

# Clinical and Diagnostic Sciences

## Clinical & Diagnostic Sciences Contacts

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**Nuclear Medicine**, Director: Jeff  
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**Radiography**, Director: Dr. Carla Allen umcshpradsci@missouri.edu

**Respiratory Therapy**, Director: Monica Schibig breathe@missouri.edu

**Department Chair**: Dr. Kathy Moss MossK@health.missouri.edu

**Student Support Staff**: Adria Koehn (573)  
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**Undergraduate Advisor**: Cason Jones <https://healthprofessions.missouri.edu/student-services/make-an-appointment/>

## 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** employs ionizing radiation (X-ray, computed tomography or CT, fluoroscopy, mammography, bone densitometry) and strong magnetic fields (magnetic resonance or MRI) to image anatomy. Radiologic technologists work closely with physicians to assist with medical interventions such as angioplasty and stent insertion used to diagnose, monitor, and treat disease. These professionals work in hospitals, clinics, imaging centers, mobile services, research centers, and industry.

**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 Clinical Professor** S. Starr\*

### Diagnostic Medical Ultrasound Program

**Clinical Professor** M. M. Hdeib\*, D. W. Clem\*

**Associate Clinical Professor** S. Anderson\*

**Assistant Clinical Professor** J. Stormo\*

### Nuclear Medicine Program

**Associate Teaching Professor** J. A. Galen\*

**Assistant Clinical Professor** J. Gladson\*

**Assistant Clinical Professor Adjunct** M. Feldman\*

### Radiography Program

**Teaching Professor** C. Allen\*

**Assistant Teaching Professor** M. Meadors\*

**Assistant Clinical Professor Emerita** M. Sebacher\*

### Respiratory Therapy

**Clinical Professor** K.S. Moss\*

**Associate Clinical Professor** M. A. Schibig\*, 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 (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/bhs-clinical-diagnostic-sciences/>)
  - with emphasis in Clinical Laboratory Science (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/bhs-clinical-diagnostic-sciences-emphasis-clinical-laboratory-science/>)

- with emphasis in Diagnostic Medical Ultrasound (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/bhs-clinical-diagnostic-sciences-emphasis-diagnostic-medical-ultrasound/>)
- with emphasis in Nuclear Medicine (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/bhs-clinical-diagnostic-sciences-emphasis-nuclear-medicine/>)
- with emphasis in Radiography (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/bhs-clinical-diagnostic-sciences-emphasis-radiography/>)
- with emphasis in Respiratory Therapy (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/bhs-clinical-diagnostic-sciences-emphasis-respiratory-therapy/>)

## Graduate

- MHS in Clinical and Diagnostic Sciences (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/mhs-clinical-diagnostic-sciences/>)
  - with emphasis in Clinical Laboratory Science (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/mhs-clinical-diagnostic-sciences-emphasis-clinical-laboratory-science/>)
  - with emphasis in Imaging Sciences (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/mhs-clinical-diagnostic-sciences-emphasis-imaging-sciences/>) (Diagnostic Medical Ultrasound, Nuclear Medicine, Radiography)
  - with emphasis in Respiratory Therapy (<http://catalog.missouri.edu/schoolofhealthprofessions/clinicaldiagnosticsciences/mhs-clinical-diagnostic-sciences-emphasis-respiratory-therapy/>)

### Clinical and Diagnostic Sciences

School of Health Professions

Director of Graduate Studies: Moses Hdeib

405 Lewis Hall  
(573) 884-2994

MHS CDS Program Director: Kathy Moss

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

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### 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

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### 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

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### CDS 3460W: Cardiovascular and Pulmonary Diagnostic Applications I - Writing Intensive

(same as RA\_SCI 3460W). 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

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### 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

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**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

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**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

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**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

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**CDS 4480: Clinical Ethics**

(same as 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 healthcare.

**Credit Hours:** 3

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**CDS 4480W: Clinical Ethics - Writing Intensive**

(same as HLTH\_SCI 4480W). 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

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**CDS 4500: Emergency and Disaster Management in Healthcare**

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

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**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

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**CDS 4955: Introduction to Research**

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

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**CDS 4955W: Introduction to Research - Writing Intensive**

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

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**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

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**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

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**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

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**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 harmonic 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

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**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 apply effective leadership styles and methods in order to be efficient, dynamic, and successful leader. The course will guide the students in developing critical thinking and problem solving strategies necessary to expand their strategic leadership knowledge and skills to function in diverse environments of the CDS fields as integrated units or separately. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** Program and instructor's consent

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**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

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**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

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**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

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**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.

**Credit Hours:** 3

**Prerequisites:** Program and instructor's consent

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**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

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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 Hour:** 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 Hour:** 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 Hour:** 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 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

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**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

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**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

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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 8990: Clinical Capstone**

The Clinical Capstone is the culminating academic endeavor of students who earn the MHSCDS degree. The project provides an opportunity to explore a problem or issue of particular personal or professional interest and to address that problem or issue through focused study and applied research under the direction of a faculty member(s) and professional mentors. The project should demonstrate the student's ability to synthesize and apply the knowledge and skills acquired in his/her academic program to real-world issues and problems. This final project should affirm students' ability to think critically and creatively, to solve practical problems, to make reasoned and ethical decisions, and to communicate effectively. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** CDS 8430, CDS 8410, CDS 8420

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