

# DIAGNOSTIC MEDICAL SONOGRAPHY – B.S.

The Bachelor of Science degree in diagnostic medical sonography has two concentrations. A general and vascular 27-month curriculum (nine academic quarters) leads to eligibility to take the registered vascular technology (RVT) and registered diagnostic medical sonography (RDMS) national ARDMS board examinations. A second concentration in cardiac sonography is offered as a 24-month curriculum (eight academic quarters), also leading to eligibility to take the registered cardiac national boards RDCS. Last, a one-year certificate in cardiac sonography is offered, leading to the same eligibility with ARDMS.

General sonographers perform examinations evaluating organs such as the liver, kidneys, spleen, gallbladder, and thyroid—as well as obstetrics/gynecology, pediatrics, and breast. The vascular sonographer performs a variety of noninvasive examinations to evaluate the arteries and veins, assess blood flow and valve competency, and to detect the presence of clots. The cardiac sonographer performs echocardiograms evaluating the heart function, valves, and all cardiac vessels for pathology.

## Program learning outcomes

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

1. Demonstrate effective interaction in health care;
2. Demonstrate basic didactic knowledge essential to the practice of medical sonography;
3. Develop and demonstrate professional behaviors and attitudes of an entry-level sonographer;
4. Utilize oral and written communication in various sonography settings;
5. Demonstrate critical thinking, professional judgement, and discretion within the profession.

## Admissions

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:

- A minimum of 104 degree transferable units
- Minimum G.P.A. of 2.5 (3.0 preferred)
- Attend an ultrasound information session prior to observation
- Eight hours of observation in medical sonography (preferably at LLUMC) is required prior to the interview. Observations are scheduled after October and after application to program has been submitted.
- Interview

## Prerequisites

All the following courses must be completed prior to the start of the program. All prerequisites, including general education courses, must be completed at an accredited college or university.

### Domain 1: Religion and Humanities (20 quarter or 14 semester units)

#### Humanities (12-20 quarter or 8-14 semester units)

Selected from at least three of the following content areas: civilization/history, fine arts, performing/visual arts (not to exceed four quarter credits), literature, modern language, philosophy, general humanities elective.

#### Religion (0-8 quarter or 0-6 semester units)

An applicant who has attended a Seventh-day Adventist college or university is required to have taken four quarter units of religion from an Adventist institution for each full year equivalent (48 quarter units/32 semester units) of attendance at an Adventist college or university. If the applicant has not attended an Adventist institution, no religion units are required. In either case, however, the applicant must have completed 20 quarter or 14 semester units in Domain 1: Religion and Humanities.

### Domain 2: Scientific inquiry and analysis (24-32 quarter or 16-22 semester units)

#### Natural Sciences (minimum of 12 quarter or 8 semester units)

Human anatomy and physiology with laboratory, complete sequence.\*

College algebra or higher, one semester/quarter.\*

Introduction to physics (general physics also accepted), one semester/quarter.\*

\* Must be completed within the past five years.

#### Social sciences (minimum of 12 quarter or 8 semester units)

Units must be selected from two of the following content areas: anthropology, economics, geography, political sciences, psychology, and sociology.

### Domain 3: Communication (9-13 quarter or 6-9 semester units)

English composition (complete sequence).

Remaining courses may be selected from the following content areas: computer information systems, critical thinking, and public speaking.

### Domain 4: Health and Wellness (2-6 quarter or 1.5-4 semester units)

Personal health or nutrition (one course).

Physical education (two separate physical activity courses).

Additional course requirement.

Medical terminology (must be completed within the past five years).

### Domain 5: Electives

To meet the minimum requirement of 105 units quarter units required for matriculation, electives may be selected from the previous four domains.

For more information regarding GE requirements for graduation, see LLU general education requirements (<http://llucatalog.llu.edu/about-university/division-general-studies/>).

## Program requirements

### General and vascular concentration

#### Junior Year

##### Summer Quarter 1

		Units
AHCJ 318	Emotional Intelligence and Leadership Skills for Health-Care Professionals	3
AHCJ 326	Fundamentals of Health Care	2

AHCJ 493	Senior Portfolio I	3
RTCH 385	Radiologic Trends in Health Care	2
RELT 406	Adventist Beliefs and Life	3
RTCH 387	Writing for Health-Care Professionals	3
<b>Autumn Quarter</b>		
RTMS 344	Introduction to Medical Sonography	5
RTMS 371 <sup>1</sup>	General Vascular Clinical Affiliation	8
<b>Winter Quarter</b>		
RTMS 348	Abdomen/Neurosonography	5
RTMS 372 <sup>1</sup>	General Vascular Clinical Affiliation	8
<b>Spring Quarter</b>		
REL_ Religion elective		2
RTMS 345	Ob-Gyn Sonography	5
RTMS 373 <sup>1</sup>	General Vascular Clinical Affiliation	8
<b>Senior Year</b>		
<b>Summer Quarter 1</b>		
RTCH 489	Effective Communication for Supervisors	3
RTMS 346	Vascular Technology/Doppler/Scan Techniques	5
RTMS 471 <sup>1</sup>	General Vascular Clinical Affiliation	8
<b>Autumn Quarter</b>		
RTMS 379	Ultrasound Physics and Instrumentation I	2
RTMS 421	Board Review OB-GYN Sonography	1
RTMS 472 <sup>1</sup>	General Vascular Clinical Affiliation	8
RELE 456	Personal and Professional Ethics	3
<b>Winter Quarter</b>		
RTMS 387	Ultrasound Physics and Instrumentation II	2
RELR 409	Christian Perspectives on Death and Dying	3
RTMS 422	Board Review Abdomen	2
RTMS 473 <sup>1</sup>	General Vascular Clinical Affiliation	8
<b>Spring Quarter</b>		
RTCH 464	Moral Leadership	3
RTMS 423	Board Review Vascular	1
RTMS 474 <sup>1</sup>	General Vascular Clinical Affiliation	8
<b>Summer Quarter</b>		
AHCJ 494 <sup>2</sup>	Senior Portfolio II	3
RTCH 467	Management of a Radiologic Service	3
RTMS 424	Professionalism in Medical Sonography	1
RTMS 475 <sup>1</sup>	General Vascular Clinical Affiliation	8
<b>Total Units:</b>		<b>129</b>

<sup>1</sup> 27 units of affiliation count toward the 192 units required for the degree. The remaining affiliation units are required for licensure and must be completed prior to the awarding of the B.S. degree.

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

## Cardiac concentration

### Junior Year

#### Autumn Quarter

AHCJ 326	Fundamentals of Health Care	2
AHCJ 493	Senior Portfolio I	3
CEPT 245	Cardiovascular Anatomy and Physiology	3
CEPT 248	Cardiovascular Patient Assessment	2

#### Units

CEPT 251	Cardiac Electrophysiology and Rhythm Recognition I	2
<b>Winter Quarter</b>		
CEPT 252	Cardiac Electrophysiology and Rhythm Recognition II	2
CEPT 271	Cardiology Diseases and Therapeutics I	2
RTCH 387	Writing for Health-Care Professionals	3
RTCH 467	Management of a Radiologic Service	3
RTED 475	Curriculum Development for the Radiation Sciences	3
<b>Spring Quarter</b>		
AHCJ 305	Infectious Disease and the Health-Care Provider	1
CEPT 272	Cardiology Diseases and Therapeutics II	2
CEPT 285	Cardiology	3
REL_ Religion elective		3
RTCH 464	Moral Leadership	3
<b>Summer Quarter</b>		
AHCJ 318	Emotional Intelligence and Leadership Skills for Health-Care Professionals	3
RELE 456	Personal and Professional Ethics	3
RELT 406	Adventist Beliefs and Life	3
RTCH 489	Effective Communication for Supervisors	3
<b>Senior Year</b>		
<b>Autumn Quarter</b>		
RTMS 339	Echocardiography I	4
RTMS 379	Ultrasound Physics and Instrumentation I	2
RTMS 361 <sup>1</sup>	Cardiac Sonography Clinical Affiliation	8
<b>Winter Quarter</b>		
RTMS 347	Echocardiography II	4
RTMS 387	Ultrasound Physics and Instrumentation II	2
RTMS 362 <sup>1</sup>	Cardiac Sonography Clinical Affiliation	8
<b>Spring Quarter</b>		
RTMS 363 <sup>1</sup>	Cardiac Sonography Clinical Affiliation	8
RTMS 385	Board Review Echocardiography	2
RTMS 386	Echocardiographic Case Studies Adult and Pediatrics	2
<b>Summer Quarter</b>		
AHCJ 494 <sup>2</sup>	Senior Portfolio II	3
RTMS 364 <sup>1</sup>	Cardiac Sonography Clinical Affiliation	8
RTMS 424	Professionalism in Medical Sonography	1
<b>Total Units:</b>		<b>101</b>

<sup>1</sup> 27 units of affiliation count toward the 192 units required for the degree. The remaining affiliation units are required for licensure and must be completed prior to the awarding of the B.S. degree.

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

## Normal time to complete the program

Four (4) years – (two [2] years prior to LLU plus two [2] years [24 months for cardiac and 27 months for general and vascular] at LLU) – full-time only

## Courses

### **RTMS 339. Echocardiography I. 4 Units.**

Focuses on normal anatomy, scan techniques, cardiac measurement, and new dynamics. Case study presentations.

### **RTMS 344. Introduction to Medical Sonography. 5 Units.**

Introduction to sonography—including ob-gyn, abdomen, vascular, neurosonography, cardiac, and pediatric. Covers terminology and scan techniques for all areas.

### **RTMS 345. Ob-Gyn Sonography. 5 Units.**

Ob-Gyn scan techniques, fetal anatomy and pathologies, gynecological anatomy and pathologies. Student case presentations and case studies.

### **RTMS 346. Vascular Technology/Doppler/Scan Techniques. 5 Units.**

Covers vascular technology, Doppler, abdomen, and small parts. Continues case studies and case presentations.

### **RTMS 347. Echocardiography II. 4 Units.**

Echocardiography, adult and pediatric. Further focuses on anatomy, pathology, hemodynamics, and Doppler. Includes case studies and presentations.

### **RTMS 348. Abdomen/Neurosonography. 5 Units.**

Sonography of the abdomen and neonatal neurosonography specialties and scan techniques. Visualizes sonography of the abdomen, cross-section scan techniques, and pathologies on ultrasound. Includes neonatal neurosonography; anatomy and pathologies also included.

### **RTMS 361. Cardiac Sonography Clinical Affiliation. 8 Units.**

Cardiac clinical affiliate includes 320 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams.

### **RTMS 362. Cardiac Sonography Clinical Affiliation. 8 Units.**

Cardiac clinical affiliate includes 320 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams. Prerequisite: RTMS 361.

### **RTMS 363. Cardiac Sonography Clinical Affiliation. 8 Units.**

Cardiac clinical affiliate includes 320 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams. Prerequisite: RTMS 362.

### **RTMS 364. Cardiac Sonography Clinical Affiliation. 8 Units.**

Cardiac clinical affiliate includes 320 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams. Prerequisite: RTMS 363.

### **RTMS 371. General Vascular Clinical Affiliation. 8 Units.**

General vascular affiliate includes 320 clock hours of observation and hands-on experience, and a variety of patient exams including general abdomen, ob-gyn and vascular. Includes identification of a variety of normal and pathological cases throughout the training experience.

### **RTMS 372. General Vascular Clinical Affiliation. 8 Units.**

General vascular affiliate includes 320 clock hours of observation and hands-on experience, and a variety of patient exams including general abdomen, ob-gyn and vascular. Includes identification of a variety of normal and pathological cases throughout the training experience. Prerequisite: RTMS 371.

### **RTMS 373. General Vascular Clinical Affiliation. 8 Units.**

General vascular affiliate includes 320 clock hours of observation and hands-on experience, and a variety of patient exams including general abdomen, ob-gyn and vascular. Includes identification of a variety of normal and pathological cases throughout the training experience. Prerequisite: RTMS 372.

### **RTMS 379. Ultrasound Physics and Instrumentation I. 2 Units.**

Studies the basic physical principles and instrumentation of ultrasound production and imaging. Selected case study presentations, as assigned.

### **RTMS 384. Topics in Medical Sonography. 1 Unit.**

Surveys selected topics in medical sonography. Procedure summaries, projects, literature reviews.

### **RTMS 385. Board Review Echocardiography. 2 Units.**

Case presentations by faculty and students reviewing vast variety of pathologies, as well as normal anatomy. Prerequisite: RTMS 339, RTMS 347.

### **RTMS 386. Echocardiographic Case Studies Adult and Pediatrics. 2 Units.**

Case presentations by faculty and students reviewing normal anatomy and variety of pathologies in adult and pediatric cases. Prerequisite: RTMS 339, RTMS 347.

### **RTMS 387. Ultrasound Physics and Instrumentation II. 2 Units.**

Study and review of the basic physical principles and instrumentation of ultrasound, with additional emphasis on Doppler and artifacts. Prerequisite: RTMS 379.

### **RTMS 421. Board Review OB-GYN Sonography. 1 Unit.**

Board review presented in case study format; normal and pathologies involved in ultrasound evaluation of the OB-GYN specialty. Prerequisite: Completion of the first year of the medical sonography program.

### **RTMS 422. Board Review Abdomen. 2 Units.**

Board review presented in case study format. Normal scans and pathologies involved in a wide variety of abdominal and small part ultrasound examinations. Prerequisite: RTMS 421.

### **RTMS 423. Board Review Vascular. 1 Unit.**

Board review presented in case study format; normal and pathologies involved in a wide range of vascular ultrasound examinations. Prerequisite: RTMS 422.

### **RTMS 424. Professionalism in Medical Sonography. 1 Unit.**

Presents a variety of topics to develop professionalism and prepare graduates for the work force. Topics include writing a resume/CV, interviewing, and communication. Prerequisite: RTMS 421, 422, 423.

### **RTMS 471. General Vascular Clinical Affiliation. 8 Units.**

General vascular affiliate includes 320 clock hours of observation and hands-on experience, and a variety of patient exams including general abdomen, ob-gyn and vascular. Includes identification of a variety of normal and pathological cases throughout the training experience. Prerequisite: RTMS 373.

### **RTMS 472. General Vascular Clinical Affiliation. 8 Units.**

General vascular affiliate includes 320 clock hours of observation and hands-on experience, and a variety of patient exams including general abdomen, ob-gyn and vascular. Includes identification of a variety of normal and pathological cases throughout the training experience. Prerequisite: RTMS 471.

### **RTMS 473. General Vascular Clinical Affiliation. 8 Units.**

General vascular affiliate includes 320 clock hours of observation and hands-on experience, and a variety of patient exams including general abdomen, ob-gyn and vascular. Includes identification of a variety of normal and pathological cases throughout the training experience. Prerequisite: RTMS 472.

**RTMS 474. General Vascular Clinical Affiliation. 8 Units.**

General vascular affiliate includes 320 clock hours of observation and hands-on experience, and a variety of patient exams including general abdomen, ob-gyn and vascular. Includes identification of a variety of normal and pathological cases throughout the training experience. Prerequisite: RTMS 473.

**RTMS 475. General Vascular Clinical Affiliation. 8 Units.**

General vascular affiliate includes 320 clock hours of observation and hands-on experience, and a variety of patient exams including general abdomen, ob-gyn and vascular. Includes identification of a variety of normal and pathological cases throughout the training experience. Prerequisite: RTMS 474.

**RTMS 965. Cardiac Ultrasound Clinical Affiliation. 8 Units.**

Cardiac clinical affiliate includes 320 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams.

**RTMS 966. Cardiac Ultrasound Clinical Affiliation. 8 Units.**

Cardiac clinical affiliate includes 320 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams.

**RTMS 967. Cardiac Ultrasound Clinical Affiliation. 8 Units.**

Cardiac clinical affiliate includes 320 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams.

**RTMS 968. Cardiac Ultrasound Clinical Affiliation. 8 Units.**

Cardiac clinical affiliate includes 320 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams.

**RTMS 978. Medical Sonography Clinical Affiliation. 11 Units.**

Clinical experience in medical sonography (352 clock hours) covering a wide variety of technical procedures. Prerequisite: RTMS 977.