

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 102 degree-transferable units for the general/vascular concentration or 96 degree transferable units for the cardiac concentration
- 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 (8 quarter units)

(completed during enrollment at LLU)

Domain 2: Arts and humanities (minimum 16 quarter units/ 11 semester 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 is required to meet a "content area."

Domain 3: Scientific inquiry and quantitative reasoning (minimum 12 quarter units/8 semester units)

These JRCDS required courses must be completed within the past five years.

- Anatomy & physiology with laboratory, complete sequence
- College algebra
- General/introductory physics (one quarter/semester, no lab required)

Domain 4: Social sciences (minimum 12 quarter units/8 semester units)

- Select from two of the following content areas: psychology/lifespan development, sociology, anthropology, economics, and geography.
- 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/6 semester units)

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

Domain 6: Health and wellness (minimum 2 quarter units/1.5 semester 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, must be completed within the past five years.

Electives

To meet minimum total of 102 quarter/68 semester units for General Vascular emphasis or 96 quarter/64 semester units for cardiac emphasis prior to matriculation, electives may be selected from the previous domains. For more information regarding GE requirements for graduation, see LLU general education requirements (<http://llucatalog.llu.edu/about-university/division-general-studies/>).

*Please note: "C minus" grades are not transferable for credit

Program requirements

General and vascular concentration

Junior Year

Summer Quarter

AHCJ 318	Emotional Intelligence and Leadership Skills for Health-Care Professionals	3
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AHCJ 326	Fundamentals of Health Care	2
RTCH 387	Writing for Health-Care Professionals	3
RTCH 491	Portfolio I	3
RELT 406	Adventist Beliefs and Life	3
Autumn Quarter		
RTMS 344	Introduction to Medical Sonography	5
RTMS 371 ¹	General Vascular Clinical Affiliation	8
Winter Quarter		
RTMS 348	Abdomen/Neurosonography	5
RTMS 372 ¹	General Vascular Clinical Affiliation	8
Spring Quarter		
RTMS 345	Ob-Gyn Sonography	5
RTMS 373 ¹	General Vascular Clinical Affiliation	8
RTCH 385	Radiologic Trends in Health Care	2
Senior Year		
Summer Quarter		
RTCH 489	Effective Communication for Supervisors	3
RTMS 346	Vascular Technology/Doppler/Scan Techniques	5
RTMS 471 ¹	General Vascular Clinical Affiliation	8
Autumn Quarter		
RELE 456	Personal and Professional Ethics	3
RTMS 379	Ultrasound Physics and Instrumentation I	2
RTMS 421	Board Review OB-GYN Sonography	1
RTMS 472 ¹	General Vascular Clinical Affiliation	8
Winter Quarter		
RELR 409	Christian Perspectives on Death and Dying	3
RTMS 387	Ultrasound Physics and Instrumentation II	2
RTMS 422	Board Review Abdomen	2
RTMS 473 ¹	General Vascular Clinical Affiliation	8
Spring Quarter		
RTCH 464	Moral Leadership	3
RTMS 423	Board Review Vascular	1
RTMS 474 ¹	General Vascular Clinical Affiliation	8
Summer Quarter 2		
RTCH 492 ²	Portfolio II	3
RTCH 467	Management of a Radiologic Service	3
RTMS 424	Professionalism in Medical Sonography	1
RTMS 475 ¹	General Vascular Clinical Affiliation	8
Total Units:		127

¹ 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.

² Fulfills service learning requirement

Cardiac concentration

Junior Year

Autumn Quarter

AHCJ 326	Fundamentals of Health Care	2
CEPT 245	Cardiovascular Anatomy and Physiology	3
CEPT 248	Cardiovascular Patient Assessment	2
CEPT 251	Cardiac Electrophysiology and Rhythm Recognition I	2

Units

2	RTCH 491	Portfolio I	3
3	Winter Quarter		
3	CEPT 252	Cardiac Electrophysiology and Rhythm Recognition II	2
3	CEPT 271	Cardiology Diseases and Therapeutics I	2
5	RTCH 387	Writing for Health-Care Professionals	3
8	RTCH 467	Management of a Radiologic Service	3
3	RTED 475	Curriculum Development for the Radiation Sciences	3
Spring Quarter			
1	AHCJ 305	Infectious Disease and the Health-Care Provider	1
2	CEPT 272	Cardiology Diseases and Therapeutics II	2
3	CEPT 285	Cardiology	3
3	REL_ Religion	elective	3
3	RTCH 464	Moral Leadership	3
Summer Quarter			
3	AHCJ 318	Emotional Intelligence and Leadership Skills for Health-Care Professionals	3
3	RELE 456	Personal and Professional Ethics	3
3	RELT 406	Adventist Beliefs and Life	3
3	RTCH 489	Effective Communication for Supervisors	3
Senior Year			
Autumn Quarter			
4	RTMS 339	Echocardiography I	4
2	RTMS 379	Ultrasound Physics and Instrumentation I	2
8	RTMS 371	General Vascular Clinical Affiliation	8
Winter Quarter			
4	RTMS 347	Echocardiography II	4
2	RTMS 387	Ultrasound Physics and Instrumentation II	2
8	RTMS 372	General Vascular Clinical Affiliation	8
Spring Quarter			
8	RTMS 373	General Vascular Clinical Affiliation	8
2	RTMS 385	Board Review Echocardiography	2
2	RTMS 386	Echocardiographic Case Studies Adult and Pediatrics	2
Summer Quarter			
3	RTCH 492	Portfolio II	3
1	RTMS 424	Professionalism in Medical Sonography	1
8	RTMS 471	General Vascular Clinical Affiliation	8
Total Units:		101	

¹ 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.

² 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

*As a program requirement, all students must pass the ARDMS Sonography Principles and Instrumentation (SPI) exam while enrolled as a student in either concentration.

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 364 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 363 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. 10 Units.

Cardiac clinical affiliate includes 420 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. 10 Units.

Cardiac clinical affiliate includes 418 clock hours of observation and hands-on experience, and a variety of cardiac echocardiograms. Includes adult, pediatric and fetal cardiac exams.