Clinical and Diagnostic Sciences

The Clinical and Diagnostic Sciences BHS is made up of five programs; Clinical Laboratory Sciences, Diagnostic Medical Ultrasound, Nuclear Medicine, Radiological Science, and Respiratory Therapy.

Clinical Laboratory Science Program
School of Health Professions
605 Lewis Hall
(573) 882-8011 and (573) 884-1847
Director: Steven Starr

Clinical laboratory scientists are skilled, certified professionals trained in the theoretical and practical aspects of clinical laboratory medicine – chemistry, hematology, microbiology, immunology, molecular pathology, and blood banking. Clinical Laboratory Scientists have various levels of responsibility - as staff technologists, research technologists, supervisors, managers, or educators -- and can work in a variety of settings, including hospitals, clinics, laboratories, and research centers. Approximately 60 to 70 percent of all medical decisions regarding a patient's diagnosis and treatment, as well as their hospital admission and discharge, are based upon laboratory test results obtained by Clinical Laboratory Scientists.

The Clinical Laboratory Science (CLS) program at MU is a unique collaboration with the University of Nebraska Medical Center in Omaha. The CLS program includes three years of prerequisite coursework, requiring 16 hours of both Biology and Chemistry, and 11 months in the clinical phase of the CLS program. The clinical year begins during the third week of May, with 11 weeks of coursework and clinical lab rotations in a dedicated summer student lab facility at the University of Nebraska's Medical Center in Omaha. After the initial 11 weeks in the program, CLS students return to Columbia and complete their clinical laboratory rotations at one of three clinical sites, which include the University of Missouri Hospital and Clinics, Boice and Bynum Pathology Laboratories, and Harry S. Truman Memorial Veteran's Hospital. Students graduate with a Bachelor of Health Science degree in Clinical and Diagnostic Sciences with emphasis in Clinical Laboratory Science from the University of Missouri with a Certificate in Medical Technology from the University of Nebraska Medical Center.

Diagnostic Medical Ultrasound Program
School of Health Professions
406 Lewis Hall
(573) 884-2994
Director: Moses Hdeib

The Diagnostic Medical Ultrasound (DMU) Program in the School of Health Professions (http://shp.missouri.edu) at the University of Missouri (http://www.missouri.edu) offers a Bachelor of Health Science (BHS) in Diagnostic Medical Ultrasound. The DMU Program is a 35-40 hours per week, 52 weeks per year Clinical Education Program. The DMU program has over 25 clinical sites through the state of Missouri in which students are placed during their clinical training.

Nuclear Medicine Program
School of Health Professions
605 Lewis Hall
(573) 884-7843
Director: Glen Heggie

The nuclear medicine technologist is concerned with the use of radioactivity for patient diagnosis, monitoring of treatment and in some cases the treatment itself. The nuclear medicine technologist uses radioactive compounds to perform body function studies, produce images of internal organs and analyze biological specimens.

Nuclear Medicine uses extremely small amounts of radioactive compounds in order to image and assess the function and state of health of many of the body's internal organs, and to treat some forms of cancer. It is a multidisciplinary field dependent upon contributions from Physics, Chemistry and Medicine. This highly sophisticated discipline is at the forefront of discovering and understanding the complex physiologic processes of the body. This discipline is of enormous importance to medical specialties such as Cardiology (heart), Neurology (nervous system), Oncology (cancer), Orthopedics (bone), Endocrinology (hormone system), Hematology (blood), Nephrology (kidney), and Pulmonology (lung).

Radiological Science Program
School of Health Professions
607 Lewis Hall
(573) 884-2623
Director: Patricia Tew

Radiographers are highly skilled health professionals who work closely with physicians and specialize in the use of x-rays. They provide patient services using a variety of imaging modalities. In addition to conventional x-ray procedures, the radiographer also works with computerized axial tomography (CT), magnetic resonance imaging (MRI), cardiovascular-interventional technology, mammography, bone densitometry, and quality management.

Established in 1960, the Radiography Program is the only baccalaureate level program at a public institution of higher education in Missouri. This discipline provides preparation for leaders in the field by offering a Bachelor of Health Science degree. Graduates have demonstrated their superior achievement through their performance on national certifying examinations with a 100% overall pass rate. After graduating from the program, students may choose to do an additional clinical externship in computerized tomography or magnetic resonance imaging, which will lead to a certificate of completion and eligibility to take the national certifying examination in that area.

Mission Statement:

The primary mission of the radiography program is to prepare highly competent, registry eligible professionals in the medical imaging sciences. Our program and curriculum are designed to provide an educational foundation for the advancement into leadership and managerial positions within medical imaging, as well as providing an environment where scholarly activity, professional development, and service are expectations. Our curriculum enables successful graduates to readily interact with a variety of health care and science related fields.

Respiratory Therapy Program
School of Health Professions
617 Lewis Hall
(573) 882-9722
Program Director: Monica Schibig

The University of Missouri Respiratory Therapy Program was established in 1967. The program is credited to be among the country's first baccalaureate degree programs in Respiratory Therapy. The University of Missouri's Respiratory Therapy program prepares graduates for the
Advanced Practitioner level, Registered Respiratory Therapist (RRT) and students graduate with a Bachelor of Health Science in Respiratory Therapy.

The Mission of the University of Missouri Respiratory Therapy Program is to coordinate superior classroom, laboratory, and clinical experiences to prepare advanced Respiratory Care Practitioners, develop learners who will effectively engage in professional leadership roles, and provide an environment where research and service are expectations.

**Faculty**

**Clinical Laboratory Science Program**
- Clinical Professor G. D. Heggie*
- Clinical Instructor S. Starr

**Diagnostic Medical Ultrasound Program**
- Clinical Professor M. M. Hdeib*
- Clinical Associate Professor D. W. Clem*, E. M. Hdeib*
- Clinical Assistant Professor S. Anderson*, K. Merideth*

**Nuclear Medicine Program**
- Clinical Professor G. D. Heggie*
- Assistant Clinical Professor M. Feldman

**Radiological Sciences Program**
- Clinical Associate Professor C. Allen
- Clinical Assistant Professor M. Sebacher, P. Tew

**Respiratory Therapy**
- Clinical Professor G. D. Heggie*
- Associate Clinical Professor K. S. Moss*, M. A. Schibig
- Assistant Clinical Professor L. M. Lair, J. L. Keely, S. W. Parker

* Graduate Faculty Member - membership is required to teach graduate-level courses, chair master’s thesis committees, and serve on doctoral examination and dissertation committees.
** Doctoral Faculty Member - membership is required to chair doctoral examination or dissertation committees. Graduate faculty membership is a prerequisite for Doctoral faculty membership.

**Undergraduate**

- BHS in Clinical and Diagnostic Sciences (http://catalog.missouri.edu/undergraduategraduate/schoolofhealthprofessions/clinical-diagnostic-sciences/bhs-clinical-diagnostic-sciences)
  - with emphasis in Clinical Laboratory Science (http://catalog.missouri.edu/undergraduategraduate/schoolofhealthprofessions/clinical-diagnostic-sciences/bhs-clinical-diagnostic-sciences-emphasis-clinical-laboratory-science)
  - with emphasis in Diagnostic Medical Ultrasound (http://catalog.missouri.edu/undergraduategraduate/schoolofhealthprofessions/clinical-diagnostic-sciences/bhs-clinical-diagnostic-sciences-emphasis-diagnostic-medical-ultrasound)
  - with emphasis in Nuclear Medicine (http://catalog.missouri.edu/undergraduategraduate/schoolofhealthprofessions/clinical-diagnostic-sciences/bhs-clinical-diagnostic-sciences-emphasis-nuclear-medicine)
  - with emphasis in Radiography (http://catalog.missouri.edu/undergraduategraduate/schoolofhealthprofessions/clinical-diagnostic-sciences/bhs-clinical-diagnostic-sciences-emphasis-radiography)
- with emphasis in Respiratory Therapy (http://catalog.missouri.edu/undergraduategraduate/schoolofhealthprofessions/clinical-diagnostic-sciences/mhs-clinical-diagnostic-sciences-emphasis-respiratory-therapy)

**Graduate**

- MHS in Clinical and Diagnostic Sciences (http://catalog.missouri.edu/undergraduategraduate/schoolofhealthprofessions/clinical-diagnostic-sciences/mhs-clinical-diagnostic-sciences)

**Clinical and Diagnostic Sciences**
School of Health Professions
409 Lewis Hall
(573) 884-2994
Director: Moses Hdeib

The Master of Health Science in Clinical and Diagnostic Sciences is offered by the School of Health Professions, Department of Clinical and Diagnostic Sciences. The Clinical and Diagnostic Program (DMU) is a 35-40 hours per week, 52 weeks per academic year clinical education program.

**Future Certification and Careers**

Upon successfully completing the requirements of the DMU Program, MHS Graduates will be eligible to apply to the American Registry of Diagnostic Medical Sonographers (ARDMS) for registry in Abdomen, Obstetrics and Gynecology, Vascular Technology and Cardiac Ultrasound.

**Financial Aid**

Please contact the financial aid office. Some programs require an application and extra form or statement from those who wish to be considered for internal assistantships, fellowships or other funding packages. Check the program website or ask the program contact for details.

**CDS 2190: Medical Terminology**

Medical terminology based on a word building system. This course is intended for students majoring in health professions, nursing and other helping professions, pre-med and biology.

**Credit Hours:** 3

**Prerequisites:** sophomore standing

**CDS 3200: Essentials of Pathology**

Provides basic foundation for understanding etiology of disease with emphasis on systemic pathology for non-medical students.

**Credit Hours:** 2

**Recommended:** general biology and one course in either physiology or anatomy

**CDS 3460: Cardiovascular and Pulmonary Diagnostic Applications I**

(same as RA_SCI 3460). Interdisciplinary small group, case-based study of common cardiovascular, pulmonary and other diseases. Pathophysiology, diagnosis and treatment from the perspective of allied health professionals. Emphasis on critical thinking, teamwork skills.

**Credit Hours:** 3
Prerequisites: Acceptance into Radiologic Sciences, Radiography Program

CDS 3460W: Cardiovascular and Pulmonary Diagnostic Applications I - Writing Intensive
(same as RA_SCI 3460). Interdisciplinary small group, case-based study of common cardiovascular, pulmonary and other diseases. Pathophysiology, diagnosis and treatment from the perspective of allied health professionals. Emphasis on critical thinking, teamwork skills.
Credit Hours: 3
Prerequisites: Acceptance into Radiologic Sciences, Radiography Program

CDS 4085: Problems in Clinical and Diagnostic Sciences
Supervised investigation in an aspect of Clinical and Diagnostic Sciences usually culminating in a written report.
Credit Hour: 1-5
Prerequisites: instructor's consent

CDS 4328: Radiation Safety and Biology
Regulations and procedures for safe uses of radiation to heighten student understanding of radiation physics, radiation biology, and radiation safety. Graded on A-F basis only.
Credit Hours: 4
Prerequisites: Junior standing
Recommended: One course in Biological Sciences and Physics/Chemistry

CDS 4440: Organization and Administration
(same as RA_SCI 4440 and RS_THR 4440). Examines design and operation of allied health service departments and educational programs, including facilities, personnel procedures, record systems, ethics, medical-legal aspects, interdepartmental relations and curriculum development.
Credit Hours: 3

CDS 4440: Cardiovascular and Pulmonary Diagnostic Applications II
Interdisciplinary study of cardiac dysrhythmias, MI, stroke. Application of current American Heart Association Advanced Cardiac Life Support (AHA ACLS) algorithms. Successful completion of this course fulfills AHA ACLS Provider requirements.
Credit Hours: 3

CDS 4440: Clinical Ethics
Exploration of bioethics issues in health care with emphasis on issues related to patient choice and provider responsibility. Topics include philosophical theories, principles and models for ethical and lawful decision making in healthcare.
Credit Hours: 3

CDS 4480W: Clinical Ethics - Writing Intensive
Exploration of bioethics issues in health care with emphasis on issues related to patient choice and provider responsibility. Topics include philosophical theories, principles and models for ethical and lawful decision making in healthcare.
Credit Hours: 3

CDS 4480: Asthma Education
This course will provide the student with a multi-faceted approach to caring for the patient with asthma. Topics include pathophysiology, pharmacology, patient/family education, patient assessment and management. Assists students to take the Asthma Educator Credentialing Exam. Graded on A-F basis only.
Credit Hours: 2
Prerequisites: instructor's consent

CDS 4485: Healthcare Organization and Leadership
In this course, students will explore leadership principles as they relate to the student's focus area, combining previous expertise in the field with an interdisciplinary perspective within the healthcare community. Graded on A-F basis only.
Credit Hours: 3
Prerequisites: Senior standing

CDS 4985W: Healthcare Organization and Leadership - Writing Intensive
In this course, students will explore leadership principles as they relate to the student's focus area, combining previous expertise in the field with an interdisciplinary perspective within the healthcare community. Graded on A-F basis only.
Credit Hours: 3
Prerequisites: Senior standing

CDS 4955: Introduction to Research
(same as RS_THR 4955). An interdisciplinary course designed to promote undergraduate allied health research. Includes identifying and designing research problems through formulating relevant questions, learning to systematically search for answers, and methods for searching the literature.
Credit Hours: 3

CDS 4955W: Introduction to Research - Writing Intensive
(same as RS_THR 4955). An interdisciplinary course designed to promote undergraduate allied health research. Includes identifying and designing research problems through formulating relevant questions, learning to systematically search for answers, and methods for searching the literature.
Credit Hours: 3

CDS 4985: Healthcare Organization and Leadership
In this course, students will explore leadership principles as they relate to the student's focus area, combining previous expertise in the field with an interdisciplinary perspective within the healthcare community. Graded on A-F basis only.
Credit Hours: 3
Prerequisites: Senior standing

CDS 4985W: Healthcare Organization and Leadership - Writing Intensive
In this course, students will explore leadership principles as they relate to the student's focus area, combining previous expertise in the field with an interdisciplinary perspective within the healthcare community. Graded on A-F basis only.
Credit Hours: 3
Prerequisites: Senior standing
CDS 7025: CDS Electronic Communication and Informatics
The course presents an overview of healthcare informatics pertaining to all clinical and diagnostic sciences (CDS) constituent programs and of medical informatics. The course introduces all possible electronic communication avenues and methods used in clinical and diagnostic sciences. It provides a comprehensive introduction to the applications of information systems in a range of healthcare environments including clinical and diagnostic sciences education, clinical research, and diverse clinical settings where students will be employed upon graduation. It includes extensive readings and critical discussions of relevant professional research literature. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Program and instructor's consent

CDS 7027: Techniques for Teaching CDS Courses Traditionally or Online
Clinical and Diagnostic Sciences (CDS) is a new model that integrates multiple dissimilar programs in the allied health and medical fields. This course is designed to prepare CDS professionals to design, organize, conduct and evaluate professional educational offerings, including pre-professional didactic and clinical coursework, in-service trainings, and continuing professional education sessions conducted through traditional and/or online formats. The course will guide the student in developing critical thinking and problem solving strategies necessary in the clinical, therapeutic and diagnostic imaging modalities, as well as the relationship between theoretical and practical aspects of teaching techniques specific to CDS. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Program and instructor's consent

CDS 7110: Management Approaches in CDS
Clinical and Diagnostic Sciences (CDS) is a multiple discipline program in allied health sciences and medical fields. This course is designed to prepare CDS professionals to effectively explore the variety of styles and effective approaches of management. The course will guide the student in developing critical thinking and problem solving strategies necessary in the clear understanding of the strategic avenues required by the appropriate management methods that lead to a harmonious decorum of integration between multiple programs and departments in CDS. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Program and instructor's consent

CDS 7112: Leadership Styles in CDS
The course is designed to prepare clinical and diagnostic sciences (CDS) professionals from various integrated programs of CDS fields to understand and effectively apply practical organizational skills when dealing with multidisciplinary clinical laboratory settings. The course will guide the students to explore all available practical methods in order to construct an efficient, dynamic, and flowchart accessible laboratory within the CDS department and the fields. The outcome of this course will augment the student's abilities to develop critical thinking and problem solving strategies necessary to function in diverse laboratory environments within the CDS integrated fields. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Program and instructor's consent

CDS 7113: Practical Multidiscipline Laboratory Organization in CDS
The course is designed to prepare clinical and diagnostic sciences (CDS) professionals from various integrated programs of CDS fields to understand and effectively apply practical organizational skills when dealing with multidisciplinary clinical laboratory settings. The course will guide the students to explore all available practical methods in order to construct an efficient, dynamic, and flowchart accessible laboratory within the CDS department and the fields. The outcome of this course will augment the student's abilities to develop critical thinking and problem solving strategies necessary to function in diverse laboratory environments within the CDS integrated fields. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Program and instructor's consent

CDS 7114: Organizational Design and Dynamics in CDS
The course is designed to prepare clinical and diagnostic sciences (CDS) professionals from various integrated programs of CDS fields to understand and conceptualize the most appropriate model of structure design of an organization as part of the CDS constituent fields and holistically integrated CDS organization as a whole. Students will learn and be instructed to understand the dynamics that occur within the CDS organizational design. The course will guide the students as they explore various examples available for designs of a CDS organization. The outcome of this course will enhance the student's abilities to develop critical thinking and problem solving strategies necessary to function in diverse clinical and diagnostic environments within the CDS integrated fields. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Program and instructor's consent

CDS 7116: Administration of Educational Programs in CDS
Clinical and Diagnostic Sciences (CDS) is a new model that integrates multiple dissimilar programs in the allied health and medical fields. This course is designed to prepare CDS professionals to effectively administer and articulate with educational programs. The course will guide the student in developing critical thinking and problem solving strategies necessary to implement strategic plans, institute clinical affiliation agreements, establish thoughtful and consistent policies and procedures, evaluate student selection criteria and pursue accreditation for education programs in CDS. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Program and instructor's consent

CDS 7118: Telecommunication and Reporting in CDS
Clinical and Diagnostic Sciences (CDS) is a new model that integrates multiple dissimilar programs in the allied health and medical fields. This course will introduce and prepare CDS professionals to telecommunication avenues of interacting, transmitting, and mobilizing the data and pertinent information to the countless outlets of information distribution areas. The course will provide the professional student with the tools and means to understand how to report all the relevant data and information essential to the process to interact and disseminate significant events and results used within the CDS constituent programs. The course will guide the student in developing critical thinking and problem solving strategies necessary in the clinical, therapeutic, and diagnostic imaging modalities in the process of telecommunication skills and reporting methods among all the CDS fields. Graded on A-F basis only.
**CDS 7840: Asthma Education**
This course will provide the student with a multi-faceted approach to caring for the patient with asthma. Topics include pathophysiology, pharmacology, patient/family education, patient assessment and management. Assists students to take the Asthma Educator Credentialing Exam. Graded on A-F basis only.

**Credit Hours:** 3  
**Prerequisites:** Program and instructor's consent

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**CDS 8001: Topics in Clinical and Diagnostic Sciences**
This course is designed to explore, through selected themes assigned by the instructor, advanced clinical and diagnostic sciences (CDS) topics in psychosocial, professional, educational, and technical areas. The organized study of a specific CDS topic will be conducted in a holistic manner. Graded on A-F basis only.

**Credit Hours:** 1-3

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**CDS 8050: Research in Clinical and Diagnostic Sciences**
This course is designed for the clinical and diagnostic sciences (CDS) programs' graduates and health science degree holders who wish to explore advanced opportunities in CDS through a research component and scientific investigations. It will allow the students to formulate appropriate reasons for pursuing a specific area of interest. The course will provide knowledge about research methodology in CDS, the operation of, and how to conduct a research in a CDS department and in a clinical setting. It will guide the student to develop appropriate research qualities associated with the CDS constituent programs. The course guides the students in developing independent study and scientific investigation skills. The course does not lead to a thesis or dissertation. Graded on A-F basis only.

**Credit Hours:** 1-3  
**Prerequisites:** Program and instructor's consent

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**CDS 8085: Problems in Clinical and Diagnostic Sciences**
Clinical and Diagnostic Sciences (CDS) field is still an emerging profession in the medical field. This course is designed to provide a broad overview of multiple "problems" faced by CDS in the health care context. Through a variety of themes exploring theoretical and clinical aspects of the constituent professions, the course will guide the student in developing critical thinking and problem solving strategies necessary in the analysis of the controversial aspects of a chosen subject. Issues will include, but not limited to the role and function of CDS in health care in general and clinical and diagnostic imaging in special, the relationship between theoretical and practical aspects of the imaging modality and clinical aspects (fast pace of advancing technology versus slow pace of clinical application, education, literature of specialty, etc.), ethical and legal issues in the CDS constituent professions, problems faced by a clinical and diagnostic educational program, CDS graduates' role in diagnosis, education, management, and CDS clinical applications.

Graded on A-F basis only.

**Credit Hours:** 1-3  
**Prerequisites:** Program and instructor's consent

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**CDS 8090: Research in Clinical and Diagnostic Sciences**
This course is designed for the clinical and diagnostic sciences (CDS) constituents programs and health science graduates who wish to explore through the methods of scientific research any area of interest in CDS fields. It leads to a thesis or dissertation. Graded on A-F basis only.

**Credit Hour:** 1-3  
**Prerequisites:** Program and instructor's consent

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**CDS 8920: Applied Research Methodologies in Clinical and Diagnostic Sciences**
Practical research application of clinical and diagnostic sciences (CDS) in a real time clinical environment: exploring the various methods of applied clinical research and how they relate to decision making, patient handling, technical applications, instrumentation and image processing. Graded on A-F basis only.

**Credit Hours:** 3  
**Prerequisites:** BHS degree in CDS and or allied health professions, and Program and instructor's consent

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**CDS 8925: Applied Research Methodologies in Clinical and Diagnostic Sciences**
Practical research application of clinical and diagnostic sciences (CDS) in a real time clinical environment: exploring the various methods of applied clinical research and how they relate to decision making, patient handling, technical applications, instrumentation and image processing. Graded on A-F basis only.

**Credit Hours:** 3  
**Prerequisites:** Program and instructor's consent