University of North Carolina Hospitals

Medical Dosimetry Program

Student Handbook

2023-2024

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Two (2) UNC Hospitals medical dosimetry students

Introduction

The following general information regarding policies, procedures, regulations, and schedules has been prepared for the student entering the UNC Hospitals Medical Dosimetry Program. The student should familiarize himself with these policies, procedures, etc., ask questions for better understanding, and abide by them to the best of his ability.

Students of all backgrounds are equally welcome to the program irrespective of race, sex, or national origin. Members of the program faculty are happy to discuss career opportunities and related matters in medical dosimetry with all interested students.

Mission

The UNC Hospitals Medical Dosimetry Program will prepare competent, educated, and professional entry-level medical dosimetrists who will participate in scholarly activity and enhance overall patient care (JRCERT Standard 1.1).

Goals and Student Learning Outcomes (JRCERT Standards 1.1, 6)

Goal 1: Students will be clinically competent.

A) Student Learning Outcome: Students will demonstrate acquisition of correct dosimetry treatment planning skills.
B) Student Learning Outcome: Students will evidence competency in treatment.

Goal 2: Students will demonstrate effective communication skills.

A) Student Learning Outcome: Students will effectively communicate with patients, medical dosimetrists, faculty, and staff.
B) Student Learning Outcome: Students will write at a proficient level by graduation.

Goal 3: Students will develop critical thinking skills.

A) Student Learning Outcome: Students will apply didactic concepts and information into the clinical setting.
B) Student Learning Outcome: Students will conceptualize current patient safety radiation therapy Lean A3 engineering principles.

Goal 4: Students will grow and develop professionally.

A) Student Learning Outcome: Students will demonstrate professional behaviors.
B) Student Learning Outcome: Students will participate in continuing education.

Program Description

The medical dosimetrist is a vital and essential member of the radiation oncology team. The UNC Hospitals Medical Dosimetry Program is located in the UNC Department of Radiation Oncology in Chapel Hill, NC. The UNC Department of Radiation Oncology was formed in 1987 from the UNC Division of Radiation Therapy. The UNC Division of Radiation Therapy began in 1969 with the purchase of a cobalt-60 unit.

The program course materials and practicum cover radiation protection, medical imaging/anatomy, radiation physics, radiobiology, clinical radiation oncology, quality assurance, tumor localization, dose calculations, external beam treatment planning, and brachytherapy. Clinical practicum includes chart reviews and dose calculations, record and verify system data entry, external beam (3D, IMRT, arc-based therapy) treatment planning, TomoTherapy, CyberKnife planning and treatment, brachytherapy preparation, planning, and treatment, and treatment machine quality assurance.

Special project assignments, conference attendance and presentation, and journal article reviews are also part of the curriculum.

Program Purpose

The purpose of the UNC Hospitals Medical Dosimetry Program is to fulfill its mission and goals through the completion of stated objectives. The program provides superior quality higher education with flexibility to accommodate expanding technological growth in radiation oncology and medical dosimetry created knowledge and clinical practice. The program maintains relationships with other educational programs for support and collaboration to improve medical dosimetry education.

The student has the responsibility to make the most of available educational experiences, and once enrolled, is obligated to abide by the policies and procedures of the UNC Hospitals Medical Dosimetry Program.

Non-Discrimination

The program does not discriminate in student recruitment or admissions practices on the grounds of race, color, sex, religion, gender, age, disability, marital status, national origin, or any other protected class. If the student has a question/concern about discrimination, he may contact the UNC Department of Radiation Oncology Clinical Director at (984) 215-2528 (JRCERT Standards 1.1, 1.2).

Advising

Being housed within a Carnegie Level 1 Research Institution allows the UNC Hospitals Medical Dosimetry Program to offer the student excellent supportive academic, behavioral, and clinical advisement.

The UNC Hospitals Medical Dosimetry Program director and didactic and clinical instructors are available for recruitment and pre-admissions advising as necessary. The admissions procedure for the program includes an extensive advising session. The enrolled student has an orientation advising session at the beginning of each semester.

The program director and didactic and clinical instructors are also available for individual academic, behavioral, and/or clinical advisement as needed. Each didactic instructor provides mid-semester feedback to the medical dosimetry student. Additionally, the program director meets both mid-semester and post-semester with each UNC Hospitals medical dosimetry student to discuss his/her progress through the curriculum.

Because the medical dosimetry program is housed within the UNC Department of Radiation Oncology, the program director/instructors orally communicate with each student almost daily. This type of continuous communication allows for both informal and formal feedback between the student and the program director/instructors, thus allowing a continuous type of advising between the program director/instructors and the student on academic, behavioral, and/or clinical issues. Furthermore, each clinical instructor is given anonymous student feedback by the program director.

Additionally, each UNC Hospitals medical dosimetry student has access to the UNC-Chapel Hill Libraries (5, including a dedicated Health Sciences Library) to access/check out journals/books and use the learning resources. The UNC Hospitals student also has access to the UNC Libraries via departmental Internet.

Finally, academic, behavioral, and clinical advisement is also offered by UNC School of Medicine faculty. As an external advisement measure, the UNC Hospitals School of Nuclear Medicine Technology and Molecular Imaging director is available as a student advisor for an academic, behavioral, or clinical issues (JRCERT Standard 2.2).

JRCERT Program Accreditation

The program is recognized by the Joint Review Committee on Education in Radiologic Technology (JRCERT). A copy of the Standards for an Accredited Educational Program in Medical Dosimetry is available online and from the program director. Any questions about the program may be forwarded to either the program director or the JRCERT (JRCERT Standard 1.5). The JRCERT's contact information is:

JRCERT
20 N. Wacker Drive
Suite 2850
Chicago, IL 60606-2901
Phone: (312) 704-5300
E-mail: mail@jrcert.org

In addition to being in this student handbook, the UNC Hospitals Medical Dosimetry Program's Program Effectiveness Data are also available via the JRCERT's Web site, jrcert.org (JRCERT Standard 6.2).

The medical dosimetry program effectiveness data are also on the UNC Hospitals Medical Dosimetry Program Web page (http://med.unc.edu/radonc/education/dosimetry-2/) (JRCERT Standard 6.2).

UNC Hospitals Medical Dosimetry Program's Program Effectiveness Data

Outcome	Measurement Tool	Benchmark	Timeframe	Responsible Party	Results
Attrition	Program completion rate	50%	Annual	Program Director (reported annually to the Development Committee)	2023: 0% 2022: 0% 2021: 0% 2020: 0% 2019: 2018:
Pass rate	Credentialing examination pass rate	75%	5-year average pass rate (at 1st attempt within 12 months of graduation)	Program Director (reported annually to the Development Committee)	2022: 100% 2021: 100% 2020: 100% 2019: 100% 2018: 100%
Employment	Job placement rate	75%		Program Director (reported annually to the Development Committee)	2022: 100% 2021: 100% 2020: 100% 2019: 100% 2018: 100%

The Sponsoring Institution

UNC Hospitals sponsors the medical dosimetry program. All program functions, including administrative structure (organizational structure and administrative support, as well as didactic and clinical faculty, faculty continuing medical education, and clerical support services are coordinated and administered by UNC Hospitals and UNC School of Medicine faculty and staff (JRCERT Standard 2). Moreover, the education program has a dedicated didactic classroom and dedicated student clinical workstations. The education program reviews and maintains student learning resources and student services as would be expected at a Carnegie Level 1 Research Institution (JRCERT Standard 2). Finally, the UNC Hospitals clinical medical dosimetry setting is recognized by the JRCERT. The education program has no external clinical sites (JRCERT Standard 3.1).

The UNC Department of Radiation Oncology has the following student groups/education programs: 1) UNC Hospitals radiation therapy students; 2) UNC Hospitals medical dosimetry students; 3) UNC Hospitals medical physics residents; 4) UNC Hospitals radiation oncology medical residents, and the following visiting students: 1) UNC radiologic science students; 2) UNC nursing students; and 3) UNC medical students. The UNC Department of Radiation Oncology has a tripartite mission of clinical care, research, and education. This mission correlates with the UNC School of Medicine and the greater UNC Hospitals. The University of North Carolina, UNC Hospitals, and its programs are all physically located on the contiguous UNC-Chapel Hill/UNC Hospitals campus.

Professional liability insurance coverage is taken care of by a group policy through UNC Hospitals.

Agreement to Adhere to the Program's Policies and Procedures

The student indicates acceptance of these policies and procedures by enrollment in the UNC Hospitals Medical Dosimetry Program. The program reserves the right to change these policies and procedures when in the best interest of the program. Upon implementation, the student will receive written notification of any changes. It should be noted that during orientation there is a review of the student handbook. Each student signs and dates a form that states that he understands all policies and procedures within the UNC Hospitals Medical Dosimetry Program student handbook.

Policies Governing Student Continuation and Promotion

The student is responsible for observing the policies and procedures of the UNC Hospitals Medical Dosimetry Program as they are announced in this document. The program director will assist the student with the details of his program and/or academic problems. This assistance does not relieve the student of his individual responsibility for meeting the requirements and observing the regulations of UNC Hospitals, the UNC Department of Radiation Oncology, and the UNC Hospitals Medical Dosimetry Program.

Corrective Action and Grievance Procedure: Student Right to Appeal (Due Process)

The medical dosimetry program director must address issues in which the student fails to follow dosimetry program curriculum guidelines or policies:

The issue will be adjudicated in the following manner:

A) The program director will determine the necessary course of action and present it to the student.

B) If formal discussion with the program director does not resolve the violation, misinterpretation, or inequitable application of any existing policy, procedure, or regulation, or other action issue to the student's satisfaction, the student has the right to submit a written appeal to the UNC Hospitals Medical Dosimetry Program Development Committee within 10 working days following the initial date of the issue. The appeal will then be directed to the UNC Department of Radiation Oncology Clinical Director. If the issue is not resolved to the student's satisfaction, the student has 10 working days to submit a second written appeal to the Program Development Committee. The appeal will then be directed to the UNC Department of Radiation Oncology Associate Chair for Administration. If the issue is still not resolved to the student's satisfaction, the student has 10 working days to submit a third written appeal to the development committee. The final appeal will then be directed to a mediation committee, whose members are outside the UNC Department of Radiation Oncology. This committee consists of the following members: the UNC Hospitals School of Nuclear Medicine Technology and Molculear Imaging program director, the UNC Nuclear Medicine Chair, and a UNC Nuclear Medicine student. This is the final appeal process for the student (JRCERT Standards 1.1, 1.5).

The program also assesses current student and alumni evaluations for the general overall structure and function of the education program via specific questions through its semester course evaluations and graduate surveys. The program director, faculty, and staff are always available for comments/suggestions about any component of the education program that needs improvement. If for any reason a student feels he is not being heard, he should speak directly with the program director to make sure the request/suggestion/complaint has been communicated properly.

If the student wishes to contact the JRCERT regarding a situation, he may do so with the aforementioned information.

Workplace Hazards, Harassment, Communicable Disease, and Substance Abuse

In the event that the student is concerned with workplace hazards, harassment, communicable diseases, or substance abuse, he should contact the program director immediately. The program director will work with the facility to ensure the safety of the student (JRCERT Standard 5.2).

Grades

To be eligible for a certificate in medical dosimetry, the student must satisfactorily pass all courses in the UNC Hospitals Medical Dosimetry Program curriculum. If the student's academic and/or clinical performance is considered unsatisfactory, the student will be placed on formal probation. In order to remove the probationary status, the student must make at least 80% on subsequent assignments during the next semester and complete any remedial work/examinations as required by the didactic instructor and approved by the Program Development Committee. Should the probationary status go unremoved, the student will be dismissed from the program. To satisfactorily pass a course means that the student earns a grade of at least a C. To satisfactorily pass a course in which the student makes a C-, the student must complete any remedial work/examinations as required by the didactic instructor and approved by the Program Development Committee.

Any student making a grade of D in any one course will automatically be dismissed from the program.

If the student is dissatisfied with any didactic and/or clinical grade during the course of the year, he has the right to appeal. Please see the Corrective Action and Grievance Procedure: Student Right to Appeal (Due Process) section in this document.

The grading scale for all classes will be as follows (unless otherwise indicated in site-specific syllabi):

97 and up	A+
93-96	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
63-66	D
Below 63	F

Code of Conduct

Expulsion or suspension, or lesser sanctions, may result from the commission of any of the following offenses:

> Academic cheating, including (but not limited to) unauthorized copying, collaboration, or use of notes/books on examinations, and plagiarism (defined as *the intentional representation of another person's words, thoughts, or ideas as one's own*)

For academic cheating, suspension is the normal sanction for the initial offense, unless the Program Development Committee determines that unusual mitigating circumstances justify a lesser sentence.

The furnishing of false information, with the intent to deceive, to members of the UNC Hospitals community who are acting in the exercise of their official duties, forgery, falsification, and/or fraudulent misuse of UNC Hospitals' documents, records, or identification cards will result in expulsion from the program.

It is noted that a sanction against a student may also result in the student being dismissed from the program. For example, if a grade of F is given in a course in which the student has admitted cheating, he will be dismissed from the program.

Every student has the right to appeal any infraction of the Code of Conduct. Please see the Corrective Action and Grievance Procedure: Student Right to Appeal (Due Process) section in this document.

Dismissal from the Program

In addition to academic ineligibility to complete the program, the student may be dismissed for inappropriate professional attitudes and/or actions, as described in the American Association of Medical Dosimetrists (AAMD) Code of Ethics, and the practice standards established by the profession. These standards are important professional standards for the student preparing to deliver a high standard of healthcare delivery and service.

A student may be judged unacceptable for continuation in the UNC Hospitals Medical Dosimetry Program when he has displayed a lack of professionalism with respect to other students, patients, faculty, and/or staff.

The UNC Hospitals Medical Dosimetry Program reserves the right to dismiss a student from the program when the student does not, in its judgement, demonstrate sufficient promise to justify the continuation of study in the UNC Hospitals Medical Dosimetry Program.

If the student is dismissed from the program, he has the right to appeal, as stated in this document.

Readmission

A student who withdraws from the program must reapply and go through the admissions process again. No refunds are made after orientation is complete.

Use of Illegal Drugs

Students, faculty, and staff of UNC Hospitals are responsible, as citizens, for knowing about and complying with the provisions of North Carolina law that make it a crime to possess, sell, deliver, or manufacture those drugs designated collectively as "controlled substances" in Article 5 of Chapter 90 of the North Carolina General Statutes. Any member of the Hospitals community who violates that law is subject both to prosecution and punishment by civil authorities and to disciplinary proceedings by the UNC Department of Radiation Oncology. Disciplinary proceedings against a student, faculty member, or staff member will be initiated when the alleged conduct is deemed to affect the interests of UNC Hospitals.

Before entry into the UNC Hospitals Medical Dosimetry Program, the accepted student will have to pass an official drug test.

Health Program

Students in the UNC Hospitals Medical Dosimetry Program are under the healthcare program of UNC Hospitals. It mandatory that the student carry a hospitalization insurance policy to cover any necessary operations or special services that may be required during his education.

Holidays

The student will not have class or clinical education on hospital holidays: Independence Day, Labor Day, Thanksgiving Day, Christmas Day, New Year's Day, Martin Luther King Jr.'s Birthday, and Memorial Day. The student must be present on all other holidays unless preapproved by the program director.

Sick Time

The student must contact the program director/didactic/clinical instructor in all cases if sick by 8:00 a.m. that morning. Any time missed by the student due to calling in sick must be made up. If the student misses class time, he is responsible to contact the instructor and make up missed information – notes, quizzes, or exams. If the student misses clinical rotations, he must make up time during scheduled vacations or come early/stay late. The student may not exceed more than 40 hours/week or more than 10 hours in any day. If the student exceeds these time limits, he must do so voluntarily.

Due to the nature of the program's curriculum, class attendance and timeliness are mandatory, with the exception of student/family illness or attendance of professional meetings/seminars. These exceptions will constitute an excused absence and the student is to make up any missed didactic work. Class absences are excused only by the program director or didactic instructor; any absence regarding professional meetings/seminars must be approved in advance.

Excessive tardiness is subject to corrective discipline, in the form of probation and/or dismissal. Excessive tardiness is defined as more than three (3) instances of lateness in a semester. After four (4) instances, the student will be placed on formal probation. Any five (5) instances in a semester will result in dismissal from the program.

In order to be fair and equitable to each student and the program, it is the policy of the program that the student cannot bank time before an absence. The student can, however, make up time after the absence.

Inclement Weather Policy

If bad weather (snow, ice, flooding, tornado, earthquake, etc.) occurs on a clinical day, the student is responsible for finding out if the local university is closed. If it is closed due to hazardous road conditions, the student is excused from going to class/clinical education, even though the radiation oncology department may be open. The student must write "Inclement Weather" on his time sheet, and this absence will be verified by the clinical instructor. If the

local university is open, but the student cannot get to UNC Hospitals, then he must make up the day.

Note: All unexcused "Inclement Weather" days must be made up.

Dress Code

All clothing and jewelry must be consistent with professional/business dress standards applicable to the work responsibilities involved and must be appropriate for reasonably anticipated public contact. The student's clothes should be neatly pressed for a professional appearance. Open-toed shoes are not allowed.

The student must wear his UNC Hospitals badge each day. The identification badge must be worn so that the picture, name, and department are easily visible at all times.

Hair, including beards and mustaches, is to be clean, neatly groomed, and kept in such a way as not to interfere with student duties or safety. Hair that is longer than the collar on males, or longer than the shoulder on females, is to be pulled back and fastened to prevent contamination.

Makeup, perfume, and cologne are to be moderately applied.

Fingernails are to be clean, trimmed, and extend no further than ¼'' beyond the fingertips. Clear or conservative light-colored nail polish may be worn.

No visible tattoos are allowed. Piercings are limited to ears only (one set of earrings).

Disability, Illness, Pregnancy

The program director will determine if any student may continue the program should illness or disability arise. The decision will be made on an individual basis, taking into account the nature and degree of the disability, as well as a physician's recommendation that the student may continue the program. Accommodations for disabilities as defined by federal (ADA) and state laws will be provided (JRCERT Standard 2.3).

If a student becomes pregnant while in the program, the pregnancy policy within this handbook will be followed.

The student must make up all missed class and clinic time. If the student is unable to complete assigned time commitments by the end of the program, he will not graduate until he has successfully completed class and clinical rotations.

Student Clinical Hours

8:00 a.m. – 4:30 p.m.

Hours may vary depending upon the clinical rotation requirement. The student sometimes may need to remain in the clinic beyond the normal hours in order to complete a project related to his learning. On rare occasions, the student may need to work on a Saturday or Sunday to complete a

quality assurance procedure. However, these student clinical clock hours must be discussed with and approved by the program director prior to the student utilizing them.

Clinic Site	Phone Number	Clinical Instructors
UNC Hospitals NC Basnight Cancer Hospital Department of Radiation Oncology 101 Manning Drive Chapel Hill, NC 27599-7512	(984) 974-8639	UNC MDCB-certified medical dosimetrists

Emergency/Safety Orientation

During the initial program orientation, the student will participate in an emergency procedures/safety orientation specific to UNC Hospitals. These health and safety issues are completed before the student is allowed in the UNC Hospitals clinical area. The policies and procedures include, but are not limited to, the following (JRCERT Standards 5.1, 5.2, 5.5):

Hazards: fire, electrical/chemical emergencies
Emergency preparedness
Medical emergencies
HIPAA
Standard precautions

Attendance

The student must report to his assigned class or clinical rotation for the duration of the hours specified by the schedule, unless pre-approved by the program director for absence or tardiness. If the student misses five (5) days throughout the program (beyond the given five (5) days of vacation), his clinical grade will be lowered one (1) letter grade. If the student misses six (6) or more days during the year, the student can be removed from the program.

The student is expected to report to the class/clinical area at the designated time. Tardiness is not considered responsible, professional behavior. Three (3) late arrivals, each in excess of 10 minutes, will be considered the equivalent of one (1) absence for grade determination. It is the student's responsibility to call the program director/clinical instructor prior to the beginning of the class/clinical time period if he is going to be late. Failure to do this will result in two (2) points being deducted from the final class/clinical grade for each infraction.

Vacation

The student receives five (5) days of vacation. He is also allowed one (1) personal day (i.e., for a wedding/funeral) and two (2) interview days while in the program. The interview days require documentation and may only be taken during the spring or summer semesters.

The student is given release time to attend professional meetings/seminars. The student is responsible for his travel, hotel, and conference fee.

Health Insurance – Emergency Situation

If the student has an emergency, he is to go to the local hospital emergency room or urgent care clinic.

Radiation Monitoring

The student must wear a personnel monitoring device at all times in the clinic. Exposure reports will be available for review once processed. If a dose reading exceeds normal limits ($\geq$ 0.125 rem or $\geq$ 1.25 mSv per quarter), the student will be contacted by the UNC Radiation Safety Officer or program personnel. In the event an accidental exposure occurs, the student must notify the program director regarding the incident. The program director will work with the Radiation Safety Officer and make a plan of action for the event. If the badge is lost, damaged, or the student has any other concerns, he should contact the program director (JRCERT Standard 5.1).

If a student feels that he has received a high radiation dose exposure (exceeding normal limits of 0.125 rem or 1.25 mSv per quarter), for any reason, the student should immediately contact the program director. The student should not wait. An emergency reading will be done by UNC Radiation Safety.

UNC Hospitals badges are read quarterly. When the quarterly reports come to the UNC Department of Radiation Oncology, they are made available to the program director, who will make them available to the student. It is each student's responsibility to look at and initial the report.

UNC Hospitals has a radiation safety department on site. If anyone has a high radiation reading, the UNC Radiation Safety department will notify the program director and student in writing and in person.

Direct Supervision Policy

All procedures performed by a student while on a clinical rotation must be directly supervised by a qualified practitioner. This individual will receive the procedure in relation to the student's achievement, evaluate the condition of the patient in relation to the student's knowledge, be present during the procedure, and review and approve the procedure. All clinical work performed by a student must be checked prior to clinical implementation. Any time a student is having direct contact with a patient, facility personnel must be present (JRCERT Standard 5.4).

Classroom Behavior/Code of Conduct

The classroom is a safe environment for the student. The focus will be on learning. Causing disruptions, harassment of other students, foul language, disrespect for others, or entertaining at someone else's expense will not be tolerated.

UNC Hospitals Medical Dosimetry Program Pregnancy Policy

The UNC Hospitals Medical Dosimetry faculty recognize the basic premise of providing the pregnant student with the information to make an informed decision based on her individual needs and preference. Thus, all UNC Hospitals medical dosimetry students are requested to read the following document, contained in this policy.

1. NCRP Report #116, 1993, Section 10 “Protection of the Embryo-Fetus”
2. US Nuclear Regulatory Commission Regulatory Guide 8.13, Revision 3 December 1999, “Instruction Concerning Prenatal Radiation Exposure”

Further information on the fetal effects of radiation may be found in Bushong’s radiographic physics book (Bushong, SC. *Radiologic Science for Technologists: Physics, Biology, & Protection*. 12th ed. Elsevier Science/Mosby, Inc.; 2020).

Finally, UNC Hospitals medical dosimetry faculty believe it is the responsibility of the pregnant student to advise her program director and clinical instructor voluntarily and in writing of her pregnancy and the estimated date of the baby’s birth (delivery). Formal, voluntary notification (declaration of pregnancy) is the only means by which the clinical facility and the UNC Hospitals Medical Dosimetry Program can ensure that the dose to the embryo-fetus is limited during the pregnancy (not to exceed 5 mSv (500 mrem)). In the absence of the voluntary, written disclosure, the student cannot be considered pregnant.
Therefore, at the beginning of the program, each UNC Hospitals Medical Dosimetry female student will read the documents, have her questions answered to her satisfaction, and choose to proceed with her medical dosimetry education as indicated herein.

The voluntary, written disclosure of pregnancy and her decision toward the UNC Hospitals Medical Dosimetry Program will be kept in the student’s folder, maintained by the program director. Release of such information may occur only upon the written permission of the student.

Appendix B

Prenatal Radiation Exposure, Regulatory Guide 8.13

A. Introduction

The Code of Federal Regulations in 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," in Section 19.12, "Instructions to Workers," requires instruction in the "health protection problems associated with exposure to radiation and/or radioactive material, in precautions or procedures to minimize exposure, and in the purpose and functions of protective devices employed." The instructions must be "commensurate with potential radiological health protection problems present in the workplace."

The Nuclear Regulatory Commission's (NRC's) regulations on radiation protection specified in 10 CFR Part 20, "Standards for Protection Against Radiation"; and 10 CFR 20.1208, "Dose to an Embryo/Fetus," requires licensees to "ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv)." Section 20.1208 also requires licensees to "make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman." A declared pregnant woman is defined in 10 CFR 20.1003 as a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

The regulatory guide is intended to provide information to pregnant women, and other personnel, to help them make decisions regarding radiation exposure during pregnancy. This Regulatory Guide 8.13 supplements Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure" (Ref. 1), which contains a broad discussion of the risks from exposure to ionizing radiation.

Other sections of the NRC's regulations also specify requirements for monitoring external and internal occupational dose to a declared pregnant woman. In 10 CFR 20.1502, "Conditions Requiring Individual Monitoring of External and Internal Occupational Dose," licensees are required to monitor the occupational dose to a declared pregnant woman, using an individual monitoring device, if it is likely that the declared pregnant woman will receive, from external sources, a deep dose equivalent in excess of 0.1 rem (1 mSv). According to Paragraph (e) of 10 CFR 20.2106, "Records of Individual Monitoring Results," the licensee must maintain records of dose to an embryo/fetus if monitoring was required, and the records of dose to the embryo/fetus must be kept on file but may be maintained separately from the dose records. The licensee must retain the required form or record until the Commission terminates each pertinent license requiring the record.

The information collections in this regulatory guide are covered by the requirements of 10 CFR Parts 19 or 20, which were approved by the Office of Management and Budget, approval numbers 3150-0044 and 3150-0014, respectively. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

B. Discussion

As discussed in Regulatory Guide 8.29 (Ref. 1), exposure to any level of radiation is assumed to carry with it a certain amount of risk. In the absence of scientific certainty regarding the relationship between low dose exposure and health effects, and as a conservative assumption for radiation protection purposes, the scientific community generally assumes that any exposure to ionizing radiation may cause undesirable biological effects and that the likelihood of these effects increases as the dose increases. At the occupational dose limit for the whole body of five (5) rem (50 mSv) per year, the risk is believed to be very low.

The magnitude of risk of childhood cancer following in utero exposure is uncertain in that both negative and positive studies have been reported. The data from these studies "are consistent with a lifetime cancer risk resulting from exposure during gestation which is two to three times that for the adult" (NCRP Report No. 116, Ref. 2). The NRC has reviewed the available scientific literature and has concluded that the 0.5 rem (5 mSv) limit specific in 10 CFR 20.1208 provides an adequate margin of protection for the embryo/fetus. This dose limit reflects the desire to limit the total lifetime risk of leukemia and other cancers associated with radiation exposure during pregnancy.

In order for a pregnant worker to take advantage of the lower exposure limit and dose monitoring provisions specified in 10 CFR Part 20, the woman must declare her pregnancy in writing to the licensee. A form letter for declaring pregnancy is provided in this guide or the licensee may use its own form letter for declaring pregnancy. A separate written declaration should be submitted for each pregnancy.

C. Regulatory Position

1. Who Should Receive Instruction

Female workers who require training under 10 CFR 19.12 should be provided with the information contained in this guide. In addition to the information contained in Regulatory Guide 8.29 (Ref. 1), this information may be included as part of the training required under 10 CFR 19.12.

2. Providing Instruction

The occupational worker may be given a copy of this guide with its Appendix, an explanation of the contents of the guide, and an opportunity to ask questions and request additional information. The information in this guide and Appendix should also be provided to any worker or supervisor who may be affected by a declaration of pregnancy or who may have to take some action in response to such a declaration.
Classroom instruction may supplement the written information. If the licensee provides classroom instruction, the instructor should have some knowledge of the biological effects of radiation to be able to answer questions that may go beyond the information provided in this guide. Videotaped presentations may be used for classroom instruction. Regardless of whether the licensee provides classroom training, the licensee should give workers the opportunity to ask

questions about information contained in this Regulatory Guide 8.13. The licensee may take credit for instruction that the worker has received within the past year at other licensed facilities or in other courses or training.

3. Licensee's Policy on Declared Pregnant Women

The instruction provided should describe the licensee's specific policy on declared pregnant women, including how those policies may affect a woman's work situation. In particular, the instruction should include a description of the licensee's policies, if any, that may affect the declared pregnant woman's work situation after she has filed a written declaration of pregnancy consistent with 10 CFR 20.1208.

The instruction should also identify who to contact for additional information as well as identify who should receive the written declaration of pregnancy. The recipient of the woman's declaration may be identified by name (e.g., John Smith), position (e.g., immediate supervisor, the radiation safety officer), or department (e.g., the personnel department).

4. Duration of Lower Dose Limits for the Embryo/Fetus

The lower dose limit for the embryo/fetus should remain in effect until the woman withdraws the declaration in writing or the woman is no longer pregnant. If a declaration of pregnancy is withdrawn, the dose limit for the embryo/fetus would apply only to the time for the estimated date of conception until the time the declaration is withdrawn. If the declaration is not withdrawn, the written declaration may be considered expired one year after submission.

5. Substantial Variations Above a Uniform Monthly Dose Rate

According to 10 CFR 20.1208(b), "The licensee shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in paragraph (a) of this section," that is, 0.5 rem (5 mSv) to the embryo/fetus. The National Council on Radiation Protection and Measurements (NCRP) recommends a monthly equivalent dose limit of 0.05 rem (0.5 mSv) to the embryo/fetus once the pregnancy is known (Ref. 2). In view of the NCRP recommendation, any monthly dose of less than 0.1 rem (1 mSv) may be considered as a substantial variation above a uniform monthly dose rate and as such will not require licensee justification. However, a monthly dose greater than 0.1 rem (1 mSv) should be justified by the licensee.

D. Implementation

The purpose of this section is to provide information to licensees and applicants regarding the NRC's staff's plans for using this regulatory guide.

Unless a licensee of an applicant proposes an acceptable alternative method for complying with the specified portions of the NRC's regulations, the methods described in this guide will be used by the NRC staff in the evaluation of instructions to workers on the radiation exposure of pregnant women.

Appendix C

Questions and Answers Concerning Prenatal Radiation Exposure

1. Why am I receiving this information?

The NRC's regulations (in 10 CFR 19.12, "Instructions to Workers") require that licensees instruct individuals working with licensed radioactive materials in radiation protection as appropriate for the situation. The instruction below describes information that occupational workers and their supervisors should know about the radiation exposure of the embryo/fetus of pregnant women.

The regulations allow a pregnant woman to describe whether she wants to formally declare her pregnancy to take advantage of lower dose limits for the embryo/fetus. This instruction provides information to help women make an informed decision to declare a pregnancy.

2. If I become pregnant, am I required to declare my pregnancy?

No. The choice whether to declare your pregnancy is completely voluntary. If you choose to declare your pregnancy, you must do so in writing and a lower radiation dose limit will apply to your embryo/fetus. If you choose not to declare your pregnancy, you and your embryo/fetus will continue to be subject to the same radiation dose limits that apply to other occupational workers.

3. If I declare my pregnancy in writing, what happens?

If you choose to declare your pregnancy in writing, the licensee must take measures to limit the dose to your embryo/fetus to 0.5 rem (5 mSv) during the entire pregnancy. This is one-tenth of the dose that an occupational worker may receive in a year. If you have already received a dose exceeding 0.5 rem (5 mSv) in the period between conception and the declaration of your pregnancy, an additional dose of 0.05 rem (0.5 mSv) is allowed during the remainder of the pregnancy. In addition, 10 CFR 20.1208, "Dose to an Embryo/Fetus," requires licensees to make efforts to avoid substantial variation above a uniform monthly dose rate so that all the 0.5 rem (5 mSv) allowed dose does not occur in a short period during the pregnancy.
This may mean that, if you declare your pregnancy, the licensee may not permit you to do some of your normal job functions if those functions would have allowed you to receive more than 0.5 rem, and you may not be able to have some emergency response responsibilities.

4. Why do the regulations have a lower dose limit for the embryo/fetus of a declared pregnant woman than for a pregnant worker who has not declared?

A lower dose limit for the embryo/fetus of a declared pregnant woman is based on a consideration of greater sensitivity to radiation of the embryo/fetus and the involuntary nature of the exposure. Several scientific advisory groups have recommended (Refs. 1 and 2) that the dose to the embryo/fetus be limited to a fraction of the occupational dose limit.

5. What are the potentially harmful effects of radiation exposure to my embryo/fetus?

The occurrence and severity of health effects caused by ionizing radiation are dependent upon the type and total dose of radiation received, as well as the time period over which the exposure was received. See Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Exposure" (Ref. 3), for more information. The main concern is embryo/fetal susceptibility to the harmful effects of radiation such as cancer.

6. Are there any risks of genetic defects?

Although radiation injury has been induced experimentally in rodents and insects, and in the experiments was transmitted and became manifest as hereditary disorders in their offspring, radiation has not been identified as a cause of such effect in humans. Therefore, the risk of genetic effects attributable to radiation exposure is speculative. For example, no genetic effects have been documented in any of the Japanese atomic bomb survivors, their children, or their grandchildren.

7. What if I decide that I do not want any radiation exposure at all during my pregnancy?

You may ask your employer for a job that does not involve any exposure at all to occupational radiation dose, but your employer is not obligated to provide you with a job involving no radiation exposure. Even if you receive no occupational exposure at all, your embryo/fetus will receive some radiation dose (on average 75 mrem (0.75 mSv)) during your pregnancy from natural background radiation.

The NRC has reviewed the available scientific literature and concluded that the 0.5 rem (5 mSv) limit provides an adequate margin of protection for the embryo/fetus. This dose limit reflects the desire to limit the total lifetime risk of leukemia and other cancers. If this dose limit is exceeded, the total lifetime risk of cancer to the embryo/fetus may increase incrementally. However, the decision on what level of risk to accept is yours. More detailed information on potential risk to the embryo/fetus from radiation exposure can be found in Refs. 2-10.

8. What effect will formally declaring my pregnancy have on my job status?

Only the licensee can tell you what effect a written declaration of pregnancy will have on your job status. As part of your radiation safety training, the licensee should tell you the company's policies with respect to the job status of declared pregnant women. In addition, before you declare your pregnancy, you may want to talk to your supervisor or your radiation safety officer and ask what a declaration of pregnancy would mean specifically for you and your job status.

In many cases you can continue in your present job with no change and still meet the dose limit for the embryo/fetus. For example, most commercial power reactor workers (approximately 93%) receive, in 12 months, occupation radiation doses that are less than 0.5 rem (5 mSv) (Ref. 11). The licensee may also consider the likelihood of increased radiation exposures from accidents and abnormal events before making a decision to allow you to continue in your present job.

If your current work might cause the dose to your embryo/fetus to exceed 0.5 rem (5 mSv), the licensee has various options. It is possible that the licensee can and will make a reasonable accommodation that will allow you to continue performing your current job, for example, by having another qualified employee do a small part of the job that accounts for some of your radiation exposure.

9. What information must I provide in my written declaration of pregnancy?

You should provide, in writing, your name, a declaration that you are pregnant, the estimated date of conception (only the month and year need be given), and the date that you give the letter to the licensee. A form letter that you can use is included at the end of these questions and answers. You may use that letter, use a form letter the licensee has provided to you, or write your own letter.

10. To declare my pregnancy, do I have to have documented medical proof that I am pregnant?

NRC regulations do not require that you provide medical proof of your pregnancy. However, NRC regulations do not preclude that licensee from requesting medical documentation of your pregnancy, especially if a change in your duties is necessary in order to comply with the 0.5 rem (5 mSv) dose limit.

11. Can I tell the licensee orally rather than in writing that I am pregnant?

No. The regulations require that the declaration must be in writing.

12. If I have not declared my pregnancy in writing, but the licensee suspects that I am pregnant, do the lower dose limits apply?

No. The lower dose limits for pregnant women apply only if you have declared your pregnancy in writing. The United States Supreme Court has ruled (in *United Automobile Workers International Union v. Johnson Controls, Inc*., 1991) that "Decisions about the welfare of future children must be left to the parents who conceive, bear, support, and raise them rather than to the employers who hire those parents" (Ref. 7). The Supreme Court also ruled that your employer may not restrict you from a specific job "because of concerns about the next generation." Thus, the lower limits apply only if you choose to declare your pregnancy in writing.

13. If I am planning to become pregnant but am not yet pregnant and I inform the licensee of that in writing, do these lower limits apply?

No. The requirement for lower limits applies only if you declare in writing that you are already pregnant.

14. What if I have a miscarriage or find out that I am not pregnant?

If you have declared your pregnancy in writing, you should promptly inform the licensee in writing that you are no longer pregnant. However, if you have not formally declared your pregnancy in writing, you need not inform the licensee of your non-pregnant status.

15. How long is the lower dose limit in effect?

The dose to the embryo/fetus must be limited until you withdraw your declaration in writing, or you inform the licensee in writing that you are no longer pregnant. If the declaration is not withdrawn, the written declaration may be considered expired one year after submission.

16. If I have declared my pregnancy in writing, can I revoke my declaration of pregnancy even if I am still pregnant?

Yes, you may. The choice is entirely yours. If you revoke your declaration of pregnancy, the lower dose limit for the embryo/fetus no longer applies.

17. What if I work under contract at a licensed facility?

The regulations state that you should formally declare your pregnancy to the licensee in writing. The licensee has the responsibility to limit the dose to the embryo/fetus.

18. Where can I get additional information?

The references to this Appendix contain helpful information, especially Ref. 3, NRC's Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure" for general information on radiation risks. The licensee should be able to give this document to you.

For information on legal aspects, see Ref. 7, "The Rock and the Hard Place: Employer Liability to Fertile or Pregnant Employees and Their Unborn Children – What Can the Employer Do?", which is an article in the journal *Radiation Protection Management*.

You may telephone the NRC Headquarters at (301) 415-7000. Legal questions should be directed to the Office of the General Counsel, and technical questions should be directed to the Division of Industrial and Medical Nuclear Safety.

You may also telephone the NRC Regional Offices at the following numbers: Region 1, (610) 337-5000; Region II, (404) 562-4400; Region III, (630) 829-9500; and Region IV, (817) 860-8100. Legal questions should be directed to the Regional Counsel, and technical questions should be directed to the Division of Nuclear Material Safety.

References for Appendix B & C Reports

1. National Council on Radiation Protection and Measurements, *Limitation of Exposure to Ionizing Radiation*, NCRP Report No. 116, Bethesda, MD, 1993.
2. International Commission on Radiological Protection, *1990 Recommendations of the International Commission on Radiological Protection*, ICRP Publication 60, Ann. ICRP 21: No. 1-3, Pergamon Press, Oxford, UK, 1991.
3. USNRC, "Instruction Concerning Risks from Occupational Radiation Exposure," Regulatory Guide 8.29, Revision 1, February 1996.[1] (Electronically available at www.nrc.gov/NRC/RG/index.html)
4. Committee on the Biological Effects of Ionizing Radiations, National Research Council, *Health Effects of Exposure to Low Levels of Ionizing Radiation* (BEIR V), National Academy Press, Washington, DC, 1990.
5. United Nations Scientific Committee on the Effects of Atomic Radiation, *Sources and Effects of Ionizing Radiation*, United Nations, New York, 1993.
6. R. Doll and R. Wakeford, "Risk of Childhood Cancer from Fetal Irradiation," *The British Journal of Radiology*, 70, 130-139, 1997.
7. David Wiedis, Donald E. Jose, and Timm O. Phoebe, "The Rock and the Hard Place: Employer Liability to Fertile or Pregnant Employees and Their Unborn Children – What Can the Employer Do? *Radiation Protection Management*, 11, 41-49, January/February 1994.
8. National Council on Radiation and Measurements, *Considerations Regarding the Unintended Radiation Exposure of the Embryo, Fetus, or Nursing Child*, NCRP Commentary No. 9, Bethesda, MD, 1994.
9. National Council on Radiation Protection and Measurements, *Risk Estimates for Radiation Protection*, NCRP Report No. 115, Bethesda, MD, 1993.
10. National Radiological Protection Board, *Advise on Exposure to Ionizing Radiation During Pregnancy*, National Radiological Protection Board, Chilton, Didcot, UK, 1998.
11. M. L. Thomas and D. Hagemeyer, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities, 1996," Twenty-Ninth Annual Report, NUREG-0713, Vol. 18, US.

Pregnancy Declaration

I fully understand the contents of these documents, have had my questions answered to my satisfaction, and choose to proceed with my medical dosimetry education as indicated below.

_____ I am fully aware of the UNC Hospitals Medical Dosimetry Program pregnancy policy and choose to continue my didactic and clinical education without modification or interruption. If I am currently pregnant or become pregnant while in the medical dosimetry program, I may notify my program director or clinical instructor voluntarily and in writing with one of the options below if I want to declare my pregnancy.

_____ I am pregnant and choose to continue my didactic and clinical education without modification or interruption. I accept full responsibility for my own actions and the health of my baby. Furthermore, I absolve, discharge, release, and hold harmless my clinical site and its staff, and the Board of Trustees of UNC Health together with its officers and employees (the medical dosimetry program and its faculty) for any legal liability, claims, damages, or complications that may occur during fetal growth, birth, and post-natal development of my baby.

_____ I am pregnant and choose to continue my didactic and clinical education with some modification of my clinical assignment. I will not participate in the brachytherapy or CyberKnife procedures. A grade of incomplete will be given until I have completed all clinical education missed during my pregnancy. The completion of the incomplete may delay my sitting for the MDCB exam.

_____ I am pregnant and choose to take a leave of absence from clinical assignments during my pregnancy. A grade of incomplete will be given until I have completed all clinical education missed during my pregnancy. The completion of the incomplete may delay my sitting for the MDCB exam.

_____ I am pregnant and choose to take a leave of absence from the UNC Hospitals Medical Dosimetry Program. If I notify the program director of my desire to return, I will be offered a position in the next class, the following year.

_____ I wish to withdraw my previous declaration of pregnancy.

I agree to comply with the above-stated policy with my decision as indicated above.

_____ _____

Student signature Date

_____ _____

Program director signature Date

Safety Procedures

Only the student can make his experience a safe one. Most accidents are caused by unsafe acts of the person involved. Because of the nature of some of the activities at the hospital, it is of vital importance that each student become well-acquainted with the hazards involved in the operations of this department to protect him, his coworkers, and his patients and to effectively safeguard hospital equipment and property.

It is important that the student observe safe practices, keep his clinical area clean, and actively participate by suggesting improvements that will help make his clinical experience a safe one.

In the case of an accident, an incident report must be filled out and forwarded to the department clinical director immediately. Should the incident involve a patient, the patient is not to be sent away until seen by a physician. Appropriate care must be administered, and the incident report should be signed by the involved patient. The program director is to be informed immediately, even if the incident appears to be of minor significance.

Incident Reports

All incidents involving patients, visitors, students, or faculty/staff must be documented via a written incident report on forms provided.

Patient/Visitor Incident

Where real or potential injury occurs, medical attention must be provided immediately. All involved persons must inform the clinical supervisor as soon as possible. In the event a student is involved the program director should be notified. A patient incident report form is to be filled out by the student and given to the clinical supervisor.

Student Incident

In the event that a student is injured or suspected to have been exposed to a communicable disease, the student is to notify the program director. The student is to obtain a release form from a physician before returning to the clinical area. A copy of this release form is to be maintained in the student's folder.

Health Status

For the student to maintain his own health, it is necessary for him to have adequate health insurance coverage. The student is responsible for the expenses associated with illnesses and/or injuries. Clinical sites will provide emergency care but are not responsible for the expenses associated with that care. Each student must provide proof of health insurance at the time of matriculation.

Student Maltreatment

The UNC Hospitals Medical Dosimetry Program has a zero-tolerance policy for maltreatment of any student. Maltreatment is defined as any of the following behaviors:

1. Public humiliation
2. Threats of physical or psychological harm
3. Requirements to perform personal service for another individual

4. Limiting opportunities, grades, or any other activities because of gender, race, religion, or sexual orientation
5. Sexual advances, remarks, or innuendos
6. Offensive racial or religious remarks or actions

In order to be sure that these activities do not occur, the following will be observed:

1. The policy will be disseminated to all current and new students/employees.
2. There will be an annual discussion of maltreatment with employees at faculty/staff meetings.
3. Any individual who experiences or observes evidence of others not following this policy is obligated to report this to the program director, clinical supervisor, or administrative director. The program director will make an independent decision based on the situation as to whether the action is best reported to a higher level.

Additional policies (those that follow) are covered in program orientation. The student also receives a background check, drug test, immunizations, an identification badge, and a personnel radiation monitor to protect his health and safety.

Immunizations, Background Check, and Drug Screening

The background check and drug screen are administered by a company contracted with UNC Hospitals and are paid for by the student. Information about the check will be communicated to students who are offered conditional acceptance to the program after interviews are completed annually. Students are required to have a current BLS (Basic Life Support) certification upon the beginning of the program year, and it must be maintained as current while enrolled in the program.

The following immunizations are required by UNC Hospitals for admission to the program, and must be maintained as current (where applicable) through the program year:

Type	Requirement
Measles	2 doses or positive titer
Mumps	2 doses or positive titer
Rubella	2 doses or positive titer
Varicella	2 doses or positive titer
Tetanus/Diphtheria/T dap	1 dose T dap, then Td booster ever 10 yr
Hepatitis B (HBV) series	Energix-B or Recombivax B 3 doses or positive titer If incomplete series, then Heplisav-B 2 doses 4 weeks apart For declination or waiver, a copy must be on file at the school and/or be approved by the facility or agency
Influenza	Annual – Fall See academic/agency guidelines

	"Optimally, vaccination should occur before onset of influenza activity in the community. Health care providers should offer vaccination by the end of October" on the Influenza Vaccination Information for Health Care Workers' page https://www.cdc.gov/flu/professionals/healthcareworkers.htm
Tuberculosis Screening Preplacement (https://www.cdc.gov/tb/topic/testing/healthcareworkers.htm) Baseline Individual TB Risk Assessment including TB symptom evaluation, and either a 2-step TB skin test (given 1-3 weeks apart) or a TB blood test within 12 months of program admission or readmission. If a student has had a positive TB skin test in the past, such as due to TB exposure/infection or receiving the BCG vaccine, documentation of a chest x-ray for the + test will be required along with the Baseline Individual TB Risk Assessment and TB symptom evaluation.	Baseline Individual TB Risk Assessment Baseline TB Symptom Assessment 2-step TB skin test (given 1-3 weeks apart) OR TB Blood Test within 12 months of program admission or readmission Documentation of a chest x-ray is required for a past +PPD or blood test. If current +PPD or blood test, additional evaluation for TD disease will be required as deemed necessary from a healthcare provider. Annual TD education and risk assessment.

The TB screening can be arranged to be done by UNC Hospitals 's Occupational Health during the first week of program orientation for incoming students.

Graduation Requirements/National MDCB Certification Examination

Students who successfully complete the curriculum may be eligible to take the national certification examination offered by the MDCB through Route 1. Successful completion of this program does not guarantee the student is eligible to take this examination, since the MDCB reviews the applications and determinations eligibility for the examination.

Questions regarding eligibility should be directed to the MDCB (mdcb.org). It is the responsibility of the student to apply for the certification examination. Applications usually take weeks to process.

Before a student enrolled in the UNC Hospitals Medical Dosimetry Program can be eligible to apply for the medical dosimetry examination or receive his certificate, he must fulfill the following requirements and obligations to UNC Hospitals:

1. The student must have successfully met the academic requirements of the program as established by the grading system and academic standards of the program.
2. The student must have his fees and any fines accumulated paid in full before he can receive credit for his courses.
3. A student that has exceeded his allowable personal days (up to 40 hours), must make compensation for this extra time. This will involve clinical assignments after the

scheduled date of completion. Refer to the beforementioned requirements in this document.
4. The student must have completed all projects and required work before he will be allowed to officially graduate.
5. The student must return all property (i.e., books, identification badges, etc.) or remit financial compensation for lost property.

The entering student will graduate 12 full months following the entrance date, provided he has met the full requirements.

Release of Student Records

The student must sign a consent form to release his student records if he wants faculty/staff to provide verbal or written recommendations. Faculty may need to refer to student records to make recommendations. All student records are released under the federal guidelines of the Family Educational Rights and Privacy Act (FERPA 1974). Student records are maintained in a locked file cabinet. Students wishing to review any appropriate records should make an appointment with the program director. The student is encouraged to do such if he has any questions regarding his progress in the program (JRCERT Standard 1.4).

UNC Hospitals Medical Dosimetry Program Curriculum

The UNC Hospitals Medical Dosimetry Program curriculum is designed to integrate classroom and clinical education throughout the professional year. The student is limited to no more than 40 contact hours per week. The courses below must be taken in sequence, beginning with the fall semester.

Courses

MD 500 Orientation to Radiation Oncology 1 credit hour (12.5 contact hours)
This course provides the student with an overview of radiation therapy/medical dosimetry and is taught during the initial weeks of the student's matriculation into the medical dosimetry program. The student will understand the student handbook and sign/date all policies and procedures. All medical, regulatory, and financial business will be completed. The student will be given department/hospital/campus tours, have pictures taken, and meet different groups and individuals within the department and greater organization. Included in the orientation are all health and safety policies, including radiation safety and protection. Most importantly, the student completes Lean training on good catches, A3s, kaizens, and other quality improvement tools. Finally, the student gives written and oral reports on medical dosimetry professionalism (Assessment Plan, Goal 4, Objective 3). Clinical orientation is also given during this initial period of time.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program

MD 501 Introduction to Medical Dosimetry 1 credit hour (12.5 contact hours)
This course is an introduction to medical dosimetry techniques in the UNC Department of Radiation Oncology. This includes treatment charts, patient information flow, and basic and irregular field calculations. This course also covers the various quality assurance procedures performed in a radiation oncology department. Also included are various statistics topics to

educate the student in becoming a good consumer of medical dosimetry research. Professional development, billing/coding, HIPAA, and professional service are also addressed.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program

MD 502 Medical Dosimetry Physics 3 credit hours (37.5 contact hours)
This course teaches basic theories and calculations for radiation therapy. It covers the following topics: radiologic physics, protection of x-rays, radiation simulation and treatment machines, interactions of ionizing radiation, radiation measurements, dose calculations, computerized treatment planning, dose calculation algorithms, electron beam characteristics, and brachytherapy physics and procedures. In addition, imaging for radiation therapy, IMRT, stereotactic radiosurgery, special procedures, particle therapy, hyperthermia, and radiation safety. This course is 15 weeks in length.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program

> Note: The student must complete the medical and physics resident course during the fall semester. Before beginning this course, the student will be given a physics examination to determine his medical physics knowledge.

MD 503 Brachytherapy Dosimetry 1 credit hour (12.5 contact hours)
This course teaches the physics of brachytherapy. It includes source characteristics, dosimetry systems, and dose calculations.
Prerequisite: A grade of C or better in MD 502

MD 504 Research Methodology and Design Statistics I 3 credit hours (37.5 contact hours)
This course is an introduction to basic research concepts and statistics. Development of the research project begins. This course is 15 weeks in length.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program

MD 505 Research Methodology and Design Statistics II 3 credit hours (37.5 contact hours)
This course is a continuation of MD 504 with projects finalized. This course is 15 weeks in length.
Prerequisite: A grade of C or better in MD 504

MD 506 Clinical Education I 6 credit hours (360 contact hours)
This is the first of a three-course sequence. During the three-course sequence, the student completes clinical rotations including 3D, IMRT, brachytherapy, and quality assurance. The length of these rotations varies. While in the clinical setting, the student will observe and work directly with a medical dosimetrist. Emphasis is given on learning and understanding the role and responsibilities of a medical dosimetrist in the clinical setting. This course is 15 weeks in length.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program

MD 507 Clinical Education II 6 credit hours (360 contact hours)
This is the second of a three-course sequence. During the three-course sequence, the student will complete clinical rotations including 3D, IMRT, brachytherapy, and quality assurance. While in the clinical setting, the student will observe and work directly with a medical dosimetrist.

Emphasis is given on learning and understanding the role and responsibilities of a medical dosimetrist in the clinical setting. This course is 15 weeks in length.
Prerequisite: A grade of C of better in MD 506

MD 508 Clinical Education III 6 credit hours (360 contact hours)
This is the third of a three-course sequence. During the three-course sequence, the student will complete clinical rotations include 3D, IMRT, brachytherapy, CyberKnife, and quality assurance. The length of these rotations varies. While in the clinical setting, the student will observe and work directly with a medical dosimetrist. Emphasis is given on learning and understanding the role and responsibilities of a medical dosimetrist in the clinical setting. This course is 12 weeks in length.
Prerequisite: A grade of C or better in MD 507

MD 509 Radiation Safety and Protection 1 credit hour (12.5 contact hours)
This course is an introduction to the sources of radiation. It includes detection and measurement, source handling, surveys, maximum permissible doses, room design, and regulations.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program

MD 510 Anatomy for Radiation Oncology 1 credit hour (12.5 contact hours)
This course teaches human anatomy with an emphasis on sectional anatomy and topography as it applies to radiation therapy. Identification of cross-sectional anatomy at different anatomical locations within the human body is also reviewed.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program

MD 511 Radiation Oncology Pathology 1 credit hour (12.5 contact hours)
This course is an introduction to bodily responses to injury, including neoplasia, carcinogenesis, and staging/grading of tumors.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program

MD 512 Special Topics in Radiation Oncology 3 credit hours (37.5 contact hours)
This course consists of various seminars associated with radiation oncology. Topics include treatment techniques of various cancers, technological advances in cancer treatment, cancer treatment trends, and the role of a medical dosimetrist.
Prerequisite: A grade of C or better in MD 503

MD 513 The Radiobiology of Radiotherapy* 3 credit hours (37.5 contact hours)
This course is an overview of radiation biology. A classically trained radiobiologist teaches this course.
Prerequisite: Admission to the UNC Hospitals Medical Dosimetry Program
*The UNC Hospitals radiation therapy graduate may choose to continue his/her education and, if accepted, enroll in the UNC Hospitals Medical Dosimetry Program. Though he has passed similar courses in the radiation therapy program, the student must complete (and pass) all of the courses in the medical dosimetry program curriculum. An exemption exam is offered to the student who has completed the UNC Hospitals Radiation Therapy Program and wishes to "test out" of MD 513. The student must achieve a score of 80% to receive a grade of Pass in this course.

MD 514 Clinical Radiation Oncology 3 credit hours (37.5 contact hours)
This course is an overview of the different neoplasms in radiation oncology. The body is divided into sections for the content of this course.
Prerequisite: A grade of C or better in MD 500 and MD 501

Total 42 hours

The student is encouraged to seek academic counseling from the program director/instructor on any problem that might interfere with acceptable academic progress. Failure to seek such counseling from any resources available to the student, and to establish communication on that matter with the program director, will disqualify the circumstances as valid reasons for poor performance and/or expression of attitudes. For specific or more involved counseling needs, the program director will direct the student to the appropriate resources.

Professional actions and attitudes, as set forth by the AAMD Code of Ethics, are as important as traditional academic standards in preparation to deliver a high standard of health care and service. A student may be judged unacceptable for continuation in the program, regardless of academic and/or clinical standing, when he has displayed a lack of professionalism with respect to patients, students, and faculty/staff. Although the following is not totally inclusive, the student's conduct at professional meetings/seminars is also considered. Although such activities may not be held on campus, the student is considered a representative of the program, hospital, university, and state while attending such functions and should conduct himself accordingly.

Course Sequence

Fall: Semester 1

MD 500	Orientation to Radiation Oncology	1 hour
MD 501	Introduction to Medical Dosimetry	1 hour
MD 504	Research Methodology and Design Statistics I	3 hours
MD 506	Clinical Education I	6 hours
MD 509	Radiation Safety and Protection	1 hour
MD 510	Anatomy for Radiation Oncology	1 hour
MD 511	Radiation Oncology Pathology	1 hour
	Total	14 hours

Spring: Semester II

MD 502	Medical Dosimetry Physics	3 hours
MD 505	Research Methodology and Design Statistics II	3 hours
MD 507	Clinical Education II	6 hours
MD 513	The Radiobiology of Radiotherapy	3 hours
MD 514	Clinical Radiation Oncology	3 hours
	Total	18 hours

Summer: Semester III

MD 503	Brachytherapy Dosimetry	1 hour
MD 508	Clinical Education III	6 hours
MD 512	Special Topics of Radiation Oncology	3 hours
	Total	10 hours
	Total	42 hours

UNC Department of Radiation Oncology

Facilities and Equipment

The UNC Department of Radiation Oncology is located in the B and M levels of the NC Cancer Hospital. The primary didactic classroom is located within the UNC Department of Radiation Oncology. The student will train clinically in the UNC Department of Radiation Oncology as well.

1. The student is invited and encouraged to attend as many departmental functions as possible, such as the annual fall picnic and winter party.
2. Policies and procedures are posted within the department in their respective areas. All schedules, meetings, memos, etc., are posted either on the good news bulletin boards or e-mailed via the list serv.

Equipment

The UNC Department of Radiation Oncology is comprised of approximately 50,000 square feet of workspace within the NC Cancer Hospital. Equipment includes three conventional linear accelerators, a TomoTherapy unit, a CyberKnife, and a brachytherapy suite. The current clinical treatment planning software is RayStation. The department is state-of-the-art and is one of only 51 recognized comprehensive cancer centers in the United States.

UNC Department of Radiation Oncology

Faculty and Staff

1. Board-certified radiation oncologists
2. Medical residents
3. Medical physicists
4. Medical physics residents
5. Computer programmers
6. Certified medical dosimetrists
7. Medical dosimetry students
8. Registered radiation therapists
9. Radiation therapy students
10. Registered oncology nurses
11. Administrative assistants
12. Laboratory, computer science, and clinical trials researchers
13. Process improvement faculty and staff
14. Undergraduate, graduate, post-doctoral, and medical student researchers

How to Apply

Application forms can be downloaded from the UNC Department of Radiation Oncology Web site (https://med.unc.edu/radonc/education/dosimetry-2/) and are also available upon request from the program director. Completed applications must be submitted no later than March 1 preceding July (Fall) enrollment. Specific information required for a complete application includes:

1. Official high school transcript (if less than five (5) years since graduation)
2. Official higher education transcripts (technical schools/community colleges/colleges/universities, etc.)
3. Official radiation therapy program transcript
4. Three written references using the UNC Hospitals Medical Dosimetry Program reference forms
5. Additional information as requested by program admissions

A personal interview and visit to the UNC Department of Radiation Oncology is a required part of the admissions process. April 1 is the target date for admissions decisions.

A maximum of two (2) students may be admitted to the program each year. This may vary as program needs change.

Tuition and Fees

There is no application fee. The computer/laboratory fee of $1,500 is to be paid during orientation. There are also costs for books (approximately $500) and other school supplies. Housing, health insurance, an official drug test, and parking are the responsibility of the student. The program does not participate in Title IV financial aid. Private loans may be secured by personal banks. The program director will also provide any necessary documentation to defer student loans.

Transfer Students/Credits

The UNC Hospitals Medical Dosimetry Program does not accept transfer students or transfer credits. It is up to the program the student is applying for as to whether credits received during this program will be accepted at another program.

Program Physical Requirements

1. The physical activity of this position requires the student to be able to: climb, push, talk, stand, hear, walk, reach, grasp, kneel, feel, balance, pull, stoop, lift, use fingers, crawl, crouch, and perform repetitive motion.
2. The physical requirements of this position require the student be able to perform heavy work involving the exertion of up to 100 lbs. of force occasionally and/or 50 lbs. of force frequently.
3. The visual requirements, including color, depth perception, and field of vision are that the student's visual acuity is required to determine the accuracy, neatness, and thoroughness of the work assigned or to make general observations.
4. The conditions to which the student will be subject in this position include, but are not limited to, inside environmental conditions.

5. Hazards include physical conditions such as proximity to moving parts, electrical current, etc.
6. The student may be exposed to infectious diseases.
7. The student may have to interact with prisoners or mentally challenged patients.

UNC Hospitals
Medical Dosimetry Program

Assessment Plan: Analysis and Actions

Fall (1st semester) 2023 – Summer (3rd semester) 2024

Mission Statement: The UNC Hospitals Medical Dosimetry Program will produce competent, educated, and professional entry-level medical dosimetrists who will participate in scholarly activity and enhance overall patient care (JRCERT Standard 1.1).

Goal 1: Students will be clinically competent.

Outcomes	Measurement Tools	Benchmarks	Timeframes	Responsible Party	Results	Metrics	Action Plan
Students will demonstrate acquisition of correct dosimetry treatment planning skills.	Formative: Overall evaluation (Clinical Performance)	At least a 4- on the 5-point scale	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2): 5	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an appropriate measurement tool and benchmark.
	Summative: Employer survey (IIJ)	At least a 4.5 on the 5-point scale	Annually	Program Director (reported annually to the	2023 (n = 2):	Data for 2024 will be added for comparison.	Data for 2023 will be collected and entered in December 2023.

				Development Committee)			
Students will evidence competency in treatment.	Formative: Weekly evaluation (I5)	At least a 4 on the 5-point scale	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2): 5	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an appropriate measurement tool and benchmark.
	Summative: Employer Survey (IIG)	At least a 4.5 on the 5-point scale	Annually	Program Director (reported annually to the Development Committee)	2023 (n = 2):	Data for 2024 will be added for comparison.	Data for 2023 will be collected and entered in December 2023.

Goal 2: Students will demonstrate effective communication skills.

Outcomes	Measurement Tools	Benchmarks	Timeframe	Responsible Party	Results	Metrics	Action Plans
Students will effectively communicate with patients, medical dosimetrists, faculty, and staff.	Formative: Weekly evaluation (III1)	At least a 4 on the 5-point scale	Annually	Program Director (reported annually to the Development Committee)	2023 (n = 2): 5	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an appropriate measurement tool and benchmark.
	Summative: Employer Survey (IIIK)	At least a 4.5 on the 5-point scale	Annually	Program Director (reported annually to the Development Committee)	2023 (n = 2):	Data for 2024 will be added for comparison.	Data for 2023 will be collected and entered in December 2023.
Students will write at a proficient level by graduation.	Formative: MD500 Professionalism Written Report	A grade of at least 40/50	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2): 49	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an appropriate measurement tool and benchmark.

	Summative: MD505 Research Project	A grade of at least 40/50 on the final paper	3rd semester	Program Director (reported annually to the Development Committee)	2023 (n = 2):	Data for 2024 will be added for comparison.	Data for 2023 will be collected and entered in June 2023.

Goal 3: Students will develop critical thinking skills.

Outcomes	Measurement Tools	Benchmarks	Timeframe	Responsible Party	Results	Metrics	Action Plans
Students will apply didactic concepts and information in the clinical setting.	Formative: Weekly evaluation (II3)	At least a 4 on the 5-point scale	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2): 5	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an appropriate measurement tool and benchmark.
	Summative: Overall evaluation (Clinical Performance)	At least a 4.5 on the 5-point scale	3rd semester	Program Director (reported annually to the Development Committee)	2023 (n = 2):	Data for 2024 will be added for comparison.	Data for 2023 will be collected and entered in June 2023.
Students will conceptualize current patient safety radiation therapy Lean A3 engineering principles.	Formative: MD509 A3 worksheet assignment	A grade of at least 40/50	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2):	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an

							appropriate measurement tool and benchmark.
	Summative: MD509 Test Question 4	2/2 answer correctly	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2): 100%	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an appropriate measurement tool and benchmark.

Goal 4: Students will grow and develop professionally.

Outcomes	Measurement Tools	Benchmarks	Timeframe	Responsible Party	Results	Metrics	Action Plans
Students will demonstrate professional behaviors.	Formative: Overall evaluation (Professional Appearance)	At least a 4 on the 5-point scale	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2): 5	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an appropriate measurement tool and benchmark.
	Summative: Graduate Survey (IIIL)	At least a 4.5 on the 5-point scale	Annually	Program Director (reported annually to the Development Committee)	2023 (n = 2):	Data for 2024 will be added for comparison.	Data for 2023 will be collected and entered in December 2023.
Students will participate in continuing education.	Formative: Student is a member of a professional organization.	½ are a member	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2): 50%	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an

							appropriate measurement tool and benchmark.
	Summative: Graduate Survey (IVD)	2/2 answer yes	Annually	Program Director (reported annually to the Development Committee)	2023 (n = 2):	Data for 2024 will be added for comparison.	Data for 2023 will be collected and entered in December 2023.
Students will communicate professionally both orally and through the written word.	Formative: MD500 Professionalism Oral Report	A grade of at least 20/25	1st semester	Program Director (reported annually to the Development Committee)	2023 (n = 2): 23.5	Data for 2024 will be added for comparison.	The students met the benchmark. The program will monitor next year's data to determine if this is an appropriate measurement tool and benchmark.
	Summative: MD505 Research Presentation	A grade of at least 16/20	3rd semester	Program Director (reported annually to the Development Committee)	2023 (n = 2):	Data for 2024 will be added for comparison.	Data for 2023 will be collected and entered in June 2023.

Revised March 2023