

# RADIATION SCIENCES – B.S. (ENTRY LEVEL)

## Program directors

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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 entry-level Radiation Sciences B.S. 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 two years at Loma Linda University primarily emphasizes the core aspects of medical imaging (radiography), beginning with two days per week at a clinical affiliation beginning the third week of the program. The remaining six quarters combine clinical training on a two-to-three-days-per-week basis, with more advanced classroom topics.

The third year of the program allows students to select an area of emphasis in CT, MRI, Administration and Education, Imaging Informatics, Mammography and MRI, Cardiac Imaging, Vascular Imaging, or Advanced Imaging. Clinical affiliation in the final year consists of four quarters split between medical radiography and area-of-emphasis clinical time on a three-to-four-days-per-week basis.

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.

The baccalaureate degree comprises a minimum of 192 quarter units in the following:

- Loma Linda University general education (GE) requirements.
- Radiation sciences professional and core courses.
- Area of emphasis
- E-Portfolio that comprises academic and professional work, a capstone project, and service learning.

## Program learning outcomes (Goals)

By the end of this program, the graduate should be able to:

1. Demonstrate clinical competence in medial radiography.
2. Demonstrate the values and attitudes of an entry-level radiographer.
3. Apply concepts from institutional learning outcomes.

4. Investigate concepts of managers and educators who contribute to the imaging disciplines through service and leadership.
5. Discuss leadership principles and advocate for excellence in patient care.
6. Integrate concepts from chosen area of emphasis.

## Professional registration and certification

Upon completion of the requirements for the Radiation Science, BS degree, the graduate is eligible to write the qualifying examination of The American Registry of Radiologic Technologists (ARRT) in Radiography (R). 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 and the American Society of Radiologic Technologists for professional growth and continuing education in their professional discipline.

Graduates completing advanced modalities in their emphasis are eligible for ARRT examinations in CT, MRI, M, CI, and/or VI.

## 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 meet the following requirements:

- High school completion from an accredited institution, or passed the GED.
- A minimum of 45 quarter units (or 30 semester units) at an accredited college or university, including appropriate AP courses.
- Observation experience—A minimum of eight hours of career observation in a radiology department is required. Contact the LLU-SAHP Radiation Technology department to obtain the appropriate form.
- Online application—the essay section 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 3.0 or higher is preferred.

## Prerequisites and corequisites

Courses are listed as they relate to general education domains. Courses preceded by an asterisk (\*) are required for admission to the program. Remaining general education courses are taken at LLU within the program. Elective credits taken to meet the minimum 45 units required before matriculation may be selected from the following domains.

### Domain 1: Religion (12 quarter units)

(completed during enrollment at LLU)

### Domain 2: Arts and humanities (minimum 16 quarter units)

Units must be selected from at least three of the following content areas: civilization/history, art, literature, language, philosophy, religion, or general humanities electives. A minimum of 3 quarter units in an area are required to meet a "content area."

**Domain 3: Scientific inquiry and quantitative reasoning (minimum 12 quarter units)**

- \*Human anatomy and physiology with laboratory, complete sequence (two course minimum)
- \*Introductory or general physics at the college level (one quarter/semester)

**Domain 4: Social sciences (minimum 12 quarter units)**

- Select from two of the following content areas: anthropology, economics, geography, political sciences, psychology, and sociology.
- The human diversity requirement is fulfilled in the portfolio core courses: RTCH 491 Portfolio I and RTCH 492 Portfolio II (approved by the University GE Committee).

**Domain 5: Written and oral communication (minimum 9 quarter units)**

- \*English composition, complete sequence that meets the baccalaureate degree requirements of a four-year college or university
- \*Interpersonal communication, oral communication, or public speaking
- Additional courses may include information systems, critical thinking

**Domain 6: Health and wellness (minimum 2 quarter units)**

- A didactic course in health or nutrition (e.g., personal health, personal nutrition, population health, global health, and community nutrition) minimum of 2 units
- Physical education. Must include at least two separate physical activity courses totaling a minimum of one quarter units.

**Other**

\*Medical terminology

## Program requirements

**Sophomore****Autumn Quarter**

	Units
AHCJ 326 Fundamentals of Health Care	2
PSYC 101 <sup>4</sup> Introduction to Psychology	4
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**

RTCH 371 Radiography Clinical Affiliation I	2
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
SPAN 101 Introduction to Spanish	

**Spring Quarter**

ANTH 315 <sup>4</sup> Cultural Anthropology	4
RTCH 372 Radiography Clinical Affiliation II	3
RTMR 325 Radiologic Pathology	1

RTMR 247 Languages for Radiographers	1
RTMR 255 Medical Radiography Procedures III	3
RTMR 255L Medical Radiography Procedures Laboratory III	1
REL_ 4__ Religion course <sup>1</sup>	3

**Summer Quarter**

RTCH 373 Radiography Clinical Affiliation III	3
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**Junior Year****Autumn Quarter**

AHCJ 225 <sup>3</sup> History of Radiation and Imaging 1890-1940	3
RTCH 324 Introduction to CT and Imaging Modalities	3
RTCH 374 Radiography Clinical Affiliation IV	3
RTCH 464 Moral Leadership	3
REL_ 4__ Religion course <sup>1</sup>	3

**Winter Quarter**

AHCJ 226 <sup>3</sup> History of Radiation and Imaging 1940-Present Day	3
AHCJ 318 Emotional Intelligence and Leadership Skills for Health-Care Professionals	3
REL_ 4__ Religion course <sup>1</sup>	3
RTCH 375 Radiography Clinical Affiliation V	3
RTCH 489 Effective Communication for Supervisors	3
RTSI 367 Cross-sectional Radiographic Anatomy	2

**Spring Quarter**

AHRM 475 Health-Care Research and Statistics	4
RTCH 376 Radiography Clinical Affiliation VI	3
RTCH 385 Radiologic Trends in Health Care	2
RTCH 485 Digital Management in Radiology	3

**Summer Quarter**

PSYC 226 <sup>4</sup> Life-Span Development	4
RTCH 387 Writing for Health-Care Professionals	3
RTCH 467 Management of a Radiologic Service	3
RTCH 491 Portfolio I	3

**Senior Year****Autumn Quarter**

DTCS 301 <sup>5</sup> Human Nutrition	3
PEAC 110 Independent Activities	1
RTCH 378 Radiography Clinical Affiliation VIII	1
RTCH 492 <sup>2</sup> Portfolio II	3
Area of emphasis coursework	5-8
Emphasis affiliation course	3

**Winter Quarter**

RTCH 380 Radiography Clinical Affiliation X	1
RTMR 363 Comprehensive Review I	2
PHIL 204 Introduction to Philosophy	
Area of emphasis coursework selected from below	6-8
Emphasis affiliation course	3

**Spring Quarter**

PEAC 110 Independent Activities	1
RTCH 327 Professional Development	1
RTCH 380 Radiography Clinical Affiliation X	1
RTMR 365 Comprehensive Review II	3
Area of emphasis coursework selected from below	5-7

Emphasis affiliation course	3
<b>Summer Quarter</b>	
RTCH 377 Radiography Clinical Affiliation VII	1
REL_4__ Religion course <sup>1</sup>	3
Area of emphasis coursework (selected from below)	6-7
Emphasis affiliation course (selected from area of emphasis below)	3
<b>Total Units:</b>	<b>161-164</b>

<sup>1</sup> One religion course must be selected from the following: RELT 406 Adventist Beliefs and Life, RELT 423 Loma Linda Perspectives, RELT 436 Adventist Heritage and Health, or RELT 437 Current Issues in Adventism.

<sup>2</sup> Fulfills service-learning requirement.

<sup>3</sup> May substitute with another humanities course.

<sup>4</sup> May substitute for another social science course.

<sup>5</sup> May substitute for another health course.

#### Area of emphasis: administration and education

HCBL 434 Financial Management for Health Care	3
HCBL 346 Legal and Ethical Environment in Health Care	3
HLIN 430 Quality Management and Performance Improvement in Health Care	3
RTCH 414 Practicum in Radiation Sciences	3
RTCH 450 Advanced Radiography Clinical Affiliation (3)	12
RTED 475 Curriculum Development for the Radiation Sciences	3
RTED 476 Adult Learning Theory for the Radiation Science Student	3
RTED 477 Learning Activities and Assessment for the Radiation Sciences	3
RTSI 344 Pharmacology for Imaging Professionals	4
<b>Total Units</b>	<b>37</b>

#### Area of emphasis: advanced medical imaging

AHCJ 402 Pathology I	4
AHCJ 403 Pathology II	3
HCBL 346 Legal and Ethical Environment in Health Care	3
HLIN 430 Quality Management and Performance Improvement in Health Care	3
RTCH 450 Advanced Radiography Clinical Affiliation (3)	12
RTCH 487 Advanced Radiography Procedures in Trauma	2
RTCH 488 Advanced Radiography Procedures in Orthopedics and Pediatrics	3
RTII 354 Introduction to Informatics	3
RTSI 344 Pharmacology for Imaging Professionals	4
<b>Total Units</b>	<b>37</b>

#### Area of emphasis: cardiac imaging

AHCJ 402 Pathology I	4
AHCJ 403 Pathology II	3
CEPT 245 Cardiovascular Anatomy and Physiology	3
CEPT 251 Cardiac Electrophysiology and Rhythm Recognition I	2
CEPT 252 Cardiac Electrophysiology and Rhythm Recognition II	2

RTCH 456 Cardiac Interventional Clinical Affiliation (3)	12
RTCH 487 Advanced Radiography Procedures in Trauma	2
RTSI 344 Pharmacology for Imaging Professionals	4
RTSI 345 Cardiac/Interventional Procedures	3
RTSI 360 Cardiac Imaging Review	1
<b>Total Units</b>	<b>36</b>

#### Area of emphasis: imaging informatics

HLIN 430 Quality Management and Performance Improvement in Health Care	3
RTCH 450 Advanced Radiography Clinical Affiliation (3)	12
RTED 475 Curriculum Development for the Radiation Sciences	3
RTII 354 Introduction to Informatics	3
RTII 356 Information Technology in Radiology	3
RTII 358 PACS Planning and Implementation	3
RTII 378 Systems Management in Informatics	3
RTII 384 Advanced Imaging Informatics	1
RTII 386 Certification Exam Review	2
RTSI 344 Pharmacology for Imaging Professionals	4
<b>Total Units</b>	<b>37</b>

#### Area of emphasis: mammography with MRI

HCBL 346 Legal and Ethical Environment in Health Care	3
RTCH 455 Magnetic Resonance Imaging Clinical Affiliation (3)	6
RTCH 458 Mammography Clinical Affiliation (3) or RTCH 450 Advanced Radiography Clinical Affiliation	6
RTCH 480 Mammography Principles and Procedures	3
RTCH 484 Mammography Certification Review	1
RTCH 486 Fundamentals of Breast Ultrasound	3
RTCH 488 Advanced Radiography Procedures in Orthopedics and Pediatrics	3
RTSI 344 Pharmacology for Imaging Professionals	4
RTSI 361 MRI Physics I	2
RTSI 362 MRI Physics II	2
RTSI 365 MRI Patient Care and Procedures	2
RTSI 456 MRI Certification Review	1
<b>Total Units</b>	<b>36</b>

#### Area of emphasis: special imaging CT/MRI

HCBL 346 Legal and Ethical Environment in Health Care	3
RTCH 488 Advanced Radiography Procedures in Orthopedics and Pediatrics	3
RTSI 344 Pharmacology for Imaging Professionals	4
RTSI 456 MRI Certification Review	1
RTSI 457 CT Certification Review	1
RTSI 361 MRI Physics I	2
RTSI 362 MRI Physics II	2
RTSI 364 CT Patient Care and Procedures	2
RTSI 365 MRI Patient Care and Procedures	2
RTSI 369 CT Physics	2
RTCH 454 Computed Tomography Clinical Affiliation (3)	6

RTCH 455	Magnetic Resonance Imaging Clinical Affiliation (3)	6
<b>Total Units</b>		<b>34</b>

**Area of emphasis: special imaging CT**

AHCJ 402	Pathology I	4
AHCJ 403	Pathology II	3
HCBL 346	Legal and Ethical Environment in Health Care	3
HLIN 430	Quality Management and Performance Improvement in Health Care	3
RTCH 454	Computed Tomography Clinical Affiliation (3)	6
RTCH 454 or RTCH 450	Computed Tomography Clinical Affiliation (3) Advanced Radiography Clinical Affiliation	6
RTCH 488	Advanced Radiography Procedures in Orthopedics and Pediatrics	3
RTSI 344	Pharmacology for Imaging Professionals	4
RTSI 457	CT Certification Review	1
RTSI 364	CT Patient Care and Procedures	2
RTSI 369	CT Physics	2
<b>Total Units</b>		<b>37</b>

**Area of emphasis: special imaging MRI**

AHCJ 402	Pathology I	4
AHCJ 403	Pathology II	3
HCBL 346	Legal and Ethical Environment in Health Care	3
HLIN 430	Quality Management and Performance Improvement in Health Care	3
RTSI 344	Pharmacology for Imaging Professionals	4
RTSI 456	MRI Certification Review	1
RTSI 361	MRI Physics I	2
RTSI 362	MRI Physics II	2
RTSI 365	MRI Patient Care and Procedures	2
RTCH 455	Magnetic Resonance Imaging Clinical Affiliation (3)	6
RTCH 455 or RTCH 450	Magnetic Resonance Imaging Clinical Affiliation (3) Advanced Radiography Clinical Affiliation	6
<b>Total Units</b>		<b>36</b>

**Area of emphasis: vascular imaging**

AHCJ 402	Pathology I	4
AHCJ 403	Pathology II	3
RTCH 457	Vascular Interventional Clinical Affiliation (3)	12
RTCH 488	Advanced Radiography Procedures in Orthopedics and Pediatrics	3
RTSI 344	Pharmacology for Imaging Professionals	4
RTSI 351	Angio/Interventional Procedures I	3
RTSI 352	Angio/Interventional Procedures II	3
RTSI 356	Vascular Anatomy and Physiology	3
RTSI 359	Vascular Imaging Review	1
<b>Total Units</b>		<b>36</b>

A minimum G.P.A. of 2.5 is required for each quarter in the program.

**Normal time to complete the program**

Four (4) years – three (3) years (eleven [11] academic quarters) at LLU – full-time enrollment required

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.