

Clinical and Diagnostic Sciences

Clinical & Diagnostic Sciences Contacts

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Department Overview

The Department of Clinical and Diagnostic Sciences is the academic home of programs in the following cardiopulmonary and diagnostic science professions. Our on-campus undergraduate programs prepare students for entry-to-practice careers. Our online undergraduate, certificate, and graduate programs prepare credentialed professionals to advance their practice in clinical leadership and clinical specialist positions. Employment opportunities for all of these professions are projected to grow much faster than average.

Clinical Laboratory Science (also known as Medical Laboratory Science) includes the theoretical and practical aspects of clinical laboratory medicine – chemistry, hematology, microbiology, immunology, molecular pathology, blood banking, serology, immunology, and molecular pathology. Clinical Laboratory Scientists perform chemical, biological, and other analytical procedures used by physicians to diagnose and monitor the treatment of disease. These professionals work in hospitals, clinics, laboratories, and research centers.

Diagnostic Medical Ultrasound uses high-frequency sound waves to produce dynamic visual images capturing size, function, and structure of organs, tissues or blood flow with real time tomographic images in two, three, and four dimensions. Sonographers function with a high degree of independence, to gather and analyze data and to prepare reports of their findings for interpretation and diagnosis by a physician. These professionals work in hospitals, clinics, private physician offices, and other medical facilities performing examinations in their areas of specialization.

Nuclear Medicine utilizes radionuclides to produce functional, molecular images that demonstrate physiologic processes. Nuclear Medicine technologists administer extremely small amounts of radioactive compounds used for cancer treatment or to produce images used in diagnosing many diseases. These professionals work in hospitals, imaging and research centers, commercial radiopharmacies, and nuclear research reactors.

Radiography is a specialized medical imaging field that utilizes ionizing radiation (X-ray, computed tomography [CT], fluoroscopy, mammography, and bone densitometry) and strong magnetic fields (magnetic resonance imaging [MRI]) to visualize anatomy. Radiologic technologists independently perform diagnostic imaging procedures to provide physicians with high-quality medical images used to diagnose illness and injury, develop treatment plans, and monitor the effectiveness of treatment. In interventional procedures, such as angioplasty and stent placement, they work alongside physicians to support therapeutic interventions. These professionals find employment in hospitals, clinics, imaging centers, mobile services, research institutions, and various industries.

Respiratory Therapy (also known as Respiratory Care) uses positive pressure, gases (oxygen, helium, nitric oxide) and aerosolized medication to diagnose and treat cardiovascular and pulmonary disorders. Respiratory therapists work under the direct or indirect supervision of physicians to manage ventilators (respirators) and artificial airways, perform pulmonary function testing, and analyze arterial blood specimens. These professionals work in hospitals, intensive care units, emergency rooms, air and ambulance transport, neonatal and pediatric units, patient homes, sleep laboratories, and in the medical device industry.

Faculty

Clinical Laboratory Science Program

Assistant Teaching Professor A. Thompson*

Diagnostic Medical Ultrasound Program

Clinical Professor D. W. Clem*

Assistant Teaching Professor D. Sharrock*, J. Stormo*, A. Townsend*

Nuclear Medicine Program

Associate Teaching Professor J. A. Galen*

Assistant Teaching Professor J. Treadway*

Radiography Program

Teaching Professor C. Allen*

Assistant Teaching Professor T. Otto*

Respiratory Therapy

Clinical Professor K.S. Myers*

Associate Teaching Professor J. L. Keely*, L. M. Lair*, 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 (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsciences/bhs-clinical-diagnostic-sciences/>)
 - with emphasis in Diagnostic Medical Ultrasound (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsciences/bhs-clinical-diagnostic-sciences-emphasis-diagnostic-medical-ultrasound/>)
 - with emphasis in Medical Laboratory Science (<https://catalog.missouri.edu/collegeofhealthsciences/>)

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emphasis-medical-laboratory-science/)

- with emphasis in Nuclear Medicine (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsscience/bhs-clinical-diagnostic-science-emphasis-nuclear-medicine/>)
- with emphasis in Radiography (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsscience/bhs-clinical-diagnostic-science-emphasis-radiography/>)
- with emphasis in Respiratory Therapy (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsscience/bhs-clinical-diagnostic-science-emphasis-respiratory-therapy/>)

Graduate

- MHS in Clinical and Diagnostic Sciences (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsscience/mhs-clinical-diagnostic-science/>)
 - with emphasis in Clinical Laboratory Science (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsscience/mhs-clinical-diagnostic-science-emphasis-clinical-laboratory-science/>)
 - with emphasis in Imaging Sciences (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsscience/mhs-clinical-diagnostic-science-emphasis-imaging-science/>)
 - with emphasis in Respiratory Therapy (<https://catalog.missouri.edu/collegeofhealthsciences/clinicaldiagnosticsscience/mhs-clinical-diagnostic-science-emphasis-respiratory-therapy/>)

Clinical and Diagnostic Sciences

College of Health Sciences

Director of Graduate Studies: Dr. Carla Allen

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MHS CDS Program Director: Dr. Kathy Myers

The Master of Health Science in Clinical and Diagnostic Science (MHS CDS) includes three emphasis areas from which students may choose: MHS CDS-Clinical Laboratory Science, MHS CDS-Imaging Sciences and MHS CDS-Respiratory Therapy.

Prospective students for the MHS CDS program will most commonly be credentialed in Clinical Laboratory Science, Diagnostic Medical Ultrasound, Nuclear Medicine Technology, Radiography or Respiratory Therapy. Our program aligns well with health care providers who have a goal to build advanced, profession-specific competencies while also fostering beliefs and choices essential to the development of safe and effective interprofessional health care teams.

The MHS CDS program is a 30-credit, online program designed to be completed part-time by practicing health care professionals who are employed full time.

The curriculum is organized into three parts with integrated opportunities to achieve stackable credentials. Interprofessional core courses (9 credits) offer practical preparation for effective team functioning. Leadership electives (minimum 12 credits) offer preparation for one of three career paths: Health care facilities (hospitals, clinics); Higher education programs preparing entry-to-practice health care professionals (colleges, universities); or Health care industry (medical equipment or

pharmaceutical sales and customer support). Emphasis area electives (minimum 6 credits) prepare students for one or more advanced professional credentials. The program culminates in a capstone project centered on a topic of personal or professional interest that is tailored to the student's goals (3 credits).

The program is facilitated by nationally recognized faculty and content experts. Students benefit from high quality, well-resourced distance learning support. Admission may be granted at any time to qualified candidates.

Future Certification and Careers

Students may earn graduate certificates and prepare for advanced professional certifications and credentials, consistent with their elective course choices. The program is designed to prepare credentialed professionals in Clinical Laboratory Science, Diagnostic Medical Ultrasound, Nuclear Medicine, Radiography, and Respiratory Therapy for careers as clinical specialists, educators, and leaders.

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 2190H: Medical Terminology - Honors

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; Honors eligibility required

CDS 3100: Introduction to Research

Introduction to quantitative and qualitative research concepts and processes informing the science of health care practice. Graded on A-F basis only.

Credit Hours: 3

CDS 3100W: Introduction to Research - Writing Intensive

Introduction to quantitative and qualitative research concepts and processes informing the science of health care practice.

Credit Hours: 3

Prerequisites: Department permission, restricted to pre-CDS majors

CDS 3200: Essentials of Pathology

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

Credit Hours: 3

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

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, 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: 2

Corequisites: Students must be enrolled in the Radiologic Science or Respiratory Therapy Program to take this class

CDS 4460: 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 4480: Clinical Ethics

(same as HLTH_SCI 4480; cross-leveled with CDS 7480). 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

(same as HLTH_SCI 4480W; cross-leveled with CDS 7480). 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 4500: Emergency and Disaster Management in Healthcare

(cross-leveled with CDS 7500). This course will provide the student with an orientation the principles of disaster management in the community (both state and federal levels) and the acute care facility. Topics include biological agents, allocation of resources and ethical considerations. Graded on A-F basis only.

Credit Hour: 1

Prerequisites: Restricted to students in the Undergraduate Academic Program of Health Professions

CDS 4840: 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 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 7480: Clinical Ethics

(cross-leveled with CDS 4480, HLTH_SCI 4480). 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 health care. Expectations for graduate credit include additional requirements to apply bioethical theories, principles and models in authentic leadership contexts. Graded on A-F basis only.

Credit Hours: 3

CDS 7500: Emergency and Disaster Management in Healthcare

(cross-leveled with CDS 4500). This course will provide the student with an orientation to the principles of disaster management in the community (both state and federal levels) and the acute care facility. Topics include management of disasters and community health in various situations by using case studies. Graded on A-F basis only.

Credit Hour: 1-3

CDS 7640: Clinician Educator

This course brings forward the knowledge, attitudes, and skills necessary for expanding the practice of health professionals in a quickly changing healthcare environment. The role of the various disciplines, and understanding the readiness of patients, students, and staff to learn, is clearly outlined in theoretical and practical approaches. This course provides a thorough review of learning theories, teaching methods, and instructional tools. It provides a comprehensive understanding of different populations and their attendant challenges and disparities. Finally, the course reviews the emerging technology environment which brings greater opportunity to develop and execute team-based and personalized approaches to educating others. Graded on A-F basis only.

Credit Hours: 3

Prerequisites: Department permission

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: 2

Prerequisites: instructor's consent required

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 Hour: 1-3

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 Hour: 1-3

Prerequisites: Program and instructor's consent

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 Hour: 1-3

Prerequisites: Program and instructor's consent

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

CDS 8410: Clinical Analytics

Through this course, students will explore foundational philosophies of performance improvement and the types of data available to inform clinical decision-making. Students will also learn how to select and define indicators, to collect data, and to provide feedback on progress toward quality measurement. Finally, students will evaluate the application of tools and methods to assess clinical performance in a variety of health care settings, and address the challenges of implementing professional development and quality improvement plans. An analytics synthesis project will allow the student to delve deeply into the role of clinical analytics in their clinical profession and engage them in addressing a clinical problem of their own choosing. Graded on A-F basis only.

Credit Hours: 3

Prerequisites: Course enrollment is restricted to students who have been admitted to the MHS CDS program

CDS 8420: Clinical Management

This course focuses on topics critical to being an effective clinical manager. Specifics include employee management and training emphasizing issues unique to patient care settings; understanding the revenue cycle specific to hospital and clinic operations; understanding, designing and implementing a strategic plan for a clinical operation; and reducing liability while maintaining accountability and compliance in a health care organization. Graded on A-F basis only.

Credit Hours: 3

Prerequisites: Course enrollment is restricted to students who have been admitted to the MHS CDS program

CDS 8430: Clinical Leadership

Leadership theory for practicing clinical and diagnostic health professionals. Exploration of theoretical foundations and models of leadership. Emphasis given to clinical practice trends, reflective self-assessment. Analysis of leadership cases in hospitals/clinics, industry, and entry-into-practice educational settings. Graded on A-F basis only.

Credit Hours: 2

Prerequisites: Course enrollment is restricted to students who have been admitted to the MHS CDS program

CDS 8560: Product and Customer Support in Health Care Industry

Prepares health care practitioners to apply knowledge of their specialty to employment in medical device or pharmaceutical industry contexts. This course will focus on product and customer support for health care products and services. Upon completion of this course, students will increase their knowledge in customer and product support specific to healthcare/medical devices and create a clinical educational tool package to launch or support a product in their area of specialty. Graded on A-F basis only.

Credit Hours: 3

CDS 8570: Sales and Marketing in Health Care Industry

Develops critical thinking, solution-based management skills, content-driven sales and marketing approaches. Skills and concepts build on requisite knowledge and experience in clinical and diagnostic fields to expand a career into health care industry. Students will apply concepts using authentic business planning, product evaluation, product advertisement, value proposal, strategic selling approaches, and focus group projects. Graded on A-F basis only.

Credit Hours: 3

Recommended: Students should hold a health care credential and at least two years of clinical experience

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

CDS 8989: Clinical Capstone I

Exploration of a clinical problem selected by the student, with preparation of a capstone project proposal to address the clinical problem through applied research. Graded on S/U basis only.

Credit Hour: 1

Prerequisites: Program consent

CDS 8990: Clinical Capstone II

Exploration of a clinical problem selected by the student, with preparation of a capstone project proposal to address the clinical problem through applied research. Implementation of the capstone project proposal, data analysis, and presentation of capstone project. Graded on S/U basis only.

Credit Hour: 2-3

Prerequisites: Program consent
