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University of Miami

Department of Radiation Oncology

Medical Radiation Dosimetry

Graduate Program

Student Handbook

Contents

Program Overview:

The graduate program (Master of Science or Certificate) in Medical Radiation Dosimetry is a degree for those who seek professional qualification and employment as medical radiation dosimetrists. This 38-credit, one-year program grounds the student in the rudiments of clinical oncology, radiation physics, radiation biology, human anatomy, medical imaging, and radiation treatment technology, which the radiation dosimetrist applies continually in practice. Graduates can expect to enter employment directly as radiation dosimetrists eligible for professional certification. The program requires one year of full-time commitment, a substantial part of which is clinical training in the University of Miami Department of Radiation Oncology under the supervision of practicing dosimetrists and medical physicists. Of the 38 credits required, 12 are traditional classroom courses, eight are research seminar courses, in which students review current academic literature and formulate a research project to be completed by the year's end. The remaining 18 credits are clinical with a lecture component. A final comprehensive exam is also required.

Program Mission and Goals: The mission of the University of Miami's graduate program in Medical Radiation Dosimetry is to equip students with the skills and knowledge to provide excellent medical dosimetry service to radiotherapeutic practice and to foster students' curiosity, critical and analytical thinking, and creativity so they can contribute to the growth of their field.

The program's primary educational objective is to provide clinical, didactic, and research experience consistent with curricular recommendations of the American Association of Medical Radiation Dosimetrists (AAMD) and the Joint Review Committee on Education in Radiologic Technology (JRCERT) such that upon program completion graduates can work as entry level medical radiation dosimetrists and pass professional certification examination by the Medical Dosimetrist Certification Board (MDCB), which they will be eligible to take pending the program's accreditation by the latter body JRCERT.

While these goals are highly specific, the program commits itself not merely to the training of niche workers, but also to the cultivation of students' interpersonal, technical, and scientific communication skills, to the development of the critical appreciation of the contemporary research in their field, and to the multiple skills, analytical, integrative, discursive, and computational, and creative, that are called upon by those engaged in original research.

Students will have a structured, immersive clinical experience in the University of Miami Department of Radiation Oncology, consisting of rotations through major areas of medical dosimetry practice, supervised by University of Miami medical dosimetrists and medical physicists and supplemented by parallel classroom instruction in the practice of medical dosimetry. Didactic courses will be taught by faculty physicians, medical physicists, and biologists and will provide foundational training in core topics of anatomy and oncology, medical physics, radiation biology, and radiation oncology quality management. Finally, under the supervision of medical physicists, students will review systematically the recent medical dosimetry and allied literatures so that they may develop and perform capstone research projects conceived with the explicit goal of publication in any of several journals of medical dosimetry, medical physics, or radiation oncology.

Student Learning Outcomes:

Upon completion of the program, students will be able to:

- demonstrate medical dosimetry treatment planning skills by generating for multiple treatment sites clinically acceptable plans
- evaluate treatment plans and successfully formulate, apply, and justify orally and in writing strategies for their improvement
- accurately and precisely communicate radiotherapy treatment planning issues orally and in writing with dosimetrists, medical physicists, and radiation oncologists
- successfully appreciate, report on orally and in writing, and analyze contemporary research efforts *(for those pursuing the MS degree)*
- successfully propose, implement, and report on a novel research project and to participate in its preparation for publication *(for those pursuing the MS degree)*.

Admissions Requirements:

The program accepts up to five students each year and evaluates applications on a rolling basis. Students may begin their studies in the fall term only. Candidates must apply online through a Centralized Application Service (CAS). There is a non-refundable $80 processing fee.

Applicants for admission must hold at least a Bachelor of Science or Bachelor of Applied Science Degree or equivalent, with a minimum grade point average of 3.0 or must have graduated from an accredited radiation therapy program and hold a bachelor's degree with minimum grade point average of 3.0. Successful candidates will have completed post-secondary work in basic mathematics and physics, biology, anatomy and physiology, and oral and written communication. Those with insufficient background may be admitted provisionally at the discretion of the admissions committee while they do remedial work. Preference will be shown to those who have completed at least one year of physics and calculus. Submission of TOEFL scores will be required of candidates who have not earned degrees in the United States.

Selection of students into the program will be done through the admissions committee which consists of the program director, educational coordinator, chief of medical physics, chief of medical physics, a physician representative, and a dosimetrist preceptor representative. The interviews are conducted in person or video based. The ranking of the candidates is done based on the academic credentials (e.g., GPAs), personal statement, recommendation letters, related experience, and interview performance.

The University of Miami Miller School of Medicine is committed to providing equal opportunity and an educational and work environment free from discrimination on the basis of sex, race, color, religion, national origin, disability, age, sexual orientation, gender identity, genetic information, marital status, citizenship status, or other protected classification.

The program, insofar as it responds to a regional need, is expected to attract students of wide diversity because of the demographics of south Florida. It will admit applicants of diverse

educational backgrounds as well, considering applications from all science, engineering, and other technical graduates, as well as from those already established in radiation therapy even if they lack science or engineering degrees.

Program Administration: The program is sponsored and approved by University of Miami Graduate Studies and is administered by the University of Miami, Department of Radiation Oncology. The department is chaired by Professor Alan Pollack, M.D., Ph.D. Dr. Frank serves as the CEO and President of the Miami. Instructors for the program are all members of the Department of Radiation Oncology, which comprises radiation oncologists, medical physicists, radiation biologists (all UM faculty), and medical dosimetrists. Our Medical Dosimetry Program has two main campus and two other clinical practice stings at off-site Sylvester Comprehensive Cancer Center (SCCC) treatment facilities:

University of Miami Miller School of Medicine
SCCC Main
Miami, FL
305-
Educational Coordinator: William Amestoy, CMD
Preceptor: Hayden Guerrero, MS, CMD

University of Miami Miller School of Medicine
SCCC West
Miami, FL
305-
Preceptor: Jonathan Cyriac

University of Miami Miller School of Medicine
SCCC Lennar Medical Foundation
Coral Gables, FL
305-
Preceptor: Pablo Pereira, CMD

University of Miami Miller School of Medicine

SCCC Deerfield Beach
Deerfield Beach, FL
305-
Preceptor: Mike Zyma, CMD

The University of Miami Radiation Oncology Department employs 10 MDCB certified dosimetrists. Four of these dosimetrists are located at the SCCC main, four of them are located at SCCC West, two are located at SCC Deerfield Beach and two are located at SCCC Lennar Medical Foundation. The faculty consists of sixteen medical physicists, sixteen radiation oncologists, and four radiation biologists.

The clinical practicum is done under the supervision of a medical dosimetrist or medical physicist and complementary lectures focusing on seven services: radiotherapy treatment, radiotherapy simulation, three-dimensional external beam planning, intensity modulated external beam planning, brachytherapy planning, stereotactic radiotherapy planning, and special procedures. All clinical practicums are completed during the three-term sequence in an order to be scheduled by the participating clinical sites.

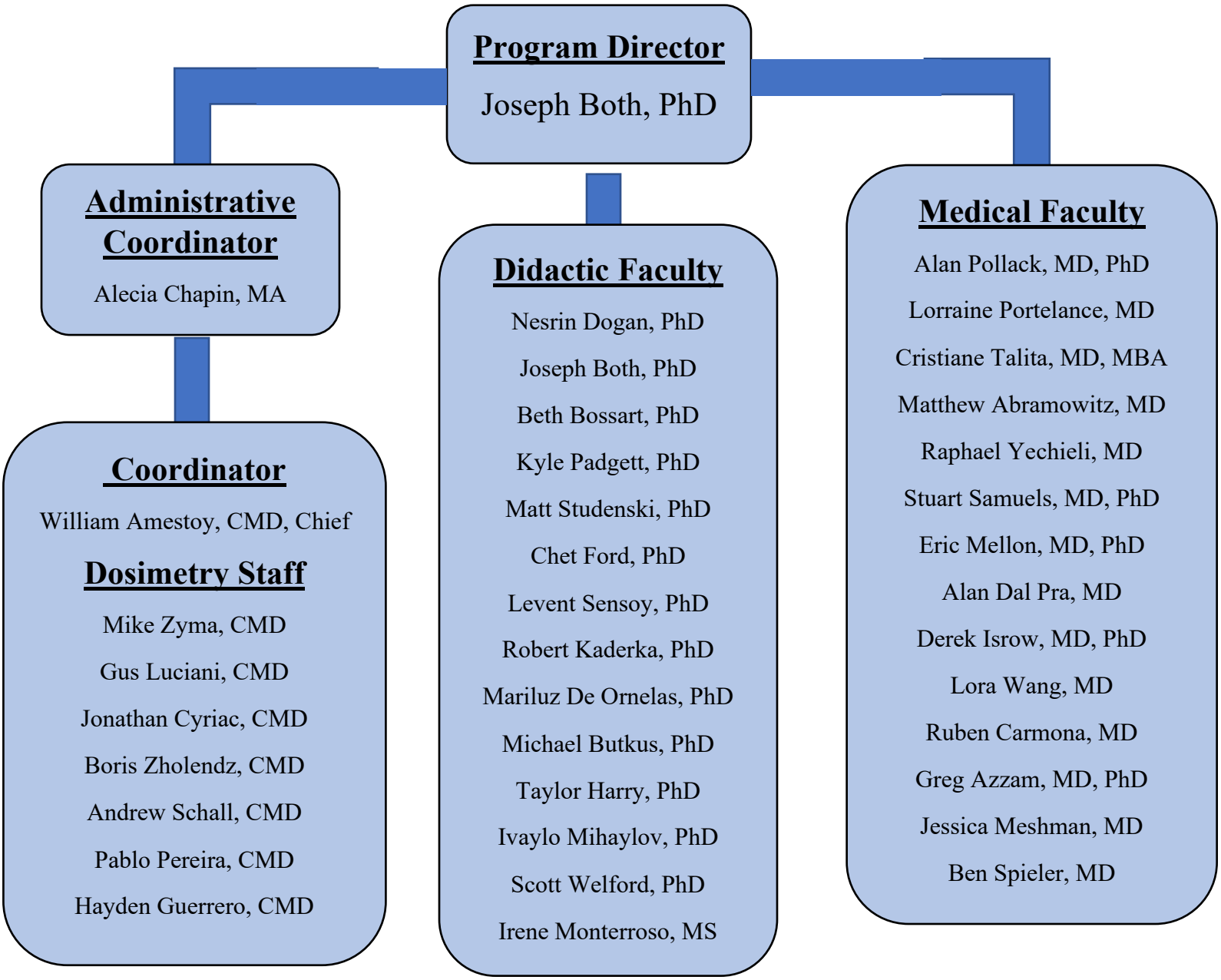
Each student is required to keep a logbook of planned cases to ensure that treatment planning for all treatment sites is covered according to the required curriculum.

Students are encouraged to attend weekly new patient conference where the treatment plans for all new patient starts are reviewed and discussed by radiation oncologists, medical physicists, dosimetrists, and residents. Students are also encouraged to attend the other conferences within the department, including resident lectures, ground rounds presentations, other faculty and trainee lectures and journal club.

The University of Miami Hospitals and clinics are accredited by JCAHO and all Radiation Oncology facilities are accredited by the ACR. Table 1 shows the organizational chart for the Medical Dosimetry Program. Joseph Both, PhD, assistant professor, serves as the director of the

Medical Dosimetry Program. He has the overall responsibility for the program and coordinates the physics didactic teaching efforts. William Amestoy, CMD, is the chief dosimetrist and serves as the educational coordinator and is responsible for coordinating the clinical practicum of the students in the program. Nesrin Dogan, PhD, is the vice chair and chief of Medical Physics Division and serves as the physics advisor for the students. Ben Spieler, MD, assistant professor, radiation oncologist, will coordinate teaching efforts of medical faculty for the program. Scott Welford, PhD, associate professor, radiation oncology biology division chief, will coordinate the radiation biology teaching effort. The administrative aspects of the program will be coordinated by Alecia Chapin, MA, senior administrative assistant.

Table 1: Medical Dosimetry Program Organizational Chart



Faculty: Medical Dosimetry Faculty, excluding dosimetrist Program faculty (who do not have University faculty appointments), have rights and responsibilities as outlined in the *University of Miami Faculty Manual, 2021-2022*, available at https://fs.miami.edu/_assets/pdf/facultysenate/Documents/FacultyManual.pdf, and are bound by the policies therein. Dosimetrist Program faculty are by Program policy bound to follow those parts of the *University of Miami Faculty Manual* dealing with ethical matters, academic matters, academic regulations, and faculty-student relations.

In addition, the program adopts guidelines delineating Program faculty obligations directly *Standards for an Accredited Educational Program in Medical Dosimetry (2021)* and which are reproduced here with minor revision:

Program Director:

Assuring effective program operations;

Overseeing ongoing program accreditation and assessment processes;

Participating in budget planning;

Participating in didactic and/or clinical instruction, as appropriate;

Maintaining current knowledge of the professional discipline and educational methodologies through continuing professional development;

Assuming the leadership role in the continued development of the program.

Clinical Coordinator:

Correlating and coordinating clinical education with didactic education and evaluating its effectiveness;

Participating in didactic and/or clinical instruction;

Supporting the program director to assure effective program operations;
Participating in the accreditation and assessment processes;

Maintaining current knowledge of the professional discipline and educational methodologies through continuing professional development;

Maintaining current knowledge of program policies, procedures, and student progress.

Didactic Faculty:

Preparing and maintaining course outlines and objectives, instructing, and evaluating student progress;

Participating in the accreditation and assessment process;

Supporting the program director to assure effective program operations;

Participating in periodic review and revision of course materials;

Maintaining current knowledge of professional discipline;

Maintaining appropriate expertise and competence through continuing professional development.

Clinical Preceptor:

Maintaining knowledge of program mission and goals;

Understanding the clinical objectives and clinical evaluation system and evaluating students' clinical competence;

Providing students with clinical instruction and supervision;

Participating in the assessment process, as appropriate;

Maintaining current knowledge of program policies, procedures, and student progress and monitoring and enforcing program policies and procedures.

Clinical Instructor:

Understanding the clinical competency system;
Understanding requirements for student supervision;

Evaluating students' clinical competence, as appropriate;

Supporting the educational process;

Maintaining current knowledge of program clinical policies, procedures, and student progress.

Facilities and Equipment:

Facilities

The students enrolled at Medical Dosimetry program will access to two conference rooms within the Radiation Oncology Department, Sylvester Comprehensive Cancer Center. These conference rooms are equipped with large TV monitors and can also be accessed remotely and are used for all didactic lectures, weekly new patient conferences, ground rounds presentations and any other presentations and meetings.

The students will have access to multiple treatment planning systems, including Varian Eclipse (ver. 16.1) for both photon, electron and proton planning, Varian Ethos Adaptive treatment planning and delivery system, ViewRay MR-Guided Linac system, Elekta Oncentra LDR and HDR planning and delivery system. Advanced image registration software (MIM and Velocity) is also available.

The students have access to all the libraries on academic and medical campus. The papers can also be accessed free through internet.

The students are provided with a desk with dual-screen computers in the dosimetry room. The multiple workstations are available for students to work on their treatment planning assignments. The remote access via Citrix and remote desktop are available if it is needed.

Equipment

The Department of Radiation Oncology at University of Miami Miller Scholl of Medicine has following equipment

Imaging Devices

- 1 Siemens Somatom 20 slice
- 3 Siemens Somatom 64 slice, dual energy
- GE 3T MR Scanner
- Philips PET/CT

Linear Accelerators

- Varian TrueBeam with OBI/CBCT (4)

- Varian Edge (1) with OBI/CBCT – being installed
- Varian Ethos with CBCT (1)
- Varian Trilogy with OBI/CBCT (1)
- Varian 23 IX with OBI/CBCT (1)
- ViewRay Meridian Guided Linac (1)

Particle Accelerators

- Varian ProBeam Proton Therapy with OBI/CBCT (1)

Other Treatment Delivery Devices

- Elekta Gamma Knife Perfexion
- Elekta Flexitron HDR unit
- Elekta LDR Prostate Seed Implant
- CivaSheet
- Y90 microspheres
- Eye Plaques
- Varian RPM respiratory motion management
- Vision RT OSMS surface localization and tracking system

Treatment Planning Systems

- Varian Eclipse
- ViewRay
- Nucletron Oncentra (LDR and HDR)

Safety:

Training

All students are required to complete radiation safety training during their formal orientation to the radiotherapy clinic, which is given by a qualified medical physicist annually at the beginning of the required course Medical Dosimetry Practicum I. A student who has not completed this is ineligible for any clinical training.

Personnel Monitoring

Medical dosimetry students must always wear personnel monitoring devices in the clinic areas. Devices will be read monthly. Reports for all badged personnel are posted in in the Sylvester Main treatment area. It is each student's responsibility to review and initial the report. If dose exceeds normal limits (0.125 rem or 1.25 mSv per quarter) the University of Miami Director of Radiation Control or program director will inform the student both in person and in writing. In case of known or suspected accidental exposure (likely to exceed normal limits of 0.125 rem or 1.25 mSv per quarter), the student must *immediately* notify the program director, who will report to the Director of Radiation Control and formulate a response to the event.

If a badge is lost, damaged, or otherwise concerning to the student, the student should contact the program director.

Staff Responsibility

It is a policy of the Department of Radiation Oncology, that only faculty medical physicists and faculty physicians are able to approve medical dosimetry treatment plans and calculations, and that joint approval by both a physicist and a physician are required before treatment using such calculations or plans commences. All calculations and plans performed by dosimetry students must be reviewed for correctness by staff dosimetrists and revised, if necessary, before review by physicists and physicians. Patient safety depends on this policy's being implemented without fail.

It is a policy of the Department of Radiation Oncology that direct contact procedures may be performed with student assistance only if the student is supervised in person by a certified

radiotherapy technologist, dosimetrist, medical physicist, or radiation oncologist who has assessed the student's relevant experience and knowledge and decided the student's participation is appropriate.

Magnetic Resonance Environments

Magnetic resonance environments pose hazards to improperly screened individuals. In the interest of preserving the best possible student safety, students will have no access to MR environments.

Curriculum:

Program Curriculum

The graduate program offers both the graduate certificate (30 credit hours) and the Master of Science degree (38 credit hours), with the requirements of each to be fulfilled in a single academic year consisting of two semesters and a summer term. The didactic and clinical requirements for the certificate and the degree are the same, but the master's degree requires eight additional credit hours devoted to research methods, review, and practice, while the certificate requires none. The program adopts the 2019 American Association of Medical Dosimetrists curricular guidelines, with the didactic curriculum consisting of 12 credit hours of lecture-based coursework: Clinical Oncology and Anatomy for Medical Dosimetry, Quality and Safety in Radiotherapy, Radiation Oncology Physics I and II, and Radiation Biology for Medical Dosimetry, and the clinical curriculum consisting of 18 credit hours of practical training, designated Medical Dosimetry Practicum I, II, and III, supervised by clinical preceptors and supplemented by lecture. The detailed correspondence between these courses and the AAMD curricular guidelines is summarized in the curriculum analysis grid below.

The research component of the Master of Science curriculum is designated Seminar in Medical Dosimetry I, II, and III. This year-long experience provides a foundation in contemporary research issues and techniques in medical radiation dosimetry and related medical physics topics via lectures in research methodology, faculty guided literature review, and the students' formulation and completion under faculty supervision of an original research project and its defense. Satisfactory oral presentation of the project and examination on it by a committee of instructors are required.

Throughout their practical experience in courses Medical Dosimetry Practicum I, II, and III (6 credit hours each, offered in fall, spring, and summer terms respectively), students must demonstrate specific clinical competencies, which include the minimal clinical competencies described in the 2019 AAMD guidelines for external beam therapies of head and neck, thorax, abdomen, pelvis, extremities, and brachytherapy, as well as additional competencies in total body irradiation, total skin irradiation, proton treatment planning, and stereotactic radiosurgery treatment planning.

At the beginning of each of Medical Dosimetry Practicum I, II, and III, students are informed of the competencies they are expected to develop during that term. Assigned competencies for a given term may vary from student to student depending upon the clinical training sites to which they are assigned, because some competencies can be developed at only one site, for example those related to brachytherapy or proton therapy, while competencies in linear accelerator treatment planning may be developed and examined equally well at all sites. The director and coordinator schedule student rotation through training sites such that all students are given equal opportunities to develop all required competencies, and they revise this schedule as necessary.

Working with clinical preceptors, who are assigned per student and per topic, students develop and follow a pathway to competency, which, at the discretion of preceptor, coordinator, and director may include informal or professional conference, lecture, reading, report writing, journaling, and written examination, and *shall* include planning of practice cases and live cases as they are available. No less frequently than once per two weeks, the student's progress toward each competency is reviewed by the corresponding preceptor in conference with the student, and the results are reported to the coordinator and director. For each competency topic, the student participates in a competency assessment exercise, which at minimum requires unguided performance of the clinical task and which may also require oral or written examination or reporting. The precise requirements of each assessment are communicated by the preceptor at the beginning of the term. Assessments are scheduled by joint agreement of the preceptor and student and evaluated on a pass-fail scale by the preceptor. It is expected that all assessments be passed during the term in which they are originally scheduled. Consequently, a student shall be given multiple attempts to pass any competency assessment during the term, subject to the following conditions: a student falls from good standing if either the total number of competency assessment failures exceeds seven or the total number of failures for a single competency assessment exceeds three. A student who is not in good standing is removed from program.

All courses, both didactic and practical, are held in person, with the didactic courses having regular meeting times approximately equivalent to one hour per week per credit hour, and with lecture, reading, and discussion the primary modes of instruction. The practical courses are likewise held in person and require students to appear at their assigned clinics daily. The primary modes of instruction in practical courses are observation, practice, lecture, reading, and

discussion, all requiring students' physical presence in their assigned clinics. Some lectures may be delivered via the internet to accommodate students' or instructors' schedules at diverse sites, but there is no distance learning option, and neither are there part-time, weekend, or accelerated learning options.

Required Courses

Clinical Oncology and Anatomy for Medical Dosimetry	2
Medical Dosimetry Practicum I	6
Medical Dosimetry Practicum II	6
Medical Dosimetry Practicum III	6
Radiation Oncology Physics I	3
Radiation Oncology Physics II	3
Seminar in Medical Dosimetry I (required for MS only)	3
Seminar in Medical Dosimetry II (required for MS only)	3
Seminar in Medical Dosimetry III (required for MS only)	2
Radiation Biology for Medical Dosimetry	2
Quality and Safety in Radiotherapy	2
Comprehensive Written Examination	0
Capstone Research Project and Oral Examination	0
Total Credit Hours	38

Didactic and seminar courses are valued in credit hours, one unit of which correspond to 50 minutes per week of classroom instruction delivered over the 16-week semester. Thus, a course meeting twice per week for 75 minutes during an entire semester is a three-credit hour course. Practicum courses are valued in credit hours, one unit of which corresponds to 4 hours of clinical

training per week. Thus, students are required to spend 24 hours per week in clinical training. Work related to the practicum, for example reading, preparing reports or presentations, and the like, may be done outside of the 24-hour per week clinical block.

Clinical Obligations:

Documentation of Clinical Hours

Each student must keep a record of their clinical hours and each week have the hours approved by the dosimetrist. Each student is required to keep a logbook of planned cases to ensure that treatment planning for all treatment sites is covered according to the required curriculum.

Clinic Attendance

Clinical schedules will not be changed to accommodate student work schedules. Each student is required to be on campus from 8:00AM to 5:00PM, Monday through Friday. Students will be given a one-hour lunch break. Clinical education with follow the University of Miami's Graduate School Academic calendar.

Background Test

Students will be required to complete a background check prior to the beginning of the Fall semester.

Dress Code:

Students are expected to dress in business casual attire or scrubs. Students are required to wear their University of Miami Student badge while on campus.

Graduation Requirements:

The MS degree in medical radiation dosimetry requires 38 credit hours, eight of which are research based, with the remainder course and practical work. A cumulative grade point average of 3.0 is required. No transfer of credit may be used in fulfillment of these requirements.

Candidates for the MS degree will need to demonstrate competency by passing a comprehensive written examination set by an examination committee of at least three instructors during the final summer session of the program. Master's candidates must also pass an oral examination on their capstone research project. Re-examination of a student failing either exam may occur at the discretion of the committee and must be completed within one year of failure but not during the same summer session as the original exam.

Grievance Procedures:

There are two types of procedures: academic and nonacademic. Charges may be brought against a faculty member, committee, or department chair by a student. Students are first encouraged to meet with the faculty member, program director, or chair of the department in order to settle the grievance informally through open communication. The chain-of-command for grievances is:

- The person who caused the problem
- The Educational Coordinator
- The University of Miami Medical Radiation Dosimetry Program Director
- The Vice Chair and Chief of Medical Physics Division

If the issue is not resolved through open and transparent communication within the department, students are encouraged to seek assistance from the University Ombudsperson for possible resolution before initiating the formal graduate grievance process. If the issue is still not resolved, students may contact the Graduate Student Appeals Committee by reaching out to the Graduate School for details about the appeals process.

It is the goal of the University and the Program to resolve disputes involving graduate students in a fair and collegial manner. To accomplish this The University of Miami has developed a set of Graduate Grievance Procedures, published in the Academic Bulletin, https://bulletin.miami.edu/general-university-information/graduate-policies-and-procedures/academic-policies/. Students with grievances are advised to consult these procedures, whose beginning paragraphs are quoted below:

"These University of Miami Graduate Grievance Procedures provide an opportunity for the resolution of disputes involving graduate students in a fair and collegial manner. These Graduate Student Grievance Procedures supersede all prior such procedures in effect or formerly utilized at the graduate level. They do not supplant UM Students Rights & Responsibilities or any other published policy or procedure relating to graduate students.

"The formal grievance process described herein is intended for cases not involving grades or matters covered by the Honor Code, which have not been resolved at the department or program level, and it is available only after a final determination within the relevant School or College has been reached. Students are encouraged to seek assistance from the University Ombudsperson for

possible resolution before initiating the formal graduate grievance process. The procedures set forth here are applicable to any of the following types of grievances by graduate students who are enrolled in any graduate program at the University of Miami, except exclusively in the M.D. and J.D. programs:

1. grievances alleging improper dismissal or suspension from a graduate program;
2. grievances alleging the improper withholding or termination of financial support of any kind;
3. grievances alleging any other improper treatment, either substantive or procedural, of a graduate student by a faculty member, department or program, or university agency or administrator except:
    a. allegations of improper evaluation of the quality and/or quantity of academic work (see UM Student Rights & Responsibilities);
    b. allegations of unfair recommendation for employment or further graduate study;
    c. allegations of discriminatory treatment arising from the student complainant's age, race, gender, sexual preference, handicap, national origin, or religion. (Such allegations ordinarily are handled by Workplace Equity and Inclusion).
    d. grade appeals (certain appeals are reviewed by the Faculty Senate Student Affairs Committee,-FSSAC; see UM FSSAC Standard Grade Appeals Process- Graduate Students)."

Students having concerns or complaints that are not grievances according to the definitions above are advised to address their concerns or complaints in writing to the program director, who will inform the clinical coordinator and Department of Radiation Oncology leadership and potentially Graduate School leadership and forward them a copy of the complaint. With their advice, the director will respond in writing to the student by outlining the subsequent actions to be taken in working toward a resolution, which may include referral to a body or bodies outside the program.

Plan of Study:

Year One	
Fall	Credit Hours
Clinical Oncology and Anatomy for Medical Dosimetry	2
Medical Dosimetry Practicum I	6
Radiation Oncology Physics I	3
Seminar in Medical Dosimetry I (not required for certificate degree)	3
Credit Hours	14
Spring	
Radiation Biology for Medical Dosimetry	2
Medical Dosimetry Practicum II	6
Radiation Oncology Physics II	3
Seminar in Medical Dosimetry II (not required for certificate degree)	3
Credit Hours	14
Summer	

Quality and Safety in Radiotherapy	2
Medical Dosimetry Practicum III	6
Seminar in Medical Dosimetry I (not required for certificate degree)	2
Credit Hours	10
Total Credit Hours	38

Fall Term

Clinical Oncology and Anatomy for Medical Dosimetry

An introduction to the multidisciplinary practice and science of oncology including a site-based description of disease and treatment strategy with a parallel introduction to human anatomy. CT and MR imaging anatomy for radiotherapy treatment planning.

Medical Dosimetry Practicum I

The first of sequence of three courses. Clinical rotations under the supervision of a medical dosimetrist or medical physicist and complementary lectures focusing on seven services: radiotherapy treatment, radiotherapy simulation, three-dimensional external beam planning, intensity modulated external beam planning, brachytherapy planning, stereotactic radiotherapy planning, and special procedures. All rotations must be completed during the three-term sequence in an order to be scheduled by the participating clinics.

Radiation Oncology Physics I

The first of a sequence of two courses. The physics and technology of radiotherapy taught at a level appropriate for radiation oncology residents: topics in elementary physics, nuclear physics, interactions of photons, principles of dosimetry and dosimetric

measurement, dosimetry and calibration of photon and electron beams, dose calculation, and brachytherapy.

Seminar in Medical Dosimetry I

The first of a sequence of three courses with a capstone requirement of an original research effort to be completed during the summer term. A review of contemporary medical dosimetry and related medical physics and radiation oncology research in seminar format.

Spring Term

Radiation Biology for Medical Dosimetry

An introduction to radiation biology with attention to clinically used concepts: fractionated survival models, oxygenation and radiation quality effects, cell and tissue kinetics, acute effects, normal tissue response, effective and equivalent dose, and therapeutic ratio.

Medical Dosimetry Practicum II

The second of sequence of three courses.

Radiation Oncology Physics II

The second of a sequence of two courses. The physics and technology of radiotherapy taught at a level appropriate for radiation oncology residents: topics in modulated external beam radiotherapy, stereotactic radiotherapy and radiosurgery, patient motion management, image guided radiotherapy, proton therapy, special radiation procedures, quality assurance and radiation safety, andmedical imaging.

Seminar in Medical Dosimetry II

The second of a sequence of three courses.

Summer Term

Quality and Safety in Radiotherapy

A general introduction to quality, its dimensions, management, and improvement followed by topics specific to radiotherapy: patient safety and error management, quality improvement, quality assurance, and equipment and patient-specific quality control.

Medical Dosimetry Practicum III

The third of sequence of three courses.

Seminar in Medical Dosimetry III

The third of a sequence of three courses.

Academic Policies:

Time to Completion

Time to completion starts when a student begins any program in the Graduate School, whether it be a master's, doctoral or certificate program. All work must be completed within six years of the time of admission to graduate work, for those studying for the various master's degrees. Individual programs may set a shorter time period. Exceptions to the time to completion policy may be granted by the Dean of the Graduate School at the request of the Graduate Program Director.

Transfer Credits

The transfer of credits is not accepted.

Withdrawals

Military Withdrawals

Tuition refunds of 100% are granted to students who withdraw due to military service, provided they do not receive credit hour for the course (see below under "Credit Hour for Courses After the 12th Week of the Semester").

If you receive federal financial aid and withdraw before you complete 60% of the semester, a pro rate calculation will determine the amount of financial aid you have earned. It is based on the amount of time you were enrolled. This calculation is independent of any charges incurred at the university.

Credit Hour for Courses After the 12th Week of the Semester

The following statement of policy was adopted by action of the Academic Deans' Council April 14, 1967:

1. On recommendation of the Dean of the school or college, students who withdraw after the 12th week of the semester because of official orders to active duty with the Armed Forces of the United States may be awarded credit hour in any course in which they have achieved a C or better up to the time of withdrawal. Instructors

must certify that the student had achieved satisfactory accomplishment based on previous work in the course by awarding an appropriate grade. Accomplishment of less than C should be entered on the permanent record as a withdrawal without prejudice (W).

2. Credit hour granted for a course under this policy should count toward graduation.
3. There should be no refund of tuition for courses for which credit hour has been granted. Refunds of courses not awarded credit hour should be on the same basis as complete withdrawals for military service.
4. The above recommendations are procedures for determining the awarding of credit hour and do not release the student from the usual withdrawal procedures.

Veterans and children of deceased or totally disabled veterans attending the University as students under the government's educational benefits bills must also clear their withdrawal with the main campus Veterans Affairs Officials in the Office of the Registrar who can be contacted at:

Phone: 305-284-8682 or
Email: veterans@miami.edu

Leave of Absence

Leave may be obtained by petition of the Program Director followed by the approval of the Dean of the Graduate School. Leave of Absence officially stops the time to completion clock. The Petition for Leave of Absence form may be found on the Graduate School website. https://www.grad.miami.edu/

Grades and Credit Hours

The same letter grades are used for graduate and undergraduate students, but with somewhat different meaning.

A	Excellent accomplishment

B	Good accomplishment
C	Fair, but below that expected of graduate students (C- is the lowest passing grade. Some programs may require higher standards.).
S	Symbol used for satisfactory (S- used for low satisfactory and U used for unsatisfactory) thesis, dissertation, practicum, and internship credit hour. It may be used for regular courses under special circumstances with the prior approval of the instructor, department chairman, and the Dean of the Graduate School. The Graduate School considers a grade of "S" to indicate a minimum of a 3.0 GPA in a graduate course if a student has taken no prior coursework on the graduate level. A grade of "S" reflects that a student is in good academic standing.
D	Poor (not acceptable for credit hour toward the advanced degree)
F	Failure
W	Course dropped prior to the last day for withdrawing from classes as published in the official calendar of the university. Courses dropped after last date must have approval of Dean of the Graduate School. Credit hour can be earned only by successful repetition of the course.
I	Incomplete work in passing status with the instructor's permission to complete the course. (Not to be used for thesis or dissertation credit hours). The "I" should be changed to a letter grade within one (1) calendar year after it is given, unless the Academic Dean of the student's primary school or college and the Dean of the Graduate School approve the delay. If the "I" is not changed within one year, credit hour can be earned only by successful repetition of the course. (Note: Fellowships and financial aid may be withdrawn if there is an excess accumulation of "I"s on a student's transcript).
NG	Symbol assigned by Enrollment Services indicating that the instructor has not yet reported the student's grade. For a student to receive credit hour for the course, the instructor must report a passing grade prior to the student's graduation.[1]

[1] Faculty Senate Legislation #85005(B)

An average of B (3.0) is required for a graduate degree, and no "D" credit hour may be counted toward the degree. All work leading to the graduate degree and taken as a graduate student will be counted in computing the quality point average, including courses graded "D".

Award of Academic Merit

Students who obtain a 3.8 G.P.A. or better will receive an Award of Academic Merit from the Graduate School. The Award is posted on the transcript.

Quality points are awarded as follows:

A+	4.00
A	4.00
A-	3.70
B+	3.30
B	3.00
B-	2.70
C+	2.30
C	2.00
C-	1.70
D+	1.30
D	1.00
F	0.00

The quality point average is then determined by dividing the total of quality points earned by the total of credit hours attempted. The symbols "S", "W", and "I" are not counted as credit hour attempted.

Class Attendance and Absences

Regular and punctual class attendance is expected of all graduate students. It is the student's responsibility to know the instructor's policies regarding examinations, penalties for absences, and late or missed work.

V.A. students will be provided a grade report at the end of each semester period. A copy of the report will be placed in the student's permanent file maintained by the Veteran Affairs Office. Because of the far-reaching effects of these revisions in the V.A. educational benefits program, it is suggested that you exercise care and judgment in your program planning and in the selection of your courses.

University of Miami Academic Bulletin

A complete listing of policies and procedures can be found at the following website: https://bulletin.miami.edu/

Code of Ethics:

The University of Miami expects all graduate students to adhere to the highest standards of ethics and academic integrity. All forms of academic fraud are strictly prohibited. These include, but are not limited to, plagiarism, cheating, collusion, falsification, violation of professional ethics, or misrepresentation of research data. Students certify that all work (whether an examination, dissertation, thesis, research paper, research project, form of creative expression, experimental data, or any other academic undertaking) submitted for evaluation, presentation, or publication meets these standards.

Additionally, graduate students are expected to respect and appreciate the diversity of the community and to respect the rights of others, be they property, privacy, opinion, or expression. Any student found to be in violation of these standards is subject to disciplinary actions by the student's program and/or the Graduate School through the process described in the Graduate Student Honor Code. All graduate students are bound by the rules and regulations of the University of Miami that apply to them.

Program Assessment Plan:

To determine how well the Graduate Program in Medical Radiation Dosimetry meets its educational goals, this Assessment Plan directs the Program to collect data on its effectiveness outcomes and its students' learning outcomes.

The Program's educational goals, as reviewed and approved by the University in the new program approval process, are reported in the *Student Learning and Outcomes* section of this Handbook:

> The program's primary educational objective is to provide clinical, didactic, and research experience consistent with curricular recommendations of the American Association of Medical Radiation Dosimetrists and the Joint Review Committee on Education in Radiologic Technology (JRCERT) such that upon program completion graduates can work as entry level medical radiation dosimetrists and pass the professional certification examination by the Medical Dosimetrist Certification Board, which they will be eligible to take pending the program's accreditation by JRCERT.

The degree to which the goals of employment and certification of graduates are met shall be measured by the effectiveness outcomes defined by JRCERT (*Standards for an Accredited Educational Program in Medical Dosimetry*, 2021):

> Credentialing examination pass rate: The number of graduates who pass, on first attempt, the Medical Dosimetrist Certification Board (MDCB) certification examination, or an unrestricted state licensing examination, compared with the number of graduates who take the examination within the next testing cycle after graduation.
> Job placement rate: The number of graduates employed in the radiologic sciences compared to the number of graduates actively seeking employment in the radiologic sciences. The JRCERT has defined not actively seeking employment as: 1) graduate fails to communicate with program officials regarding employment status after multiple attempts, 2) graduate is unwilling to seek employment that requires relocation, 3) graduate is unwilling to accept employment, for example, due to salary or hours, 4) graduate is on active military duty, and/or 5) graduate is continuing education.
> Program completion rate: The number of students who complete the program within the stated program length. The program specifies the entry point (e.g., required orientation date, final drop/add date, final date to drop with 100% tuition refund, official class roster date, etc.) used in calculating the program's completion rate. When calculating the total number of students enrolled

> in the program (denominator), programs need not consider students who attrite due to nonacademic reasons such as: 1) financial, medical/mental health, or family reasons, 2) military deployment, 3) a change in major/course of study, and/or 4) other reasons an institution may classify as a nonacademic withdrawal.

Consequently, the Program will annually collect and indefinitely retain data relevant to the exam pass rate, job placement rate, program completion rate, and graduate and employer satisfaction as measured by surveys distributed to graduates and their employers within six months of hiring. These data will be shared in annual Program review meetings for multiple communities of interest: current students, Program faculty, and the Department's Education Committee (chaired by the Department's Vice Chair for Education). They will also be publicly available in summary form on Department and Program websites which will be updated annually with each accrual of new data.

We adopt the JRCERT standard for these data, namely, a five-year average credentialing examination pass rate of not less than 75 percent at first attempt within the next testing cycle after graduation and a five-year average job placement rate of not less than 75 percent within twelve months of graduation. Failure or predicted failure to achieve these rates will prompt the convening of a committee of the coordinator, director, and at least one other faculty member to develop an action plan to identify causes and correct them.

The Program, as the *Handbook* reports, has identified a set of collateral goals as well:

> …, the program commits itself not merely to the training of niche workers, but also to the cultivation of students' interpersonal, technical, and scientific communication skills, to the development of the critical appreciation of the contemporary research in their field and to the development of multiple skills, analytical, integrative, discursive, computational, and creative, that are called upon by those engaged in original research or tackling difficult problems.

The set of goals in the paragraph above are for convenience abbreviated as (1) the achievement of clinical competency, (2) the fostering of critical (i.e., analytical, integrative, discursive, computational, and creative) thinking, and (3) the fostering of written and oral communication

skills in multiple contexts. The *Handbook* continues by identifying learning outcomes related to these goals, where numerals in parentheses indicate the goals to which the given outcome relates:

> Upon completing the program, students will be able to:
>
> - demonstrate medical dosimetry treatment planning skills by generating for multiple treatment sites clinically acceptable plans (1, 2)
> - evaluate treatment plans and successfully formulate, apply, and justify orally and in writing strategies for their improvement (1, 2, 3)
> - accurately and precisely communicate radiotherapy treatment planning issues orally and in writing with dosimetrists, medical physicists, and radiation oncologists (3)
> - successfully appreciate, analyze, and report on (orally and in writing) contemporary research efforts *(for those pursuing the MS degree)* (2, 3)
> - successfully propose, implement, and report on a novel research project and to participate in its preparation for publication *(for those pursuing the MS degree)* (2, 3).

The Program determines how well it meets its goals by measuring learning outcomes through assessment. The following tables identify for each goal two or more associated learning outcomes, and for each learning outcome, two methods of assessment.

Goa1 l: Achievement of Clinical Competency			
Outcome1: Generate radiotherapy plans		Outcome 2: evaluate treatment plans and formulate, apply, and justify orally and in writing strategies for their improvement	
Assessment 1: Clinical competency assessments	Assessment 2: Comprehensive exam	Assessment 1: Clinical competency assessments	Assessment 2: Comprehensive exam

Goa1 2: Fostering Critical Thinking			
Outcome1: Generate radiotherapy plans		Outcome 2: evaluate treatment plans and formulate, apply, and justify orally and in writing strategies for their improvement	
Assessment 1: Clinical competency assessments	Assessment 2: Comprehensive exam	Assessment 1: Clinical competency assessments	Assessment 2: Comprehensive exam

Goa1 2: Fostering Critical Thinking			
Outcome 3: Appreciate, analyze, and report on (orally and in writing) contemporary research		Outcome 4: Propose, implement, and report on a novel research project and participate in its preparation for publication	
Assessment 1: Oral review of individual assigned research papers	Assessment 2: Written synthesis in review article form of a multiple research papers	Assessment 1: Capstone research project proposal	Assessment 2: Capstone research project defense

Goa1 3: Fostering Communication Skills			
Outcome 1: Evaluate treatment plans and formulate, apply, and justify orally and in writing strategies for their improvement		Outcome 2: Communicate radiotherapy treatment planning issues orally and in writing with dosimetrists, medical physicists, and radiation oncologists	
Assessment 1: Clinical competency assessments	Assessment 2: Comprehensive exam	Assessment 1: Clinical competency assessments	Assessment 2: Comprehensive exam

Goa1 3: Fostering Communication Skills	
Outcome 3: Appreciate, analyze, and report on (orally and in writing) contemporary research	Outcome 4: Propose, implement, and report on a novel research project and participate in its preparation for publication

Assessment 1: Oral review of individual assigned research papers	Assessment 2: Written synthesis in review article form of a multiple research papers	Assessment 1: Capstone research project proposal	Assessment 2: Capstone research project defense

The clinical competency assessments in the table above are described in the *Curriculum* section of the *Handbook*. Each clinical competency assessment exercise will be graded on a scale of high pass, pass, low pass, and fail, and since multiple assessments will be made during Medical Dosimetry Practicum I, II, and III, a substantial set of data will accumulate.

Comprehensive examination, required of all students, consisting of clinical treatment planning, oral, and written components, designed to test clinical, critical thinking, and communication skills, and also graded along each of these dimensions on a scale of high pass, pass, low pass, and fail, will provide another set of data.

Students pursuing the master's degree are assessed along critical thinking and communication dimensions throughout Seminar in Medical Dosimetry I, II, and III through oral presentation of other's work, written synthesis of related works in the style of review articles, and both oral proposal and defense of the capstone research project. All these assessments are graded along critical thinking and communication dimensions on a high pass to fail scale. These grades provide a third set of data.

The data generated in Medical Dosimetry Practicum I, II, and III and in Seminar in Medical Dosimetry I, II, and III will be collected in a continual way but reported to the coordinator and director at the middle and end of each semester or summer session. Data from the comprehensive examinations, proposals, and defenses will be reported with no delay.

It is difficult to project quantitative achievement level benchmarks because the Program has no historic data. However, this plan provisionally adopts the standard, suggested by the JRCERT effectiveness outcome standard of 75 percent, that the program expects for each type of assessment a 75 percent first attempt high pass or pass rate. Additionally, the program expects a second attempt (available for clinical competencies and Capstone research project proposal and

defense) high pass or pass rate of 100 percent. Failure or predicted failure to achieve these rates will prompt the convening of a committee of the coordinator, director, and at least one other faculty member to develop an action plan to identify causes and correct them. Thus, assessment cycle activity occurs at half-term periods.

Annually compiled data will be shared in annual Program review meetings for multiple communities of interest: current students, Program faculty, and the Department's Education Committee (chaired by the Department's Vice Chair for Education) and shall be used to solicit feedback helpful in improving the Program's assessment plan and overall administration.

This Assessment Plan shall be reviewed annually by a committee of the coordinator, director, and at least one other faculty member as part of the Program annual review, which must in accord with JRCERT recommendations, "… review its mission statement, goals, student learning outcomes, and assessment plan to assure that assessment methods are providing credible information to make evidence-based decisions," (*Standards for an Accredited Educational Program in Medical Dosimetry*, 2021).

Tuition and Financial Resources:

The tuition is $44,000 for MS degree and $34,000 for certificate program students. Financial aid is available through federal and private loans. Applicants will automatically be considered for a limited number of scholarships to offset the tuition

Health Insurance:

Graduate students enrolled full time at the University of Miami are required to obtain adequate health insurance if they do not have existing health insurance. The university offers a student health insurance plan through the student health service. The annual health insurance plan premium is added to student fees at the start of the academic year.

Pregnancy Policy:

The declaration of pregnancy is voluntary, and the university understand that when to disclose that you are expecting a child is a very personal decision. Students may declare or un-declare pregnancy at any time. This must be done in writing to the Program Director. The university has resources to help assist you in planning ahead to best balance pregnancy and school/clinical obligations. You are not required to take time off for your pregnancy or once your child is born. However, all students are permitted to take a leave of absence from their program should they chose to do so. The petition for Leave of Absence can be found at https://www.grad.miami.edu/policies-and-forms/forms/index.html. It is important that you carefully review the ramifications of taking a leave to ensure a smooth return once you are ready to return.

Students Rights and Responsibilities:

The University of Miami Student Rights and Responsibilities Handbook can be found at: https://doso.studentaffairs.miami.edu/_assets/pdf/policies/student_rights_and_responsibilities_handbook.pdf.