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[Our mission, vision & core values](#)

[Leadership](#)

[History](#)

[Equality, diversity & inclusion](#)

[Annual report](#)

[Give to MSK](#)

This two-semester course is geared for first-year students. It is designed to provide an introduction into the various basic clinical patient setups that students encounter in their clinical rotations. The clinical setups will be broken down into their basic components and analyzed, with emphasis into the rationale for each. Practical surface anatomy will be covered. Students will be instructed on the methods and techniques used in accurately setting up a patient for treatment. Discussion on simulation concepts and principles will be presented. An integral part of the course is the review of simulation films and CTs. The class will provide a solid foundation of clinical setup skills that students will build on during their clinical rotations.

## Methods of Patient Care

This course is designed to provide the student with foundational concepts in the assessment and evaluation of the patient for service delivery. Psychological and physical needs and factors affecting treatment outcome will be presented and examined. Routine and emergency care procedures and infection control will be presented. The basic information required for the student therapist to understand the medical implications of radiation therapy and side effects for treatment to various organs will be provided. The more common chemotherapeutic agents will be introduced, and the methods of administration and possible side effects will be discussed.

## Medical Terminology

This course will establish a foundation in the standardized language of medical practice, including abbreviations and symbols. Knowledge of medical terms and their meanings will be used as a preparatory tool for reading, understanding, interpreting, and applying prescriptions to radiation therapy. It will help to give the student a deeper understanding of medical terms as they relate to radiation oncology.

## **Record Keeping**

This course will familiarize the student with the patient electronic chart and its content. All components of the legal document will be defined and discussed, ensuring students the ability to use proper documentation and find any information necessary regarding the patient's treatment.

## **Clinical Anatomy I-II**

This two-semester course will include anatomy and physiology of the human body; emphasis on anatomy of the skeletal, muscular, circulatory, nervous, respiratory, digestive, excretory, reproductive, and endocrine systems. The course will explore the clinical aspects of human anatomy in radiation oncology and include CT images of various areas.

## **Radiation Physics I-II**

The course content of the first semester is designed to establish a basic knowledge of physics pertinent to developing an understanding of radiation used in the clinical setting. Fundamental physics units, measurements, principles, atomic structure, and types of radiation are emphasized. Also presented are fundamentals of x-ray generating equipment, x-ray production, and its interaction with matter. Students will be introduced to units used in radiation therapy, including the metric system and SI units. The student will be instructed in the basic mathematical functions and skills needed to perform all essential calculations encountered in the radiation therapy profession.

The second semester is designed to expand on the concepts and theories introduced during the first semester Physics course. Detailed analysis of the structure of matter, properties of radiation, nuclear transformation, x-ray production, and interactions of ionizing radiation are emphasized. Also presented are treatment units used in external radiation therapy, measurement and quality of ionizing radiation produced, absorbed dose measurement, dose distribution, and scatter analysis. In addition, the course will include properties of photon and electron beams, electron beam therapy, brachytherapy, gamma ray constants of isotopes, calculation of brachytherapy dose in clinical applications, systems of implant dosimetry, and implant techniques.

## **Ethics & Law in Radiation Therapy**

This course will establish a foundation of professional practice for the radiation therapist as part of the radiation-therapy team. Ethical behavior for caregivers will be defined and discussed with focus on the interdependence of the radiation therapist and patient.

## **Radiation Protection**

The student will be provided with the basic principles and concepts of radiation protection and safety. Radiation health and safety requirements of federal and state regulatory agencies, accreditation agencies, and health care organizations are incorporated. Specific responsibilities of the radiation therapist are discussed, examined, performed, and evaluated.

## **Principles of Radiography**

This course is designed to establish a knowledge base in factors that govern and influence the production and recording of radiographic images for patient simulation, treatment planning, and treatment verification in radiation oncology. Radiation oncology imaging equipment and related devices will be emphasized.

## **Radiobiology**

This course is designed to present basic concepts and principles of radiation biology. The interactions of radiation with cells, tissues and the body and resultant biophysical event will be presented. Discussion of the theories and principles of tolerance dose, time-dose relationships, fractionation schemes, survival curves and the relationship to the clinical practice of radiation therapy will be discussed, examined, and evaluated.

## **Pathology**

This course will introduce the student to the concept of diseases. Emphasis will be placed on different types of pathologies in various organ systems, causative factors, and biological behavior. Etiology and clinical manifestations will be described.

## **Clinical Radiation Oncology I-II / Board Review**

This two-semester courses will provide the student with the fundamentals of clinical radiation oncology. The medical, biological, and pathological aspects as well as the physical and technical aspects will be discussed. The diagnosis, treatment prescription, the documentation of treatment parameters and delivery, emergency procedures, and patient condition and education needs will also be presented, discussed, examined, and evaluated. The course is also designed to examine and evaluate the management of neoplastic disease using knowledge in arts and sciences, while promoting critical thinking and the basis of ethical clinical decision making. The epidemiology, etiology, detection, diagnosis, patient condition, treatment, and prognosis of neoplastic disease will be presented, discussed, and evaluated in relationship to histology, anatomical site, and patterns of spread. Oncologic emergencies and management of such will be discussed. The radiation therapists' responsibility in the management of neoplastic disease will be examined and linked to the skills required to analyze complex issues and make informed decisions while appreciating the character of the profession. This course is designed to be taught over a period of two semesters. During class times, when a lecture is not scheduled, or the lecturer or physician becomes unavailable, the lecture time will be used for board review and the original lecture will be rescheduled. Students will be required to submit a research paper within specified guidelines, which may be submitted to CART as part of a student competition.

## **Treatment Planning I-II**

This two-semester course is designed to establish factors that influence and govern clinical planning of patient treatment. Included are isodose description, patient contouring, radiobiological considerations, dosimetry calculations, compensation, and clinical application of treatment beams. Optimal treatment planning is emphasized along with particle beams. Attention is given to the rationale, theory, and calculations for each method. Class demonstrations and projects are incorporated to complement specific content areas and are focused on clinical applications. In addition, approximately half of the second semester is spent discussing various brachytherapy procedures including techniques, rationale, and calculations. In addition, students will be assigned a two-week clinical rotation in the treatment-planning department and a one-week rotation in brachytherapy.

## **Quality Assurance**

To comprehend quality management as it relates to aspects of radiation therapy. Quality management protocols will be presented as they apply to patient care, record keeping, documentation, and equipment and radiation output. In addition, proper billing protocol, billing compliance, and managed care will be discussed as per ASRT guidelines.

## **Image Review**

This course will ensure the student's proficiency at reading and analyzing films, CTs and treatment fields. Organs and structures will be located radiographically and discussed in relation to anatomical landmarks. Typical treatment fields, including borders, blocking, and nodal chains, will be identified and discussed.

## **Registry Examination Preparation**

During this course students will be given supplementary material on information previously taught. The goal of this class is to reinforce knowledge learned from previous courses. Student therapists will be given a comprehensive review of topics presented during the first three semesters of the program and will progress to review the classes taught over the fourth semester. Multiple teaching aides and styles will be utilized, including PowerPoints, handouts, short exams as well as full length exams similar in format to registry exams.

At the end of the fourth semester, student therapists will be given a comprehensive review of topics presented during the two years of the program by various instructors. Several practice type tests will be administered, including computerized tests to simulate the style of the registry exam, as outlined in the Radiation Therapy Certification Handbook. These multiple-choice questions will be devised by instructors and students and will include questions from semester course exams in addition to questions from review books. During this review, eligibility requirements, the application process, and exam security will be emphasized. Also, during the last year, when there are no specific lectures scheduled during a class period, the time scheduled for Clinical Radiation Oncology will be utilized to review for the boards.

In addition, students may also participate in a registry review seminar and student competition in Chicago during a weekend in April partially sponsored by the program. Students may also participate in a 2-day Registry Review seminar/webinar through Thomas Jefferson Hospital and/or a 3-day registry review seminar/webinar through the New England Society of Radiation Therapists. Attendance at these seminars is strictly on a voluntary basis and at the students' own expense. The program may choose to sponsor a webinar of one of these seminars through a grant.

In addition, workshops will be presented for professional development. These workshops include such topics as licensure and certification, resume preparation, interview skills, etc.

## **Graduation Requirements**

To qualify for graduation from the training program, students must meet the following requirements:

The program offers 539.75 hours of didactic courses and 2077 hours of clinical experience; the student must complete 85% of these hours.

Satisfactory completion of all courses with a grade point average of 75% or better.

Completion of monthly clinical evaluation with a grade point average of at least a 75%.

Successful completion of required clinical competencies by June of the senior year.

Return of any equipment/books borrowed from the school and/or medical library.

Fulfillment of all monetary obligations.

Completion of all program assessment forms/evaluations/surveys, financial aid entrance and exit interviews, if applicable.

# Grading System

The grading system for the Radiation Therapy Program is a numerical one. A minimum Grade Point Average of 75% is required for graduation. There are no repeated courses, incompletes, or withdrawals in the Radiation Therapy Program.

To pass each course the student must receive a grade of 75% or better. If a student falls below 75% on any academic course or clinical rotation, he/she will be placed on probation. If the student does not improve by the end of the semester and fails a didactic course, he/she will be dismissed from the program.

If a first year student fails any academic course or two clinical rotations within a 12-month period, or if a senior student fails any academic course or one clinical rotation in his/her second year, the student will be dismissed from the program. If any student is in danger of failing, the Program Director and Clinical Coordinators must be notified midway through the clinical rotation or semester.

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