

# MEDICAL RADIOGRAPHY – A.S.

## Program director

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## Medical advisor

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

The technologist may also assist the radiologist 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 coursework at any institutionally accredited college or university. The first quarter at Loma Linda University primarily emphasizes the theoretical aspects of radiography, with two days per week at a clinical affiliation beginning week seven. 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 (40 hours/week). Students are free on all national holidays and during quarter breaks. Loma Linda University and the Department of Radiation Technology cannot guarantee employment or passing of board exams.

## 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 goals

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

1. Be clinically competent.
2. Provide excellent patient care for a variety of radiologic examinations with respect to the dignity and diversity of all people.
3. Follow radiation protection standards to minimize occupational and public dose.
4. Safely operate all varieties of diagnostic radiography equipment.
5. Become a board-eligible entry-level professional in the field of radiography.
6. Defend the profession's code of ethics and work within the profession's scope of practice.

## Program learning outcomes

1. By the end of the program, graduates should be able to:
  - a. Utilize knowledge needed to complete radiographic examinations of diagnostic quality, while applying proper patient care and radiation protection standards.
  - b. Integrate effective communication skills into their health-care practice with both patients and colleagues.
  - c. Employ critical-thinking and problem-solving skills to both prepare for and apply image critique in order to successfully complete radiography exams.
  - d. Demonstrate professional values, behaviors, and attitudes as an entry-level radiographer.

## Affiliations

For the clinical portion of the program, students are assigned to an affiliated medical center: Loma Linda University Health in Loma Linda, East Campus, Faculty Medical Offices, Murrieta, SACH clinic, and the Surgical Hospital in Loma Linda; Eisenhower Medical Center, Desert Hospital, Redlands Community Hospital, Parkview Community Hospital, St. Bernardine Medical Center, Community Hospital of San Bernardino, Riverside Community Hospital, Highland Springs, San Geronio Community Hospital, White Memorial Medical Center, St. Mary Regional Medical Center; and Children's Hospital of Orange County.

## CPR & IV certification

Students are required to have current health-care provider adult, child, and infant cardiopulmonary resuscitation (CPR-BLS) certification for all scheduled clinical experiences. CPR certification must be completed at the American Heart Association health-care provider level. This may be earned 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. Intravenous (IV) certification will be required with an online course and on-campus lab. Either of these items is the responsibility of the student to finance as part of the program cost.

## 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. Graduates are encouraged to become members of the California Society of Radiologic Technologists and the American Society of Radiologic Technologists for professional growth and continuing education in their professional discipline.

## Program Accreditation

The Medical Radiography 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 competitive, selective process. In addition to Loma Linda University (<https://llucatalog.llu.edu/about-university/admission-policies-information/#admissionrequirements>) and School of Allied Health Professions admissions requirements (<https://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.
- A minimum of 42 quarter units (or 28 semester units) at an accredited college or university.
- Observation experience—A minimum of eight hours of career observation in a radiology department is required. Contact the department to obtain the appropriate form.
- Online application, three references, an essay, and transcripts from all schools attended including high school. The essay should include: why you are choosing LLU, your process for selecting this profession, what makes you a good candidate, and anything else that helps us get to know you. Contact the department for more information.
- A prerequisite GPA of 2.5 minimum; however, a competitive G.P.A. of 3.1 or higher is preferred.

## Prerequisites

- Human anatomy and physiology, complete sequence of two courses minimum, with a lab for each course
- Introductory or general physics at the college level (one quarter/semester)
- General psychology or general sociology
- English composition, complete sequence
- Interpersonal communication, oral communication, or public speaking
- Electives to meet the minimum total requirement of 42 quarter units (such as: cultural anthropology, nutrition, health, life span development, Spanish, or computer science)
- Medical Terminology

## Program Requirements

### Sophomore

#### Autumn Quarter

AHCJ 326	Fundamentals of Health Care	2
AHCJ 328	Wholeness Portfolio I	0
RTMR 202	Clinical Orientation	1
RTMR 224	Legal Issues in Medical Radiography	1
RTMR 246	Professional Communication & Presentation	2
RTMR 253	Medical Radiography Procedures I	3
RTMR 253L	Medical Radiography Procedures Laboratory I	1
RTMR 285	Principles of Radiography I	3

#### Winter Quarter

AHCJ 328	Wholeness Portfolio I	0
RTMR 221	Radiologic Patient Care	2
RTMR 254	Medical Radiography Procedures II	3
RTMR 254L	Medical Radiography Procedures Laboratory II	1
RTMR 282	Imaging Physics, Radiobiology, and Radiation Protection	3
RTMR 286	Principles of Radiography II	2

RTMR 371	Medical Radiography Affiliation I	5
<b>Spring Quarter</b>		
AHCJ 328 <sup>1</sup>	Wholeness Portfolio I	1
RELT 423	Loma Linda Perspectives	2
RTMR 247	Languages for Radiographers	1
RTMR 255	Medical Radiography Procedures III	3
RTMR 255L	Medical Radiography Procedures Laboratory III	1
RTMR 325	Radiologic Pathology	1
RTMR 372	Medical Radiography Affiliation II	7
<b>Clinical Year</b>		
<b>Summer Quarter</b>		
RTMR 373	Medical Radiography Affiliation III	12
<b>Autumn Quarter</b>		
RELR 275	Whole Person Care	2
RTCH 324	Introduction to Imaging and Therapeutic Modalities in the Radiation Sciences	3
RTMR 374	Medical Radiography Affiliation IV	7
<b>Winter Quarter</b>		
RTCH 327	Professional Development	1
RTMR 363	Comprehensive Review I	2
RTMR 375	Medical Radiography Affiliation V	7
RTSI 367	Cross-sectional Radiographic Anatomy	2
<b>Spring Quarter</b>		
RTMR 365	Comprehensive Review II	3
RTMR 386	Medical Radiography Affiliation VI	10
<b>Total Units:</b>		<b>94</b>

<sup>1</sup> Fulfills service learning requirement.

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 each quarter in the program.

## Normal time to complete the program

Three (3) years – two (2) years (seven [7] academic quarters) at LLU – full-time enrollment required

## Courses

### RTMR 095. Survey of Radiation Sciences. 1 Unit.

- 1 Develops students' interest in and knowledge of the radiation sciences by exploring each of the specialties in the field, such as radiography, CT, MRI, nuclear medicine, diagnostic medical sonography, cardiac sonography, radiation therapy, dosimetry, cardiovascular imaging, imaging informatics, radiologist assistant, mammography, radiology education, and radiology administration. Students develop a career and an education plan.

### RTMR 202. Clinical Orientation. 1 Unit.

- 0 Provides a clinical orientation to the functions of radiologic technologists, with orientation to the clinical environment conducted at affiliated clinical sites.

**RTMR 221. Radiologic Patient Care. 2 Units.**

Addresses patient care during radiographic procedures. Emphasizes patient care in the ER and OR, and during contrast procedures. Topics include radiographic professional organizations, ARRT code of ethics, personal balance and health, critical thinking and problem solving, pharmacology, medical abbreviations, spirituality in health care, challenging patient situations, and immobilization techniques.

**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 & Presentation. 2 Units.**

Provides an understanding of the professional communication and presentation skills needed to succeed as an entry-level radiographer. Topics include personality assessments, interpersonal communication, conflict resolution, moral courage, patient communication, and professionalism. 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. 3 Units.**

Introduces various radiographic procedures, including anatomy, patient positioning, geometric factors, exposure techniques, image evaluation 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. 3 Units.**

Introduces students to various radiographic procedures, which include anatomy, patient positioning, geometric factors, exposure techniques, image evaluation and patient shielding. 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. 3 Units.**

Introduces students to various radiographic procedures, which include anatomy, patient positioning, geometric factors, exposure techniques, and patient shielding. Corequisite: RTMR 255L.

**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 282. Imaging Physics, Radiobiology, and Radiation Protection. 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. Addresses fundamental concepts of radiation protection and biological effects of radiation on patients and occupationally exposed personnel. Topics include radiation safety procedures as well as radiation quantities and units.

**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. 2 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 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 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 325. Radiologic Pathology. 1 Unit.**

Reviews the pathologic processes most commonly viewed by radiographers using radiologic imaging methods. Prerequisite: RTMR 253, RTMR 254, RTMR 255.

**RTMR 344. Professional Development and Service Learning. 3 Units.**

Overview of radiologic specialties. Examines state and national radiography organizations and continuing education requirements. Reviews professional values and codes of ethics.

**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. 3 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 365L. Comprehensive Laboratory Review II. 1 Unit.**

Reviews concepts and procedures included on certificate examinations as well as emphasizing performance of those procedures. Prerequisite or concurrent: RTMR 365.

**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. 7 Units.**

Continues RTMR 371, 372, and 373.

**RTMR 375. Medical Radiography Affiliation V. 7 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.