topics will include: Elements of a profession, Definition of a professional, Elements of professionalism, How is professionalism judged?, Do's and don'ts of professionalism, Physician's charter, applicability to

physicists, Qualities of leaders, Rules of leadership, Causes of leadership failure, Ethics of a profession, Ethics of an individual, Interactions with colleagues and co-workers, Interactions with patients and the public, Confidentiality, Peer review, Negotiation skills, Relationships with employers, Conflicts of interest, Ethics in research, Use of animals in research, Use of humans in research, Relationships with vendors, Publication Ethics, History of Medical Ethics, Professional Organizations in Medical Physics, Professional credentials and licensure.

RADI 6097 Research (Capstone Project). 1-9 Credit Hours

This course is supervised research under the guidance of a faculty member. The projects may often take the form of a Practice Quality Improvement (PQI) project in patient safety, accuracy of interpretation and calculations, report turnaround times, practice guidelines and standards and surveys, as prescribed by the American Board of Radiology for Maintenance of Certification. (http://www.theabr.org/moc-rp-comp4)

RADI 7005 Treatment Planning in Radiation Therapy. 3 Credit Hours

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.

RADI 7006 Treatment Planning in Radiation Therapy II. 3 Credit Hours

This course is a continuation of RADI 7005. It presents an in-depth study of multidisciplinary treatment of the cancer patient from the clinician's viewpoint. Students are required to master concepts specific to site-specific disease including: histopathology, etiologic and epidemiology factors, detection and diagnosis, tumor stage and grade, routes of metastases, dose fractionation and prognostic factors. This course is designed to approach each cancer type by anatomic system, addressing treatment factors with increasing degrees of complexity. Assigned exercises organized by treatment site and procedure type will be carried out under the direct supervision of an assigned advisor. These will be both simulated and real case assignments.

RADI 6025. Therapy Clinical Rotation I. (12 Credit Hours)

The first clinical rotation is designed to give an introduction and an overview of all the clinical processes and the basic safety training. In detail the student will cover the following topics: employee orientation, radiation oncology orientation, HIPAA training, introduction to radiation protection, introduction to nursing and introduction to simulation, introduction to LINACs, LINAC QA and warm up, monitor unit calculations, electronic medical records orientation, regulations and professional recommendations.

RADI 6026. Therapy Clinical Rotation II. (12 Credit Hours) In the second semester of the clinical rotation, the students will cover the following topics: on board MV and kV imaging, ExacTrac

design, function and daily, monthly QA, Linac Annual QA and the RPC process, TBI and TSE, IMRT planning, LDR planning and the COMS eye plaque process, patient safety, and learn shielding techniques for CT, kV imaging, LINAC and isotopes.6037 and 60

RADI 6032. Therapy Clinical Rotation III. (12 Credit Hours)

In the third semester of the clinical rotation, the students will cover the following topics: treatment plan checks, weekly chart checks, brachytherapy planning and QA, LINAC design, SRS Treatment Planning (SRS) and daily, monthly and annual QA, participation in all aspects of SBRT treatment and treatment planning QA.

RADI 6034. Therapy Clinical Rotation IIII (12 Credit Hours)

In the fourth semester of the clinical rotation, the students will cover the following topics: medical dosimetry rotation, ultrasound, PET, MRI, SPECT imaging in radiotherapy and acceptance and commissioning of major equipment.

RADI 6027. Imaging Physics Clinical Rotation 1. 12 Credit Hours.

The first clinical rotation is designed to give an introduction and an overview of all the clinical processes and the basic safety training. In detail the student will cover the following topics: employee orientation, clinical radiology department orientation, HIPAA & MIPPA training, introduction to safety in the radiology clinic, introduction to general radiography, introduction to hard copy devices and image displays, electronic medical records orientation, introduction to ultrasounds imaging, introduction to mammography, regulations and professional recommendations.

RADI 6039. Imaging Physics Clinical Rotation 2. 12 Credit Hours

The second clinical rotation will include safety in the radiological clinic, nuclear medicine and MRI, introduction to fluoroscopy, computed tomography, magnetic resonance imaging, nuclear medicine and regulations, professionalism and ethics.

RADI 6040. Imaging Physics Clinical Rotation 3. 12 Credit Hours

The third clinical rotation will include safety in radiology clinic, advanced general radiography, advanced breast imaging and image-guided stereotactic breast biopsy, dental radiography and cone beam CT, dual-energy x-ray absorptiometry (DEXA), advanced fluoroscopic imaging and special procedures, intermediate nuclear medicine and regulations, professionalism and ethics.

RADI 6043. Imaging Physics Clinical Rotation 4. 12 Credit Hours

The fourth clinical rotation will include safety in radiology clinic, imaging informatics, advanced imaging informatics, advanced magnetic resonance imaging, advanced nuclear medicine physics, regulations, professionalism and ethics.

Contact Information

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