Medical Radiography — A.S.

Program director
Brenda L. Boyd

Medical advisor
Samuel M. Randolph

The medical radiographer, or radiologic technologist, is responsible for the accurate imaging of body structures on a radiograph or other image receptors. The technologist provides for patient protection and comfort, determines proper exposure factors, manipulates medical imaging equipment, evaluates the radiograph image for quality, and utilizes film or digital technologies to archive and transmit the patient's examination images for physician evaluation.

The technologist may also assist the radiologist physician in specialized radiographic procedures. This may require the use of sterile procedures and universal precautions in the administration of radiographic contrast agents to the patient for the enhanced viewing of body systems and their functions.

The program
The Medical Radiography Program begins with the Autumn Quarter and is based on the completion of one year of prerequisite course work at any regionally-accredited college or university. The first quarter at Loma Linda University primarily emphasizes the theoretical aspects of radiography, with one day per week in clinical orientation. The remaining six quarters combine clinical training on a two-to-five-days-per-week basis, with more advanced classroom topics. The schedule may involve limited evening assignments. Clinical and classroom involvement in the program is full time (forty hours/week). Students are off on all national holidays and quarter breaks.

Program mission statement
The Medical Radiography Program at Loma Linda University provides a quality educational experience focused on the whole person. The program prepares students to be registry-eligible, entry-level radiographers — equipped with the knowledge, skills, values, attitudes, and behaviors appropriate for providing excellent patient care and safely managing radiation exposure.

Program objectives
Upon completion of the program, the graduate should be qualified to:

1. Complete all certification requirements of the American Registry of Radiologic Technologists and licensure requirements for the state of California.
2. Anticipate and render appropriate patient care, comfort, and education for a variety of radiologic examinations.
3. Use principles of basic x-ray production to provide radiation protection that minimizes radiation exposure to the patient, to one's self, and to other members of the health-care team.
4. Understand the scope and limits of equipment operation used in radiography, and recognize and report equipment malfunctions.
5. Exhibit clinical competence by properly using radiographic equipment, techniques, and procedures; and applying knowledge of human anatomy, function, and pathology to a variety of patient situations.
6. Demonstrate excellence in the application of knowledge and skills in order to maintain a high level of quality patient care.
7. Apply problem-solving and critical-thinking skills when working with patients, performing examinations, and evaluating radiographs for diagnostic quality.
8. Incorporate the values, ethics, and practices of the radiography profession in order to provide service to humanity; and respect the dignity and diversity of all people.
9. Employ appropriate verbal, written, and interpersonal communication skills when relating to patients, co-workers, and other members of the health-care team.
10. Demonstrate the highest professional behavior in all interactions.
11. Demonstrate collaboration and teamwork in the health-care setting in order to meet the goals of the organization.
12. Defend the profession's code of ethics and work within the profession's scope of practice.
13. Construct a professional development plan for ongoing improvement in the knowledge and skills of the profession.
14. Understand the value of participating in educational and professional activities, sharing knowledge with colleagues, and investigating new and innovative aspects of professional practice.
15. Understand and apply Loma Linda University's philosophy of wholeness in one's personal and professional life.
16. Prepare students for leadership and for providing a positive patient experience.

Student learning outcomes
1. Students will demonstrate clinical competence by performing radiographic examinations of diagnostic quality and applying patient care and practices for radiographic procedures.
2. Students will communicate effectively by clearly explaining radiographic procedures to patients, effecting communication and working with the health-care team, and demonstrating appropriate communication for diverse populations.
3. Students will develop critical-thinking and problem-solving skills by appropriately adjusting procedures and critiquing images to determine diagnostic acceptability.
4. Students will demonstrate the values and attitudes of an entry-level radiographer by constructing a plan for professional development, modeling professional behavior, and examining the core values and reflecting on their personal application.

Affiliations
For the clinical portion of the program, students are assigned to one of the affiliated medical centers: Loma Linda University Medical Center—Loma Linda, Loma Linda University Medical Center-East Campus, Loma Linda University Medical Center-Faculty Medical Offices, Loma Linda University-Murrieta, Hemet Valley Medical Center, Eisenhower Medical Center, Desert Hospital, Redlands Community Hospital, Parkview Community Hospital, Pioneers Memorial Hospital, El Centro Regional Medical Center, St. Bernardine Medical Center, Community Hospital of San Bernardino, Riverside Community Hospital, Highland Springs, San Gorgonio, White Memorial Medical Center, or St. Mary Regional Medical Center.
CPR certification
Students are required to have current health-care provider cardiopulmonary resuscitation (CPR) certification (adult, child, and infant) for all scheduled clinical experience. CPR certification must be completed at the American Heart Association health-care provider level. This may be completed prior to beginning the program of study or may be obtained at Loma Linda University. Classes are available on campus at Life Support Education, University Arts building, 24887 Taylor Street, Suite 102.

Professional registration and certification
Upon completion of the requirements for the Associate in Science degree, the graduate is eligible to write the qualifying examination of The American Registry of Radiologic Technologists (ARRT). Program graduates who pass the ARRT examination in radiography are eligible to pay for and receive the state license (CRT) in California without further testing within five years of passing the ARRT examination. Graduates are encouraged to become members of the California Society of Radiologic Technologists (CSRT) and the American Society of Radiologic Technologists (ASRT) for professional growth and continuing education in their professional discipline.

Quarterly fee
In addition to the cost of the ASMR program, additional fees include a quarterly University fee and a program fee of $40.00.

Accreditation
The program is accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT), 20 North Wacker Drive, Suite 2850, Chicago, IL 60606-3182; telephone: 312/704-5300. The program is also approved by the Radiologic Health Branch (RHB) of the state of California, Department of Public Health MS 7610, P.O. Box 997414, Sacramento, CA 95899-7414; telephone: 916/327-5106.

Admissions
Admission is based on a selective process. In addition to Loma Linda University (http://llucatalog.llu.edu/about-university/admission-policies-information/#admissionrequirementstext) and School of Allied Health Professions admissions requirements (http://llucatalog.llu.edu/allied-health-professions/#generalregulationstext), the applicant must also complete the following requirements:

- high school completion from an accredited institution or passed the GED
- completed a minimum of 42 quarter units (or 28 semester units) at an accredited college or university.
- observation experience—A minimum of eight hours of observation in a radiology department is required. Contact the department to obtain the appropriate form.
- service/volunteer experience—A minimum of 20 hours of volunteer service in any area except the field of radiology is required. Contact the department to obtain more information.
- applicants are required to submit references, an essay transcripts from all schools attended, proof of volunteer hours, proof of career observation hours, and a video interview. Contact the department for more information.
- continuation in the program includes maintaining a program GPA of 2.5, a quarterly GPA of 2.5, and passing every class each quarter. Failure to pass a class or earning a 2.49 GPA and below in any quarter will result in failure to progress and termination in the program.

Prerequisites
- Human anatomy and physiology, complete sequence with laboratory
- Two years high school mathematics at algebra level or above, with grades of C or above; or intermediate algebra in college (college algebra is preferred)
- Medical terminology
- One year high school chemistry or physics; or introductory chemistry, introductory physics in college (one quarter/semester) (physics is preferred)
- General psychology or general sociology
- English composition, complete sequence
- Interpersonal communication, oral communication, or public speaking
- Computer course one year high school or one quarter/semester college (or by faculty approval if substantial documentation is shown to prove computer literacy)
- Religion is a requirement only if a student attended a Seventh-day Adventist college or university (1 unit of religion for every 12 units earned at an SDA college)
- Electives to meet the minimum total requirements of 42 units (such as; cultural anthropology, nutrition, critical thinking, Spanish, or computers)

Program Requirements

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Clinical Year

Summer Quarter
RTMR 373  Medical Radiography Affiliation III  12

Autumn Quarter
REL_4___ Upper-division Religion  2
RTMR 305  Introduction to Computed Tomography I  2
RTMR 324  Radiographic Image Evaluation and Pathology  3
RTMR 374  Medical Radiography Affiliation IV  10

Winter Quarter
RTMR 306  Introduction to Computed Tomography II  2
RTMR 363  Comprehensive Review I  2
RTMR 375  Medical Radiography Affiliation V  10

Spring Quarter
RTMR 344  Professional Development and Service Learning  3
RTMR 365  Comprehensive Review II  2
RTMR 386  Medical Radiography Affiliation VI  10

Total Units: 104

Certain aspects of the curriculum require individual scheduling. Time arrangements may be subject to change. Entrance to the clinical year is contingent upon completion of all prior requirements.

A minimum G.P.A. of 2.5 is required for all courses in the program.

Normal time to complete the program

2 years (7 academic quarters) — full-time enrollment required

Courses

RTMR 202. Clinical Orientation. 3 Units.
Clinical orientation to the functions of radiologic technologists. Clinical environment orientation conducted at affiliated clinical sites.

RTMR 221. Radiologic Patient Care. 2 Units.
Addresses patient care issues specific to radiographic procedures. Emphasizes patient care in the ER and OR, as well as contrast procedures. Other topics covered include: radiographic professional organizations, ARRT code of ethics, staying balanced and healthy, critical thinking and problem solving, pharmacology, medical abbreviations, spirituality in health care, dealing with challenging patient situations, immobilization techniques, and overview of patient care topics on the ARRT board examination.

RTMR 224. Legal Issues in Medical Radiography. 1 Unit.
Presents an overview of legal issues in radiologic technology. Topics include: standards of care, patient rights, informed consent, civil liability, legal doctrines, documentation, confidentiality, scope of practice, and ethical theories.

RTMR 246. Professional Communication. 2 Units.
Provides an understanding of the professional communication skills needed to succeed as an entry-level radiographer. Addresses radiologic technology accreditation and University-required student learning outcomes in oral, written, and health care team communication.

RTMR 247. Languages for Radiographers. 1 Unit.
Introduces radiography students to the words, phrases, and medical terminology most often used in radiographic patient care situations for the common languages of patients.

RTMR 253. Medical Radiography Procedures I. 2 Units.
Introduces students to various radiographic procedures, which include anatomy, patient positioning, geometric factors, exposure techniques, and patient shielding.

RTMR 253L. Medical Radiography Procedures Laboratory I. 1 Unit.
Applies principles of patient positioning in a laboratory setting. Students practice optimum positioning practices on classmates. Anatomy covered includes: chest, upper extremity, lower extremity, bony thorax, and shoulder girdle.

RTMR 254. Medical Radiography Procedures II. 2 Units.
Introduces students to various radiographic procedures, which include anatomy, patient positioning, geometric factors, exposure techniques, and patient shielding. Continues RTMR 253. Prerequisite: RTMR 253.

RTMR 254L. Medical Radiography Procedures Laboratory II. 1 Unit.
Applies principles of patient positioning in a laboratory setting. Students practice optimum positioning practices on classmates and volunteers. Anatomy covered includes: abdomen, spine, skull, and pelvis.

RTMR 255. Medical Radiography Procedures III. 2 Units.
Introduces students to various radiographic procedures, which include anatomy, patient positioning, geometric factors, exposure techniques, and patient shielding.

RTMR 255L. Medical Radiography Procedures Laboratory III. 1 Unit.
Applies principles of patient positioning and radiographic exposure to the laboratory setting. Uses clinical patient simulation and radiographic phantoms to determine optimal radiographic techniques.

RTMR 283. Radiologic Physics. 3 Units.
Provides a background for understanding the physics of man-made radiation production. Addresses the interaction of radiation with matter for both radiation protection and the creation of radiographic images. Covers the electrical circuitry of diagnostic x-ray equipment.

RTMR 284. Radiation Protection and Biology. 2 Units.
Addresses the fundamental concepts of radiation protection and biological effects of radiation on patients and occupationally exposed personnel. Topics include: radiation safety procedures, radiation quantities and units, legal exposure standards, and radiation monitoring.

RTMR 285. Principles of Radiography I. 3 Units.
Introduces the principles of radiographic theory and technique. Covers the physical factors involved in image exposure and processing, auxiliary equipment used in producing the radiographic exposure, and techniques for obtaining the optimum image under any situation. Weekly laboratory sessions required.

RTMR 286. Principles of Radiography II. 3 Units.
Provides advanced instruction in the principles of radiographic theory and technique. Examines the role of image-intensified fluoroscopy in radiology. Weekly laboratory sessions required.

RTMR 287. Principles of Radiography III. 2 Units.
Provides advanced instruction in the use of digital imaging technology in radiology, including: digital imaging equipment, picture archival and communications systems, radiology information systems, hospital information systems, and various other radiology-related applications. Advanced techniques focus on operation, quality assurance, and radiation safety.

RTMR 305. Introduction to Computed Tomography I. 2 Units.
Introduces an overview of cross-sectional anatomy. Identifies normal anatomy in two- and three-dimensional planes. Addresses the structural and physiological functions of body systems.
RTMR 306. Introduction to Computed Tomography II. 2 Units.
Introduces basic principles, physics, imaging parameters, radiological effects, management, and patient protocol of computed tomography (CT).

RTMR 321. Radiographic Image Evaluation. 2 Units.
Expands upon the fundamental image evaluation knowledge acquired in RTMR 253, 254, and 255. Advances understanding of image evaluation with reference to radiographic anatomy, patient positioning, geometric factors, exposure techniques, and patient shielding.

RTMR 324. Radiographic Image Evaluation and Pathology. 3 Units.
Expands upon the fundamental image evaluation knowledge acquired in RTMR 253, 254, and 255. Advances understanding of image evaluation with reference to pathology, radiographic anatomy, patient positioning, geometric factors, exposure techniques, and patient shielding.

RTMR 342. Professional Development. 1 Unit.
Provides an overview of the radiologic specialties, as well as fluoroscopy technology to generate images and treat patients. Examines the state and national radiography organizations, continuing education, and services available to students and technologists. Reviews the values and code of ethics of the radiography profession as it relates to employment. Students develop a professional development plan and resume to be used for their career development.

RTMR 344. Professional Development and Service Learning. 3 Units.
Provides an overview of the radiologic specialties. Examines state and national radiography organizations and continuing education requirements. Reviews the values and code of ethics of the radiography profession as they relate to employment. Students create a professional development plan and resume; and complete a service learning project of more than 16 hours that includes involvement in the community, a needs assessment, reciprocation, and reflection for deep learning and transformation. Students also write a synthesis project that addresses the knowledge, skills, attitudes, values, and behaviors necessary to become a radiologic technologist.

RTMR 345. Radiologic Pathology. 2 Units.
Reviews the pathologic processes most commonly viewed by radiographers using radiologic imaging methods.

RTMR 363. Comprehensive Review I. 2 Units.
Reviews major content areas emphasized on certification examinations. Student evaluation and performance analysis. Time provided to make class presentations, organize study materials, and take simulated registry examinations.

RTMR 365. Comprehensive Review II. 2 Units.
Continues review of major content areas emphasized on certification examinations. Student evaluation and performance analysis. Time provided to make class presentations, organize study materials, and take simulated registry examinations.

RTMR 371. Medical Radiography Affiliation I. 5 Units.
The first of six affiliation courses that total eighteen months of clinical experience. Students gain hands-on experience in basic patient care, radiographic procedures and positioning, radiation protection, radiographic exposure and techniques, critical thinking and problem solving, and patient and health care team communication. The combined six-part affiliation sequence fulfills state requirements for clinical hours in medical radiography.

RTMR 372. Medical Radiography Affiliation II. 7 Units.
Continues RTMR 371.

RTMR 373. Medical Radiography Affiliation III. 12 Units.
Continues RTMR 371 and 372.

RTMR 374. Medical Radiography Affiliation IV. 10 Units.
Continues RTMR 371, 372, and 373.

RTMR 375. Medical Radiography Affiliation V. 10 Units.
Continues RTMR 371, 372, 373, and 374.

RTMR 384. Topics in Medical Radiography. 1-3 Units.
Lecture and discussion of a current topic in medical radiography bearing on the theory or practice of one aspect of the discipline. Specific content varies from quarter to quarter.

RTMR 386. Medical Radiography Affiliation VI. 10 Units.
Continues RTMR 371, 372, 373, 374, and 375.